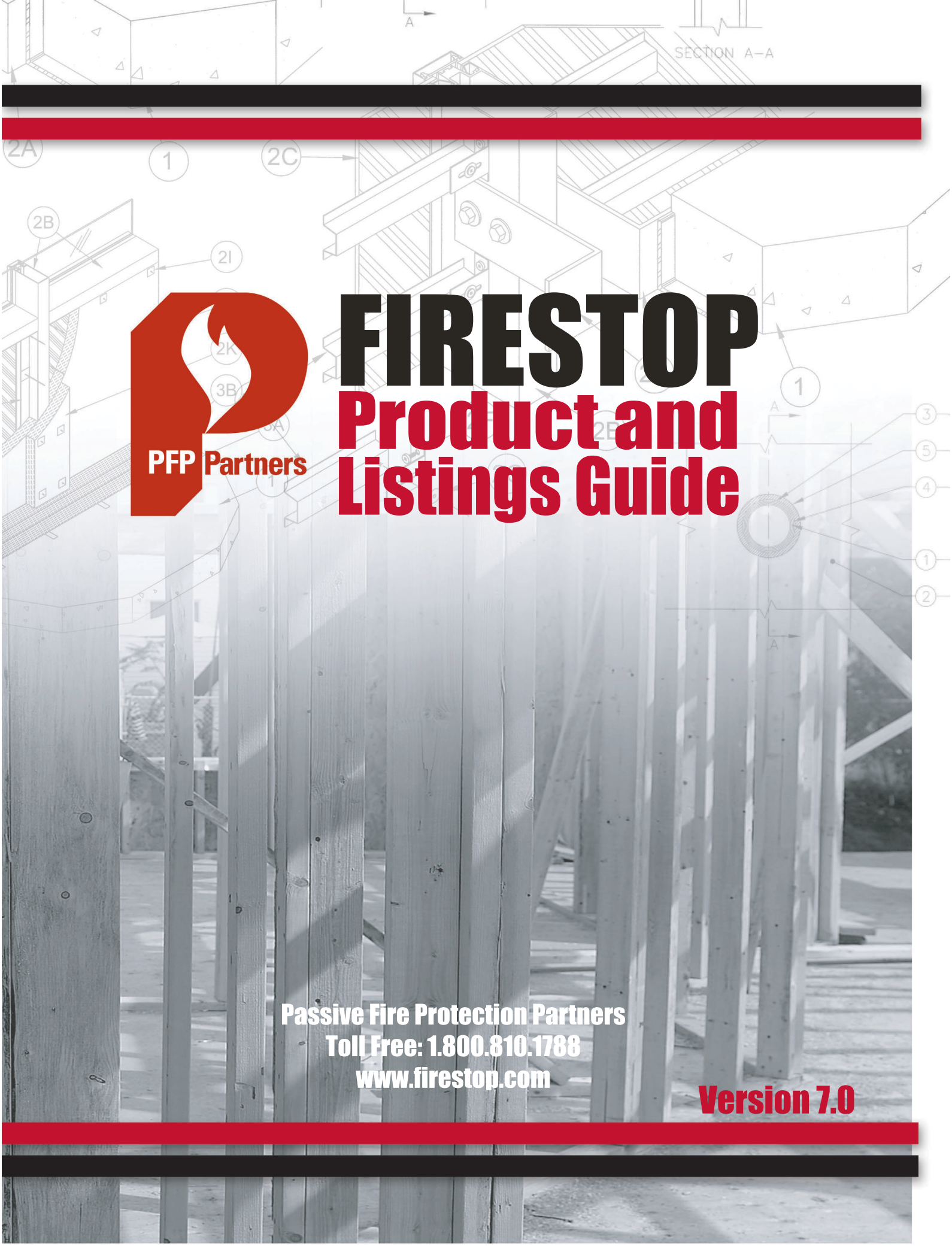

PFP Partners

FIRESTOP
Product and Listings Guide

Passive Fire Protection Partners
Toll Free: 1.800.810.1788
www.firestop.com

Version 7.0

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Passive Fire Protection Partners
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Passive Fire Protection Partners
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PFP PARTNERS FIRESTOP BRAND PRODUCTS

Firestop 3300PS	(Putty Stick)	Firestop EBI60	(Electrical Box Insert)
Firestop 3500SI	(Intumescent Spray)	Firestop FCW-44	(Firestop Cable Way)
Firestop 3600EX	(Intumescent)	Firestop MP1	(Putty Pad)
Firestop 4100NS	(Non Sag)	Firestop Pillow	(Intumescent Pillow)
Firestop 4100SL	(Self Leveling)	Firestop PPC	(Pipe Collar)
Firestop 4800DW	(Endothermic)	Firestop WS1	(Intumescent Wrap Strip)
Firestop 5100SP	(Sprayable Mastic)	Firestop WS2	(Intumescent Wrap Strip)

TESTED TO STANDARD TEST METHODS:

In the USA:

ASTM E-814	FIRE TESTS OF THROUGH PENETRATIONS FIRE STOPS
ASTM E-84	SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS
UL 1479	FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS
UL 2079	TESTS FOR FIRE RESISTANCE OF BUILDING JOINT SYSTEMS

In Canada:

ULC S115	FIRE TESTS OF FIRESTOP SYSTEMS

No Asbestos Or PCBs Are Used Or Contained In These Products

TESTED BY THIRD PARTY AGENCIES:

Underwriters Laboratories, Inc. (UL)
Intertek Testing Services Inc. – Warnock Hersey (WHI)
Factory Mutual (FM)
Omega Point Laboratories (OPL)

OTHER STATE AND LOCAL APPROVALS:

California State Fire Marshal, 4485-1433
City of New York, NY Report MEA 243-00M
ICC Evaluation Services – Report ESR-2996

George Rouhana
Executive Director

Date: July 19, 2019

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

LEED is a trademark of the US Green Building Council

To Whom It May Concern:

Re: LEED Information on Passive Fire Protection Partners' Firestopping Products

This letter will detail the contribution of Passive Fire Protection (PFP) Partners' firestopping products to the LEED Green Building Rating System in accordance with LEED-NC v4 For New Construction & Major Renovations.

In reference to LEED® Material and Resource (MR) – Credit 2 – Construction Waste Management – the following PFP Partners' materials are recyclable where facilities exist:

Packaging	**Recyclable Product**	**Weight Per Unit**
Carton	Cardboard	56 g – EBI-60 70 g – Putty Stick 190 g – 10 oz tube 350 g – 20 oz foil pack 410 g – 10L plastic jar 600 g – 29 oz plastic tube
10.1 oz (300ml) tube	Fiberboard	40 g / tube
20 oz (600ml) foil pack	Aluminum	5 g / pack
29 oz (850ml) tube	Fiberboard	84 g / tube
35.2 oz (1L) EZ pour plastic bottle	HDPE	50 g / bottle
2.5 gallon (9.5L) plastic pail	HDPE	0.8 kg / pail
2.65 gallon (10 L) plastic jar	HDPE	345 g / jar
5 gallon (18.9L) plastic pail	HDPE	1.2 kg / pail
Wooden pallet	Wood	21 kg / pallet

In reference to LEED® Material and Resources – Credit 4 – Recycled Content, all PFP Partners' firestopping products contain 5% post-consumer recycled content.

In reference to LEED® Material and Resources – Credit 5 - Regional Materials, PFP Partners can confirm that a minimum of 50% of the raw materials used in manufacturing the PFP Partners' firestopping products are sourced and processed within a 500-miles radius of our manufacturing facility in Vancouver, BC.

If the project site is located within a 500-mile radius of our manufacturing site then this manufacturing site can contribute to earning Materials and Resource Credit 5.

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The volatile organic content (VOC) of PFP Partners' firestopping products are listed below and meets the minimum LEED® requirements for low-emitting materials. These materials can assist to earn Indoor Environmental Quality (IEQ) – Credit 4.1 – Low-Emitting Materials: Adhesives & Sealants (Architectural Sealants) & Credit 4.2 – Low-Emitting Materials: Paints & Coatings (Architectural Sealants).

PFP Partners Firestopping Product	VOC content [g/L]
3300PS	0
3500SI	44.6
3600EX	37.1
4100NS	53.9
4100SL	26.0
4800DW	32.5
5100SP	81.3
EBI-60	0
FCW-44	0
MP1 – Putty Pad	0
Pillow	0
PPC Collar	N/A
WS1 – Wrap Strip	N/A
WS2 – Wrap Strip	<10

If you have any additional questions, please feel free to contact us at (604) 515-1788.

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Carton	Cardboard	56 g – EBI-60 70 g – Putty Stick 190 g – 10 oz tube 350 g – 20 oz foil pack 410 g – 10L plastic jar 600 g – 29 oz tube
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3500SI	44.6
3600EX	37.1
4100NS	53.9
4100SL	26.0
4800DW	32.5
5100SP	81.3
EBI-60	0
FCW-44	0
MP1 – Putty Pad	0
Pillow	0
PPC Collar	N/A
WS1 – Wrap Strip	N/A
WS2 – Wrap Strip	<10

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Through-Penetrations Firestop Systems

How to use selection table;

Select penetrating item (Blank, Metallic, Non-metallic, etc.) and then select type of assembly being penetrated:

CFW – Concrete Floors & Walls
CF – Concrete Floors
CMD – Concrete Metal Decks
PCF – Precast Concrete Floors
FF – Framed Floors
HF – Hambro Floor Systems
CW – Concrete Walls
FW – Framed Walls
CPW – Composite Panel Wall

BLANK OPENINGS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-0064	3500SI, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - 4-1/2 x 40 or 4-1/2 in. diam void	3
CFW	C-AJ-0087	3600EX, 4100NS, 4100SL, 4800DW	2 hr - 4 in. sch 40 steel or pvc sleeve	4
CFW	PFP/PHV 120-20	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - 8 in. diameter max opening.	590
CFW	C-BJ-0024	3500SI, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - opening max 25 in. x 25 in. or 25 in. diam	99
FF	F-C-0003	3600EX. 4800DW	1 & 2 hr - 5-1/8 in. diameter max opening	159
CW	PFP/PV 120-11	Pillow	2 hr - concrete walls	655
FW	W-L-0001-C	3600EX, 4100NS, 4800DW	1 hr - max 12 x 12 in. opening, gypsum patch	264
FW	PFP/PV 120-11	Pillow	1 & 2 hr - gypsum walls	655

METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-1238	3500SI, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	3 hr - steel, conduit, iron, copper pipes	5
CFW	C-AJ-1279	3500SI, 3600EX, 4100NS, 4800DW, 5100SP	3 hr – steel, conduit, iron, copper pipe w/ metal sleeve	7
CFW	C-AJ-1280	3500SI, 3600EX, 4800DW, 5100SP	3 hr - steel, conduit, iron, copper pipe w/ pvc sleeve	9
CFW	C-AJ-1287	3500SI, 3600EX, 4800DW, 5100SP	3 hr - multiple steel, conduit, iron, copper pipes	11
CFW	C-AJ-1288	3500SI, 3600EX, 4800DW, 5100SP	2 hr - steel, iron w/ unshield/shield MJ Clamp	13

METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-1289	3500SI, 3600EX, 4800DW, 5100SP	2 hr – steel, iron w/ unshield/shield MJ Clamp	15
CFW	C-AJ-1339	3600EX, 4800DW	3 hr - multiple steel, conduit, iron, copper pipes	17
CFW	C-AJ-1340	3600EX, 4800DW	4 hr - omegaflex gas line	19
CFW	C-AJ-1341	3600EX, 4800DW	3 hr - steel, conduit, iron, copper pipe	21
CFW	C-AJ-1381	3600EX, 4800DW	2 hr - flexible conduit	23
CFW	C-AJ-1383	3600EX, 4800DW	2 hr - multiple steel, conduit, iron, copper pipe w/ backer rod	25
CFW	C-AJ-1384	3600EX, 4800DW	3 hr - multiple steel, conduit, iron, copper pipes	27
CFW	C-AJ-1503	3500SI, 3600EX, 5100SP	2 hr - steel, conduit, iron, copper pipes w/ sleeve	29
CFW	C-AJ-1586	3600EX	2 hr - steel, iron, conduit, copper pipes	31
CFW	C-BJ-1042	3600EX, 4800DW	2 hr - steel, conduit, iron, copper pipe, sealant from bottom	100
CFW	C-BJ-1044	3600EX, 4100NS, 4100SL, 4800DW	2 hr - flexible gas line	102
CFW	C-BJ-1053	3600EX, 4100NS, 4800DW	2 hr - iron pipe, T-rating	103
CFW	C-BK-1005	3600EX, 4800DW	4 hr - steel, iron, copper pipes	114
CFW	PFP/PHV 120-01	4100NS, 4100SL, 4800DW, 5100SP	2 hr – steel, conduit, iron, copper pipes	571
CFW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - steel, conduit, iron, copper pipes	573
CFW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - emt/steel conduit, copper pipe & tube	577
CFW	PFP/PHV 120-22	3600EX, 4100NS, 4800DW	2 hr - steel or cast iron pipe, T rating.	591
CFW	PFP/PHV 120-23	3600EX, 4100NS, 4800DW	2 hr - conduit or copper pipe, T rating.	593
CFW	PFP/PHV 120-25	3600EX, 4100NS, 4100SL, 4800DW	2 hr - multiple steel, iron, conduit, copper pipes and cables	596
CFW	PFP/PHV 120-30	3600EX, 4100NS, 4800DW	2 hr - steel or cast iron pipe, T rating.	605
CFW	PFP/PHV 180-01	3600EX, 4800DW	3 hr - steel, cast iron, conduit, stainless steel pipe	622
CFW	PFP/PHV 180-03	Pillow	3 hr - multiple penetrations	623
CFW	PFP/PHV 240-01	3600EX, 4100NS, 4800DW	4 hr - conduit or copper pipe, T rating.	625
CF	PFP/PH 120-14	3600EX, 4100NS, 4800DW	2 hr - steel or cast iron pipe, w/ wc, T rating	562
CMD	F-A-1013	3600EX, 4800DW	2 hr - steel, conduit, iron, copper pipes	121
CMD	F-A-1030	3600EX, 4800DW	2 hr - steel, conduit, iron, copper pipes	123
CMD	F-A-1031	3600EX, 4800DW	2 hr - omegaflex gas line	125
CMD	PFP/PH 120-02	3600EX, 4100SL, 4800DW	2 hr - steel and cast iron pipe	557
PCF	F-B-1008	3600EX, 4800DW	2 hr - steel, conduit, iron, copper pipes	145

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METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
PCF	PFP/PHV 120-25	3600EX, 4100NS, 4100SL, 4800DW	2 hr - multiple steel, iron, conduit, copper pipes and cables	596
FF	F-C-1035	3600EX, 4800DW	1 hr - steel, iron, conduit, copper pipes	161
FF	F-C-1039	3600EX, 4800DW	2 hr - steel, iron, conduit, copper pipes chase wall optional	163
FF	F-C-1047	3600EX, 4800DW	1 hr - steel, iron, conduit, copper pipes chase wall optional	165
FF	F-C-1049	3600EX, 4800DW	1 & 2 hr - steel, iron, conduit, copper pipes w/ pipe insulator, chase wall optional	167
FF	F-C-1058	3600EX, 4100SL, 4800DW	1 hr - steel, iron, conduit, copper pipes w/ pipe insulator, chase wall	169
FF	F-C-1081	3600EX, 4800DW	2 hr - steel, iron, conduit, copper pipes	171
FF	F-C-1111	3600EX, 4100NS, 4800DW	1 & 2 hr - omega flex pipe	173
FF	PFP/PH 60-01	3600EX, 4800DW	1 hr - framed floor with chase wall copper pipe & tube, cast iron pipe	529
FF	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - steel, conduit, iron, copper pipes	573
FF	PFP/PHV 120-14	3600EX, 4800DW	1 & 2 hr - copper pipe, tubing & cast iron pipe	582
HF	F-E-1038	3600EX, 4100NS, 4800DW	1, 1-1/2 & 2 hr - steel, iron, copper pipes	222
CW	W-J-1040	3600EX, 4100NS, 4800DW	1, 2, 3 & 4 hr - steel, iron, conduit, copper pipes	234
CW	W-J-1107	3600EX, 4800DW	1 & 2 hr - omegaflex gas line	236
CW	W-J-1160	3600EX, 4100NS, 4800DW	2 hr - multiple steel, iron, conduit, copper pipes	237
FW	W-L-1010-C	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple steel, iron, conduit, copper pipes	265
FW	W-L-1098	3600EX, 4100NS, 4800DW	1, 2, 3 & 4 hr - steel, iron, conduit, copper pipes	267
FW	W-L-1155	3600EX, 4800DW	1 & 2 hr - steel, iron, conduit, copper pipes w/ metal sleeve	269
FW	W-L-1233	3600EX, 4800DW	1 & 2 hr - omegaflex gas line	271
FW	W-L-1234	3600EX, 4100NS, 4800DW	1 & 2 hr – steel, iron partial penetrations	273
FW	W-L-1245	3600EX, 4800DW	1 hr - steel, iron, conduit, copper pipes	275
FW	W-L-1246	3600EX, 4800DW	1 hr - flexible conduit	277
FW	W-L-1271	3600EX, 4800DW	2 hr -steel, iron, conduit, copper pipes; shaft wall	279
FW	W-L-1280	3600EX, 4100NS, 4800DW	1 & 2 hr - flexible metal piping	281
FW	W-L-1285	3600EX, 4800DW	1 & 2 hr - steel, iron, conduit, copper pipes; at max 45 degree angle	283
FW	W-L-1300	3600EX, 4100NS, 4800DW	1 hr - steel, iron, conduit, copper pipes; gypsum wall patch	285
FW	W-L-1345	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple steel, iron, conduit, copper pipes	287
FW	W-L-1434	5100SP	2 hr - steel, iron, conduit, copper pipes w/ sleeve	289

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METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	PFP/PH 120-01	3600EX, 4800DW	1 & 2 hr - rods, c-struts, h-struts, cables	556
FW	PFP/PHV 120-01	4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - multiple steel, conduit, iron, copper pipes	571
FW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple steel, conduit, iron, copper pipes	573
FW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr – multiple emt/steel conduit, copper pipe & tube	577
FW	PFP/PV 60-05	3600EX, 4100NS, 4800DW	1 hr - multiple cast iron, steel copper pipes.	633

NON-METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-2165	3600EX, 4800DW	2 hr - cpvc	33
CFW	C-AJ-2190	3600EX, 4800DW	2 hr - cpvc	34
CFW	C-AJ-2222	3600EX, 4800DW	2 hr - pvc, cpvc, pex, rnc w/ metal sleeve	35
CFW	C-AJ-2225	3600EX, 4800DW	2 hr - pvc, cpvc, rnc w/nonmetallic sleeve	37
CFW	C-AJ-2239	3600EX, 4800DW	2 hr - pex.	39
CFW	C-AJ-2240	3600EX, 4800DW	2 hr - multiple pex	40
CFW	C-AJ-2323	3600EX, 4800DW w/ PPC	2 hr - pvc, cpvc, rnc	41
CFW	C-AJ-2324	3600EX, 4800DW w/ PPC	2 & 3 hr - pvc, abs, frpp, cpvc	43
CFW	C-AJ-2325	3600EX, 4800DW w/ WS1	2 hr - pvc, cpvc, abs, rnc	45
CFW	C-AJ-2403	3600EX, 4100NS, 4800DW w/ WS1	3 hr - frpp pipe	47
CFW	C-AJ-2415	3600EX	2 hr - glass pipe	48
CFW	C-AJ-2416	3600EX	2 hr - ent	50
CFW	C-AJ-2691	3600EX w/ WS2	3 hr - pvc - 50 Pa	51
CFW	C-AJ-2693	3600EX w/ WS2	3 hr - pvc, cpvc	53
CFW	C-AJ-2694	3600EX w/ WS2	3 hr - pvc	55
CFW	C-AJ-2695	3600EX w/ WS2	3 hr - pvc	57
CFW	C-AJ-2696	3600EX w/ WS2	2 hr - pvc	59
CFW	C-AJ-2697	3600EX w/ WS2	3 hr - pvc - 50 Pa	61
CFW	C-BJ-2010	3600EX, 4800DW	2 hr - pvc, cpvc, rnc, pex; sealant from bottom	105
CFW	C-BK-2002	3600EX, 4800DW	4 hr - pvc, cpvc, rnc, pex	116
CFW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - pvc, cpvc	573
CFW	PFP/PHV 120-11	3600EX, 4800DW	1 & 2 hr - pex	581
CFW	PFP/PHV 120-15	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc, xfr, abs, frpp, cpvc	584
CFW	PFP/PHV 120-16	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc, ccpvc, abs, ccabs & frpp	585

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NON-METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	PFP/PHV 120-17	3600EX, 4800DW w/ PPC	1 & 2 hr - cpvc, pvc	586
CFW	PFP/PHV 120-18	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - pvc, ccpvc, cpvc, abs, frpp	587
CFW	PFP/PHV 120-19	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - pex, pvc, ccpvc, cpvc, abs, frpp	588
CFW	PFP/PHV 120-26	3600EX, 4100NS, 4100SL, 4800DW w/ PPC & WS1	1 & 2 hr - pvc, ccpvc	598
CFW	PFP/PHV 120-27	3600EX w/ PPC & WS1	1 & 2 hr - pvc, ccpvc, xfr	600
CFW	PFP/PHV 120-28	3600EX, 4800DW w/ PPC	1 & 2 hr - sch 80 pvc, cpvc	602
CFW	PFP/PHV 120-31	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - aquatherm pp pipe	607
CFW	PFP/PHV 120-32	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - aquatherm pipe	608
CFW	PFP/PHV 120-33	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - aquatherm pipe w/ bubble wrap insulation	609
CFW	PFP/PHV 120-36	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - centrotherm pp vent pipe w/ insulation	610
CFW	PFP/PHV 120-37	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - aquatherm pp pipe	611
CFW	PFP/PHV 120-38	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - aquatherm pp pipe	612
CFW	PFP/PHV 120-39	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - aquatherm pp pipe	614
CFW	PFP/PHV 120-41	3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - aquatherm pp pipe	618
CFW	PFP/PHV 120-42	3500SI, 3600EX, 4100NS, 4800DW w/ PPC & WS1	2 hr - pex pipe	620
CF	F-A-2035	3600EX, 4800DW	2 hr - abs, pvc, w/ wc	127
CF	PFP/PH 120-23	3600EX, 4100NS, 4800DW w/ WS1	2 hr - abs, pvc, w/ shower drain or wc	156
CMD	F-A-2037	3600EX, 4800DW	2 hr - cpvc	128
CMD	F-A-2080	3600EX, 4800DW	2 hr - pex	129
CMD	F-A-2084	3600EX, 4800DW w/WS1	2 hr - pvc, cpvc, rnc, abs	130
CMD	F-A-2233	3600EX w/ WS2	2 hr - pvc, cpvc, abs	131
CMD	F-A-2234	3600EX w/ WS2	2 hr - pvc-xfr, cpvc	133

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NON-METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CMD	PFP/PH 120-07	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc, ccpvc, cpvc, ccabs, abs, frpp	561
CMD	PFP/PH 120-18	3600EX & WS1 w/ PPC	2 hr - pvc, ccpvc, cpvc	564
CMD	PFP/PH 120-23	3600EX, 4100NS, 4800DW w/ WS1	2 hr - abs, pvc, w/ shower drain or wc	156
CMD	PFP/PH 180-01	3600EX w/ WS1	3 hr - pvc, ccpvc, cpvc	568
CMD	PFP/PHV 120-18	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - pvc, ccpvc, cpvc, abs, frpp	587
CMD	PFP/PHV 120-19	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - pex, pvc, ccpvc, cpvc, abs, frpp	588
CMD	PFP/PHV 120-32	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - aquatherm pipe	608
PCF	F-B-2004	3600EX, 4800DW	2 hr -pvc, cpvc, rnd	148
PCF	F-B-2008	3600EX, 4800DW w/PPC	3 hr - pvc, abs, cpvc	149
PCF	F-B-2009	3600EX, 4800DW w/PPC	3 hr - multiple pvc, cpvc	151
PCF	PFP/PHV 120-18	3600EX, 4100NS, 800DW w/ WS1	1 & 2 hr - pvc, ccpvc, cpvc, abs, frpp	587
PCF	PFP/PHV 120-32	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - aquatherm pipe	608
FF	F-C-2080	3600EX, 4800DW	1 hr - cpvc, pvc and rnc	175
FF	F-C-2093	3600EX, WS1	2 hr - cpvc, pvc, abs, and rnc w/ chase wall optional	177
FF	F-C-2094	3600EX, WS1	1 hr - cpvc, pvc and abs; w/ tub drain	179
FF	F-C-2095	3600EX, WS1	1 hr - cpvc,pvc and abs; w/ wc	181
FF	F-C-2124	3600EX	1 hr - cpvc w/ pipe insulator; chase wall optional	183
FF	F-C-2174	3600EX, 4800DW	1 & 2 hr - ent	185
FF	F-C-2198	3600EX, WS1	1 hr - cpvc, pvc, abs, and rnc w/ chase wall optional	186
FF	F-C-2266	3600EX	1 & 2hr - pvc, rnc, cpvc	188
FF	F-C-2420	3600EX w/ WS2	1 hr - pvc, abs	190
FF	F-C-2421	3600EX w/ WS2	1 & 2hr - pvc, ent, cpvc	193
FF	PFP/PH 60-01	3600EX, 4800DW	1 hr - abs, pvc, cpvc w/ chase wall	529
FF	PFP/PH 60-02	3600EX, 4800DW	1 hr - abs, pvc, cpvc w/ chase wall	530
FF	PFP/PH 60-04	3600EX, 4800DW w/ PPC	1 hr - pvc, ccpvc, abs, ccabs.	532
FF	PFP/PH 60-06	3600EX, 4100NS, 4800DW w/ PPC	1 hr - abs, pvc, cpvc.	533
FF	PFP/PH 60-07	3600EX, 4100NS, 4800DW, WS1	1 hr - abs, pvc w/ rated or non-rated chase wall.	534
FF	PFP/PH 60-08	3600EX, 4100NS, 4800DW	1 hr - pvc,rnc, pex, pe/al/pe,.pex/al/pex	537
FF	PFP/PH 60-09	3600EX, 4100NS, 4800DW	1 hr - pe/alpe, pex/alpex	538
FF	PFP/PH 60-12	3600EX	1 hr - pvc, ccpvc, abs, ccabs, rnc	543

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NON-METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FF	PFP/PH 60-13	3600EX, 4100NS, 4800DW, WS1	1 hr - aquatherm pp	544
FF	PFP/PH 60-15	3600EX, 4100NS, 4800DW, WS1	1 hr - aquatherm pp	546
FF	PFP/PH 60-16	3600EX, 4100NS, 4800DW, WS1	1 hr - multiple pex	548
FF	PFP/PH 60-17	3600EX, 4100NS, 4800DW, WS1	1 hr - aquatherm pp	549
FF	PFP/PH 60-18	3600EX, 4100NS, 4800DW, WS1	1 hr - pex	550
FF	PFP/PH 60-20	3600EX, 4100NS, 4800DW, WS1	1 hr - aquatherm pp	552
FF	PFP/PH 60-21	3600EX, 4100NS, 4800DW, WS1	1 hr - aquatherm pp	553
FF	PFP/PH 60-22	3600EX, 4100NS, 4800DW, WS1	1 hr - pex	554
FF	PFP/PH 120-06	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc, ccpvc, cpvc, ccabs, abs, frpp	560
FF	PFP/PH 120-15	3600EX	1 & 2 hr - pvc, ccpvc, cpvc, abs w/ chase wall	563
FF	PFP/PHV 60-02	3600EX, 4800DW	1 hr - flexible ent	570
FF	PFP/PHV 120-14	3600EX, 4800DW	1 & 2 hr - abs, pvc, cpvc	582
HF	PFP/PH 60-10	3600EX, 4100NS, 4800DW, WS1	1 hr - pvc, cpvc	539
HF	PFP/PH 120-22	3500SI, 3600EX, 4100NS, 4800DW w/ WS1	2 hr - pex	565
CW	W-J-2038	3600EX, 4800DW	1, 2, 3 & 4 hr - cpvc, pvc, pex	238
CW	W-J-2156	3600EX, 4100NS, 4800DW w/WS1	2 hr - multiple pvc, rnc, cpvc	239
CW	W-J-2263	3600EX w/ WS2	4 hr - pvc	241
CW	PFP/PV 120-14	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - PEX	660
FW	W-L-2126	3600EX, 4800DW	1, 2, 3 & 4 hr - cpvc, cpvc, pex	291
FW	W-L-2233	3600EX, 4800DW w/PPC	1 & 2 hr - pvc, cpvc	293
FW	W-L-2283	3600EX, 4800DW w/WS1	1 & 2 hr - pvc, cpvc, rnc; max 45 degree sleeved	295
FW	W-L-2296	3600EX, 4800DW	1 hr - pvc, cpvc, abs partial penetrations	297
FW	W-L-2319	3600EX, 4800DW w/WS1	1 & 2 hr - pvc, cpvc, rnc, abs	299
FW	W-L-2320	3600EX, 4100NS, 4800DW w/PPC	1 hr - pvc, rnc, cpvc, w/ gypsum wall patch	301
FW	W-L-2338	3600EX	1 & 2 hr - glass pipe	303
FW	W-L-2339	3600EX	1 & 2 hr - flexible ent	304
FW	W-L-2367	3600EX, 4100NS, 4800DW w/WS1	1 & 2 hr - containment pvc pipe	305

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Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	W-L-2369	3600EX, 4100NS, 4800DW w/WS1	1 hr - beverage line bundle	307
FW	W-L-2391	3600EX, 4100NS, 4800DW w/WS1	1 & 2 hr - multiple pvc, rnc, cpvc	308
FW	W-L-2520	3600EX, 4100NS, 4800DW	1 hr - pvc, cpvc, abs	310
FW	W-L-2523	3600EX, 4100NS, 4800DW w/WS1	2 hr - pvc, rnc, cpvc, max 45 degree sleeved	312
FW	W-L-2591	3600EX w/ WS2	1 & 2 hr - pvdf	314
FW	W-L-2592	3600EX w/ WS2	1 & 2 hr - pp, cpvc	316
CPW	W-N-2002	3600EX w/ WS2	1 & 2 hr - pvc, abs, frpp, cpvc	371
FW	PFP/PHV 60-01	3600EX, 4800DW	1 hr - pvc, ccpvc, cpvc partial penetration.	569
FW	PFP/PHV 60-02	3600EX, 4800DW	1 hr - flexible ent	570
FW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - pvc, cpvc	573
FW	PFP/PHV 120-11	3600EX, 4800DW	1 & 2 hr - pex	581
FW	PFP/PHV 120-14	3600EX, 4800DW	1 & 2 hr - abs, pvc, cpvc	582
FW	PFP/PV 60-02	3600EX, 4100NS, 4800DW	1 hr - cpvc, pe/al/pe, pex/al/pex	629
FW	PFP/PV 60-03	3600EX, 4100NS, 4800DW	1 hr - abs partial penetration	630
FW	PFP/PV 60-04	3600EX, 4100NS, 4800DW w/ WS1	1 hr - abs, pvc, cpvc, rnc	631
FW	PFP/PV 60-08	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	636
FW	PFP/PV 60-09	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	637
FW	PFP/PV 60-10	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	638
FW	PFP/PV 60-11	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	639
FW	PFP/PV 60-12	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	640
FW	PFP/PV 60-13	3600EX, 4100NS, 4800DW	1 hr - pex pipe	641
FW	PFP/PV 60-14	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	642
FW	PFP/PV 60-15	3600EX, 4100NS, 4800DW w/ WS1	1 hr - aquatherm pp	643
FW	PFP/PV 120-02	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc, ccpvc, cpvc, ccabs, abs, frpp	645
FW	PFP/PV 120-03	3600EX, 4800DW w/ PPC	1 & 2 hr - pvc. ccpvc, xfr, abs, ccabs	646
FW	PFP/PV 120-08	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple flexible ent.	652
FW	PFP/PV 120-09	3600EX, 4100NS, 4800DW	1 & 2 hr - pvc, cpvc	653

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NON-METALLIC PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	PFP/PV 120-14	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - PEX	660
FW	PFP/PV 120-20	3600EX, w/ WS1	2 hr - aquatherm pp	661
FW	PFP/PV 120-24	3600EX, w/ WS1	2 hr - aquatherm pp - 50 Pa	666
FW	PFP/PV 240-01	3600EX, 4100NS, 4800DW w/ WS1	4 hr - pvc, cpvc, multiple	700

CABLES & ELECTRICAL BOXES

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-3115	3500SI, 3600EX, 4100NS, 4100SL, 4800DW	3 hr - multiple cables	63
CFW	C-AJ-3142	3500SI, 3600EX, 4800DW, 5100SP	3 hr - multiple cables w/ metal sleeve	65
CFW	C-BJ-3026	3600EX, 4800DW	2 hr - multiple cables; sealant from bottom	106
CFW	C-BK-3002	3600EX, 4800DW	4 hr - multiple cables	117
CFW	PFP/PHV 120-01	4100NS, 4100SL, 4800DW, 5100SP	2 hr - multiple bx/teck, loomex/romex cables	571
CFW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	2 hr - multiple bx/teck, loomex/romex cables	573
CFW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - emt/steel conduit, multiple cables	577
CFW	PFP/PHV 120-25	3600EX, 4100NS, 4100SL, 4800DW	2 hr - multiple cables	596
CFW	PFP/PHV 180-03	Pillow	3 hr - multiple penetrations	623
CMD	F-A-3004	3600EX, 4800DW	2 hr - multiple cables	135
PCF	F-B-3007	3600EX, 4800DW	2 hr - multiple cables	152
PCF	PFP/PHV 120-25	3600EX, 4100NS, 4100SL, 4800DW	2 hr - multiple cables	596
FF	F-C-3028	3600EX, 4800DW	1 hr - single cable	196
FF	F-C-3059	3600EX, 4800DW	1 & 2 hr - cables bundle; w/ chase wall optional	198
FF	F-C-3082	3600EX, 4800DW	1 & 2 hr - cable w/ chase wall optional	200
FF	PFP/PH 60-11	3300PS	1-hr - single & multiple cables and voids	540
FF	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple bx/teck, loomex/romex cables	573
HF	F-E-3019	3600EX, 4800DW	1 & 2 hr – multiple cables	224
CW	W-J-3024	3600EX, 4800DW	1 & 2 hr - multiple cables	243
CW	W-J-3125	3300PS	2 hr - multiple cables	245
CW	W-J-3126	3300PS	2 hr - multiple cables w/ sleeve	246
CW	PFP/PHV 120-01	4100NS, 4100SL, 4800DW, 5100SP	2 hr - multiple bx/teck, loomex/romex cables	571
FW	W-L-3085	3600EX, 4800DW	1 & 2 hr - multiple cables	318
FW	W-L-3113	3600EX, 4800DW	1 & 2 hr - multiple cables w/ metal sleeve	320
FW	W-L-3249	3300PS	1 & 2 hr - cable bundle	322
FW	W-L-3250	3300PS	1 & 2 hr - cable bundle in sleeve	324

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CABLES & ELECTRICAL BOXES

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	W-L-3343	5100SP	1 & 2 hr - multiple cables w/ metal sleeve	326
FW	PFP/PV 60-06	3600EX, 4100NS, 4800DW w/ MP1	1 hr - metallic outlet box	534
FW	PFP/PHV 120-01	4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - multiple bx/teck, loomex/romex cables	571
FW	PFP/PHV 120-02	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple loomex/romex, bx/tech, telephone	573
FW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - emt/steel conduit, multiple cables	577
FW	R18335(1)	4800DW	1 & 2 hr - steel double elec boxes in same stud cavity	374
FW	R18335(2)	4800DW	1 hr - non-metallic or metal double elec boxes in same stud cavity	375
FW	R18335(3)	MP1	1 & 2 hr - steel double elec boxes in same stud cavity	376
FW	R18335(4)	3600EX, 4100NS, 4800DW w/EBI	1 & 2 hr - steel double elec boxes in same stud cavity	377
FW	R18335(5)	MP1	1 & 2 hr - metallic double elec boxes in same stud cavity	379
FW	R18335(6)	MP1	2 hr - non-metallic elec boxes in same stud cavity	380
FW	R18335(7)	MP1	1 & 2 hr - non-metallic elec boxes in same stud cavity	381
FW	R18335(8)	MP1	1 hr - non-metallic elec boxes in same stud cavity	382

CABLES TRAYS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - max 24 x 6 in. steel or alum cable tray	577
CFW	PFP/PHV 120-40	3600EX, 4100NS, 4800DW	1 & 2 hr - max 4 x 36 in. steel cable tray	616
CW	W-J-4013	3500SI, 3600EX, 4100NS, 4800DW, 5100SP	1 & 2 hr - 12 x 4 in. alum or steel cable tray	248
CW	W-J-4024	3500SI, 3600EX, 4800DW, 5100SP	1 & 2 hr - 24 x 6 in. alum or steel cable tray	250
CW	PFP/PV 120-13	Pillow	1 & 2 hr - max 4 X 30 in. steel cable tray	658
FW	W-L-4013	3500SI, 3600EX, 4100NS, 4800DW, 5100SP	1 & 2 hr - 12 x 4 in. alum or steel cable tray	328
FW	W-L-4026	3500SI, 3600EX, 4800DW, 5100SP	1 & 2 hr - 24 x 6 in. alum or steel cable tray	330
FW	PFP/PHV 120-04	3600EX, 4100NS, 4100SL, 4800DW, 5100SP	1 & 2 hr - max 24 x 6 in. steel or alum cable tray	577
FW	PFP/PV 120-13	Pillow	1 & 2 hr - max 4 X 30 in. steel cable tray	658

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CABLES TRAYS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	PFP/PV 120-21	3600EX, 4100NS, 4800DW	1 & 2 hr - max 4 X 36 in. steel cable tray	662

INSULATED PIPES

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-5114	3600EX, 4100NS, 4100SL, 4800DW	2 hr - fg insulated metal pipes	67
CFW	C-AJ-5115	3600EX, 4800DW	2 hr - ab/pvc insulated metal pipes	69
CFW	C-AJ-5145	3600EX, 4800DW	3 hr - multiple ab/pvc & fg insulated metal pipes	71
CFW	C-AJ-5152	4800DW	2 hr - fg insulated metal pipes	73
CFW	C-AJ-5153	4800DW	2 hr - ab/pvc insulated metal pipes	75
CFW	C-AJ-5164	3600EX, 4100NS, 4800DW	2 hr - fg insulated metal pipes	77
CFW	C-AJ-5205	3600EX, 4100NS, 4800DW	2 hr - calsil insulated metal pipes	79
CFW	C-AJ-5226	3600EX, 4100NS, 4800DW	2 hr - multiple ab/pvc & fg insulated metal pipes	81
CFW	C-AJ-5271	3600EX	2 hr- fg insulated metal pipes w/ sleeve	83
CFW	PFP/PHV 120-29	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - koolphen metal pipes	603
CFW	C-BJ-5012	3600EX, 4100NS, 4100SL, 4800DW	2 hr - celluar glass insulation metal pipes	108
CFW	C-BK-5002	3600EX, 4800DW	4 hr - fg insulation metal pipes	119
CF	PFP/PH 120-04	3600EX, 4800DW	2 hr - fg insulated copper pipes w/ sleeve	558
CF	PFP/PH 120-05	3600EX, 4800DW	2 hr - koolphen insulated steel, iron w/ sleeve	559
CMD	F-A-5022	3600EX, 4800DW	2 hr - fg insulated metal pipes	137
CMD	F-A-5023	3600EX, 4800DW	2 hr - ab/pvc insulated metal pipes	139
CMD	PFP/PH 60-03	3600EX, 4800DW	1 hr - fg insulated metal pipes w/ alum jacket.	531
CMD	PFP/PH 120-04	3600EX, 4800DW	2 hr - fg insulated copper pipes w/ sleeve	558
CMD	PFP/PH 120-05	3600EX, 4800DW	2 hr - koolphen insulated steel, iron w/ sleeve	559
PCF	F-B-5001	3600EX, 4100NS, 4800DW	2 hr - fg insulated metal pipes	154
FF	F-C-5032	3600EX, 4800DW	1 & 2 hr - ab/pvc insulation w/ chase wall optional	202
FF	F-C-5035	3600EX, 4800DW	1 & 2 hr - ab/pvc and/or fg insulation; chase wall	204
FF	F-C-5053	3600EX, 4100NS, 4800DW	1 hr - ab/pvc or fg insulated metal pipes	207
HF	F-E-5009	3600EX, 4100NS, 4800DW	1, 1-1/2 & 2 hr - fg insulated metal pipes	226
HF	F-E-5016	3600EX, 4100NS, 4800DW	1, 1-1/2 & 2 hr - fg insulated metal pipes	228
CW	W-J-5031	3600EX, 4800DW	1 hr - fg insulated pipes	252
CW	W-J-5090	3600EX	1, 2, 3 & 4 hr - fg insulated metal pipes	254
CW	PFP/PV 120-01	3600EX, 4800DW	2 hr - fg insulated metal pipes w/ alum jacket.	644
FW	W-L-5080	3600EX, 4100NS, 4800DW	1 hr - fg insulated metal pipes	332

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INSULATED PIPES

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
FW	W-L-5095	3600EX, 4100NS, 4800DW	1 & 2 hr - ab/pvc insulated metal pipes	334
FW	W-L-5129	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple ab/pvc or fg insulated metal pipes	336
FW	W-L-5139	3600EX, 4800DW	1 & 2 hr - ab/pvc insulated metal pipes	338
FW	W-L-5140	3600EX, 4800DW	1 hr - fg insulated metal pipes	340
FW	W-L-5162	3600EX, 4100NS, 4800DW	1 hr - calsil insulated metal pipes	342
FW	W-L-5182	3600EX, 4100NS, 4800DW w/WS1	4 hr - fg insulated metal pipes	344
FW	W-L-5187	3600EX	1, 2, 3 & 4 hr - fg insulated metal pipes	346
FW	W-L-5188	3600EX	1 & 2 hr - cellular glass insulated metal pipes	348
FW	W-L-5189	3600EX	1 hr - calsil insulated metal pipes	350
FW	W-L-5281	3600EX	2 hr - fg insulated metal pipes w/ sleeve	352
FW	W-L-5282	3600EX	2 hr - fg insulated metal pipes w/ sleeve	354
FW	W-L-5283	3600EX	1 hr - fg insulated metal pipes w/ sleeve	356
FW	PFP/PHV 120-29	3600EX, 4100NS, 4800DW w/ WS1	1 & 2 hr - koolphen metal pipes	603
FW	PFP/PV 120-01	3600EX, 4800DW	2 hr - fg insulated metal pipes w/ alum jacket.	644
FW	PFP/PV 120-05	3600EX, 4100NS, 4800DW	1 & 2 hr - ab/pvc insulated metal pipes partial penetration	648
FW	PFP/PV 120-22	3600EX, 4100NS, 4800DW, WS1	2 hr - fg insulated aquatherm pipe	664
FW	PFP/PV 120-23	3600EX, 4100NS, 4800DW, WS1	2 hr - fg insulated aquatherm pipe	665

ELECTRICAL BUSWAYS & METALLIC DUCTS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-6028	3600EX, 4100NS, 4800DW	2 hr - 24 in.x 4-1/2 in. busway	85
CFW	C-AJ-7037	3600EX, 4800DW	1 hr - 16 in. round 22 ga. duct	86
CFW	C-AJ-7071	3500SI, 5100SP	2 hr - 4 in. round steel duct	87
CFW	C-AJ-7072	3600EX, 4100NS, 4800DW	2 hr - 24 x 24 in. grease duct w/ duct wrap	88
CFW	C-AJ-7085	3600EX, 4100NS, 4800DW	2 hr - 22 in. round 22ga. duct	90
CFW	C-AJ-7115	3600EX, 4100NS, 4800DW	2 hr - 22 in. round 22ga duct	91
CFW	C-AJ-7116	3600EX, 4100NS, 4800DW	2 hr - 24 x 24in. min 26ga. duct	92
CFW	C-AJ-7133	3500SI	3 hr – 8 in. round min 30ga. duct	93
CF	F-A-7003	3600EX, 4800DW	2 hr - 24 in. x 24 in. duct	141
CF	F-A-7004	3600EX, 4800DW	2 hr - 16 in. diam duct	142
CMD	F-A-7008	3600EX, 4800DW	2 hr - 16 in. diam duct	143
CMD	F-A-7010	3600EX, 4800DW	2 hr - 16 in. diam duct w/fg insulation	144

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ELECTRICAL BUSWAYS & METALLIC DUCTS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
PCF	F-B-7001	3600EX, 4100NS, 4800DW	2 hr - 8 in. duct	156
FF	F-C-7011	3600EX, 4100SL, 4800DW	1 & 2 hr - 4 in. diam duct; chase wall	209
FF	F-C-7012	3600EX, 4800DW	1 hr - 12 x 4 in. duct; chase wall	211
FF	F-C-7015	3600EX, 4800DW	1 & 2 hr - 4 in. diam duct	213
FF	F-C-7050	3600EX, 4800DW	1 & 2 hr - 8 in. diam duct	215
FF	F-C-7051	3600EX, 4800DW	1 hr - 12 x 4 in. duct	217
HF	F-E-7006	3600EX, 4100NS, 4800DW	1, 1-1/2 & 2 hr - 8 in. diam steel duct	230
CW	W-J-7009	3600EX, 4100NS, 4800DW	1 & 2 hr - 26 x 30 in.; min 24 ga. rectangular duct	256
CW	W-J-7010	3600EX, 4800DW	1 & 2 hr - 16 in. min 22 ga round duct	258
CW	W-J-7126	3600EX, 4800DW	2 hr - 100 x 100 in. min 26 ga rectangular duct	260
CW	W-J-7127	3600EX, 4800DW	2 hr - 100 x 100 in insulated rectangular duct	262
FW	W-L-7014	3600EX, 4100NS, 4800DW	1 & 2 hr - 26 x 30 in. min 24 ga rectangular duct	358
FW	W-L-7021	3600EX, 4800DW	1 & 2 hr - 16 in. min 26 ga round duct	360
FW	W-L-7078	3600EX, 4800DW	2 hr - 24 x 24 in. rectangular duct	362
FW	W-L-7086	3600EX, 4100NS, 4800DW	1 & 2 hr - 24 x 24 in. grease duct w/ duct wrap	364
FW	W-L-7217	3600EX, 4800DW	1 & 2 hr - 100 x 100 in. min 26 ga rectangular duct	366
FW	W-L-7218	3600EX, 4800DW	1 & 2 hr - 100 x 100 in insulated rectangular duct	368
FW	PFP/PV 120-04	3600EX, 4800DW	2 hr - 24 in. x 24 in. 16 ga. rectangular duct w/ fg insulation	647
FW	PFP/PV 120-04	3600EX, 4800DW	2 hr - max 16 in. min 24ga round duct w/ fg insulation.	647

MULTIPLE PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
CFW	C-AJ-1339	3600EX, 4800DW	3 hr - multiple steel, conduit, iron, copper pipes	17
CFW	C-AJ-1383	3600EX, 4800DW	2 hr - multiple steel, conduit, iron, copper pipes	25
CFW	C-AJ-1384	3600EX, 4800DW	3 hr - multiple steel, conduit, iron, copper pipes	27
CFW	C-AJ-5145	3600EX, 4800DW	3 hr - multiple ab/pvc & fg insulated metal pipes	71
CFW	C-AJ-5226	3600EX, 4800DW	2 hr - multiple ab/pvc & fg insulated metal pipes	81
CFW	C-AJ-8061	3500SI, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - Multiple elec cables & metal pipes	95
CFW	C-AJ-8094	3600EX, 4800DW	2 hr - bare metallic & ab/pvc insulated pipe	97
CFW	C-BJ-8015	3600EX	2 hr - multiple metallic pipes w/ or w/out insulation, nonmetallic pipes & cables	110
CFW	C-BJ-8016	3600EX	2 hr - multiple metallic pipes w/ or w/out insulation, cables	112
CFW	PFP/PHV 180-03	Pillow	3 hr - multiple penetrations	623

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MULTIPLE PENETRATIONS

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
PCF	F-B-8003	3600EX, 4100NS, 4800DW	2 hr - multiple metal pipes and cables	157
FF	F-C-8027	3600EX, 4100NS, 4800DW	1 hr - multiple metal pipes, plastic pipes, elec. cables & ab/pvc insulation	219
HF	F-E-8006	3600EX, 4100NS, 4800DW	1 & 1-1/2 hr – multiple metal pipes w/ or w/pu ab/ pvc insulation	232
CW	W-J-1160	3600EX, 4100NS, 4800DW	2 hr - max eight metal pipes thru concrete wall	237
CW	PFP/PV 240-01	3600EX, 4100NS, 4800DW	4 hr - multiple combo pvc, cpvc; conduit, copper, steel; cables, wires	668
FW	W-L-1010-C	3600EX, 4100NS, 4800DW	1 & 2 hr - multiple metal pies thru gyp wall	265
FW	W-L-1345	3600EX, 4100NS, 4800DW	1 & 2 hr - max 8 metal pipes thru gyp wall	287
FW	PFP/PV 60-05	3600EX, 4100NS, 4800DW	1 hr - gyp wall multiple up to 3 in. cast iron, steel copper pipes.	633
FW	PFP/PV 240-01	3600EX, 4100NS, 4800DW	4 hr - multiple combo pvc, cpvc; conduit, copper, steel; cables, wires	668

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Joint Systems

Type of assembly joint system:

BW – Bottom of Wall
FF – Floor to Floor
FW – Floor to Wall
HW – Head of Wall
PJ – Perimeter Joint (Curtain Wall)
WW – Wall to Wall

Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
BW	BW-S-0004	3600EX, 4100NS, 4800DW	1 & 2 hr - bottom of gyp wall to conc floor joint	385
FF	FF-D-0032	3600EX, 4100NS, 4800DW	2 hr - floor to floor joint - 1 in. (25 mm) joint	401
FF	FF-D-1016	3500SI, 5100SP	2 hr - floor to floor joint - 4 in. (102 mm) joint	402
FF	FF-D-3004	3500SI, 3600EX, 4800DW, 5100SP	2 hr - floor to floor joint - 24 in. (610 mm) joint	403
FF	FF-S-1019	3500SP, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - floor to floor joint - 3in. (76 mm) joint	406
FF	PFP/PHV 120-03	4100NS, 4100SL, 5100SP	2 hr - floor to floor - 12 in. (305 mm) joint.	575
FW	FW-D-0026	3600EX, 4100NS, 4800DW	2 hr - wall to stair joint - 1 in. (25 mm) joint	407
FW	FW-D-0027	3600EX, 4100NS, 4800DW	2 hr - floor to wall - 1in. (25 mm) joint	409
FW	FW-D-1016	3500SI, 5100SP	2 hr - floor to wall - 4 in. (102 mm) joint	411
FW	FW-D-1102	3600EX, 4100NS, 4800DW	2 hr - wall to stair joint - 3 in. (76 mm) joint	413
FW	FW-S-1006	3500SI, 3600EX, 4100NS, 4100SL, 4800DW, 5100SP	2 hr - floor to wall - 3 in. (76 mm) joint	415
FW	PFP/PHV 120-03	4100NS, 4100SL, 5100SP	2 hr - floor to wall - 12in.(305 mm) joint.	575
FW	PFP/PHV 120-06	3600EX, 4100NS, 4800DW	1 & 2 hr - framed floor to framed floor/ceiling	580
HW	HW-D-0024	3600EX, 4100NS, 4800DW	1 & 2 hr - gyp wall to metal deck - 3/4 in. (19 mm) joint	417
HW	HW-D-0025	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck - 3/4 in. (19 mm) joint	420
HW	HW-D-0026	3500SI, 5100SP	1,2,3&4 hr - concrete wall to metal deck - 3/4 in. (19 mm) joint	423
HW	HW-D-0035	3600EX, 4100NS, 4800DW	2 hr - concrete wall to concrete floor - 3/4 in. (19 mm) joint	425
HW	HW-D-0036	3600EX, 4100NS, 4800DW	1 & 2 hr - gyp wall to concrete floor - 3/4 in. joint	427
HW	HW-D-0062	3500SI, 5100SP	1,2,3&4 hr - gyp wall to metal deck - 3/4 in. joint	430
HW	HW-D-0063	4800DW	1 & 2 hr - gyp wall to metal deck - 3/4 in. joint	433
HW	HW-D-0071	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck w/ mk-6 - 3/4 in. joint	436

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Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
HW	HW-D-0072	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck w/ mk-6 - 3/4 in. joint	439
HW	HW-D-0073	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck w/ open web truss and w/ mk-6 - 3/4 in. joint	443
HW	HW-D-0162	3600EX, 4100NS, 4800DW	1 & 2 hr - gyp wall parallel to metal deck - 3/4 in. joint	447
HW	HW-D-0163	3600EX, 4100NS, 4800DW	2 hr - concrete wall parallel to metal deck - 3/4 in. joint	450
HW	HW-D-0185	3500SI, 5100SP	1 hr - gyp wall to metal deck - 1 in. joint	452
HW	HW-D-0191	3600EX, 4100NS, 4800DW	2 hr - shaft wall to concrete floor - 3/4 in. joint	455
HW	HW-D-0201	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck - 3/4 in. joint	457
HW	HW-D-0263	3500SI, 5100SP	1 & 2 hr - gyp wall to concrete floor - 1 in. joint	459
HW	HW-D-0271	4100NS, 4800DW	1 & 2 hr - gyp wall to metal deck - 1 in. joint	462
HW	HW-D-0272	3500SI, 5100SP	2 hr - gyp wall to concrete floor - 1 in. joint	465
HW	HW-D-0273	3600EX, 4100NS, 4800DW	2 hr - concrete wall to concrete floor - 1 in. joint	468
HW	HW-D-0278	3500SI, 5100SP	1 & 2 hr - gyp wall parallel to metal deck w/ mk6 – 1 in. joint	470
HW	HW-D-0279	3500SI, 5100SP	1 & 2 hr - concrete wall to metal deck w/ open web truss and w/ mk-6 - 1 in. joint	473
HW	HW-D-0335	3500SI, 5100SP	1 & 2 hr - gyp wall to mk-6 coated beam w/ metal deck - 1in. joint	475
HW	HW-D-0336	3500SI, 5100SP	2 & 3 hr - concrete wall to mk-6 coated beam w/ metal deck - 1in. joint	478
HW	HW-D-0386	3500SI, 5100SP	1 & 2 hr - gyp wall parallel to metal deck - 1 in. joint	480
HW	HW-D-0387	3500SI, 5100SP	2 hr - concrete wall parallel to metal deck - 1 in. joint	483
HW	HW-D-0392	3600EX, 4100NS, 4800DW	1 & 2 hr - gyp wall to concrete floor - 1in. joint	485
HW	HW-D-0405	3500SI, 5100SP	2 hr - concrete wall to mk-6 open web truss - 1in. joint	487
HW	HW-D-0406	3500SI, 5100SP	2 hr - concrete wall to concrete floor - 1 in. joint	489
HW	HW-D-0494	3500SI, 5100SP	2 hr - gyp wall to metal deck w/ mk-6 - 3/4 in. joint w/ max 2 in. PVC, CPVC or RNC	491
HW	HW-D-0546	3500SI, 5100SP	1 & 2 hr - gyp wall to parallel to fireproof beam w/ metal deck – 3/4in. joint top of wall max 4 in. from wall to beam	494
HW	HW-D-0560	3500SI, 5100SP	1 & 2 hr - concrete wall to parallel to fireproof beam w/ metal deck – 1in. joint top of wall max 4 in. from wall to beam	498
HW	HW-D-0561	3500SI, 5100SP	2 hr - concrete wall perpendicular to metal deck - 2 in. joint - one side application	501
HW	HW-D-0562	3500SI, 5100SP	2 hr - concrete wall parallel to metal deck - 2 in. joint - one side application	504
HW	HW-D-0693	3500SI, 5100SP	2 hr - shaft wall to concrete floor - 3/4 in. joint	506
HW	HW-D-1014	3500SI, 5100SP	2 hr - concrete wall to concrete floor - 4 in. joint	508
HW	HW-D-1028	3500SI, 5100SP	2 hr - gyp wall to metal deck - 4-3/8 in. joint	510

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Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
HW	HW-D-1033	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck w/ mk6 - 4-3/8 in. joint	513
HW	HW-S-0050	3500SI, 5100SP	1 & 2 hr - gyp wall to metal deck - 1/4 in. joint	515
HW	HW-S-1006	3500SI, 3600EX, 4100NS, 4800DW, 5100SP	2 hr - concrete wall to concrete floor - 3 in. joint	517
HW	PFP/PHV 120-03	4100NS, 4100SL, 5100SP	2 hr - concrete wall to concrete floor - 12 in. joint	575
HW	PFP/PV 60-01	3600EX, 4100NS, 4800DW	1 hr - gyp wall parallel to metal deck w/ mk6 - 3/4 in. joint	628
HW	PFP/PV 120-06	3600EX, 4100NS, 4800DW, 5100SP	1 & 2 hr - gyp wall to fluted conc/metal deck, running parallel or perpendicular - 1 in. joint	649
HW	PFP/PV 120-07	3600EX, 4100NS, 4800DW, 5100SP	1 & 2 hr - gyp wall to metal deck w/ fireproofed open web truss or beam - 3/4 in. joint	651
HW	PFP/PV 120-10	5100SP	1 & 2 hr - concrete wall to metal deck - 2-1/4 in. joint	654
HW	PFP/PV 120-12	3600EX, 4100NS, 4800DW, 5100SP	1 & 2 hr - gyp wall to metal deck w/ truss - 3/4 in. joint.	656
HW	PFP/PV 240-02	5100SP	4-hr - concrete wall to concrete floor - 2 in. joint	700
PJ	CW-D-1005	5100SP	2 hr - curtain wall joint, spandrel and vision glass exterior - 4 in. joint	387
PJ	CW-D-2059	5100SP	2 hr - curtain wall joint, spandrel and vision glass exterior - 8 in. joint	392
PJ	CW-S-1004	5100SP	2 hr - curtain wall joint, gyp board and vision glass exterior - 2-1/2 in. joint	396
PJ	CW-S-2037	5100SP	2 hr - curtain wall joint, spandrel glass exterior - 8in. joint	398
PJ	CEJ 218 P	5100SP	2 hr - steel panel curtain wall, steel stud framing, insulation optional - 8 in. joint	673
PJ	CEJ 219 P	5100SP	2 hr - steel panel curtain wall, steel stud framing, w/ insulation - 8 in. joint	675
PJ	CEJ 220 P	5100SP	2 hr - steel panel curtain wall, steel stud framing, w/ insulation - 8 in. joint	678
PJ	CEJ 221 P	5100SP	2 hr - steel panel curtain wall, steel stud framing, w/ insulation - 8 in. joint	681
PJ	CEJ 222 P	5100SP	2 hr - curtain wall joint, spandrel glass exterior - 8in. joint	684
PJ	CEJ 223 P	5100SP	2 hr - concrete floor to concrete tilt-up panels - 8 in. joint	687
PJ	CEJ 224 P	5100SP	2 hr - concrete floor to concrete panel curtain wall; steel studs; mw insulation optional - 8 in. joint	689
PJ	CEJ 225 P	5100SP	2 hr - concrete floor to concrete panel curtain wall; aluminum tubing; mw insulation optional - 8 in. joint	692
PJ	CEJ 226 P	5100SP	2 hr - concrete floor to steel panel curtain wall; rect. aluminum tube mullions with mw insulation - 8 in. joint	695

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Type of Assembly	System #	PFP Partner Product Used	System Details	Page #
PJ	CEJ 227 P	5100SP	2 hr - concrete floor to aluminum panel curtain wall; rect. aluminum tube mullions with mw insulation - 8 in. joint	698
PJ	CEJ 228 P	5100SP	2 hr - concrete floor to glass panel curtain wall; steel studs with mw insulation - 8 in. joint	701
PJ	CEJ 229 P	5100SP	2 hr - concrete floor to aluminum panel curtain wall; steel studs with mw insulation - 8 in. joint	704
PJ	CEJ 230 P	5100SP	2 hr - concrete floor to glass panel curtain wall; steel studs with mw insulation - 8 in. joint	707
PJ	CEJ 231 P	5100SP	2 hr - concrete floor to aluminum panel curtain wall; steel studs with mw insulation - 8 in. joint	710
PJ	CEJ 232 P	5100SP	2 hr - concrete floor to concrete tilt-up panels with brick exterior - 8 in. joint	713
PJ	CEJ 233 P	5100SP	2 hr - concrete floor to concrete tilt-up panels with stone exterior - 8 in. joint	716
PJ	PFP/JS 120-01	5100SP	2 hr - concrete floor to EFIS exterior wall - 8 in. joint	719
PJ	PFP/JS 120-02	5100SP	2 hr - concrete floor to EFIS exterior wall - 8 in. joint	723
PJ	PFP/JS 120-03	5100SP	2 hr - concrete floor to EFIS exterior wall - 8 in. joint	727
PJ	PFP/JS 120-04	5100SP	2 hr - concrete floor to EFIS exterior wall - 8 in. joint	731
PJ	PFP/JS 120-05	5100SP	2 hr - concrete floor to gypsum exterior wall - 8 in. joint	735
WW	WW-D-0035	3600EX, 4100NS, 4800DW	2 hr - concrete wall to concrete wall - 1in. joint	519
WW	WW-D-0077	3600EX, 4100NS, 4800DW	2 hr - concrete wall to concrete wall – 3/4in. joint	520
WW	WW-D-1016	5100SP	2 hr - concrete wall to concrete wall - 4 in. joint	521
WW	WW-S-0053	3600EX, 4100NS, 4800DW	1 & 2 hr – GWB wall to concrete wall – 3/4in. joint	523
WW	WW-S-1023	3600EX, 4100NS, 4800DW, 5100SP	2 hr - concrete wall to concrete wall - 3 in. joint	525
WW	PFP/PHV 120-03	4100NS, 4100SL, 5100SP	2 hr - concrete wall to concrete wall - 12 in. joint	575

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3300PS *Firestop Intumescent Putty Stick*

PRODUCT DESCRIPTION

PFP Partners' 3300PS is a one-component intumescent firestop sealant based on environmentally friendly chemistry. 3300PS has been designed specifically to seal through-penetrations of electrical wires, conduit and cables against the spread of fire, smoke, fumes and toxic gases in 1 and 2 hour rated assemblies.

3300PS is virtually odourless, also provides a flexible non-hardening seal which is non-reactive with most substrates.

3300PS can be used on a variety of construction material substrates and removes the guesswork by having one universal product solution for almost all applications.

3300PS is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy.

GENERAL APPLICATION AND USES

3300PS has been designed specifically to seal through-penetrations of electrical wires, conduit and cables against the spread of fire, smoke, fumes and toxic gases in 1 and 2 hour rated assemblies.

3300PS must be installed in compliance with the listed system designs published by third party testing laboratories: Underwriters Laboratories (UL & ULC) or Intertek Testing Sevices - Warnock Hersey (WHi). Refer to their respective published Fire Resistance Directories or websites. The manufacturers recommend this product be installed by those trained in proper installation procedures (TQ Card) and able to read and understand a firestop system design listing (i.e. UL or WHi listing designs).

SECTION CONTENTS **Page No.**

3300PS – Putty Stick

PACKAGING

1-3/4 in. diameter by 10 in. long sticks (44.5 mm diameter by 245 mm long)

Approximate volume 24 cubic inches (394 ml)

COLOR

Dark Red

PRODUCT FEATURES

- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Easy to install
- Easy cleanup
- Post-consumer recyclables

TECHNICAL DATA

Base	Polyisobutylene Resin
Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 32°F (0°C) prior to installation.
Curing System	One-component – Non curing
VOC (less water)	0 g/L
Solids	100%
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50

Color	Dark Red
In-Service Temperature	Up to 120°F (49°C)
Volume Expansion	> 300% (free expansion)
Expansion Temperature	392°F (200°C)
Storage Temperature	40°F to 90°F (4°C to 32°C)
Specific Gravity	1.27 to 1.47
pH	Not determined.
Application Temperature	33°F to 90°F (1°C to 32°C)
Freeze/Thaw Stability	No impact on sealant by frost

PDS - 3300PS

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: By hand.
- Cleaning: Warm water immediately after application.
- Tooling: Clean with water.

Installation Preparation

- 3300PS should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 3300PS should not be installed in submerged conditions.
- 3300PS may be painted; however, due to the larger number of paints and varnishes available, a compatibility test before application is strongly suggested.
- 3300PS can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

MAINTENANCE

The 3300PS does not require maintenance after installation. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

3300PS is chemically compatible with all types of metal and plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

Application of this product is not recommended when frost or moisture is present on the surface to be sealed..

ORDERING INFORMATION

Cat No.	Size	Color	Dispenser	Units per Case	Units per Skid
PSF	24 cubic inch (394 ml) stick	Dark Red	By Hand	12	720

3500SI *Intumescent Firestop Spray*

PRODUCT DESCRIPTION

PFP Partners' 3500SI is a highly intumescent firestop sealant based on PFP Partners' environmentally friendly chemistry. 3500SI is a latex-based product designed and tested to firestop through-penetrations, voids and construction joints.

3500SI is virtually odourless also provides a flexible seal which is non-reactive with most substrates.

3500SI can be used on a variety of construction material substrates.

3500SI is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).

3500SI meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

3500SI has been designed specifically to seal through-penetrations and joints against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.

3500SI has been tested and listed as an effective firestop by third party testing agencies: Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.

Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Electrical, cables, cable trays
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Floor-to-Floor
- Floor-to-Wall
- Head-of-Wall
- Wall-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Non Toxic – Contains no asbestos fillers or volatile solvents
- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water (in wet stage)
- Post-consumer recyclable

SECTION CONTENTS **Page No.**

3500SI – Intumescent Spray

PACKAGING
5 us gal. (18.9 L) pail (tapered)

COLOR
Blue

SPECIAL ORDER COLORS
Grey, White and Yellow

PDS - 3500SI

TECHNICAL DATA

Base	Acrylic-Vinyl Polymer
Shelf Life	24 months when product is stored in its original unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 43°F (6°C) prior to installation.
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	43°F to 90°F (6°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 20 to 30 min Fully cured time 7 to 14 days (depending on thickness & environment)
Solids Content (wt. %)	70 to 75%
Aging Test (ASTM D-1791)	Passed
Chemical Compatibility (ASTM D-543)	Passed
Corrosion (ASTM B-117)	Passed
Freeze-Thaw (ASTM D-2243)	Passed
UV Resistance (QEV High Intensity Cycle)1500 hrs, 200 cycles	Passed

Color	Blue
Odour	Mild Latex
Volume Expansion	1200% (free expansion)
Intumescent Temperature	320°F (160°C)
VOC (less water)	0.36 lbs/us. gal (44.6 g/L)
Specific Gravity (ASTM D-1475)	1.27 to 1.37
Viscosity (ASTM D-2196)	24,000 to 48,000 cps
pH (ASTM E-70)	7.5 to 8.5
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Elasticity	Up to 33%
Elongation (ASTM D-2370)	Passed
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
STC – Breached Wall Recovery (ASTM E-90)	59 Tested in a U411 wall assembly
Volume Shrinkage (ASTM C-1241)	Passed
Water Resistance (28 day Solubility Loss)	3%

MAINTENANCE

The 3500SI does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

3500SI is chemically compatible with all types of metal, plastic pipe, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

PDS - 3500SI

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Pressurized pot sprayer, brush or roller·
- Cleaning: Warm water immediately after application and before curing. Continuously flush pump and hoses with clean water until water runs clear. Dispose of wastewater as per local wastewater regulations.
- Caution: Do not apply 3500SI to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 3500SI should be applied to surfaces that are dry, clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 3500SI should not be installed in submerged conditions.
- 3500SI may be painted; however, due to the larger number of paints and varnishes available, a compatibility test before application is strongly suggested.
- 3500SI can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 12 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content; as a result, slower curing times may occur in low temperature as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

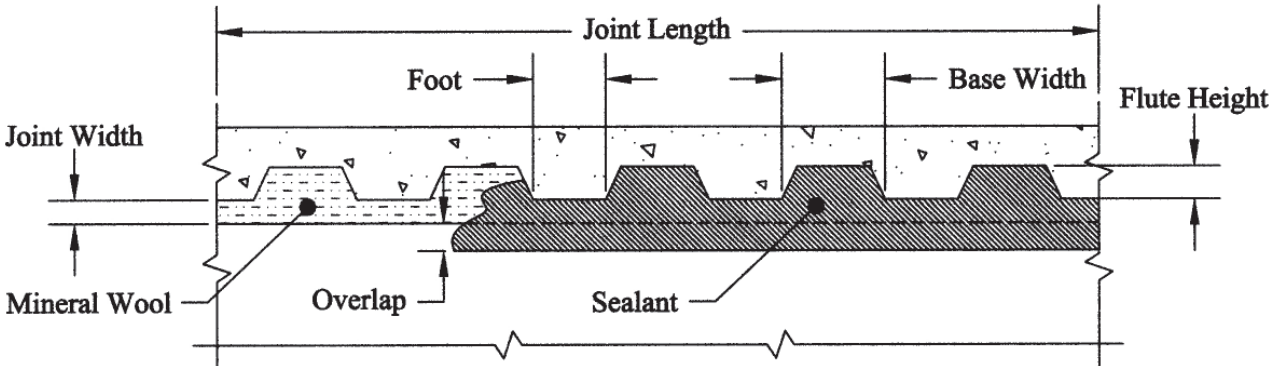
IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial – Calculated with 1/2 inch overlap on both sides of joint

Joint Width (inches)	Linear Feet / Gallon — Sealant Depth (inches)				Joint Width (inches)	Linear Feet / Gallon — Sealant Depth (inches)			
	3/32	1/8	3/16	1/4		3/32	1/8	3/16	1/4
1/2	137	103	68	51	4-1/2	37	28	19	14
1	103	77	51	39	5	34	26	17	13
1-1/2	82	62	41	31	5-1/2	32	24	16	12
2	68	51	34	26	6	29	22	15	11
2-1/2	59	44	29	22	6-1/2	27	21	14	10
3	51	39	26	19	7	26	19	13	10
3-1/2	46	34	23	17	7-1/2	24	18	12	9
4	41	31	21	15	8	23	17	11	9

INSTALLATION GUIDELINES AND SUGGESTED USE

General Fluted Metal Deck Joint Estimating – Imperial Sizes



Calculations Include:

- Both sides of wall assembly
- Variable flute heights
- 3/4 inch construction gap
- 1 inch overlap (1 inch on deck and 1 inch on wall assembly)
- 3/32 of an inch thickness of spray
- 10 percent wastage factor

100 Lineal feet of decking Flute Size (Inches)			Quantity Required	
Height	Base Width	Foot	US gallons	Liters
1-1/2	4.3	1.7	4.6	17.5
3	3.9	2.2	6.1	22.9
3	5.9	2.2	6.1	23.0

3500SI - Volumes

Packaging Size	Volume
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

3500SI - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
SIP4	5 us gal. (18.9 L) pail (tapered)	Blue	Spray Machine / Brush or Roller	1	36

PDS - 3500SI

3600EX *Intumescent Firestop Caulking*

PRODUCT DESCRIPTION

PFP Partners' 3600EX is a one-compnent highly intumescent firestop sealant based on PFP Partners' environmentally friendly chemistry. 3600EX is a latex-based product designed and tested to firestop through-penetrations, voids and construction joints.

3600EX is virtually odourless also provides a flexible seal which is non-reactive with most substrates.

3600EX can be used on a variety of construction material substrates and removes the guesswork by having one universal product solution for almost all applications.

3600EX is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).

3600EX meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

3600EX has been designed specifically to seal through-penetrations of pipes, cables, HVAC ducts, and joints against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.

3600EX has been tested inhundresds of firestopping installations by third party testing agencies: Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.

Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

3600EX – Intumescent Caulking

PACKAGING

10 fl. oz. (300 ml) cartridge
20 fl. oz. (600 ml) foil sausage pack
29 fl. oz. (850 ml) cartridge
5 us gal. (18.9 L) pail (tapered)

COLOR

Rust Red

SPECIAL ORDER COLORS

Blue, Grey, White and Yellow
Minimum quantity orders required

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Non-metallic pipe, conduit and tubing
- Electrical, cables, cable trays, busways
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Bottom-of-Wall
- Floor-to-Floor
- Floor-to-Wall
- Head-of-Wall
- Wall-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Product flows readily, does not slump or sag, easy to tool
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water (in wet stage)
- Post-consumer recyclable

PDS - 3600EX

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

TECHNICAL DATA

Base	Acrylic Emulsion
Shelf Life	24 months when product is stored in its original unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 43°F (6°C) prior to installation.
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	45°F to 90°F (7°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 20 to 30 min Fully cured time 7 to 14 days (depending on thickness & environment)
Solids Content (wt. %)	80 to 85%
Aging Test (ASTM D-1791)	Passed
Chemical Compatibility (ASTM D-543)	Passed
Corrosion (ASTM B-117)	Passed
Freeze-Thaw (ASTM D-2243)	Passed
Extrudability After Package Aging (Freeze-Thaw Stability) (ASTM C-73`)	Passed

Color	Rust Red
Odour	Mild Latex
Volume Expansion	800% (free expansion)
Intumescent Temperature	320°F (160°C)
VOC (less water)	0.3 lbs/us. gal (37.1 g/L)
Specific Gravity (ASTM D-1475)	1.40 to 1.50
Viscosity (ASTM D-2196)	640,000 to 960,000 cps
pH (ASTM E-70)	8.0 to 9.0
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Elasticity	Up to 33%
Elongation (ASTM D-2370)	Passed
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
STC – Breached Wall Recovery (ASTM E-90)	59 Tested in a U411 wall assembly
Volume Shrinkage (ASTM C-1241)	Passed
Water Resistance (28 day Solubility Loss)	3%

MAINTENANCE

The 3600EX does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

3600EX is chemically compatible with all types of metal, plastic pipe, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

GREENGUARD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818
GOLD

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Caulking gun, bulk loader or trowel in place
- Cleaning: Warm water immediately after application and before curing.
- Tooling Tooling creates a stronger bond and a smooth finish. Clean before skin formation.
- Caution: Do not apply 3600EX to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 3600EX should be applied to surfaces that are dry, clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 3600EX should not be installed in submerged conditions.
- 3600EX may be painted; however, due to the larger number of paints and varnishes available a compatibility test before application is strongly suggested.
- 3600EX can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 24 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content; as a result, slower curing times may occur in low temperature as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial

Joint Width (inches)	Linear Feet / 10 oz. Tube				Linear Feet / 29 oz. Tube				Linear Feet / Gallon			
	Sealant Depth (inches)				Sealant Depth (inches)				Sealant Depth (inches)			
	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4
1/4	24	12	9.6	4.8	37	28	19	14	308.0	154.0	123.2	61.6
1/2	12	6	4.8	2.4	34	26	17	13	154.0	77.0	61.6	30.8
3/4	8	4	3.2	1.6	32	24	16	12	102.7	51.3	41.1	20.5
1	6	3	2.4	1.2	29	22	15	11	77.0	38.5	30.8	15.4

Note: Values Above Are For One Side Only

General PentrationEstimating – Imperial - Use this chart to calculate the volume of sealant required for each penetration

Diameter of Opening (Inches)	Nominal Diameter of Pipe (inches)												
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	6.00	8.00	10.00	12.00
	Actual Diameter of SCH 40 Pipe (inches)												
	0.840	1.050	1.315	1.900	2.375	2.875	3.500	4.000	4.500	6.625	8.625	10.750	12.750
1.00	0.23												
2.00	2.59	2.28	1.78	0.31									
3.00	6.51	6.20	5.71	4.23	2.64	0.58							
4.00	12.01	11.70	11.21	9.73	8.14	6.07	2.95						
5.00	19.08	18.77	18.28	16.80	15.20	13.14	10.01	7.07	3.73				
6.00	27.72	27.41	26.93	25.44	23.84	21.78	18.65	15.71	12.37				
7.00	37.93	37.62	37.13	35.65	34.05	31.99	28.86	25.92	22.58	4.01			
8.00	49.71	49.40	48.91	47.43	45.84	43.77	40.64	37.70	34.36	15.79			
10.00	77.99	77.67	77.18	75.70	74.11	72.05	68.92	65.97	62.64	44.07	20.11		
12.00	112.54	112.23	111.74	110.26	108.67	106.61	103.48	100.53	97.19	78.63	54.67	22.33	
14.00	153.38	153.07	152.58	151.10	151.10	147.45	144.32	141.37	138.03	119.47	95.51	63.18	26.26

3600EX - Volumes

Packaging Size	Volume
10 fl. oz. (300 ml) cartridge	18 cu. in. (300 cm^3)
20 fl. oz. (600 ml) foil sausage pack	36 cu. in. (600 cm^3)
29 fl. oz. (850 ml) cartridge	52 cu. in. (850 cm^3)
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

3600EX - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
EX1	10 fl. oz. (300 ml) cartridge	Rust Red	Caulking Gun	12	1680
EX9	20 fl. oz. (600 ml) foil sausage pack	Rust Red	Caulking Gun	12	720
EX2	29 fl. oz. (850 ml) cartridge	Rust Red	Caulking Gun	12	720
EX4	5 us gal. (18.9 L) pail (tapered)	Rust Red	Bulk Loader / Trowel	1	36

4100NS *Non-Sag Firestop Caulking*

PRODUCT DESCRIPTION

PFP Partners' 4100NS is a one-component non-sag firestop sealant based on our environmentally friendly chemistry. 4100NS is a latex-based product designed and tested predominately for firestopping construction joints.
4100NS is virtually odourless and also provides a flexible seal which is non-reactive with most substrates.
4100NS can be used on a variety of construction material substrates.
4100NS is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).
4100NS meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

4100NS has been designed specifically to seal construction joints against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.
4100NS has been tested in hundresds of firestopping installations by third party testing agencies; Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.
Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

4100NS – Non-Sag Caulking

PACKAGING
10 fl. oz. (300 ml) cartridge
20 fl. oz. (600 ml) foil sausage pack
29 fl. oz. (850 ml) cartridge
5 us gal. (18.9 L) pail (tapered)

COLOR
Grey

SPECIAL ORDER COLORS
Blue, Grey, White and Yellow
Minimum quantity orders required

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Non-metallic pipe, conduit and tubing
- Electrical, cables, cable trays, busways
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Bottom-of-Wall
- Floor-to-Floor
- Floor-to-Wall
- Head-of-Wall
- Wall-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Product flows readily, does not slump or sag, easy to tool
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water (in wet stage)
- Post-consumer recyclable

PDS - 4100NS

TECHNICAL DATA

Base	Vinyl Acetate Polymers
Shelf Life	24 months when product is stored in its original unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 43°F (6°C) prior to installation.
Aging Test (ASTM D-1791)	Passed
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	45°F to 90°F (7°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 20 to 30 min Fully cured time 7 to 12 days (depending on thickness & environment)
Chemical Compatibility (ASTM D-543)	Passed
Corrosion (ASTM B-117)	Passed
Freeze-Thaw (ASTM D-2243)	Passed
Extrudability After Package Aging (Freeze-Thaw Stability) (ASTM C-731)	Passed

Color	Grey
Odour	Mild Latex
VOC (less water)	0.4 lbs/us. gal (53.9 g/L)
Solids Content (wt. %)	75 to 80%
Elasticity	Up to 33%
Elongation (ASTM D-2370)	1400%
Slump (ASTM D-2202)	Passed
Specific Gravity (ASTM D-1475)	1.40 to 1.50
Viscosity (ASTM D-2196)	560,000 to 744,000 cps
pH (ASTM E-70)	8.0 to 9.0
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
STC – Breached Wall Recovery (ASTM E-90)	59 Tested in a U411 wall assembly
Volume Strinkage (ASTM C-1241)	Passed
Water Resistance (28 day Solubility Loss)	3%

MAINTENANCE

The 4100NS does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

4100NS is chemically compatible with all types of metal, plastic pipe, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Caulking gun, bulk loader or trowel in place
- Cleaning: Warm water immediately after application and before curing.
- Tooling Tooling creates a stronger bond and a smooth finish. Clean before skin formation.
- Caution: Do not apply 4100NS to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 4100NS should be applied to surfaces that are dry, clean and free of dust, dirt and grease. Product and substrates should be warmed to at least 45°F (7°C) prior to installation.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 4100NS should not be installed in submerged conditions.
- 4100NS may be painted; however, due to the larger number of paints and varnishes available a compatibility test before application is strongly suggested.
- 4100NS can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 24 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content; as a result, slower curing times may occur in low temperature as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial

Joint Width (inches)	Linear Feet / 10 oz. Tube				Linear Feet / 29 oz. Tube				Linear Feet / Gallon			
	Sealant Depth (inches)				Sealant Depth (inches)				Sealant Depth (inches)			
	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4
1/4	24	12	9.6	4.8	37	28	19	14	308.0	154.0	123.2	61.6
1/2	12	6	4.8	2.4	34	26	17	13	154.0	77.0	61.6	30.8
3/4	8	4	3.2	1.6	32	24	16	12	102.7	51.3	41.1	20.5
1	6	3	2.4	1.2	29	22	15	11	77.0	38.5	30.8	15.4

Note: Values Above Are For One Side Only

General PentrationEstimating – Imperial - Use this chart to calculate the volume of sealant required for each penetration

Diameter of Opening (Inches)	Nominal Diameter of Pipe (inches)												
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	6.00	8.00	10.00	12.00
	Actual Diameter of SCH 40 Pipe (inches)												
	0.840	1.050	1.315	1.900	2.375	2.875	3.500	4.000	4.500	6.625	8.625	10.750	12.750
1.00	0.23												
2.00	2.59	2.28	1.78	0.31									
3.00	6.51	6.20	5.71	4.23	2.64	0.58							
4.00	12.01	11.70	11.21	9.73	8.14	6.07	2.95						
5.00	19.08	18.77	18.28	16.80	15.20	13.14	10.01	7.07	3.73				
6.00	27.72	27.41	26.93	25.44	23.84	21.78	18.65	15.71	12.37				
7.00	37.93	37.62	37.13	35.65	34.05	31.99	28.86	25.92	22.58	4.01			
8.00	49.71	49.40	48.91	47.43	45.84	43.77	40.64	37.70	34.36	15.79			
10.00	77.99	77.67	77.18	75.70	74.11	72.05	68.92	65.97	62.64	44.07	20.11		
12.00	112.54	112.23	111.74	110.26	108.67	106.61	103.48	100.53	97.19	78.63	54.67	22.33	
14.00	153.38	153.07	152.58	151.10	151.10	147.45	144.32	141.37	138.03	119.47	95.51	63.18	26.26

4100NS - Volumes

Packaging Size	Volume
10 fl. oz. (300 ml) cartridge	18 cu. in. (300 cm^3)
20 fl. oz. (600 ml) foil sausage pack	36 cu. in. (600 cm^3)
29 fl. oz. (850 ml) cartridge	52 cu. in. (850 cm^3)
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

4100NS - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
NS1	10 fl. oz. (300 ml) cartridge	Grey	Caulking Gun	12	1680
NS9	20 fl. oz. (600 ml) foil sausage pack	Grey	Caulking Gun	12	720
NS2	29 fl. oz. (850 ml) cartridge	Grey	Caulking Gun	12	720
NS4	5 us gal. (18.9 L) pail (tapered)	Grey	Bulk Loader / Trowel	1	36

4100SL *Self-Leveling Firestop Caulking*

PRODUCT DESCRIPTION

PFP Partners' 4100SL is a one-compnent self-leveling firestop sealant based on our environmentally friendly chemistry. 4100SL is a latex-based product designed and tested for firestopping through-penetration of horizontal assemblies and construction joints.

4100SL is virtually odourless and also provides a flexible seal which is non-reactive with most substrates.

4100SL can be used on a variety of construction material substrates.

4100SL is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).

4100SL meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

SECTION CONTENTS Page No.

4100SL – Self-Leveling Firestop

PACKAGING

29 fl. oz. (850 ml) cartridge
35.2 fl. oz. (1 L) EZ pour plastic bottle
5 us gal. (18.9 L) pail (tapered)

COLOR

Rust Red

GENERAL APPLICATION AND USES

4100SL has been designed specifically to seal construction joints and through-penetrations against the spread of fire, smoke, fumes and toxic gases in 1, 2 hour rated floor assemblies.

4100SL has been tested and listed as an effective firestop by third party testing agencies; Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.

Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Framed Floors

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Insulated pipe or tubing
- Electrical, cables, cable trays, busways
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Floor-to-Floor
- Floor-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on concrete and wood-frame floors
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Product flows readily
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water and soap (in wet stage)
- Post-consumer recyclable

PDS - 4100SL

TECHNICAL DATA

Base	Vinyl Acetate Polymers
Shelf Life	24 months when product is stored in its original undamaged, unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 50°F (10°C) prior to installation.
Aging Test (ASTM D-1791)	Passed
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	50°F to 90°F (10°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 30 to 40 min Fully cured time 7 to 21 days (depending on thickness & environment)
Chemical Compatibility (ASTM D-543)	Passed
Freeze-Thaw (ASTM D-2243)	Passed

Color	Rust Red
Odour	Mild Latex
VOC (less water)	0.2 lbs/us. gal (26.0 g/L)
Solids Content (wt. %)	70 to 75%
Specific Gravity (ASTM D-1475)	1.40 to 1.50
Viscosity (ASTM D-2196)	32,000 to 57,600 cps
Volume Shrinkage (ASTM C-1241)	Passed
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
pH (ASTM E-70)	8.0 to 9.0
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Water Resistance (28 day Solubility Loss)	3%

MAINTENANCE

The 4100SL does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

4100SL is chemically compatible with all types of metal, pipe insulation, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Pour sealant over tightly packed mineral wool insulation. Apply 4100SL wet sealant to a depth that will result in a dry thickness that will be in compliance with the appropriate listed system design.
- Cleaning: Warm water immediately after application and before curing.
- Tooling Tooling creates a stronger bond and a smooth finish. Clean before skin formation.
- Caution: Do not apply 4100SL to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 4100SL should be applied to surfaces that are dry, clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 4100SL should not be installed in submerged conditions.
- 4100SL may be painted; however, due to the larger number of paints and varnishes available a compatibility test before application is strongly suggested.
- 4100SL can be applied to a wide variety of substrates. Performance with specific substrates, such as insulation, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 12 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content, as a result, slower curing times may occur in low temperature as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial

Joint Width (inches)	Linear Feet / 29 oz. Tube				Linear Feet / 1 US Gallon				Linear Feet / 2.65 US Gallon			
	Sealant Depth (inches)				Sealant Depth (inches)				Sealant Depth (inches)			
	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4
1/4	69.3	34.7	27.7	13.9	308.0	154.0	123.2	61.6	816.0	408.0	326.4	163.2
1/2	34.7	17.3	13.9	6.9	154.0	77.0	61.6	30.8	408.0	204.0	163.2	81.6
3/4	23.1	11.6	9.2	4.6	102.7	51.3	41.1	20.5	272.0	136.0	108.8	54.4
1	17.3	8.7	8.9	3.5	77.0	38.5	30.8	15.4	204.0	102.0	81.6	40.8

PDS - 4100SL

General PentrationEstimating – Imperial - Use this chart to calculate the volume of sealant required for each penetration

Diameter of Opening (Inches)	Nominal Diameter of Pipe (inches)												
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	6.00	8.00	10.00	12.00
	Actual Diameter of SCH 40 Pipe (inches)												
	0.840	1.050	1.315	1.900	2.375	2.875	3.500	4.000	4.500	6.625	8.625	10.750	12.750
1.00	0.23												
2.00	2.59	2.28	1.78	0.31									
3.00	6.51	6.20	5.71	4.23	2.64	0.58							
4.00	12.01	11.70	11.21	9.73	8.14	6.07	2.95						
5.00	19.08	18.77	18.28	16.80	15.20	13.14	10.01	7.07	3.73				
6.00	27.72	27.41	26.93	25.44	23.84	21.78	18.65	15.71	12.37				
7.00	37.93	37.62	37.13	35.65	34.05	31.99	28.86	25.92	22.58	4.01			
8.00	49.71	49.40	48.91	47.43	45.84	43.77	40.64	37.70	34.36	15.79			
10.00	77.99	77.67	77.18	75.70	74.11	72.05	68.92	65.97	62.64	44.07	20.11		
12.00	112.54	112.23	111.74	110.26	108.67	106.61	103.48	100.53	97.19	78.63	54.67	22.33	
14.00	153.38	153.07	152.58	151.10	151.10	147.45	144.32	141.37	138.03	119.47	95.51	63.18	26.26

4100SL - Volumes

Packaging Size	Volume
29 fl. oz. (850 ml) cartridge	52 cu. in. (850 cm^3)
35 fl. oz. (1 L) EZ pour bottle	61.2 cu. in. (1000 cm^3)
2.65 us gal. (10 L) pail	612 cu. in. (10000 cm^3)
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

4100SL - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
SL2	29 fl. oz. (850 ml) cartridge	Rust Red	Pour	12	720
SL5	35 fl. oz. (1 L) EZ pour bottle	Rust Red	Pour	8	480
SL4	5 us gal. (18.9 L) pail (tapered)	Rust Red	Pour	1	36

4800DW *Endothermic Firestop Caulking*

PRODUCT DESCRIPTION

PFP Partners' 4800DW is a one-component endothermic firestop sealant based on our environmentally friendly chemistry. 4800DW is a latex-based product designed and tested predominately for firestopping through-penetrations and construction joints.

4800DW is virtually odourless and also provides a flexible seal which is non-reactive with most substrates.

4800DW can be used on a variety of construction material substrates and removes the guesswork by having one universal product solution for almost all applications.

4800DW is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).

4800DW meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

4800DW has been designed specifically to seal through-penetrations of pipes, cables, HVAC ducts and construction joints against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.

4800DW has been tested in hundreds of firestopping installations by third party testing agencies; Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.

Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

4800DW – Endothermic Caulking

PACKAGING

10 fl. oz. (300 ml) cartridge
20 fl. oz. (600 ml) foil sausage pack
29 fl. oz. (850 ml) cartridge
5 us gal. (18.9 L) pail (tapered)

COLOR

Rust Red

SPECIAL ORDER COLORS

Blue, Grey, White and Yellow
Minimum quantity orders required

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Insulated pipe or tubing
- Electrical, cables, cable trays, busways
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Bottom-of-Wall
- Floor-to-Floor
- Floor-to-Wall
- Head-of-Wall
- Wall-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Elastic properties – non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Product flows readily, does not slump or sag, easy to tool
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water and soap (in wet stage)
- Post-consumer recyclable

PDS - 4800DW

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

TECHNICAL DATA

Base	Vinyl Acetate Polymers
Shelf Life	24 months when product is stored in its original undamaged, unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 43°F (6°C) prior to installation.
Aging Test (ASTM D-1791)	Passed
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	45°F to 90°F (7°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 20 to 30 min Fully cured time 7 to 21 days (depending on thickness & environment)
Chemical Compatibility (ASTM D-543)	Passed
Corrosion (ASTM B-117)	Passed
Freeze-Thaw (ASTM D-2243)	Passed
Extrudability After Package Aging (Freeze-Thaw Stability) (ASTM C-731)	Passed

Color	Rust Red
Odour	Mild Latex
VOC (less water)	0.25 lbs/us. gal (32.5 g/L)
Solids Content (wt. %)	75 to 79%
Elasticity	Up to 33%
Elongation (ASTM D-2370)	1400%
Slump (ASTM D-2202)	Passed
Specific Gravity (ASTM D-1475)	1.40 to 1.50
Viscosity (ASTM D-2196)	560,000 to 744,000 cps
pH (ASTM E-70)	8.0 to 9.0
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
STC – Breached Wall Recovery (ASTM E-90)	59 Tested in a U411 wall assembly
Volume Strinkage (ASTM C-1241)	Passed
Water Resistance (28 day Solubility Loss)	3%

MAINTENANCE

The 4800DW does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

4800DW is chemically compatible with all types of metal, plastic pipe, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

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INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Caulking gun, bulk loader or trowel in place
- Cleaning: Warm water immediately after application and before curing.
- Tooling Tooling creates a stronger bond and a smooth finish. Clean before skin formation.
- Caution: Do not apply 4800DW to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 4800DW should be applied to surfaces that are dry, clean and free of dust, dirt and grease. Product and substrates should be warmed to at least 45°F (7°C) prior to installation.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 4800DW should not be installed in submerged conditions.
- 4800DW may be painted; however, due to the larger number of paints and varnishes available a compatibility test before application is strongly suggested.
- 4800DW can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 24 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content, as a result, slower curing times may occur in low temperature as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial

Joint Width (inches)	Linear Feet / 10 oz. Tube				Linear Feet / 29 oz. Tube				Linear Feet / Gallon			
	Sealant Depth (inches)				Sealant Depth (inches)				Sealant Depth (inches)			
	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4	1/4	1/2	5/8	1-1/4
1/4	24	12	9.6	4.8	37	28	19	14	308.0	154.0	123.2	61.6
1/2	12	6	4.8	2.4	34	26	17	13	154.0	77.0	61.6	30.8
3/4	8	4	3.2	1.6	32	24	16	12	102.7	51.3	41.1	20.5
1	6	3	2.4	1.2	29	22	15	11	77.0	38.5	30.8	15.4

Note: Values Above Are For One Side Only

PDS - 4800DW

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General Penetration Estimating – Imperial - Use this chart to calculate the volume of sealant required for each penetration

Diameter of Opening (Inches)	Nominal Diameter of Pipe (inches)												
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	6.00	8.00	10.00	12.00
	Actual Diameter of SCH 40 Pipe (inches)												
	0.840	1.050	1.315	1.900	2.375	2.875	3.500	4.000	4.500	6.625	8.625	10.750	12.750
1.00	0.23												
2.00	2.59	2.28	1.78	0.31									
3.00	6.51	6.20	5.71	4.23	2.64	0.58							
4.00	12.01	11.70	11.21	9.73	8.14	6.07	2.95						
5.00	19.08	18.77	18.28	16.80	15.20	13.14	10.01	7.07	3.73				
6.00	27.72	27.41	26.93	25.44	23.84	21.78	18.65	15.71	12.37				
7.00	37.93	37.62	37.13	35.65	34.05	31.99	28.86	25.92	22.58	4.01			
8.00	49.71	49.40	48.91	47.43	45.84	43.77	40.64	37.70	34.36	15.79			
10.00	77.99	77.67	77.18	75.70	74.11	72.05	68.92	65.97	62.64	44.07	20.11		
12.00	112.54	112.23	111.74	110.26	108.67	106.61	103.48	100.53	97.19	78.63	54.67	22.33	
14.00	153.38	153.07	152.58	151.10	151.10	147.45	144.32	141.37	138.03	119.47	95.51	63.18	26.26

4800DW - Volumes

Packaging Size	Volume
10 fl. oz. (300 ml) cartridge	18 cu. in. (300 cm^3)
20 fl. oz. (600 ml) foil sausage pack	36 cu. in. (600 cm^3)
29 fl. oz. (850 ml) cartridge	52 cu. in. (850 cm^3)
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

4800DW - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
DW1	10 fl. oz. (300 ml) cartridge	Rust Red	Caulking Gun	12	1680
DW9	20 fl. oz. (600 ml) foil sausage pack	Rust Red	Caulking Gun	12	720
DW2	29 fl. oz. (850 ml) cartridge	Rust Red	Caulking Gun	12	720
DW4	5 us gal. (18.9 L) pail (tapered)	Rust Red	Bulk Loader / Trowel	1	36

PDS - 4800DW

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

5100SP *Endothermic Firestop Spray*

PRODUCT DESCRIPTION

PFP Partners' 5100SP is our endothermic firestop mastic spray based on PFP Partners' environmentally friendly chemistry. 5100SP is a latex-based product designed and tested to firestop through-penetrations, construction joints and perimeter containment assemblies.
5100SP is virtually odourless and also provides a flexible seal which is non-reactive with most substrates.
5100SP can be used on a variety of construction material substrates.
5100SP is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state).
5100SP meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

5100SP has been designed specifically to seal through-penetrations and joints against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.
5100SP has been tested and listed as an effective firestop by third party testing agencies; Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-84, ASTM E-119, ASTM E-814, ASTM E-1399, CAN/ULC S101, CAN/ULC S102, CAN/ULC S115, UL 263, UL 763, UL 1479 & UL 2079.
Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

5100SP– Endothermic Spray

PACKAGING
5 us gal. (18.9 L) pail (tapered)

COLOR
Grey

SPECIAL ORDER COLORS
Blue, Grey, White and Yellow
Minimum quantity orders required

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Electrical, cables, cable trays
- Mechanical ducts
- Grouped penetrations

Firestopping Joints:

- Floor-to-Floor
- Floor-to-Wall
- Head-of-Wall
- Wall-to-Wall

PRODUCT FEATURES

- Water-based formulation
- Sprayability - Excellent fan pattern and volume output
- Non-toxic - Contains no asbestos fillers or volatile solvents
- Elastic properties – non-hardening
- Environmentally Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Inert formula will not interact with substrates
- Works on virtually every base material
- Improves STC Values and upgrades sound quality
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Cured product is mold and mildew resistant
- Easily installed
- Accepts primer and paint unlike silicone-based sealants
- Easy cleanup with water (in wet stage)
- Post-consumer recyclable

PDS -5100SP

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

TECHNICAL DATA

Base	Acrylic-Vinyl Polymer
Shelf Life	24 months when product is stored in its original unopened packaging and stored in a cool dry place, 40°F to 90°F (4°C to 32°C). Product and substrates should be warmed to at least 43°F (6°C) prior to installation.
Storage Temperature	40°F to 90°F (4°C to 32°C)
Application Temperature	43°F to 90°F (6°C to 32°C)
In-Service Temperature	Up to 120°F (49°C)
Curing System	One-component – Air cured
Curing Time (ASTM D-1640)	Dry to touch @ 6 mil 20 to 30 min Fully cured time 7 to 14 days (depending on thickness & environment)
Solids Content (wt. %)	63 to 73%
Aging Test (ASTM D-1791)	Passed
Chemical Compatibility (ASTM D-543)	Passed
Corrosion (ASTM B-117)	Passed
Freeze-Thaw (ASTM D-2243)	Passed
UV Resistance (QEV High Intensity Cycle)1500 hrs, 200 cycles	Passed

Color	Grey
Odour	Mild Latex
Tensile Strength (ASTM D2370)	28 psi (193 KPa)
Joint Movement (ASTM E-1399)	Passed
VOC (less water)	0.63 lbs/us. gal (81.3 g/L)
Specific Gravity (ASTM D-1475)	1.15 to 1.35
Viscosity (ASTM D-2196)	50,000 to 60,000 cps
pH (ASTM E-70)	8.0 to 9.0
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index <25 Smoke Development Index <50
Elasticity	Up to 33%
Elongation (ASTM D-2370)	1000%
Fungus Resistance (wet) (ASTM D-2574)	Passed
Fungus Resistance (dry) (ASTM D-3273)	Passed
STC – Breached Wall Recovery (ASTM E-90)	59 Tested in a U411 wall assembly
Volume Shrinkage (ASTM C-1241)	Passed
Water Resistance (28 day Solubility Loss)	6%

MAINTENANCE

The 5100SP does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

5100SP is chemically compatible with all types of metal, plastic pipe, plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) **DO NOT ALLOW TO FREEZE**.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

GREENGUARD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818
GOLD

Recycled
Recyclable

1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Airless sprayer with 3000 psi (20.7 MPa) capabilities and reversible spray tips, can als be applied by brush or roller.
- Spray: To achieve a dry thickness of 60-mil (1/16 inch) apply at a minimum wet thickness of 80-mil (1/12 inch)
- Cleaning: Warm water immediately after application and before curing. Continuously flush pump and hoses with clean water until water runs clear. Dispose of wastewater as per local wastewater regulations.
- Caution: Do not apply 5100SP to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS.

Installation Preparation

- 5100SP should be applied to surfaces that are dry, clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water, aliphatic solvents, mineral oils, grease, diluted inorganic acids and alkalis.
- Good resistance to mineral oils and grease.

Special Application

- 5100SP should not be installed in submerged conditions.
- 5100SP may be painted; however, due to the larger number of paints and varnishes available a compatibility test before application is strongly suggested.
- 5100SP can be applied to a wide variety of substrates. Performance with specific substrates, such as plastics, metals, etc, may differ according to manufacturer; therefore, it is suggested that preliminary compatibility tests be conducted.

LIMITATIONS

This product is not designed to be a waterproof seal. Do not apply if rain is expected within 12 hours, as exposure to snow, rain, running or standing water before the sealant is fully cured may cause the installed material to washout. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

This product is water-based and cures naturally through the evaporation of its water content, as a result, slower curing times may occur in low temperatures as well as high humidity environments. Also, any materials used in the firestop installation for damming, insulation or support may affect curing times.

Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ESTIMATING CHARTS

IMPORTANT NOTE: Estimating charts are for estimating only. Please consult applicable third party testing agency's Fire Resistance Directory for specific installation instructions and requirements.

General Joint Estimating – Imperial – Calculated with 1/2 inch overlap on both sides of joint

Joint Width (inches)	Linear Feet / Gallon				Joint Width (inches)	Linear Feet / Gallon			
	Sealant Depth (inches)					Sealant Depth (inches)			
	3/32	1/8	3/16	1/4		3/32	1/8	3/16	1/4
1/2	137	103	68	51	4-1/2	37	28	19	14
1	103	77	51	39	5	34	26	17	13
1-1/2	82	62	41	31	5-1/2	32	24	16	12
2	68	51	34	26	6	29	22	15	11
2-1/2	59	44	29	22	6-1/2	27	21	14	10
3	51	39	26	19	7	26	19	13	10
3-1/2	46	34	23	17	7-1/2	24	18	12	9
4	41	31	21	15	8	23	17	11	9

PDS - 5100SP

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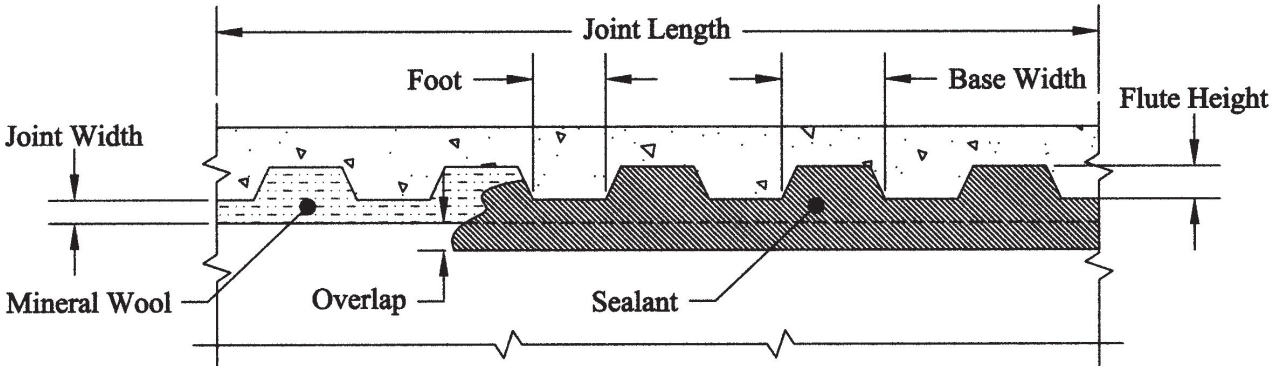
UL 2818

INSTALLATION GUIDELINES AND SUGGESTED USE

General Fluted Metal Deck Joint Estimating – Imperial Sizes



Calculations Include:

- Both sides of wall assembly
- Variable flute heights
- 3/4 inch construction gap
- 1 inch overlap (1 inch on deck and 1 inch on wall assembly)
- 3/32 of an inch thickness of spray
- 10 percent wastage factor

100 Lineal feet of decking Flute Size (Inches)			Quantity Required	
Height	Base Width	Foot	US gallons	Liters
1-1/2	4.3	1.7	4.6	17.5
3	3.9	2.2	6.1	22.9
3	5.9	2.2	6.1	23.0

5100SP - Volumes

Packaging Size	Volume
5 us gal. (18.9 L) pail (tapered)	1155 cu. in. (18900 cm^3)

ORDERING INFORMATION

5100SP - Packaging

Code	Packaging Size	Color	Dispenser	Units per Case	Units per Skid
SP4	5 us gal. (18.9 L) pail (tapered)	Grey	Spray Machine / Brush or Roller	1	36

PDS - 5100SP

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

EBI-60 *Electrical Outlet Box Insert*

PRODUCT DESCRIPTION

PFP Partners' EBI-60s are a solid intumescent pad designed to be quickly and easily installed into metallic electrical outlet boxes. EBI-60s have been designed specifically to seal electrical switches and outlet boxes against the spread of fire, smoke, fumes and toxic gases in 1 and 2 hour rated assemblies.
EBI-60 can be used in single or double electrical receptacle or switch boxes.
EBI-60 pads easily adhere to the inside back surface of metallic boxes; can be installed either during construction or during renovations.
EBI-60s are non-hazardous, safe for the environment and do not require special shipping procedures. EBI-60s do not contain solvents and are VOC compliant.

SECTION CONTENTS **Page No.**

EBI-60 – Electrical Box Insert

EBI-60 SIZES

Single box	1-13/16 x 3-3/4 x 1/4 in. (47 x 95 x 6.7 mm)
Double box	3-3/4 x 3-3/4 x 1/4 in. (95 x 95 x 6.7 mm)

COLOR

Black

GENERAL APPLICATION AND USES

EBI-60s have been designed specifically to seal electrical outlet boxes against the spread of fire, smoke, fumes and toxic gases in 1 & 2 hour rated wall assemblies.
Remove any dust, dirt and oil from surfaces with a dry cloth. Peel off the protective adhesive backing and firmly press pad to inside back panel of the metal box making sure the pad is centered. Use only one pad, sized appropriately for either single or double outlet boxes.
**When the ground screw is located on the inside back panel, make a cut in the pad to access teh exposed screw. DO NOT REMOVE MATERIAL FROM PAD.
EBI-60s installation to comply with article 370-16 of the National Electrical Code (NFPA 70). Manufacturer recommends that the EBI-60 to be installed by qualified electricians. EBI-60 must be installed in compliance with the listed system designs published by Underwriters Laboratories (UL & ULC). Refer to their published Fire Resistance Directories or website.

PRODUCT FEATURES

- Environmentally Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restriction and is environmentally friendly
- Non conductive
- Pre-cut to fit standard box sizes
- Easily installed
- Highly intumescent, up to 24 times
- Post-consumer recyclable

TECHNICAL DATA

Base	Polyisobutylene Resin
Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 32°F (0°C) prior to installation.
Curing System	One-component – Non curing
VOC (less water)	0 g/L
Solids	100%
Freeze/Thaw Stability	No impact on sealant by frost

Color	Black
Volume Expansion	16 to 24 times (free expansion)
Application Temperature	40°F to 95°F (4°C to 35°C)
In-Service Temperature	Up to 120°F (49°C)
Expansion Temperature	320°F (160°C)
Storage Temperature	35°F to 120°F (2°C to 49°C)
Specific Gravity	1.5 to 1.7
pH	Not determined.

PDS - EBI-60

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: By hand.
- Cleaning: Warm water.

Installation Preparation

- EBI-60 should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Chemical Resistance

- Good resistance to water.

Special Application

- EBI-60s should be installed by qualified electicians and in application described in UL's Fire Resistance Directory - Volume 1.
- When the ground screw is located on the inside back panel, make a cut in the pad to access the screw. DO NOT REMOVE MATERIAL FROM PAD.

MAINTENANCE

The EBI-60 Do not require maintenance after installation. Install new EBI-60 pad if original has been damaged.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

ORDERING INFORMATION

Cat No.	Size	Color	Dispenser	Units per Case	Units per Skid
EBI-F1	4 by 4 inch (102 by 102 mm) Pad	Black	By Hand	10	7200
EBI-F2	2 by 4 inch (52 by 102 mm) Pad	Black	By Hand	20	14400

FCW-44 *Firestop Cable Way*

PRODUCT DESCRIPTION

PFP Partners' FCW-44s are made with a durable two-piece powder coated steel case that contains an intumescent core designed to firestop combustible pipes and cables. In the case of a fire, the FCW's intumescent core expands to constrict to close off and seal around cables and voids.

FCW-44 have been tested and listed as a firestop device for use on voids and for penetrations of conduits, cables and wires.

The FCW-44 two-piece design allows an easy retrofit solution to pre-existing cable or void installations.

The FCW-44s are non-hazardous, safe for the environment and do not require special shipping procedures. It does not contain solvents and is VOC compliant. Cleaning up is easy with just soap and water (non-cured state.)

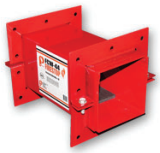
Meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

FCW-44s have been designed specifically to seal electrical cables/wires and future cable/wire penetrations against the spread of fire, smoke, fumes and toxic gases in 1 & 2 hour rated wall assemblies.

FCW-44s have been tested and approved as a firestop device by Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-814, CAN/ULC S115 & UL 1479. Refer to WHi published Fire Resistance Directories or its website. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. WHi listing designs).

SECTION CONTENTS **Page No.**



FCW-44 – Firestop Cable Way

PACKAGING

4 inch by 4 inch by 10-1/2 inches
(101 mm by 101 mm by 267 mm)

COLOR

Red

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Walls
- Framed Walls

Firestopping Penetration Items:

- Conduits
- Electrical Cables
- Electrical Wires
- Voids

PRODUCT FEATURES

- Easily installed - in new installations or for retrofitting existing installations
- Easily identifiable as a firestop device
- Environmentally Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Inert formula will not interact with substrates
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Product is mold and mildew resistant
- Post-consumer recyclable

TECHNICAL DATA

Housing	Two piece powder coated steel case
Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 45°F (7°C) prior to installation.
In-Service Temperature	Up to 180°F (82°C)

Color	Red
Expansion Material	Intumescent core
Volume Expansion	1000% (free expansion)
Intumescent Temperature	302°F (150°C)
VOC (less water)	0 g/L

PDS - FCW-44

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: By hand. Cut correct size of opening; slide FCW-44 into opening; attach clamps to both sides of the wall; install cables and smoke plugs.

Installation Preparation

- FCW-44s should be applied to surfaces that are dry, clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- FCW-44s should not be installed in submerged conditions.

MAINTENANCE

FCW-44s do not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

FCW-44s are chemically compatible with all types of metal and plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original container. Storage in high heat, high humidity conditions may reduce products shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C). Application of this product is not recommended when frost or moisture is present on the surface..

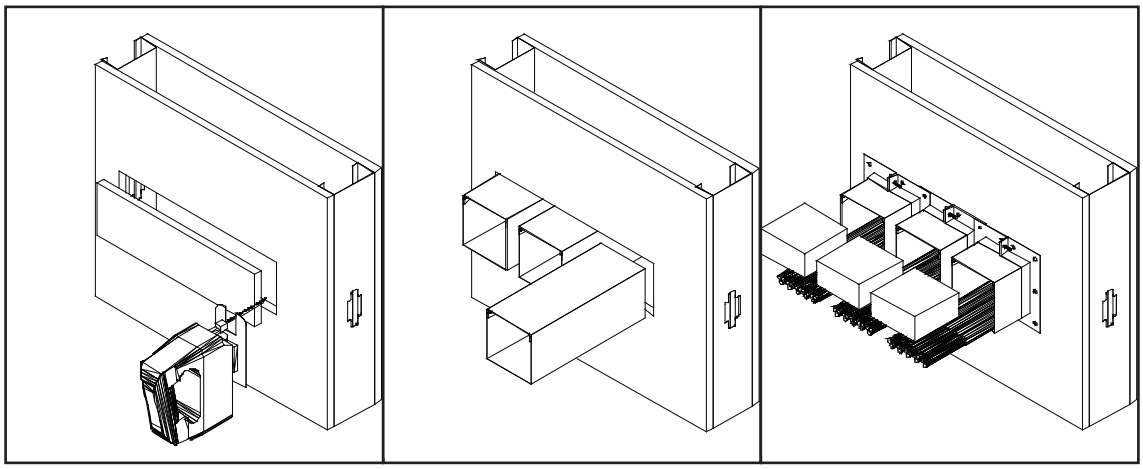
ORDERING INFORMATION

FCW-44 - Firestop Cable Way - Packaging

Cat No.	Size	Mounting Bracket	Color	Units per Carton	Units per Skid
FCW-44FCB	4 inch by 4 inch by 10-1/2 inch (101 mm by 101 mm by 267 mm)	Corner Brackets	Red	12	720
FCW-44FWC	4 inch by 4 inch by 10-1/2 inch (101 mm by 101 mm by 267 mm)	Wall Clamps	Red	12	720

Installation Instructions for Multiple FCW-44 Using the Wall Clamps

New Construction

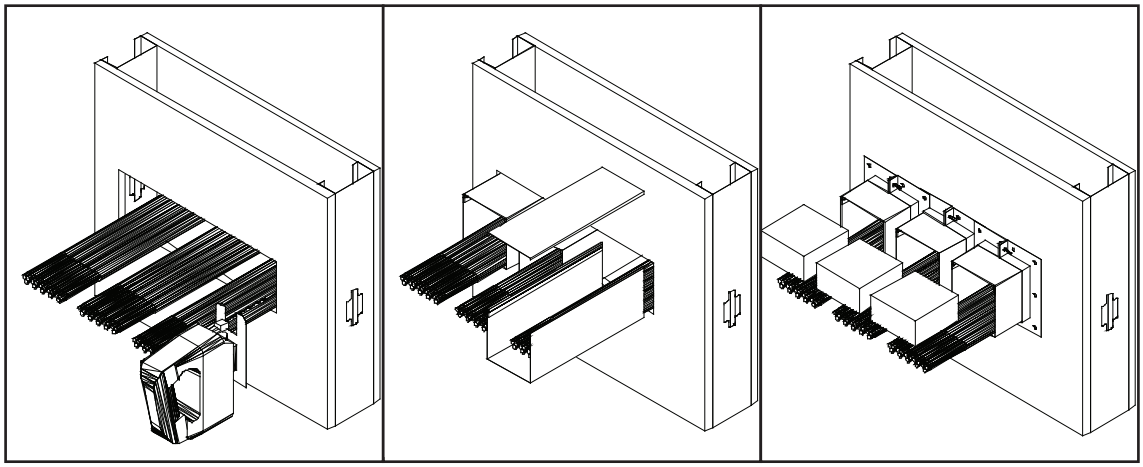


Cut correct size of opening.

Slide the FCW-44s into opening; leaving 28.6 mm (1-1/8 in.) between FCWs.

Attach brackets together and then attach brackets to both sides of the wall; install cables and smoke plugs.

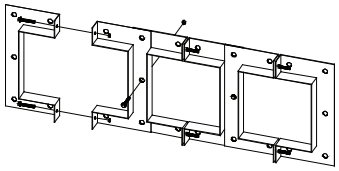
Retrofitting



Cut correct size of opening.

Fit cables into bottom of the FCW-44; close the lid and slide the FCW-44 into the opening leave 28.6 mm (1-1./8) between FCWs.

Attach brackets together and then attach brackets to both sides of the wall; install smoke plugs.



Bolt brackets together using the center hole; then install and bolt the brackets together at the top and bottom of the bracket attaching the brackets to the wall using drywall screws or concrete anchors depending on wall type.

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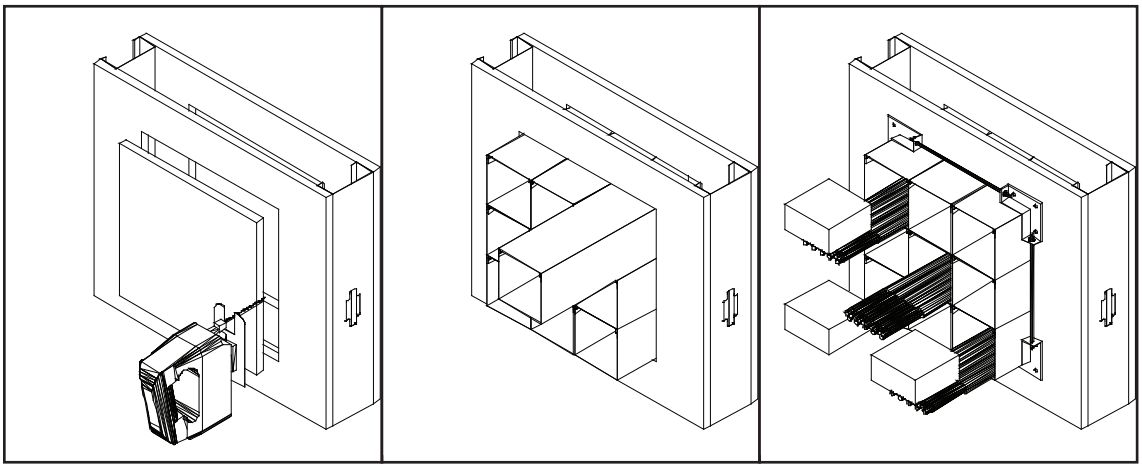
Installation Instructions for Multiple FCW-44 Using the Corner Brackets

New Construction

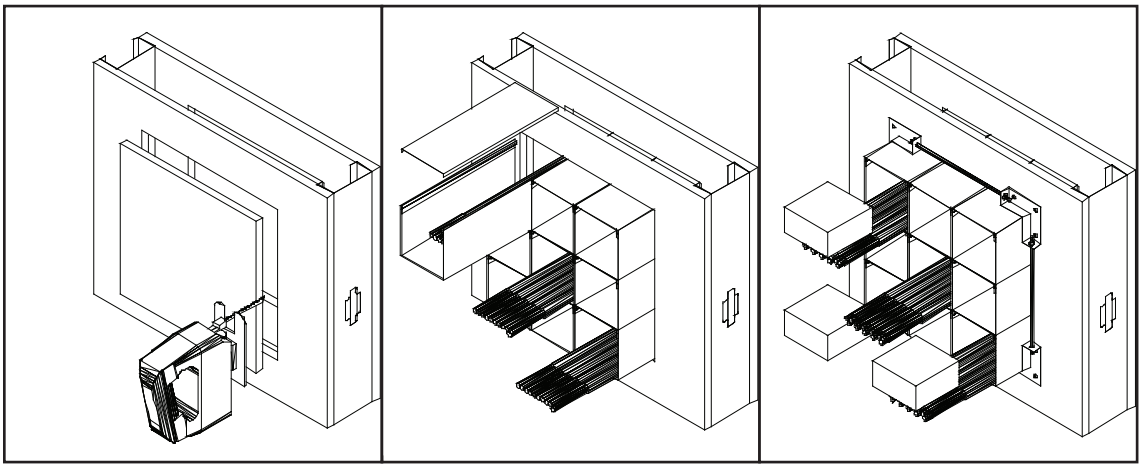


Cut opening to the correct size.

Slide the FCW-44s into opening; FCWs to be stack together.

Attach corner brackets and threaded-rods to both sides of the wall; install cables & smoke plugs.

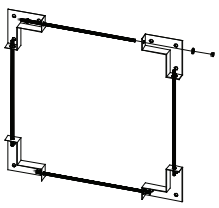
Retrofitting



Cut opening to the correct size.

Fit cables into the bottom of the FCW-44; close the lid and slide the FCW-44 in the opening stacking the FCWs together

Attach corner brackets and threaded-rods to both sides of the wall; install smoke plugs.



Bolt corner brackets together using the thread rod, cut to fit number of FCW-44s; then install the bolted corner brackets to both sides, attaching the corner brackets to wall using drywall screws or concrete anchors depending on wall type.

MP1 *Firestop Intumescent Putty Pads*

PRODUCT DESCRIPTION

PFP Partners' MP1s are a moldable intumescent firestop pad designed to be easily installed to metallic and non-metallic electrical outlet boxes. The MP1 has been designed specifically to seal electrical switches and outlet boxes against the spread of fire, smoke, fumes and toxic gases in 1 and 2 hour rated assemblies.
The MP1 provides a flexible non-hardening seal that is non-reactive with most substrates.
MP1 putty pads easily adhere and mold to the outside surface of the electrical box.
MP1s are non-hazardous, safe for the environment ad do not require special shipping procedures. They do not contain solvents and are VOC compliant. Cleaning up is easy.

GENERAL APPLICATION AND USES

MP1s have been designed specifically to seal metallic and non-metallic electrical outlet boxes against the spread of fire, smoke, fumes and toxic gases in 1 & 2 hour rated wall assemblies.
Remove any dust, dirt and oil from surfaces with dry cloth. Peel off the plastic liner on one side of the pad. Align pad with side of box, allow for an overlap onto stud and remove the remaining plastic liner and work pad to cover all surfaces of box. To ensure a proper fit pad can be cut to form tight seal around cables and conduits. To seal the conduits inside box, work putty into a ball and pack inside conduit. Only one pad (minimum 1/8 inch thickness) is required for a 1 or 2 hour rated wall assembly.
MP1s must be installed in compliance with the listed system designs published by third party testing laboratories: Underwriters Laboratories (UL & ULC) or Intertek Testing Services - Warnock Hersey (WHi). Refer to their published Fire Resistance Directories or their website. The manufacturer recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

MP1- Putty Pads

PACKAGING
7 inches by 7 inches by 1/8 inches
(178 mm by 178 mm by 3.2 mm)

COLOR
Red

PRODUCT FEATURES

- Elastic properties - non-hardening
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped without restrictions and is environmentally friendly
- Inert formula will not interact with substrates
- Improves STC Values and upgrades sound quality
- Easy installation and cleanup
- Post-consumer recyclable

TECHNICAL DATA

Base	Polyisobutylene Resin
Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 45°F (7°C) prior to installation.
Curing System	One-component - Non curing
VOC (less water)	0 g/L
Solids	100%
Freeze/Thaw Stability	No impact on sealant by frost
Surface Burning Characteristics (ASTM E-84)	Flame Spread Index < 25 Smoke Development Index < 50

Color	Red
In-Service Temperature	Up to 120°F (49°C)
Volume Expansion	>300% (free expansion)
Expansion Temperature	220°F (104°C)
Storage Temperature	40°F to 90°F (4°C to 32°C)
Specific Gravity	1.48
pH	Not determined.
Application Temperature	33°F to 90°F (1°C to 32°C)
STC Rating	60*

*Tested in U411 Wall Assembly, ASTM E-90

PDS - MP1

lix

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: By hand.
- Cleaning: Warm water immediately after application.
- Tooling: Clean with water.

Installation Preparation

- MP1s should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended. As with all sealants, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- MP1s should not be installed in submerged conditions.
- Do not expose MP1s to water

MAINTENANCE

MP1s do not require maintenance after installation. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

MP1s are chemically compatible with all types of metal and plastic jacketed wires and cables listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C).

Application of this product is not recommended when frost or moisture is present on the surface to be sealed..

ORDERING INFORMATION

Cat No.	Size	Color	Dispenser	Units per Case	Units per Skid
PPF	7 x 7 x 1/8 inches (178 x 178 x 3.2 mm)	Red	By Hand	20	4800

PDS - MP1

Pillow *Firestop Intumescent Pillows*

PRODUCT DESCRIPTION

PFP Partners' Pillow is a pliable brick shape firestopping device. The Pillow's brick shape makes firestopping medium to large through-penetration easy; just stack and compress. When exposed to fire or very high temperatures, the core of the intumescent Pillow will expand and seal around the penetration(s), forming a solid barrier against the spread of fire, smoke, fumes and toxic gasses in 1, 2 and 3 hour rated assemblies.

The Pillows are easy to install and reusable. This makes the Pillow an ideal choice for firestopping through-penetrations that may require frequent retrofitting (i.e. cable trays, fire optics, control cables, electrical conduits, etc.)

Pillows are non-hazardous, safe for the environment, and do not require special shipping procedures. Pillows do not contain solvents and are VOC compliant.

GENERAL APPLICATION AND USES

Pillows have been designed specifically to seal voids, cables trays and metallic through-penetrations against the spread of fire, smoke, fumes and toxic gases in 1, 2 & 3 hour rated assemblies.

Remove any dust, dirt and oil from surfaces with dry cloth and remove sharp edges that may snag the pillows during installation and/or removal. The Pillow is installed with 9 inch (229 mm) dimension projecting through the wall or floor assembly. Stack and compress (minimum 25 percent) pillows. Start by installing vertical Pillows, against the edge of the opening; subsequent Pillows are than stacked and compressed in horizontal rows between the vertical rows. Any voids between Pillows or between Pillows and penetrations should be sealed with either PFP Partners 3300PS (recommended for openings that are subject to retrofitting or re-entry) or PFP Partners 3600EX.

The Pillow has been tested and approved as an effective firestop by Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-814, CAN/ULC S115 & UL 1479. Pillows must be installed in compliance with the Intertek Testing Services - Warnock Hersey listed system designs. Refer to their published Fire Resistance Directories or website. The manufacturer recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Walls

Firestopping Penetration Items:

- Voids
- Metallic pipe, conduit and tubing
- Electrical cables, cable trays, busways
- Group penetrations

SECTION CONTENTS Page No.

Pillow

PACKAGING

FSP392 - 3 inches by 9 inches by 2 inches (76 mm by 229 mm by 51 mm)
FSP692 - 6 inches by 9 inches by 2 inches (152 mm by 229 mm by 51 mm)

COLOR

Red

PRODUCT FEATURES

- Pliable brick - non-hardening with a highly intumescent core
- Environmentally Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Can be shipped with restrictions and is environmentally safe
- Improves STC Values and upgrades sound quality
- Easily installed and reusable
- Post-consumer recyclable
- Pillow materials are totally encapsulated within a red poly covering. - DO NOT REMOVE OR PUNCTURE RED POLY COVERING.

TECHNICAL DATA

Physical State	Pliable red poly brick	Expansion Temperature	320°F (160°C)
Application Temperature	33°F to 90°F (1°C to 32°C)	In-Service Temperature	Up to 120°F (49°C)

- Shelf Life - Not applicable when stored in its original undamaged, unopened packaging (store in a cool dry place 40°F to 90°F (4°C to 32°C). A stock rotation program is recommended.

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Installed by hand.

Installation Preparation

- Pillows should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- Pillows should not be installed in submerged conditions. Do Not expose Pillows to water. **DO NOT REMOVE OR PUNCTURE RED POLY COVERING.**

MAINTENANCE

The Pillows do not require maintenance after installation. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

ESTIMATING NUMBER OF PILLOWS

Measure the horizontal and vertical dimensions of the opening in inches. Divide the vertical dimension by 6 and multiple by 2 gives the number of vertical pillows required. Subtract 2 x 1.5 (compressed vertical pillows) from the overall horizontal dimension and then divide by 6. This gives the number of columns of compressed pillows that will be required. Divide the vertical dimension by 1.5 to get the number of rows required. Multiple the required rows by the required columns and then adding the number of vertical pillows will give the total number of pillows required for a blank opening.

When a penetrant is present, subtract the number of pillows displaced by the penetrant. Divide the horizontal dimension of the penetrant by 6. Multiply the vertical dimension of the penetrant by the percentage of fill then divide by 1.5. Multiply the number of rows by the number of columns gives the number of pillows displaced. Then subtract the number of pillows displaced from the total blank opening number will give the total required pillows.

Example:

A concrete wall opening that is 36 in. by 6 in. with a 4 in. by 24 in. cable tray filled to 50 percent.

Number of pillows required for the blank opening:

1. **VP** - Number of vertical pillows: (6 in. / 6) * 2 = 2 FSP692 vertical pillows
2. **NPC** - Number of pillow columns: (36 in. – (2*1.5)) / 6 = 5.5 5 columns of FSP692 and 1 columns of FSP392
3. **NPR** - Number of pillows rows: 6 / 1.5 = 4 rows
4. **TPB** - Total number of pillows for blank opening is: (VP + (NPC*NPR)) = 2 FSP692 + (5 (FSP692)*4 + 1(FSP392) *4) = 22 FSP692 + 4 FSP392

Number of pillows displaced by the cable tray is:

1. **NPCD** - Number of pillow columns displaced: 24 in. / 6 = 4 4 columns of FSP692
2. **NPRD** - Number of pillows rows displaced: 4 in. multiplied by 50 percent (percentage of fill) (4 * .5) / 1.5 = 1.3 rows equals 1 row (compression will be great in cable tray then required)
3. **TPD** - Total number of pillows displaced by cable tray is: (NPCD*NPRD) = (4 (FSP692)*1) = 4 FSP692

Overall number of pillows required:

TPB – **TPD** = 22 (FSP692) – 4 (FSP692) + 4 (FSP392) = 18 (FSP692) and 4 (FSP392)

ORDERING INFORMATION

Pillows - Packaging

Cat No.	Size	Color	Applied	Units per Case	Units per Skid
PIL-F1	2 inches x 6 inches x 9 inches (51 mm x 152 mm x 229 mm)	Red	By Hand	10	480
PIL-F2	2 inches x 3 inches x 9 inches (51 mm x 76 mm x 229 mm)	Red	By Hand	20	960

PPC Collar *Plastic Pipe Collar*

PRODUCT DESCRIPTION

PFP Partners' PPC Collars are made with a durable one-piece powder-coated steel case that contains intumescent strips designed to firestop combustible pipes. In case of a fire, the collar's intumescent strips expand to constrict the combustible pipe.

PPC Collars have been tested and listed as a firestop device for use on ABS, CPVC, PVC and PP piping systems.

PPC Collars have been tested and listed for use in the United States and in Canada.

The PPC Collars are non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant.

Meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

SECTION CONTENTS **Page No.**

PPC – Collars

GENERAL APPLICATION AND USES

PPC Collars have been designed specifically to seal through-penetrations of pipes against the spread of fire, smoke, fumes and toxic gases in 1, 2 & 3 hour rated floor and wall assemblies.

The PPC Collars have been tested and approved as a firestop device by third party testing agencies; Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-814, CAN/ULC S115 (50 Pa pressure differential), & UL 1479.

Refer to UL or WHi respective published Fire Resistance Directories or their websites. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

PACKAGING

PPC 1.5 - 1-1/2 inch (38 mm)
PPC 2.0 - 2 inch (51 mm)
PPC 3.0 - 3 inch (75 mm)
PPC 4.0 - 4 inch (101 mm)
PPC 6.0 - 6 inch (152 mm)

COLOR

Red

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- ccABS and ABS pipes
- CPVC pipes
- ccPVC & PVC pipes
- FRPP pipes
- Aquatherm PP pipes
- PEX pipes

PRODUCT FEATURES

- Used on vented or closed piping systems
- Easily installed
- Environmental Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Inert formula will not interact with substrates
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Product is mold and mildew resistant
- Post-consumer recyclable

TECHNICAL DATA

Base	One piece powder coated steel case
Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 45°F (7°C) prior to installation.
In-Service Temperature	40°F to 90°F (4°C to 32°C)

Color	Red
Expansion Material	Intumescent strips with FG backing
Volume Expansion	1000% (free expansion)
Intumescent Temperature	302°F (150°C)
VOC	0 g/L

PDS - PPC

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Place collar around pipe and lock collar's clasp, then attach collar to substrate with appropriate anchors and washers; fasten all tabs to substrate.
- Number of Collars.
  - Walls: Two Collars - one on each side of wall
  - Floors: One Collar - one on underside of floor
- Caution: Some systems require mineral wool; do not apply sealant to wet mineral wool.. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS

Installation Preparation

- PPC Collars should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- PPC Collars should not be installed in submerged conditions.

MAINTENANCE

PPC Collars do not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

PPC Collars are chemically compatible with all types of plastic pipes listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C). Application of this product is not recommended when frost or moisture is present on the surface to be sealed..

ORDERING INFORMATION

PPC-Collars - Packaging

Cat No.	Size	Color	Units per Case	Units per Skid
C1.5F	For use on nom 1-1/2 inch (38 mm) ID pipe	Red	12	960
C2.0F	For use on nom 2 inch (51 mm) ID pipe	Red	12	960
C3.0F	For use on nom 3 inch (76 mm) ID pipe	Red	12	960
C4.0F	For use on nom 4 inch (102 mm) ID pipe	Red	8	288
C6.0F	For use on nom 6 inch (152 mm) ID pipe	Red	6	216

WS1 *Intumescent Wrap Strip*

PRODUCT DESCRIPTION

PFP Partners' WS1 - The highly intumescent wrap strip is a flexible fiberglass backed strip, designed to firestop combustible pipes and insulated pipe penetrations. In the case of a fire, the intumescent strips expand to constrict and close off combustible pipes.

PFP Partners' WS1 has been tested and listed as a firestop device for use on ABS, CPVC, PVC PEX & PP piping systems.

The WS1 strip is non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant.

WS1 wrap strips are non-hazardous, safe for the environment and do not require special shipping procedures. WS1's do not contain solvents and are VOC compliant.

WS1 meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

The WS1 strip has been designed specifically to seal non-metallic through-penetrations against the spread of fire, smoke, fumes and toxic gases in 1, 2, 3 & 4 hour rated floor and wall assemblies.

WS1 strip has been tested and approved as an effective firestop by third party testing agencies: Underwriters Laboratories (UL & ULC) and Intertek Testing Services - Warnock Hersey (WHi) and meets the requirements of ASTM E-814, CAN/ULC S115 (50 Pa pressure differential) and UL 1479.

Refer to UL or WHi published Fire Resistance Directories or website. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

WS1 - Intumescent Wrap Strip

PACKAGING

2 inch by 40 foot (51 mm by 12.2 m) rolls

COLOR

Grey

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- ccABS and ABS pipes
- CPVC pipes
- ccPVC and PVC pipes
- PEX pipes
- FRPP pipes
- Aquatherm PP pipes

PRODUCT FEATURES

- Used on vented or closed piping systems
- Easily installed - wrap around penetration - no waste
- Environmentally Safe – No harmful components, solvent free and is VOC compliant – LEEDs – California Air Resource Board SCM Districts – Rule 113 – South Coast Air Quality Management Districts (SCAQMD)
- Inert formula will not interact with substrates
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Product is mold and mildew resistant
- Post-consumer recyclable

TECHNICAL DATA

Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 45°F (7°C) prior to installation.

Expansion Material	Intumescent strips with FG backing
Volume Expansion	1000% (free expansion)
Intumescent Temperature	302°F (150°C)
In-Service Temperature	40°F to 90°F (4°C to 32°C)
VOC (less water)	0 g/L

PDS - WS1

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Tightly wrap the WS1 strips (refer to applicable listing regarding number of layers) around penetration and slide the strips into the annular space between penetrant and substrate; use aluminum tape to secure wrap strips.
- Application Requirements - Refer to Applicable Listing:
  - Walls: Installation required on both sides of the wall.
  - Floors: Generally requires installation on the underside of the floor.
- Caution: Some systems require mineral wool; do not apply sealant to wet mineral wool. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS

Installation Preparation

- WS1 strips should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- WS1 should not be installed in submerged conditions.

MAINTENANCE

WS1 does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

WS1 is chemically compatible with all types of plastic pipes listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products' shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C). Application of this product is not recommended when frost or moisture is present on the surface to be sealed..

ORDERING INFORMATION

WS1- Wrap Strip - Packaging

Cat No.	Size	Color	Units per Case	Units per Skid
S2-40F	0.1 inch thick by 2 inches wide by 40 feet long (2.5 mm thick by 51 mm wide by 12.2 m long)	Grey	1 roll	100 rolls

WS2 *Intumescent Wrap Strip*

PRODUCT DESCRIPTION

PFP Partners' WS2 - A highly intumescent wrap strip designed to firestop combustible pipes and insulated pipe penetrations. In the case of a fire, the intumescent strips expand to constrict and close off combustible pipes.

PFP Partners' WS2 strips have been tested and listed as a firestop device for use on ABS, CPVC, PVC PEX & PP piping systems.

The WS2 strips are non-hazardous, safe for the environment and does not require special shipping procedures. It does not contain solvents and is VOC compliant.

The WS2 strips are non-hazardous, safe for the environment and do not require special shipping procedures. The WS2 strips do not contain solvents and are VOC compliant.

Meets the green building guidelines for adhesives and sealants as specified by both the US and Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) Green Building Rating Systems.

GENERAL APPLICATION AND USES

The WS2 strip has been designed specifically to seal non-metallic through-penetrations against the spread of fire, smoke, fumes and toxic gases in 1 & 2 hour rated floor and wall assemblies.

The WS2 strips have been tested and approved as an effective firestop by third party testing agencies: Underwriters Laboratories (UL & ULC) and meets the requirements of ASTM E-814 and UL 1479 at a minimum positive pressure of 0.01 inches (2.5 Pa) of water.

The WS2 strips can be used for slip-in applications (where the strip is wrapped around the penetration and slipped into the annular space) and do-it-yourself adaptive metal collar applications. When using the adaptive metal collar, apply the WS2-strips as required and then calculate the length of adaptive metal collar needed to completely wrap around the outside diameter of WS2 strips plus 1 in. (25 mm) for overlap. Secure the adaptive metal collar around the penetration with min 1/2 in. (13 mm) wide stainless steel hose clamps.

Refer to UL published Fire Resistance Directories or website. PFP Partners recommends that this product be installed by those trained in proper installation procedures (TQ Card) and be able to read and understand a firestop system design listing (i.e. UL and/or WHi listing designs).

SECTION CONTENTS **Page No.**

WS2 - Intumescent Wrap Strip

PACKAGING

1 in. x 1/4 in. by 12 foot (25 mm x 6 mm by 3.66 m) rolls
2 in. x 1/4 in. by 12 foot (51 mm x 6 mm by 3.66 m) rolls

COLOR

Black

ADAPTIVE METAL COLLAR

PACKAGING

1 in. x 50 foot (25 mm x 15.2 m) roll
2 in. x 50 foot (51 mm x 15.2 m) roll

Tested and Classified for use in Fire Rated Assemblies:

- Concrete Floors
- Concrete Walls
- Framed Floors
- Framed Walls

Firestopping Penetration Items:

- ccABS and ABS pipes
- CPVC pipes
- ccPVC and PVC pipes
- PEX pipes
- FRPP pipes

PRODUCT FEATURES

- Used on vented or closed piping systems
- Easily installed - wrap around penetration - no waste
- Complies with the Environmental Exposure Testing of Accelerated Aging and High Humidity as per UL 1479
- Inert formula will not interact with substrates
- Product is stable over several freeze/thaw cycles; however, care should be taken to not freeze the product
- Product is mold and mildew resistant
- Post-consumer recyclable

TECHNICAL DATA

Shelf Life	Not applicable when stored in its original undamaged, unopened packaging (when stored in a cool dry place, 40°F to 90°F (4°C to 32°C)). All items should be warmed to at least 45°F (7°C) prior to installation.

Expansion Material	Intumescent strips
Intumescent Temperature	375°F (190°C)
Highest Intumescent	575°F to 1110°F (302°C to 593°C)
In-Service Temperature	40°F to 90°F (4°C to 32°C)
VOC (less water)	<10 g/L

Recycled
Recyclable

1.800.810.1788 Technical Support
1.800.810.1788 Customer Service

www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

INSTALLATION GUIDELINES AND SUGGESTED USE

Application

- Method: Tightly wrap the WS2 strips (refer to applicable listing regarding the number of layers) around penetration and slide the strips into the annular space between penetrant and substrate; use aluminum tape to secure wrap strips.
- Application Requirements - Refer to Applicable Listing:
  - Walls: Installation required on both sides of the wall.
  - Floors: Generally requires installation on the underside of the floor.
- Caution: Some systems require mineral wool; do not apply sealant to wet mineral wool.. Mineral wool may cause eye, skin or respiratory tract irritation; consult mineral wool manufacturer's MSDS

Installation Preparation

- WS2 strips should be applied to surfaces that are clean and free of dust, dirt and grease.

Health and Safety

- Hand and eye protection is highly recommended, consult the MSDS.

First Aid

- In case of contact with eyes, flush with large amount of water and consult a physician. For skin contact, wash thoroughly with soapy water. Contact a physician if skin irritation develops or persists. Consult the MSDS for additional information.

Special Application

- WS2 strips should not be installed in submerged conditions.

MAINTENANCE

The WS2 does not require maintenance after installation. If, after installation, the firestop sealant is damaged or cut, repairs should be made with the same sealant. Use only materials approved by through-penetration firestop manufacturer as suitable for repair of original seal. Never mix different manufacturer's firestopping materials.

CHEMICAL COMPATIBILITY

The WS2 are chemically compatible with all types of plastic pipes listed in the system designs.

STORAGE, HANDLING, TRANSPORTATION

Manufacturer recommends storage temperatures between 40°F to 90°F (4°C to 32°C). Keep product stored in a protected covered area in its original containers. Storage in high heat, high humidity conditions may reduce products shelf life. A stock rotation program is recommended. Transportation temperatures 45°F to 85°F (7°C to 30°C) DO NOT ALLOW TO FREEZE.

WARRANTY

Passive Fire Protection Partners will not accept liability for more than product refund. Any claim regarding product defect must be received in writing within 1 year from date of shipment. Passive Fire Protection Partners makes no other warranty or guarantee, express or implied, including warranties or fitness for a particular purpose or merchantability. The seller shall assume no other liability for incidental or consequential damages arising out of the sale or use of this product.

LIMITATIONS

This product is not designed to be a waterproof seal. Not recommended for continuous submersion or use below the waterline. For best results, store and install above 45°F (7°C). Application of this product is not recommended when frost or moisture is present on the surface to be sealed.

ORDERING INFORMATION

WS2 - Intumescent Wrap Strip - Packaging

Cat No.	Size	Color	Units per Case	Units per Skid
S22-12F	0.25 inch thick by 2 inches wide by 12 feet long (6 mm thick by 51 mm wide by 3.66 m long)	Black	1 roll	100 rolls

Adaptive Metal Collar - Packaging

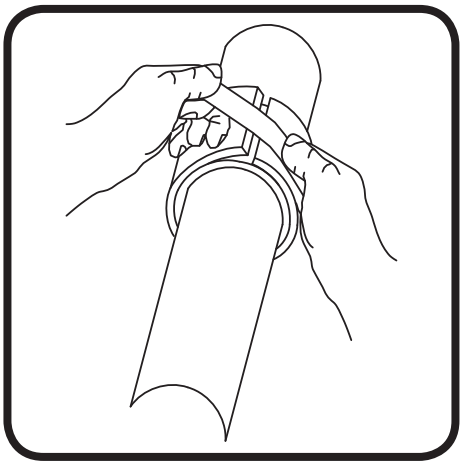
Cat No.	Size	Color	Units per Case	Units per Skid
M-1-50F	1 inch wide by 50 foot (25 mm by 15.2 m) roll	Metal	1 roll	100 rolls
M-2-50F	2 inch wide by 50 foot (51 mm by 15.2 m) roll	Metal	1 roll	100 rolls

ADAPTIVE COLLAR & WS2 INSTALLATION

Step 1.

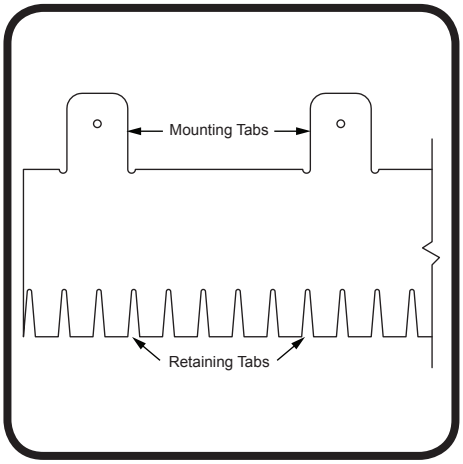
Clean the area around the non-metallic pipe where the PFP Partners' WS2 and Adaptive Collar is to be installed. Seal the annular space around the pipe with PFP Partners' 3600EX (walls both sides; floors: top side - Refer to UL listed system design for depth and additional information).

Cut the WS2 to the size of the non-metallic pipe. WS2 is tightly wrapped around penetration (film side exposed) and temporarily held in position using tape, wire or equivalent. If the listed system design requires additional wrap strips, overlay layers of the WS2 on top of each other. The butted ends in successive layers are to be offset.



2a.

Calculate the required length of the Adaptive Collar (min 0.41 mm (0.016 in.) galv. sheet steel) to completely cover the outer diameter of the installed WS2 strips, plus overlap.



PDS-WS2

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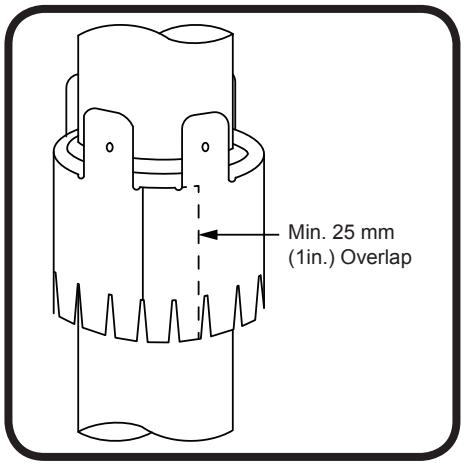
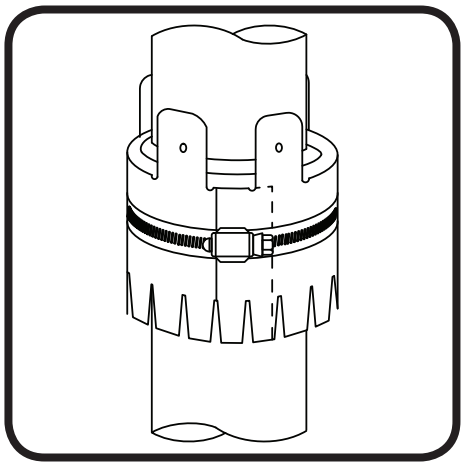
Step 2b. Adaptive Collar cut to completely cover the outer diameter of the installed WS2 strips, plus an addition of 25 mm (1 in.) overlap.



3. Adaptive Collar secured around the WS2 strips and penetration using min. 13 mm wide by 7 mm thick (0.5 in. wide by 0.028 in. thick) stainless steel hose clamp installed at mid-height of the Adaptive Collar.



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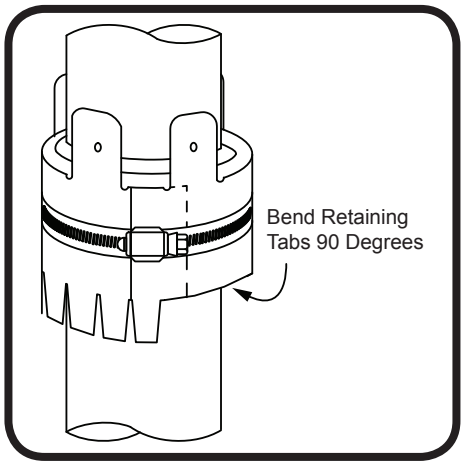
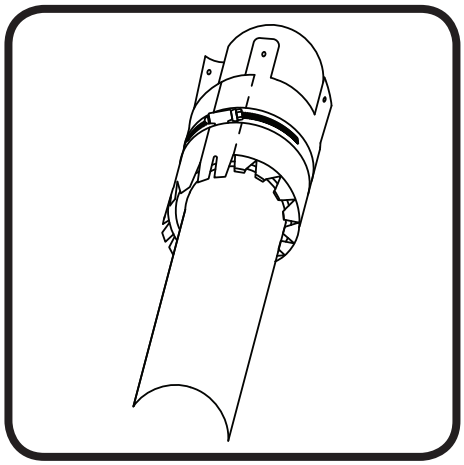
Step 4a. Bend retaining tabs 90 degrees towards the penetration. Tabs may be bent flush against penetration or trimmed to length to cover the WS2 strip layers.

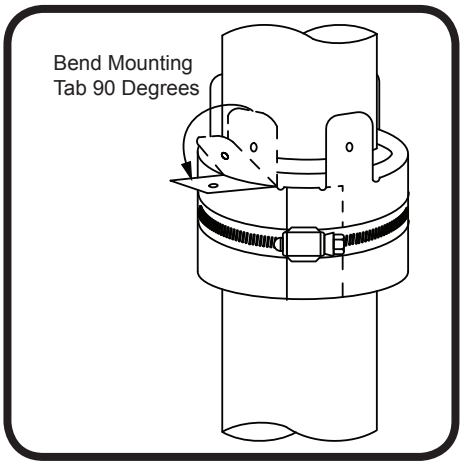


4b. Tabs may be bent flush against penetration or trimmed to length to cover the WS2 strip layers.



Step

5. Bend mounting tabs 90 degrees away from collar.



6. Slide the collar assembly against the wall or floor assembly and secure with appropriate steel fasteners and fender washers (Refer to the UL system design).

MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop 3300PS**
Product Use	Fire and Smoke Protection Putty Stick
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Polyisobutylene Resin	9003-29-6	< 30	N/A	N/A	N/A	N/A
Auxiliary Chemicals	N/A	< 70	N/A	N/A	N/A	N/A
Color Pigment	1309-37-1	< 1	N/A	N/A	10 mg/m^3	N/A

PHYSICAL PROPERTIES

Appearance / Physical State	Moldable, dark red putty	**Specific Gravity (@25°C)**	1.27 – 1.47
Odour	Negligible odour	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	N/A
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	N/A
Vapour Density (Air = 1)	N/A	**pH**	Not determined.
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	0

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	Carbon Dioxide, extinguish powder or water spray. Fight larger fire with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Dioxide, Carbon Monoxide, Hydrogen Bromide, Bromine.

MSDS - 3300PS

REACTIVITY DATA

Stability	Stable under normal storage conditions.
Condition of Reactivity	Avoid temperature above 216°C.
Incompatible Materials	Strong oxidizing and alkaline materials.
Hazardous Decomposition Products	Thermal decomposition may yield the following: Carbon Dioxide, Carbon Monoxide, Hydrogen Bromide, Bromine, Nitrogen, Phosphorous, Ammonia, 1,4-Dicyanobenzene, 4-cyanobenzene, and Antimony fumes.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Immediately flush eyes with large amount of water. Get immediate medical attention.
Skin Contact	Flush skin with large amount of soapy water. If irritation persists, get medical attention.
Inhalation	Remove person to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	Standard industrial ventilation is recommended during normal use.
Personal Protective Equipment	Not generally required during normal use and handling.
Eye Protection (Specify)	Safety glasses.
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	None normally required. However, if condition warrant, use a NIOSH/ MSHA approved respirator.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in original closed container and stored below 50°C (122°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Waste must be disposed of in accordance with federal, provincial and local environmental control regulations.
Special Shipping Instructions	N/A

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list, except ammonium polyphosphate.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	September 1, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50} =** Lethal Concentration, 50% **LD_{50} =** Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - 3500SI

MATERIAL SAFETY DATA SHEET

Product Identifier **Firestop 3500SI**
Product Use Fire and Smoke Stop Intumescent Spray
Manufacturer Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number (800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Acrylic-Vinyl Polymer	None known	< 50	N/A	N/A	N/A	N/A
Water	7732-18-5	< 30	N/A	N/A	N/E	N/E
Calcuim Carbonate	1317-65-3	< 30	N/A	N/A	N/A	N/E
Auxiliary Chemicals	N/A	< 15	N/A	N/A	N/A	N/A
Graphite	7782-42-5	< 10	N/A	N/A	2.0 mg/m^3	N/A
Titanium Dioxide	13463-67-7	< 1	N/A	N/A	10 mg/m^3	N/A
Aqueous Colorant, Blue	N/A	< 0.5	N/A	N/A	N/A	N/A

PHYSICAL PROPERTIES

Appearance / Physical State	Blue, viscous compound	**Specific Gravity (@25°C)**	1.27 – 1.37
Odour	Negligible odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic ordour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of water vapour	**pH**	7.5 - 8.5
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	44.6

FIRE AND EXPLOSION DATA

Flammability No
Means of Extinction Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C) N/A
Flash Point (°C) / Method N/A
Upper Flammable Limit (%, Vol.) N/A
Lower Flammable Limit (%, Vol.) N/A
Sensitivity to Mechanical Impact No
Sensitivity to Static Discharge No
Hazardous Combustion Products Carbon Monoxide, Carbon Dioxide, aliphatic hydrocarbons and hydrocarbon oxidation products.

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REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	Contact with incompatible substances
Incompatible Materials	Reacts with mineral acids and alkalis
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide, aliphatic hydrocarbons, and hydrocarbon oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	Standard industrial ventilation is recommended.
Personal Protective Equipment	Chemical safety glasses and gloves are required during normal use and handling.
Eye Protection (Specify)	Safety glasses
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory production is not normally required. Use a NIOSH/MSHA approved respirator if condition warrant.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in a closed container and stored between 4 - 32°C (40 - 90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local environmental control regulations.
Special Shipping Instructions	DO NOT FREEZE

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MSDS - 3500SI

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	April 28, 2008
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	New product, rev 001, April 28, 2008 Formulation updating, rev 002, August 24, 2009 Spelling mistake in Section of Precaution for Safe Handling and Use, rev 003, March 1, 2010 MSDS format changed, rev 004, September 24, 2012
Revision Date	September 12, 2017
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop 3600EX**
Product Use	Fire and Smoke Stop Intumescent Caulk
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Calcuim Carbonate	1317-65-3	< 50	N/A	N/A	N/A	N/E
Acrylic Polymer	None known	< 45	N/A	N/A	N/A	N/A
Water	7732-18-5	< 25	N/A	N/A	N/E	N/E
Graphite	7782-42-5	< 10	N/A	N/A	2.0 mg/m^3	N/A
Auxiliary Chemicals	N/A	< 10	N/A	N/A	N/A	N/A
Iron Red Oxide[(1)]	1309-37-1	< 0.5	N/A	N/A	N/A	N/A
Iron Black Oxide[(2)]	1317-61-9	< 0.1	N/A	N/A	N/A	N/A
Titanium Dioxide[(3),(4)]	13463-67-7	< 2	N/A	N/A	10 mg/m^3	N/A
Iron Yellow Oxide[(4)]	51274-00-1	< 1	N/A	N/A	N/A	N/A
Aqueous Colorant, Blue[(5)]	N/A	< 0.5	N/A	N/A	N/A	N/A

(1) - Rust Red; (2) - Grey; (3) - White; (4) - Yellow; (5) - Blue

PHYSICAL PROPERTIES

Appearance / Physical State	Rust Red, viscous compound	**Specific Gravity (@25°C)**	1.40 – 1.50
Odour	Mild odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic odour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of Water vapour	**pH**	8.0 - 9.0
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	37.1

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide, Carbon Dioxide, Aliphatic Hydrocarbons and Hydrocarbon Oxidation products.

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MSDS - 3600EX

REACTIVITY DATA

Stability	Stable under normal storage conditions
Condition of Reactivity	Contact with incompatible substances.
Incompatible Materials	Reacts with mineral acids and alkalis
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide, Aliphatic Hydrocarbons and Hydrocarbon Oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush eyes with large quantities of water for 15 minutes and get medical attention.
Skin Contact	Wash with soap and water.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	Standard industrial ventilation is recommended.
Personal Protective Equipment	Chemical safety glasses and gloves were required during normal use and handling.
Eye Protection (Specify)	Face shield or chemical goggles are recommended .
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory protection is not normally required. Use a NIOSH/MSHA approved respirator if conditions warrant.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in original closed container and stored between 4-32°C (40-90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local regulations.
Special Shipping Instructions	DO NOT FREEZE

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	January 03, 2003
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	New formulation, rev 001, January 03, 2003 Ingredient information updating, rev 002, November 16, 2006 Formulation updating, rev 003, August 24, 2009 Spelling mistake on Section of Precaution fro Safe Handling and Use, rev 004, March 1, 2010 MSDS format change, rev 005, September 24, 2012
Revision Date	September 12, 2017
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50} =** Lethal Concentration, 50% **LD_{50} =** Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - 4100NS

MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop 4100NS**
Product Use	Fire and Smoke Stop Non-Sag Caulk and Sealant
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Calcuim Carbonate	1317-65-3	< 50	N/A	N/A	N/A	N/E
Vinyl Acetate Polymers	Not disclosed	< 40	N/A	N/A	N/A	N/A
Water	7732-18-5	< 25	N/A	N/A	N/E	N/E
Auxiliary Chemicals	N/A	< 10	N/A	N/A	N/A	N/A
Titanium Dioxide[1],[3]	13463-67-7	< 1	N/A	N/A	10 mg/m^3	N/A
Iron BlackOxide[1]	1317-61-9	< 0.1	N/A	N/A	N/A	N/A
Iron Red Oxide[2]	1309-37-1	< 0.5	N/A	N/A	N/A	N/A
Iron Yellow Oxide[4]	51274-00-1	< 0.5	N/A	N/A	N/A	N/A
Aqueous Colorant, Blue[5]	N/A	< 0.5	N/A	N/A	N/A	N/A

[1] - Grey; [2] - Red; [3] - White; [4] - Yellow; [5] - Blue

PHYSICAL PROPERTIES

Appearance / Physical State	Grey, viscous compound	**Specific Gravity (@25°C)**	1.40 – 1.50
Odour	Mild odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic ordour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	18.51880	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of water vapour	**pH**	8 - 9
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	53.9

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide

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1412 Derwent Way Delta, BC V3M 6H9

REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	Contact with incompatible substances
Incompatible Materials	Reacts with strong acids and liberates carbon dioxide
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide, and Hydrocarbon Oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	10 ppm for vinyl acetate monomer (ACHIH)
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	OSHA, NTP and ACGIH have not classifed this product as a carcinogen. However, Vinyl Acetate is identified by IARC as a potential carcinogen on testing on laboratory animals, but there is no evidence that it has caused cancer in human.
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use. .
Personal Protective Equipment	Not generally required during normal use and handling.
Eye Protection (Specify)	Face shield or chemical goggles are recommended .
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory was recommended if the product was installed in poorly ventilated areas.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in a closed containers and stored between 4 - 32°C (40 - 90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local environmental control regulations.
Special Shipping Instructions	DO NOT FREEZE

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email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

MSDS - 4100NS

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	June 13, 2001
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	New formulation, rev 001, March 22, 2002 New format MSDS, rev 002, September 16, 2004 Ingredient information updating, rev 003, November 10. 2006 Formulation updating, rev 004, August 24, 2009 Spelling mistake on Section of Precaution fro Safe Handling and Use, rev 005, March 1, 2010 MSDS format change, rev 006, September 24, 2012
Revision Date	September 12, 2017
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop 4100SL**
Product Use	Fire and Smoke Stop Self Leveled Sealant
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Calcuim Carbonate	1317-65-3	< 50	N/A	N/A	N/A	N/E
Water	7732-18-5	< 35	N/A	N/A	N/E	N/E
Vinyl Acetate Polymers	25067-01-0	< 30	N/A	N/A	N/A	N/A
Additives	N/A	< 5	N/A	N/A	N/A	N/A
Vinyl Acetate Monomer	108-05-4	< 0.1	11400 mg/m^3/4H	2900 mg/Kg	10 ppm	N/A
Iron Red Oxide[1]	1309-37-1	< 1	N/A	N/A	N/A	N/A

PHYSICAL PROPERTIES

Appearance / Physical State	Red, viscous compound	**Specific Gravity (@25°C)**	1.20 – 1.50
Odour	Mild odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic odour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	17.35	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of Water vapour	**pH**	8.0 - 10.0
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	26.0

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide

MSDS - 4100SL

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MSDS - 4100SL

REACTIVITY DATA

Stability	Stable under normal storage conditions
Condition of Reactivity	Contact with incompatible substances.
Incompatible Materials	Reacts with strong acids and liberates carbon dioxide
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide and Hydrocarbon Oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	10 ppm for vinyl acetate monomer (ACHIH)
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	OSHA, NTP and ACGIH have not classifed this product as a carcinogen. However, Vinyl Acetate is identified by IARC as a potential carcinogen on testing on laboratory animals, but there is no evidence that it has caused cancer in human.
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush eyes with large quantities of water for 15 minutes and get medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use.
Personal Protective Equipment	Not required. during normal use and handling.
Eye Protection (Specify)	Face shield or chemical goggles are recommended .
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory protection is not normally required. Use a NIOSH/MSHA approved respirator if conditions warrant.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in original closed container and stored between 4-32°C (40-90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local regulations.
Special Shipping Instructions	DO NOT FREEZE

MSDS - 4100SL

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	January 03, 2003
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	Formulation reviewing, rev 001, March 22, 2003 New format of MSDS, rev 002, September 10, 2004 Ingredient information updating, rev 003, November 10, 2006 Formulation updating, rev 004, August 24, 2009 Spelling mistake on Section of Precaution fro Safe Handling and Use, rev 005, March 1, 2010 MSDS format change, rev 006, September 24, 2012
Revision Date	September 22, 2014
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - 4800DW

MATERIAL SAFETY DATA SHEET

Product Identifier **Firestop 4800DW**
Product Use Fire and Smoke Stop Caulk and Sealant
Manufacturer Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number (800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Calcuim Carbonate	1317-65-3	< 50	N/A	N/A	N/A	N/E
Vinyl Acetate Polymers	Not disclosed	< 40	N/A	N/A	N/A	N/A
Water	7732-18-5	< 25	N/A	N/A	N/E	N/E
Auxiliary Chemicals	N/A	< 5	N/A	N/A	N/A	N/A
Iron Red Oxide[1]	1309-37-1	< 0.5	N/A	N/A	N/A	N/A
Iron BlackOxide[2]	1317-61-9	< 0.1	N/A	N/A	N/A	N/A
Titanium Dioxide[2],[3]	13463-67-7	< 1	N/A	N/A	10 mg/m^3	N/A
Iron Yellow Oxide[4]	51274-00-1	< 0.5	N/A	N/A	N/A	N/A
Aqueous Colorant, Blue[5]	N/A	< 0.5	N/A	N/A	N/A	N/A

[1] - Red; [2] - Grey; [3] - White; [4] - Yellow; [5] - Blue

PHYSICAL PROPERTIES

Appearance / Physical State	Red, viscous compound	**Specific Gravity (@25°C)**	1.40 – 1.50
Odour	Mild odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic ordour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	18.51880	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of water vapour	**pH**	8 - 9
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	32.5

FIRE AND EXPLOSION DATA

Flammability No
Means of Extinction Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C) N/A
Flash Point (°C) / Method N/A
Upper Flammable Limit (%, Vol.) N/A
Lower Flammable Limit (%, Vol.) N/A
Sensitivity to Mechanical Impact No
Sensitivity to Static Discharge No
Hazardous Combustion Products Carbon Monoxide and/or Carbon Dioxide

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REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	Contact with incompatible substances
Incompatible Materials	Reacts with strong acids and liberates carbon dioxide
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide, and Hydrocarbon Oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water immediately
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use. .
Personal Protective Equipment	Not generally required during normal use and handling.
Eye Protection (Specify)	Face shield or chemical goggles are recommended .
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory was recommended if the product was installed in poorly ventilated areas.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in a closed container stored between 4 - 32°C (40 - 90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local environmental control regulations.
Special Shipping Instructions	DO NOT FREEZE

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MSDS - 4800DW

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	June 13, 2001
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	New formulation, rev 001, March 22, 2002 New format MSDS, rev 002, September 16, 2004 Ingredient information updating, rev 003, November 10. 2006 MSDS reviewing, rev 004, December 30, 2008 Formulation updating, rev 005, August 24, 2009 Spelling mistake on Section of Precaution for Safe Handling and Use, rev 006, March 1, 2010 Formulation updating, rev 007, January 3, 2011 MSDS format change, rev 008, September 24, 2012
Revision Date	September 12, 2017
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50} =** Lethal Concentration, 50% **LD_{50} =** Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - 4800DW

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop 5100SP**
Product Use	Fire and Smoke Stop Sprayable Mastic
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Calcuim Carbonate	1317-65-3	< 45	N/A	N/A	N/A	N/E
Water	7732-18-5	< 35	N/A	N/A	N/E	N/E
Vinyl Acetate Polymers	Not disclosed	< 30	N/A	N/A	N/A	N/A
Modified Acrylic Polymers	Proprietary	< 10	N/A	N/A	N/A	N/E
Additives	N/A	< 5	N/A	N/A	N/A	N/A
Titanium Dioxide[1],[3]	13463-67-7	< 2	N/A	N/A	10 mg/m^3	N/A
Iron Black Oxide[1]	1317-61-9	< 0.1	N/A	N/A	N/A	N/A
Iron Red Oxide[2]	1309-37-1	< 0.5	N/A	N/A	N/A	N/A
Iron Yellow Oxide[4]	51274-00-1	< 0.5	N/A	N/A	N/A	N/A
Aqueous Colorant, Blue[5]	N/A	< 0.5	N/A	N/A	N/A	N/A

[1] - Grey; [2] - Red; [3] - White; [4] - Yellow; [5] - Blue

PHYSICAL PROPERTIES

Appearance / Physical State	Grey, viscous compound	**Specific Gravity (@25°C)**	1.15 – 1.35
Odour	Mild odour	**Evaporation Rate**	< 1
Odour Threshold	Slight aromatic odour	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	18.51880	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	of Water vapour	**pH**	8.0 - 9.0
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	81.3

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	Normal fire fighting procedures should be followed to avoid inhalation of smokes and gases.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide

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MSDS - 5100SP

REACTIVITY DATA

Stability	Stable under normal storage conditions
Condition of Reactivity	Contact with incompatible substances.
Incompatible Materials	Reacts with strong acids and liberates carbon dioxide
Hazardous Decomposition Products	Dried film forced to burn will produce: Carbon Monoxide, Carbon Dioxide and Hydrocarbon Oxidation products.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush eyes with large quantities of water for 15 minutes and get medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use.
Personal Protective Equipment	Not required. during normal use and handling.
Eye Protection (Specify)	Face shield or chemical goggles are recommended .
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	Respiratory protection is not normally required. Use a NIOSH/MSHA approved respirator if conditions warrant.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept in original closed container and stored between 4-32°C (40-90°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local regulations.
Special Shipping Instructions	DO NOT FREEZE

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Date of Issue	June 13, 2001
Telephone	(604) 515-1788
Website	www.firestop.com
Reason for Revision	Formulation reviewing, rev 001, March 22, 2002 New format of MSDS, rev 002, September 16, 2004 Ingredient information updating, rev 003, November 10, 2006 Formulation updating, rev 004, August 24, 2009 Spelling mistake on Section of Precaution for Safety Handling and Use, rev 005, March 1, 2010 MSDS format change, rev 006, September 24, 2012
Revision Date	September 12, 2017
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - EBI-60

MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop EBI-60**
Product Use	Electrical Outlet Box Insert
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Polybutenes Polymers	9003-29-6	< 30	N/A	N/A	N/A	N/E
Calcuim Carbonate	1317-65-3	< 30	N/A	N/A	10 mg/m^3	N/E
Natural Graphite	7782-42-5	< 60	N/A	N/A	2.0 mg/m^3	N/E
Sulfuric Acid	7664-93-9	< 15	N/A	N/A	1 mg/m^3	N/E
Nitric Acid)	7697-37-2	< 10	N/A	N/A	5.2 mg/m^3	N/E

NOTE: THE ACID COMPONENTS OF THIS PRODUCT ARE ENCAPSULATED WITHIN THE NATURAL GRAPHITE MATRIX. THEY DO NOT POSE A HAZARD DURING NORMAL USE OR HANDLING.

PHYSICAL PROPERTIES

Appearance / Physical State	Black, solid	**Specific Gravity (@25°C)**	1.50 – 1.70
Odour	Slight to none	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	Not determined.
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	Not determined.
Vapour Density (Air = 1)	N/A	**pH**	Not determined.
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	0

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	214 / (PMCC)
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Thermal decomposition or combustion may produce dense smoke, oxides of carbon, sulfur, nitrogen and low molecular weight organic compounds whose composition has not been characterized. Material volume will increase up to 200 times when exposed to intense heat.

REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	Material will expand when exposed to temperature above 150°C
Incompatible Materials	Reacts with strong oxidizing agents
Hazardous Decomposition Products	Carbon Monoxide and Carbon Dioxide.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	N/A
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	Standard industrial ventilation is recommended. .
Personal Protective Equipment	General protective and hygienic measures were required during normal use and handling.
Eye Protection (Specify)	Safety glasses with side-shields
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	None normally required. However, use a NIOSH / OSHA approved respirator if mist or vapours formation should occur.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required.
Storage Requirement	Keep under their original cover at temperature between 2 - 49°C (6 - 120°F).
Spills, Leaks or Releases	Not applicable.
Waste Disposal	Care should be taken to ensure that the material or its containers are disposed of in an approved facility, in accordance with state, provincial and local regulations.
Special Shipping Instructions	Not determined.

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MSDS - EBI-60

REGULATION INFORMATION

WHMIS	D2A, E
HMIS	Health 1, Flammability 0, Reactivity 0, Personal Protection B
TDG Regulation	None known
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 12, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop Cable Way - 44**
Product Use	Fire and Smoke Stop Cables Penetration
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Intumex L	N/A	N/A	N/A	N/A	N/A	N/E

PHYSICAL PROPERTIES

Appearance / Physical State	Red, solid	**Specific Gravity (@25°C)**	1.0
Odour	Odourless	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	Not determined.
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	Not determined.
Vapour Density (Air = 1)	N/A	**pH**	Not determined.
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	N/A

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide

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MSDS - FCW-44

REACTIVITY DATA

Stability	Stable at normal conditions.
Condition of Reactivity	No dangerous reactions.
Incompatible Materials	Reacts with strong oxidizing agents.
Hazardous Decomposition Products	Carbon Monoxide and Carbon Dioxide.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	N/A
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush eyes with large quantities of water for 15 minutes and get medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use.
Personal Protective Equipment	General protective and hygienic measures
Eye Protection (Specify)	Not applicable.
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	Not required.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required
Storage Requirement	Keep receptacles tightly sealed. Store in cool dry conditions.
Spills, Leaks or Releases	Not applicable.
Waste Disposal	Smaller quantities may be disposed of with household waste. Must be specially treated adhering to official regulations. Packaging that cannot be cleansed are to be disposed of in the same manner as the product..
Special Shipping Instructions	Not determined.

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 0, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material.
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 12, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - MP1 - Putty Pad

MATERIAL SAFETY DATA SHEET

Product Identifier **Firestop MP1 - Putty Pad**
Product Use Electrical Outlet Fire Protection Pad
Manufacturer Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number (800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Polyisobutene	9003-27-4	< 40	N/A	N/A	N/A	N/E
Calcuim Carbonate	1317-65-3	< 20	N/A	N/A	N/A	N/E
Auxiliary Chemicals	Not Available	< 50	N/A	N/A	N/A	N/E

PHYSICAL PROPERTIES

Appearance / Physical State	Red, pasty	**Specific Gravity (@25°C)**	1.50
Odour	Characteristic odour	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	> 100
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	0
Vapour Density (Air = 1)	N/A	**pH**	7 - 10
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	N/A

FIRE AND EXPLOSION DATA

Flammability No
Means of Extinction CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C) N/A
Flash Point (°C) / Method N/A
Upper Flammable Limit (%, Vol.) N/A
Lower Flammable Limit (%, Vol.) N/A
Sensitivity to Mechanical Impact No
Sensitivity to Static Discharge No
Hazardous Combustion Products Carbon Monoxide and/or Carbon Dioxide.

MSDS - MP1

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REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	Contact with incompatible substances
Incompatible Materials	Reacts with strong oxidizing agents
Hazardous Decomposition Products	Carbon Monoxide and Carbon Dioxide.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	Slight on skin and eyes
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use. .
Personal Protective Equipment	Not generally required during normal use and handling.
Eye Protection (Specify)	Not required.
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	Not required.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required.
Storage Requirement	Keep receptacles tightly sealed. Store in cool dry conditions.
Spills, Leaks or Releases	Do not allow production to reach sewage system or any watercourse. Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).).
Waste Disposal	Smaller quantities may be disposed of with household waste. Must be specially treated adhering to official regulations. Packaging that cannot be cleansed are to be disposed of in the same manner as the product.
Special Shipping Instructions	None

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MSDS - MP1 - Putty Pad

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0
TDG Regulation	None known
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 24, 2016
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop Pillow**
Product Use	Fire and Smoke Stop Pillow
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Mineral Wool Board

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Mineral Fiber	None	N/A	N/A	N/A	10 mg/m^3	N/A
Cure Resin	25104-55-6	N/A	N/A	N/A	N/A	N/A

Intumescent Strip

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Polybutenes Polymers	9003-29-6	< 40	N/A	N/A	N/A	N/E
Calcuim Carbonate	1317-65-3	< 40	N/A	N/A	10 mg/m^3	N/E
Auxiliary Chemicals	N/A	< 10	N/A	N/A	N/A	N/A
Natural Graphite	7782-42-5	< 30	N/A	N/A	2.0 mg/m^3	N/E
Sulfuric Acid	7664-93-9	< 10	N/A	N/A	1 mg/m^3	N/E
Nitric Acid)	7697-37-2	< 5	N/A	N/A	5.2 mg/m^3	N/E

NOTE: THE ACID COMPONENTS OF THIS PRODUCT ARE ENCAPSULATED WITHIN THE NATURAL GRAPHITE MATRIX. THEY DO NOT POSE A HAZARD DURING NORMAL USE OR HANDLING.

PHYSICAL PROPERTIES

	Mineral Wool Board	Intumescent Strip
Appearance / Physical State	Grey / brown board	Black solid
Odour	May have a slight resin odour	Low resin odour
Odour Threshold	N/A	N/A
Vapour Pressure (mm Hg)	N/A	N/A
Vapour Density (Air = 1)	N/A	N/A
Coefficient of H_2O/Oil Distrib	N/A	N/A
Specific Gravity (@25°C)	N/A	1.50 - 1.70
Evaporation Rate	N/A	N/A
Boiling Point (°C)	N/A	N/A
Freezing Point (°C)	N/A	N/A
pH	N/A	N/A
VOC contents (g/L)	N/A	0

MSDS - Pillow

FIRE AND EXPLOSION DATA

	Mineral Wool Board	Intumescent Strip
Flammability	Non-combustible	No
Means of Extinction	Water, Foam, Carbon Dioxide or Dry Powder	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Observe normal fire fighting procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A	N/A
Flash Point (°C) / Method	N/A	214 (PMCC)
Upper Flammable Limit (%, Vol.)	N/A	N/A
Lower Flammable Limit (%, Vol.)	N/A	N/A
Sensitivity to Mechanical Impact	N/A	No
Sensitivity to Static Discharge	N/A	No
Hazardous Combustion Products	Carbon Dioxide, Carbon Monoxide and trace gases	Thermal decomposition or combustion may produce dense smoke, oxides of carbon, sulfur, nitrogen and low molecular weight organic compounds whose compositions has not been characterized. Material volume will increase up to 200 times when exposed to intense heat.

REACTIVITY DATA

	Mineral Wool Board	Intumescent Strip
Stability	Stable	Stable at normal conditions
Condition of Reactivity	Not reactive	Material will expand when exposed to temperatures above 150°C (302°F).
Incompatible Materials	This product reacts with hydrofluoric acid.	Concentrated acids or bases.
Hazardous Decomposition Products	Carbon Dioxide, Carbon Monoxide and trace amounts of formaldehyde when heated above gases 200°C (390°F).	Oxides of carbon, sulfur, nitrogen and low molecular organic compounds.
Hazardous Combustion Products	Carbon Dioxide, Carbon Monoxide and trace gases	Thermal decomposition or combustion may produce dense smoke, oxides of carbon, sulfur, nitrogen and low molecular weight organic compounds whose compositions has not been characterized. Material volume will increase up to 200 times when exposed to intense heat.

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TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	None known
Effects of Chronic Exposure to Product	None known
Exposure Limits	None known
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Immediately flush eyes with large amount of water. Get immediate medical attention.
Skin Contact	Flush skin with large amount of soapy water. If irritation persists, get medical attention. .
Inhalation	Remove person to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	Standard industrial ventilation is recommended during normal use.
Personal Protective Equipment	Not generally required during normal use and handling.
Eye Protection (Specify)	Safety glasses
Skin Protection (Specify)	Chemical resistant nitrile, neoprene or rubber gloves are recommended if contact to the product directly.
Respiratory (Specify)	None normally required. However, if conditions warrant, use a NIOSH/ MSHA approved respirator.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	N/A
Storage Requirement	Material should be kept under protective cover, in their original containers and stored below 49°C (120°F).
Spills, Leaks or Releases	Wear protective equipment during cleanup.
Waste Disposal	Waste must be disposed of in accordance with federal, provincial and local environmental control regulations.
Special Shipping Instructions	N/A

REACTIVITY DATA

	Mineral Wool Board	Intumescent Strip
WHMIS	No controlled	D2A, E
HMIS	None known	Health 1, Flammability 0, Reactivity 0,Personal Protection B
TDG Regulation	None known	None known
TSCA	All ingredients of this product ar on the inventory list.	All ingredients of this product ar on the inventory list.
DSL	None known	All ingredients of this product ar on the inventory list.

MSDS - Pillow

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MSDS - Pillow

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 12, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop PPC Collar**
Product Use	Fire and Smoke Stop Combustible Pipe Penetration
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Intumex L	N/A	N/A	N/A	N/A	N/A	N/E

PHYSICAL PROPERTIES

Appearance / Physical State	Black, solid	**Specific Gravity (@25°C)**	1.0
Odour	Odourless	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	Not determined..
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	Not determined..
Vapour Density (Air = 1)	N/A	**pH**	Not determined..
Coefficient of H_2O/Oil Distrib	Not determined..	**VOC contents (g/L)**	N/A

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide

MSDS - PPC

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MSDS - PPC Collar

REACTIVITY DATA

Stability	Stable at normal conditions
Condition of Reactivity	No dangerous reactions.
Incompatible Materials	Reacts with strong oxidizing agents
Hazardous Decomposition Products	Carbon Monoxide and Carbon Dioxide.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	N/A
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush eyes with large quantities of water for 15 minutes and get medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use.
Personal Protective Equipment	General protective and hygienic measures
Eye Protection (Specify)	Not applicable.
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	Not required..
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required
Storage Requirement	Keep receptacles tightly sealed. Store in cool dry conditions.
Spills, Leaks or Releases	Not applicable.
Waste Disposal	Smaller quantities may be disposed of with household waste. Must be specially treated adhering to official regulations. Packaging that cannot be cleansed are to be disposed of in the same manner as the product..
Special Shipping Instructions	Not determined..

MSDS - PPC

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1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 0, Flammability 0, Reactivity 0
TDG Regulation	Not classified as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 12, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MSDS - WS1 - Strip

MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop WS1 - Intumescent Strip**
Product Use	Electrical Outlet Fire Protection Pad
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Intumex L	N/A	N/A	N/A	N/A	N/A	N/E

PHYSICAL PROPERTIES

Appearance / Physical State	Black, solid	**Specific Gravity (@25°C)**	1.0
Odour	Odourless	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	Not determined..
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	Not determined..
Vapour Density (Air = 1)	N/A	**pH**	Not determined..
Coefficient of H_2O/Oil Distrib	Not determined..	**VOC contents (g/L)**	N/A

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide.

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REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	No dangerous reactions
Incompatible Materials	Reacts with strong oxidizing agents
Hazardous Decomposition Products	Carbon Monoxide and Carbon Dioxide.

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	N/A
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use. .
Personal Protective Equipment	General protective and hygienic measures
Eye Protection (Specify)	Not required.
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	Not required.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required.
Storage Requirement	Keep receptacles tightly sealed. Store in cool dry conditions.
Spills, Leaks or Releases	Not applicable.
Waste Disposal	Smaller quantities may be disposed of with household waste. Must be specially treated adhering to official regulations. Packaging that cannot be cleansed are to be disposed of in the same manner as the product.
Special Shipping Instructions	Not determined..

MSDS - WS1

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MSDS - WS1 - Strip

REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 0, Flammability 0, Reactivity 0
TDG Regulation	Not classifid as a hazardous material
TSCA	All ingredients of this product are on the inventory list.
DSL	All ingredients of this product are on the list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	September 12, 2017
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50}** = Lethal Concentration, 50% **LD_{50}** = Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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MATERIAL SAFETY DATA SHEET

Product Identifier	**Firestop WS2 - Intumescent Strip**
Product Use	Intumescent Strips
Manufacturer	Passive Fire Protection Partners, 1412 Derwent Way, Delta, BC V3M 6H9
Emergency Number	(800) 810 - 1788

INGREDIENT INFORMATION

Ingredient	CAS #	% (wt.)	LC_{50} (rat)	LD_{50} (rat)	TLV	STEL
Wrap Strip	N/A	N/A	N/A	N/A	N/A	N/E

PHYSICAL PROPERTIES

Appearance / Physical State	Black, solid	**Specific Gravity (@25°C)**	N/A
Odour	Mild Odour	**Evaporation Rate**	N/A
Odour Threshold	N/A	**Boiling Point (°C)**	Not determined.
Vapour Pressure (mm Hg)	N/A	**Freezing Point (°C)**	Not determined.
Vapour Density (Air = 1)	N/A	**pH**	Not determined.
Coefficient of H_2O/Oil Distrib	Not determined.	**VOC contents (g/L)**	<1% or <10 g/L

FIRE AND EXPLOSION DATA

Flammability	No
Means of Extinction	CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special Fire-fighting Procedures	Firefighters should wear the usual protective gear, including the use of self-contained breathing apparatus(SCBA) and other protective clothing.
Auto-ignition Temperature (°C)	N/A
Flash Point (°C) / Method	N/A
Upper Flammable Limit (%, Vol.)	N/A
Lower Flammable Limit (%, Vol.)	N/A
Sensitivity to Mechanical Impact	No
Sensitivity to Static Discharge	No
Hazardous Combustion Products	Carbon Monoxide and/or Carbon Dioxide.

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MSDS - WS2 - Strip

REACTIVITY DATA

Stability	Stable at normal condition
Condition of Reactivity	No dangerous reactions
Incompatible Materials	None known
Hazardous Decomposition Products	Carbon Monoxide, Carbon Dioxide and Fragment Hydrocarbons

TOXICOLOGICAL PROPERTIES

Routes of Exposure ■ Skin contact □ Skin absorption □ Eye contact □ Inhalation □ Ingestion

Effects of Acute Exposure to Product	Skin and eye irritation may occur after contact with the product.
Effects of Chronic Exposure to Product	None known
Exposure Limits	N/A
Irritancy of Product	None known
Sensitization of Product	None known
Carcinogenicity	None known
Teratogenicity	None known
Reproductive Toxicity	None known

FIRST AID MEASURES

Eye Contact	Flush with large quantities of water gently for 15 minutes and get immediate medical attention.
Skin Contact	Wash with soap and water immediately.
Inhalation	Remove affected person away from source of exposure to fresh air and get medical attention IMMEDIATELY.
Ingestion	Get medical attention IMMEDIATELY.

PREVENTIVE MEASURES

Engineering Controls	General ventilation is recommended during normal use. .
Personal Protective Equipment	General protective and hygienic measures
Eye Protection (Specify)	Not required.
Skin Protection (Specify)	Protective work clothing.
Respiratory (Specify)	Not required.
Other	

PRECAUTION FOR SAFE HANDLING AND USE

Handling Procedure and Equipment	No special measures required.
Storage Requirement	Do not store near heat, sparks, or open flames.
Spills, Leaks or Releases	Not applicable.
Waste Disposal	Dispose of in approved landfills in accordance with Federal, State and local regulations regarding pollution.
Special Shipping Instructions	Not determined.

MSDS - WS2

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REGULATION INFORMATION

WHMIS	Not controlled
HMIS	Health 1, Flammability 0, Reactivity 0, PPI B
TDG Regulation	Not classifid as a hazardous material
TSCA	All ingredients of this product are on the inventory list.

PREPARATION INFORMATION

Prepared by	Chemical Laboratory, Passive Fire Protection Partners
Preparation Date	April 30, 2014
Telephone	(604) 515-1788
Website	www.firestop.com
Abbreviations Used	**% (wt.)** = Weight Percentage **ACGIH** = American Conference of Governmental Industrial Hygienists **CAS Number** = Chemical Abstracts Series Number **DSL** = Domestic Substance List in Canada **H** = Hours **HMIS** = Hazardous Material Identification System **IARC** = International Agency for Research on Cancer **LC_{50} =** Lethal Concentration, 50% **LD_{50} =** Lethal Dose, 50% **MSHA** = Mine Safety and Health Administration **N/A** = Not Applicable or Not Available **N/E** = None Established **NIOSH** = The National Institute for Occupational Safety and Health **NTG** = National Toxicology Program **OSHA** = The Occupational Safety and Administration **STEL** = Short Term Exposure Limit **TDG** = Transportation of Dangerous Goods **TLV** = Threshold Limit Value **TSCA** = Toxic Substance Control Act in US **VOC** = Volatile Organic Compounds **WHMIS** = Workplace Hazardous Material Identification System

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1412 Derwent Way Delta, BC V3M 6H9

Understanding a Underwriters Laboratories (UL) Through-Penetration Firestop Listing (XHEZ).

UL uses an Alpha-alphanumeric identification system can be used to help identify the correct firestop system to select.

The Alpha component is used to identify the assembly type being penetrated, as the Numerical component is used to identify the penetration type.

First Alpha Component

C	=	signifies either a floor or wall is being penetrated
F	=	signifies a floor is being penetrated
W	=	signifies a wall is being penetrated and

Second Alpha Component – Construction type of the floor or wall

A	=	Concrete floors less than or equal to 5 inch thick
B	=	Concrete floors greater than 5 inch thick
C	=	Framed floors
D	=	Steel decks in marine vessels
E	=	Concrete floor-ceiling assembly with membrane protection
F-I	=	Reserved for future use
J	=	Concrete or masonry walls less than or equal to 8 inch thick
K	=	Concrete or masonry walls greater than 8 inch thick
L	=	Framed walls
M	=	Bulkheads in marine vessels
N	=	Composite panel walls
O-Z	=	Reserved for future use

Numerical Component – Identifies the penetrating item

0000-0999	=	No Penetrant
1000-1999	=	Metallic pipe, conduit or tubing
2000-2999	=	Nonmetallic pipe, conduit or tubing
3000-3999	=	Electrical cables
4000-4999	=	Cable trays with electrical cables
5000-5999	=	Insulated pipes
6000-6999	=	Busways
7000-7999	=	HVAC ducts
8000-8999	=	Mixed multiple penetrations
9000-9999	=	Reserved for future use

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Passive Fire Protection Partners
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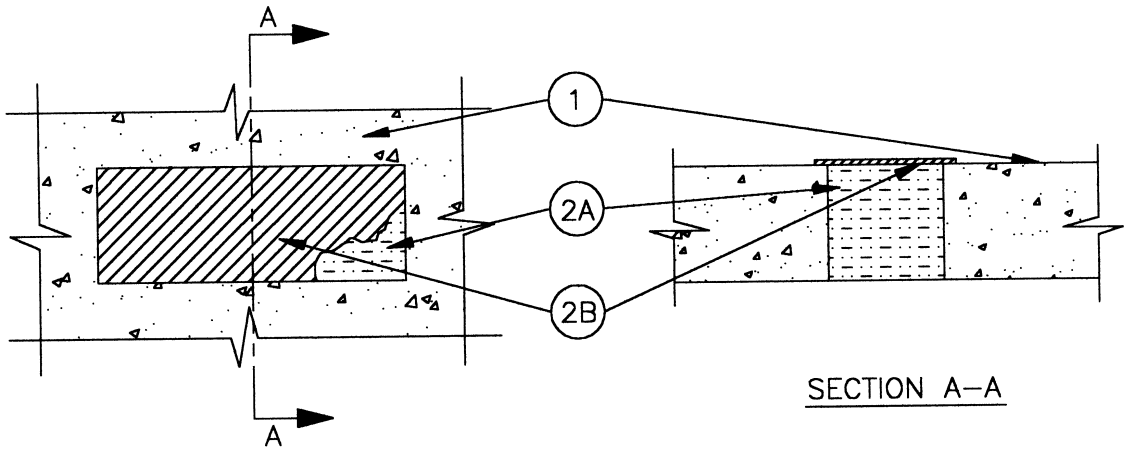
ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr

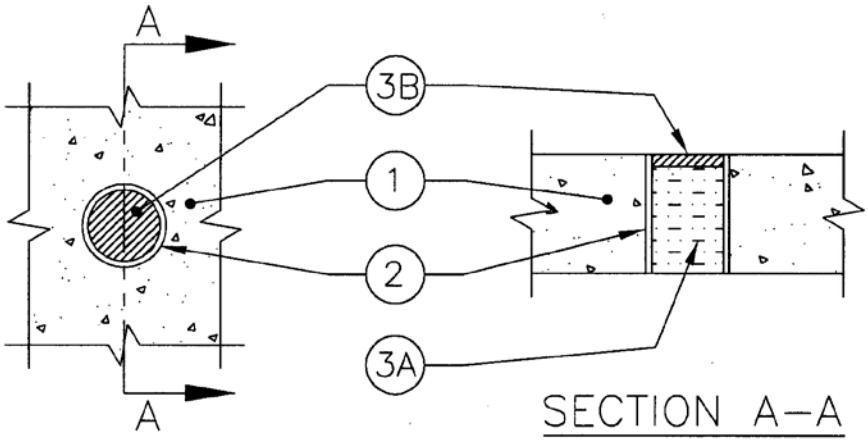


1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete floor. Min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max size of opening to be 4-1/2 in. (114 mm) by 40 in. (1 m) or 4-1/2 in (114 mm) diam.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) or 4-1/4 in. (114 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for sealants B1 and B2, respectively, compressed 25 percent into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall assembly to accommodate the required thickness of fill material (Item 2B1).
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the opening, flush with top surface of floor or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW
   B2. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) thickness of fill material sprayed or brushed on top surface of floor to completely cover mineral wool and to overlap a min of 1/2 in. (13 mm) onto concrete floor.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 5 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Sleeves – (Optional) –** The following sleeves may be used:
   A. **Metallic Sleeve –** Nom 4 in. diam (or smaller) Schedule 40 (or heavier) steel pipe sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces.
   B. **Nonmetallic Sleeve –** Nom 4 in. diam (or smaller) Schedule 40 polyvinyl chloride (PVC) pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

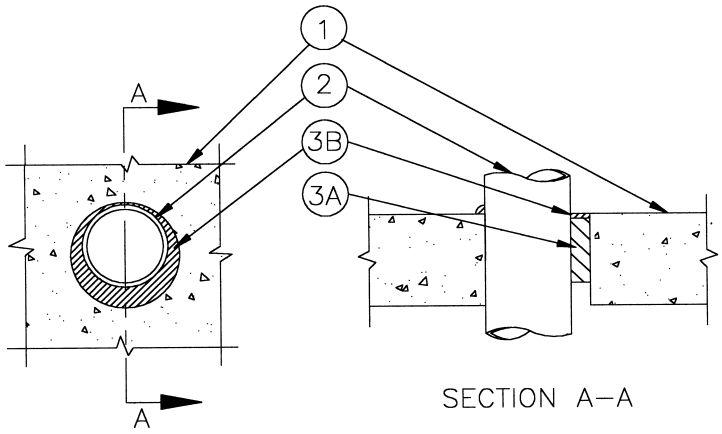
3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-3/4 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form so that the width of the wool is compressed at least 50 percent. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

* Bearing the UL Classification Marking

F Rating – 3 Hr
T Rating – 1/4 Hr
L Rating at Ambient – Less than 1 CFM/ sq. ft.
L Rating at 400°F – Less than 1 CFM/sq. ft.

C-AJ-1238

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

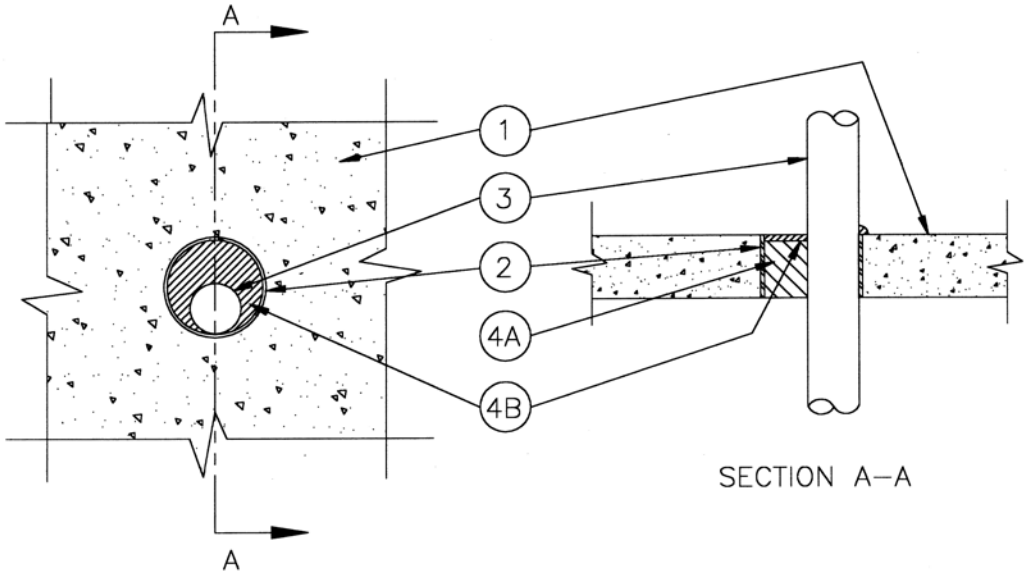
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600=2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks* Max diam of opening is 25-1/4 in. (641 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 2 1/8 in. (54 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. As an option on the top surface of the floor assemblies, metallic riser clamps sized to fit the outer circumference of the penetrant and installed in accordance with the manufacturer's installation instructions. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
   D. **Iron Pipe –** Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe.
   E. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   F. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   G. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   - A. **Packing Material** – Min 4, 4-1/4 or 4-1/2 in. (102, 108 or 114 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for sealants B1, B2 or B3 respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   - B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and concrete, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor assembly or both surfaces of wall assembly.
     Passive Fire Protection Partners – 3600EX, 4800DW
   - B2. **Fill Void or Cavity Material* – Sealant** – As an alternative to Item B1, min 1/4 in. (6 mm) thickness of fill material applied, within annulus, flush with top surface of floor or both surfaces of wall assembly. At point contact location between penetrant and periphery of opening a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor assembly or both surfaces of wall.
     Passive Fire Protection Partners – 4100NS, 4100SL
   - B3. **Fill Void or Cavity Material* – Sealant** – As an alternative to Item B1 & B2, Min 1/16 in. (1.6 mm) thickness of fill material applied to completely cover mineral wool batt insulation and to overlap the floor or wall surfaces 1/2 in. (13 mm), flush with top surface of floor or both surfaces of wall.
     Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight concrete (100-150 pcf or 1600-2400 kg/m³). Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 8 in. (203 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

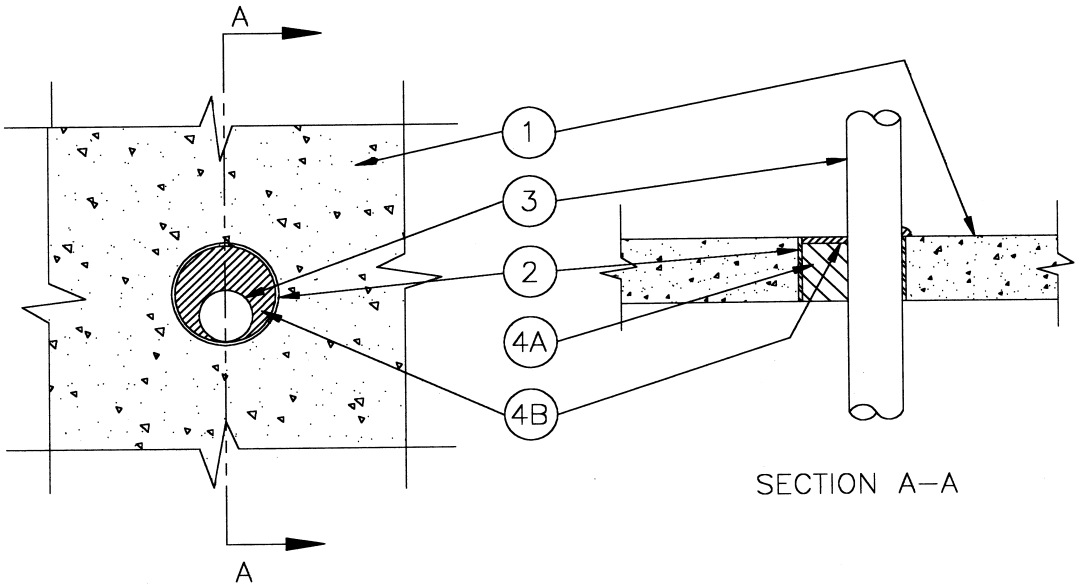
2. **Metallic Sleeve –** (Optional) – Sleeve to be cast or grouted into floor or wall assembly, flush with or max 2 in. (51 mm) above top surface of floor or both surfaces of wall assembly. The following metallic sleeves may be used within the firestop system:
   A. Nom 8 in. (203 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve.
   B. Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) sleeve.

3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and sleeve or periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in. (89 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/4 in. (102 mm or 108 mm) thickness of min 4 pcf (64 kg/m³) density mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 4B).
   B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW
   B2. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/2 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight concrete (100-150 pcf or 1600-2400 kg/m^3). Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 3 in. (76 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Sleeve –** (Optional) – Nom 3 in. (76 mm) diam (or smaller) schedule 40 polyvinyl chloride (PVC) sleeve, cast or grouted into wall or floor assembly, flush with top surface of floor or both surfaces of wall assembly.

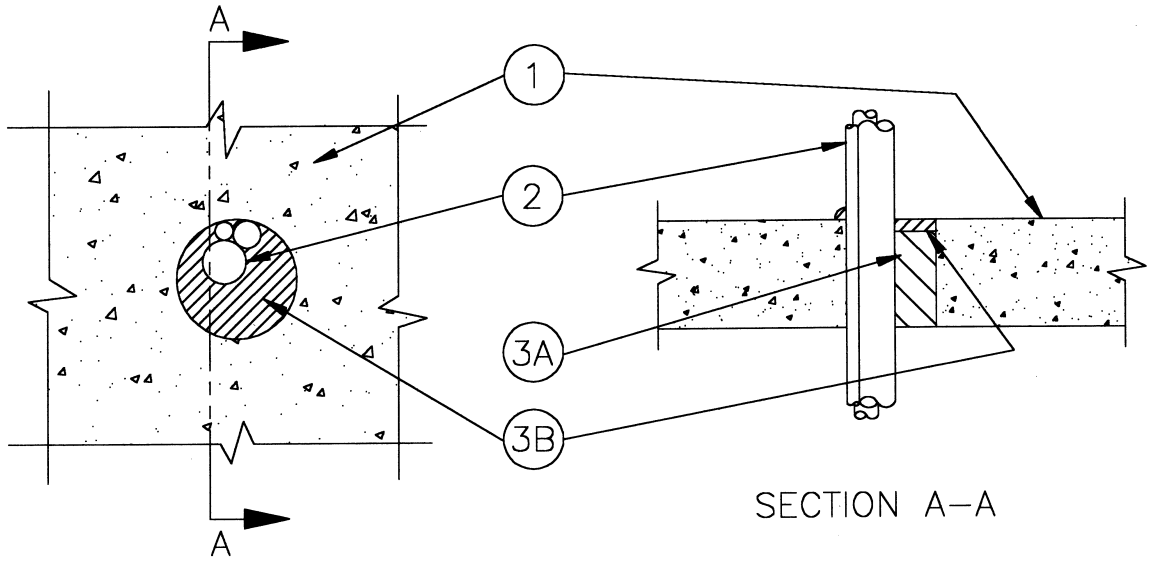
3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and sleeve or periphery of opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm) Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 2 in. (51 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   F. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/4 in. (102 or 108 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B).
   B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between pipe and periphery of opening, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the periphery of opening/pipe interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW
   B2. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surface of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

	F Rating – 3 Hr T Rating – 1/4 Hr & 1/2 Hr (See Item 2)	C-AJ-1287

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/4 Hr and 1/2 Hr (See Item 2)	FT Ratings — 1/4 Hr and 1/2 Hr (See Item 2)
	FH Rating — 3 Hr
	FTH Ratings — 1/4 Hr and 1/2 Hr (See Item 2)



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 6 in. (152 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Aggregate cross-sectional area of penetrants in opening to be max 52 percent of the cross-sectional area of the opening in the floor or wall. Pipe, conduit, or tubing to be installed either concentrically or eccentrically within the firestop system. The space between penetrants shall be min 0 in. (point contact) to max 1-5/8 in. (41 mm). The annular space between penetrants and periphery of opening shall be min 0 in. (point contact) to max 1-5/8 in. (41 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 3 in. (76 mm) diam (or smaller) rigid steel conduit or steel electrical metallic tubing.
   D. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

   T rating is 1/2 hour for pipes/conduit A, B and C. T rating is 1/4 hour for tubing/pipes D, E and F.

3. **Firestop System –** The firestop system shall consist of the following:

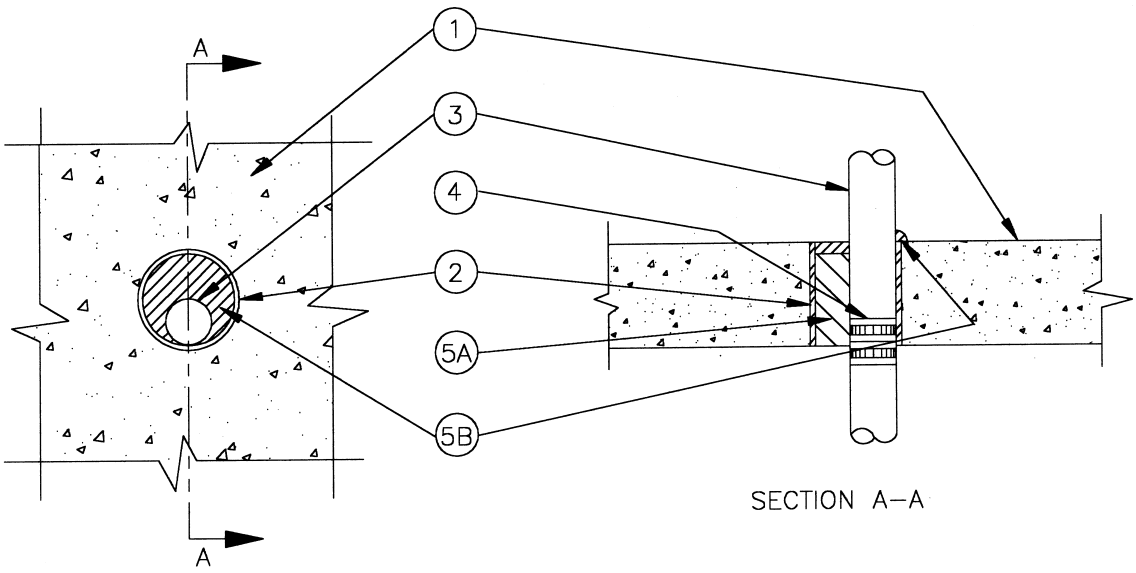
   A. **Packing Material –** Min 4 in. or 4-1/4 in. (102 or 108 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).

   B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At the point contact locations between penetrant and concrete, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

   B2. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and concrete, a 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 Hr and 1/2 Hr (See Item 4)	FT Ratings — 0 Hr and 1/2 Hr (See Item 4)
	FH Rating — 2 Hr
	FTH Ratings — 0 Hr and 1/2 Hr (See Item 4)



SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight concrete (100-150 pcf or 1600-2400 kg/m^3). Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4 in. (102 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve –** Outside diam of sleeve to be tightly fitted with inside diam of opening, flush with or both surfaces of wall assembly. The following types of sleeves may be used:
   A. Nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing sleeve.
   B. Nom 4 in. (102 mm) diam (or smaller) schedule 40 steel sleeve.
   C. Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron sleeve.

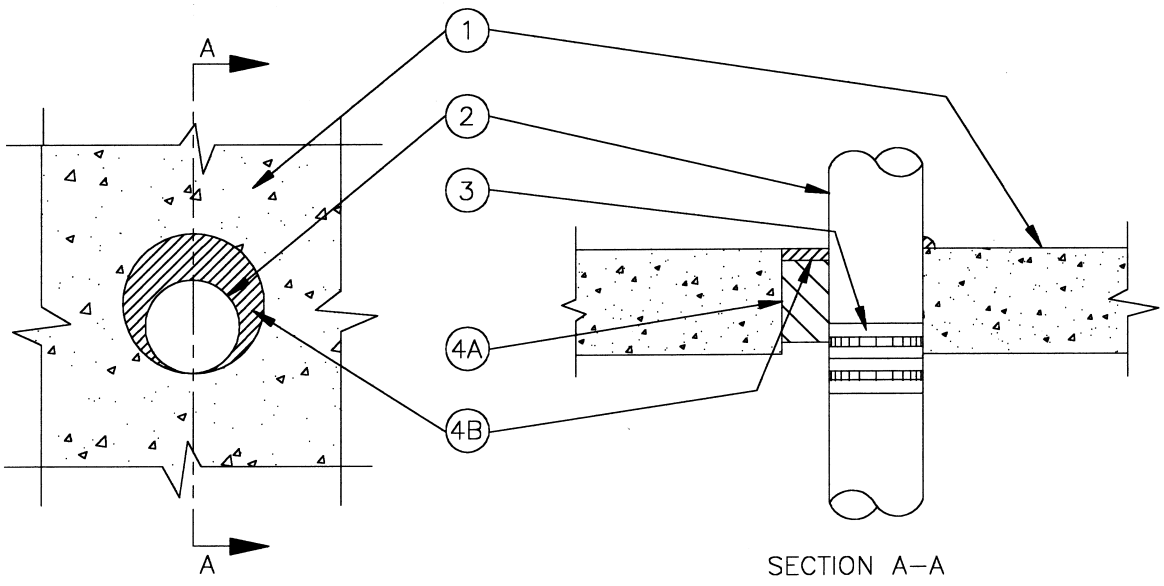
3. **Through Penetrants –** One metallic pipe to be installed either concentrically or eccentrically within the opening. Pipe to terminate a max of 2 in. (51 mm) above bottom surface of floor or at any point lower. In wall assemblies, pipe may terminate with the wall a max of 2 in. (51 mm) from either side of wall or at any point beyond. Pipe connected to additional section of identical type and size of pipe with pipe coupling (Item 4). Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.

4. **Pipe Couplings –** Pipes to be secured together with slip on coupling. Couplings secured to each pipe with 1/2 in. (13 mm) wide stainless steel hose clamps. Slip on coupling to be installed entirely within opening, partially within opening or within 12 in. (305 mm) of opening. The annular space between coupling and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). The following types of slip on couplings may be used:
   A. **Unshielded Slip On Coupling –** Nom 2 in. (51 mm) diam (or smaller) rigid rubber coupling, for installation in cast iron vented (drain, waste or vent) piping systems.
   B. **Shielded Slip On Coupling –** Nom 2 in. (51 mm) diam (or smaller) 32 gauge (or heavier) corrugated stainless steel shielded rigid rubber coupling, approved for installation in cast iron vented (drain, waste or vent) piping systems.
   T rating is 0 hours when unshielded slip on coupling is used. T rating is 1/2 hours when shielded slip on coupling is used.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/4 in. (102 or 108 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation or sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 5B).
   B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied, within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW
   B2. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/4 in. (6 mm) diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr and 1-3/4 Hr (See Item 3)	FT Ratings — 0 Hr and 1-3/4 Hr (See Item 3)
	FH Rating — 2 Hr
	FTH Ratings — 0 Hr and 1-3/4 Hr (See Item 3)



SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight concrete (100-150 pcf or 1600-2400 kg/m^3). Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 7-1/2 in. (191 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

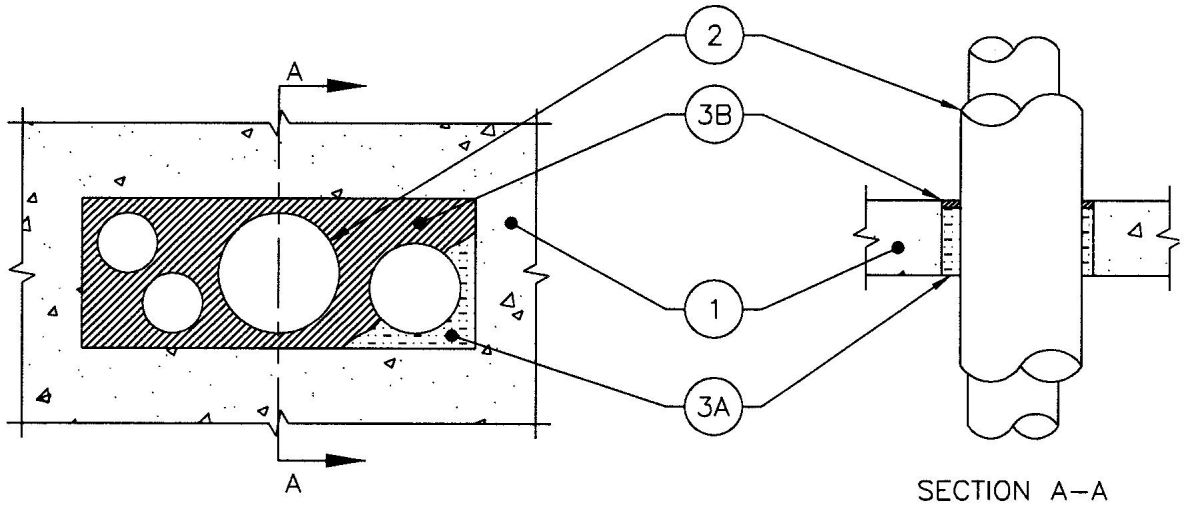
2. **Through Penetrants –** One metallic pipe to be installed either concentrically or eccentrically within the opening. Pipe to terminate a max 2 in. (51 mm) above bottom surface of floor or at any point lower. In wall assemblies, pipe may terminate within the wall a max of 2 in. (51 mm) from either side of wall or at any point beyond. Pipe connected to additional section of identical type and size of pipe with pipe coupling (Item 3). Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.

3. **Pipe Couplings –** Pipes to be secured together with slip on coupling. Coupling secured to each pipe with 1/2 in. (13 mm) wide stainless steel hose clamps. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). The following types of slip on couplings may be used:
   A. **Shielded Slip On Coupling –** Nom 4 in. (102 mm) diam (or smaller) 32 gauge (or heavier) corrugated stainless steel shielded rigid rubber coupling for installation in cast iron vented (drain, waste or vent) piping systems.
   B. **Unshielded Slip On Coupling –** Nom 4 in. (102 mm) diam (or smaller) rigid rubber coupling for installation in cast iron vented (drain, waste or vent) piping systems.
   T rating is 0 hour when unshielded coupling is used. T rating is 1-3/4 hours when shielded coupling is installed completely within opening, above bottom surface of floor, or when shielded coupling extends below bottom surface of floor.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. or 4-1/4 in. (102 or 108 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B).
   B1. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact locations between pipe and concrete, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW
   B2. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between penetrant and concrete, a 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

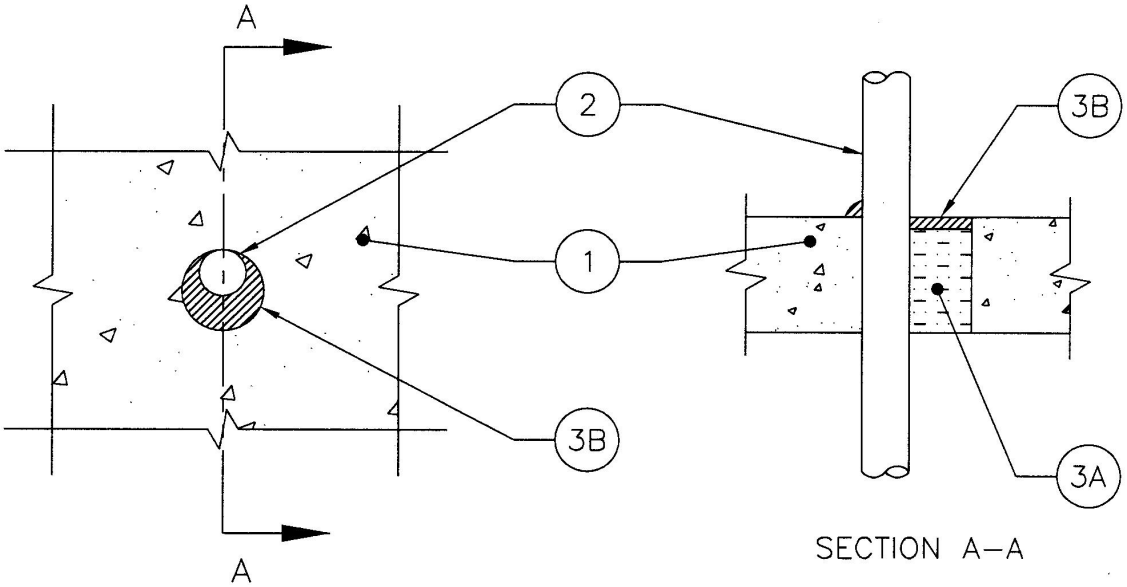
1. **Floor or Wall Assembly –** Min 4-1/2 in. (108 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete floor or min 5-1/4 in. (133 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 260 sq. in. (1677 sq. cm) with max. dimension of 26 in. (66 cm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants** – One or more metallic pipes, conduit, tubing, or duct to be installed within the opening. The annular space between penetrants and periphery of opening shall be min 3/4 in. (19 mm) to max 2 in. (51 mm). The space between pipes, conduit or tubing shall be a min. of 1-1/4 in. (32 mm) to max. 2 in. (51 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Steel Duct** – Nom 8 in. (203 mm) diam (or smaller) No. 28 gauge (or heavier) galv. steel duct.
   G. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-3/4 in. (95 mm) thickness of min. 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of sealant applied within the annulus, flush with top surface of floor or with both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 4 Hr	F Rating — 4 Hr
T Rating — 2-1/4 Hr	FT Rating — 2-1/4 Hr
	FH Rating — 4 Hr
	FTH Rating — 2-1/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min. 5-1/4 in. (133 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4 in. (102 mm). See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

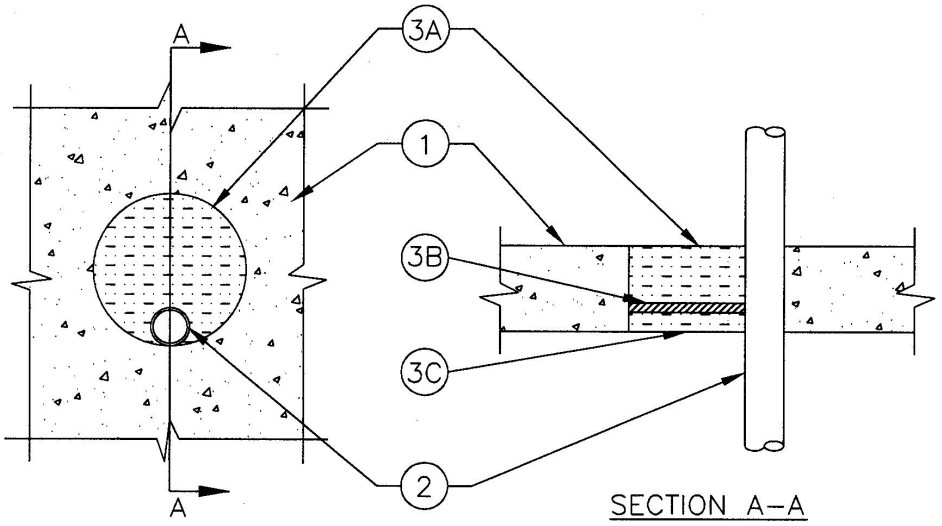
2. **Through Penetrant*** – **Omega–Flex Gas Pipe –** Nom. 2 in. (51 mm) diam (or smaller) flexible gas piping. One flexible gas pipe installed either concentrically or eccentrically within the firestop system. The annular space between gas piping and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). Gas piping to be rigidly supported on both sides of floor or wall assembly.
Omega-Flex Inc. – TracPipe Flexible Gas Piping

2A. **Stainless Steel Pipe —** (Not Shown) As an alternate to Item 2, nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. One pipe installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). Pipe to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-3/4 in. (95 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall. Min 1/2 in. (13 mm) diam bead of caulk applied to the penetrant/concrete interface at the point contact location between penetrant and periphery of opening.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/2 Hr



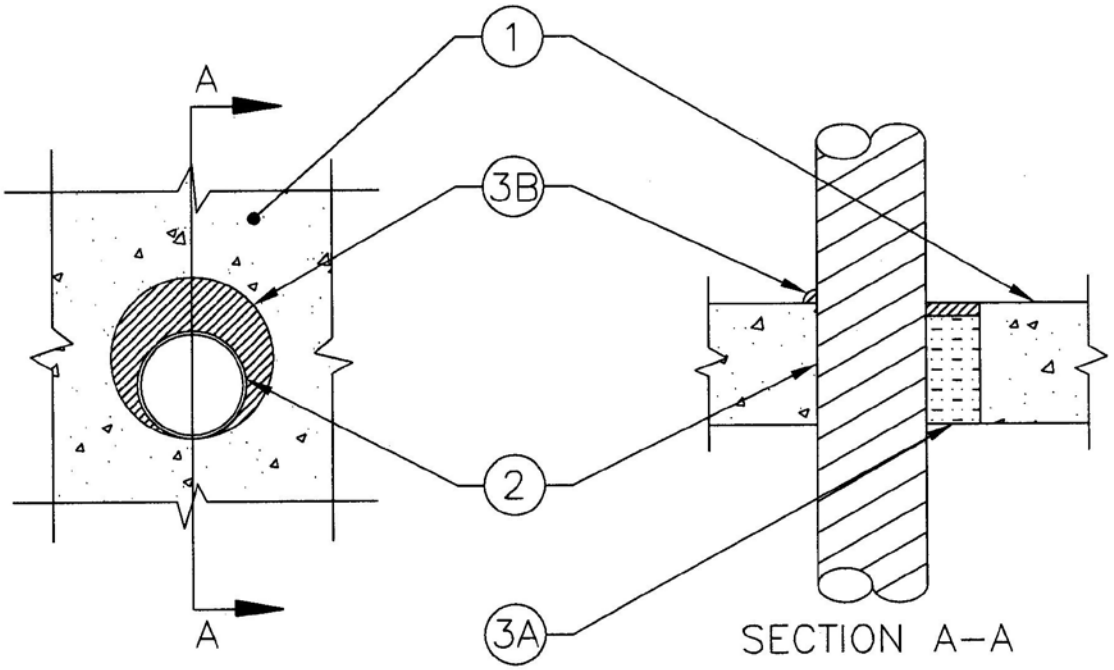
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified Concrete Block. Max diam of opening is 10 in. (254 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants* –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between the through penetrant and periphery opening shall be min 0 in. (point contact) to max 5-7/8 in. (149 mm). Through penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit.
   D. **Copper Tube –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3 in. (76 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be installed flush with the top surface of floor or with either surface of the wall.
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, completely covering mineral wool batt insulation on bottom side in floor assemblies or either side of wall assemblies.
   Passive Fire Protection Partners – 3600EX, 4800DW
   C. **Packing Material** – Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be installed to completely cover the sealant, flush with bottom surface of floor or flush with surface of wall opposite to which 3 in. (76 mm) thickness of mineral wool (Item 3A) is installed.

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 0 Hr and 3/4 Hr (See Item 2)	FT Ratings — 0 Hr and 3/4 Hr (See Item 2)
	FH Rating — 3 Hr
	FTH Ratings — 0 Hr and 3/4 Hr (See Item 2)



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete or min 5 in. (127 mm) thick reinforced lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening 6 in. (152 mm).
   See **Concrete Block** (CAZT) category in the Fire resistance Directory for names of manufacturers.

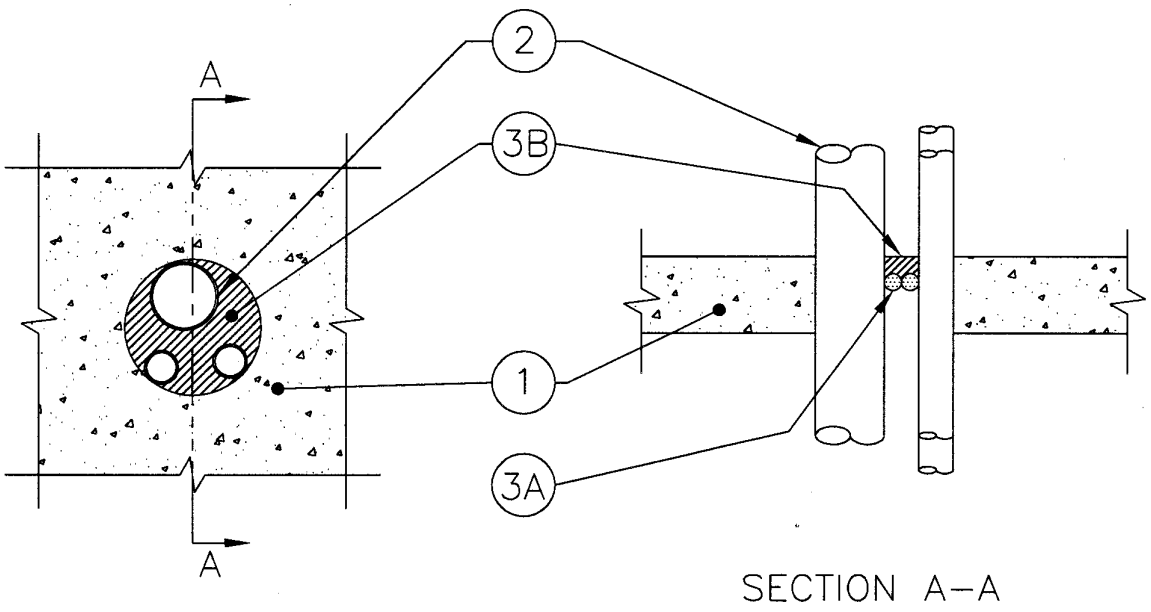
2. **Through Penetrating Product* –** Nom 4 in. (102 mm) diam (or smaller) aluminum or steel **Flexible Metal Conduit+**. Max one conduit per opening. The annular space between the conduit and the periphery of the opening shall be min 0 in. (point contact) to max 2 in. (51 mm) Flexible metal conduit to be rigidly supported on both sides of the floor or wall assembly.
   T Rating shall be 0 hr for aluminum flexible conduit and 3/4 hr for steel flexible conduit.
   AFC Cable Systems Inc.

   2A. **Stainless Steel Pipe** — Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. The annular space between the pipe and the periphery of the opening shall be min 0 in. (point contact) to max 2 in. (51 mm) Pipe to be rigidly supported on both sides of the wall assembly. **T Rating shall be 0 Hr for stainless steel pipe**

3. **Firestop System –** the firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from either surface of the wall to accommodate required amount of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, completely covering mineral wool batt insulation, flush with top surface of floor or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

***Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Ratings — 0 Hr
	FH Rating — 2 Hr
	FTH Ratings — 0 Hr



SECTION A–A

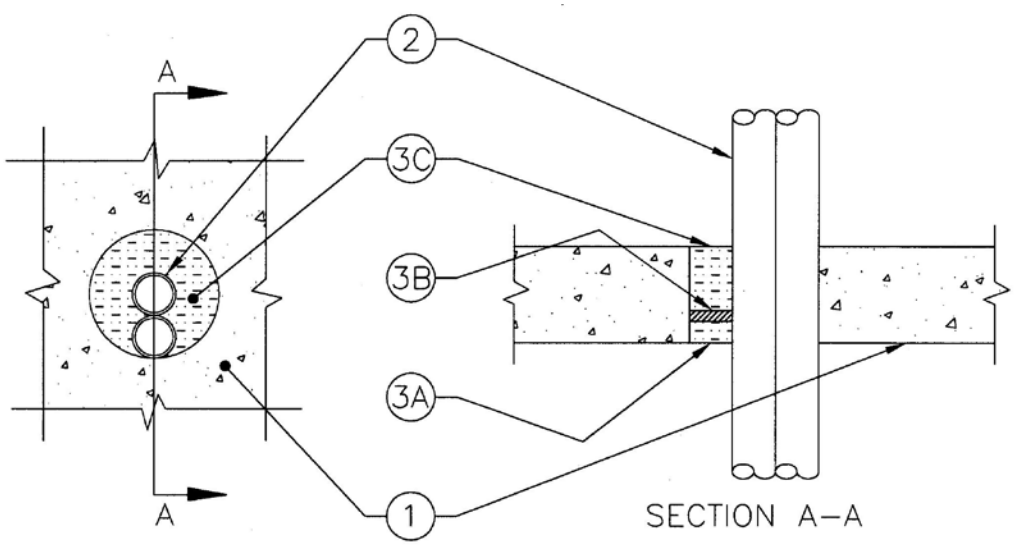
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening 8 in. (203 mm).
   See **Concrete Block** (CAZT) category in the Fire resistance Directory for names of manufacturers.

2. **Through Penetrants –** Multiple metallic pipes, flexible metal piping, tubing or conduit installed either concentrically or eccentrically within the firestop system. The annular space between penetrants shall be min 1 in. (25 mm) to max 2 in. (51 mm). The annular space between penetrants and periphery of the opening shall be min 0 in. (point contact) to max 2 in. (51 mm). The number of penetrants installed shall be such that the aggregate cross sectional area of the penetrants shall not exceed 47 percent of the cross sectional area of the opening. Penetrants to be rigidly supported on both sides of the floor or wall. The following types and sizes of metallic pipe, tubing or conduit may be used
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 (102 mm) in. diam (or smaller) rigid steel conduit.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Through Penetrating Product* – Flexible Metal Piping –** Nom 2 in. (51 mm) diam (or smaller) steel flexible metal piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.
      OMEGA FLEX INC. - TracPipe
   G. **Stainless Steel Pipe —** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material** – Foam backer rod firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of the wall to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Min 1/2 in. (13 mm) diam bead of fill material applied to the penetrant/concrete interface at point contact locations on top surface of floor or both surfaces of wall.
      Passive Fire Protection Partners – 3600EX, 4800DW,

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/4 Hr	FT Ratings — 1/4 Hr
	FH Rating — 3 Hr
	FTH Ratings — 1/4 Hr



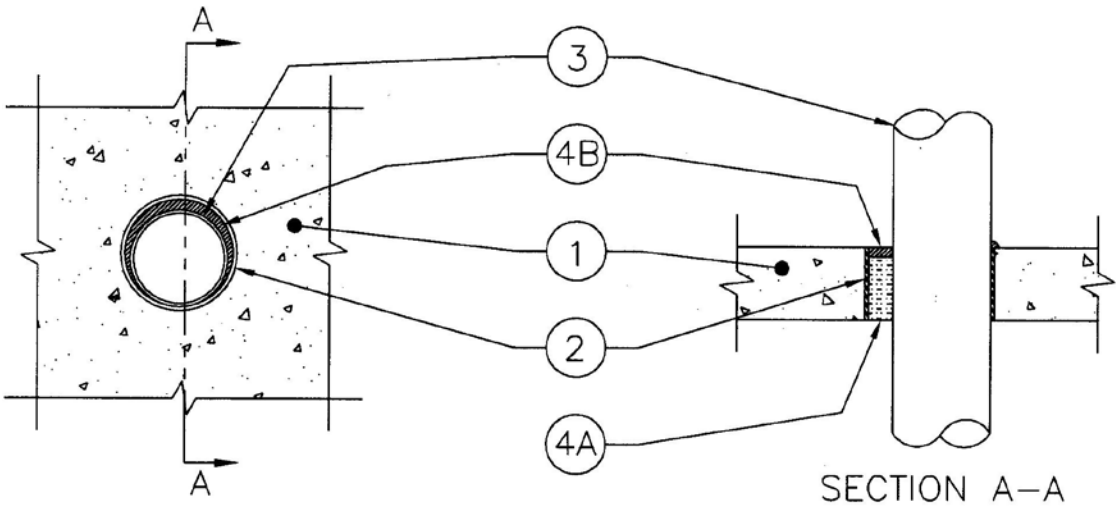
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Block***. Max diam of opening 6 in. (152 mm).
   See **Concrete Block** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Two metallic pipes, tubes or conduit installed either concentrically or eccentrically within the firestop system. The annular space between penetrants shall be min 0 in. (point contact) to max 3-1/2 in. (89 mm). The annular space between penetrants and periphery of the opening shall be min 0 in. (point contact) to max 3-1/2 in. (89 mm). Penetrants to be rigidly supported on both sides of floor or wall. The following types and sizes of metallic pipe, tubing or conduit may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 2 in. (51 mm) diam (or smaller) rigid steel conduit.
   D. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system consist of the following:
   A. **Packing Material –** Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be installed flush with bottom surface of floor or with either surface of wall.
   B. **Fill, Void or Cavity Material*-Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, completely covering mineral wool batt insulation on top surface of floor assembly or either side inside of wall assemblies.
   Passive Fire Protection Partners – 3600EX, 4800DW
   C. **Packing Material –** Min 3 in. (76 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be installed to completely cover the sealant, flush with the top surface of the floor or flush with surface of wall opposite to which 1 in. (25 mm) thickness of mineral wool (Item 3A) is installed.

***Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min 5 in. thick lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 26 in. (660 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

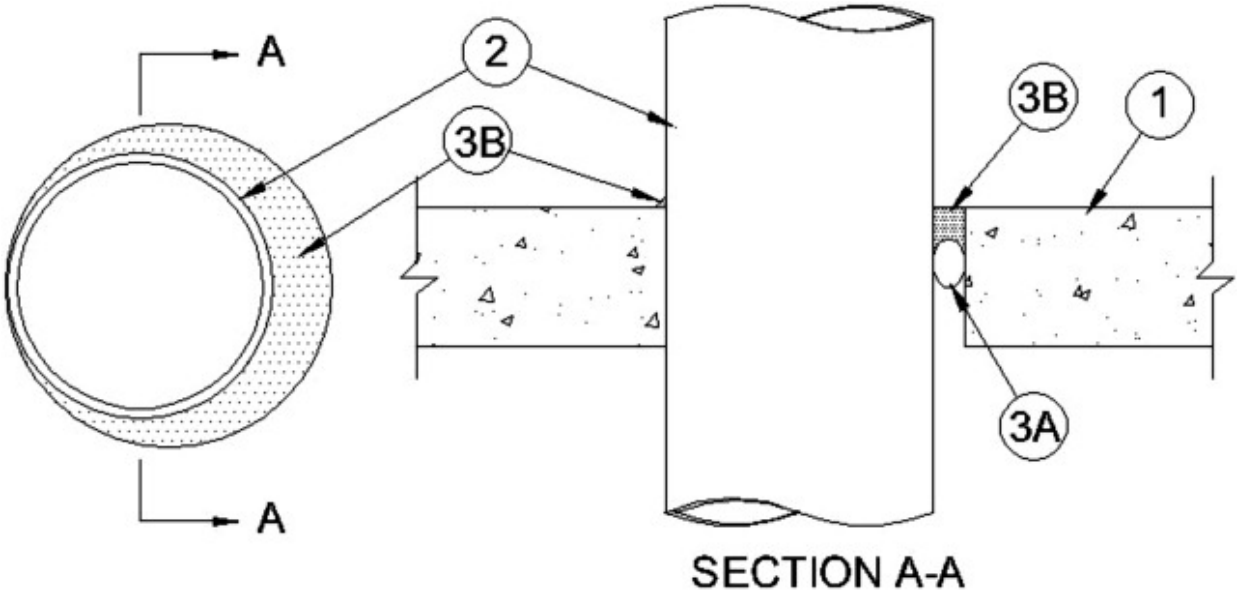
2. **Steel Sleeve –** Cylindrical steel sleeve, friction fit, cast or grouted into floor or wall opening, flush with top surface of floor or both surfaces of wall assembly. The following types and sizes of steel sleeves may be used:
   A. **Sheet Metal –** Nom 8 in. (203 mm) diam (or smaller) 24 gauge (or heavier), galv sheet metal sleeve with min 1 in. overlap along longitudinal seam.
   B. **Steel Pipe –** Nom 26 in. diam (660 mm) (or smaller) Schedule 5 (or heavier) steel pipe.
   C. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be use:
   A. **Steel Pipe –** Nom 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4-1/4 in. or 4 in. (108 or 102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B)
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material sprayed or brushed on top surface of floor or each side of wall assembly. At point contact location between penetrant and periphery of opening, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** (As an alternative) Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening, an additional 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

***** Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Ratings — 0 Hr
	FH Rating — 2 Hr
	FTH Ratings — 0 Hr



SECTION A-A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 25-1/4 in. (641 mm)
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening to be min 1/4 in. (6 mm) to max 1 in. (25 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be use:
   A. **Steel Pipe –** Nom 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Foam backer rod firmly packed into opening. Packing material to be recessed from top surface of floor of from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B)
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between pipe and periphery of opening, a 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/pipe interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

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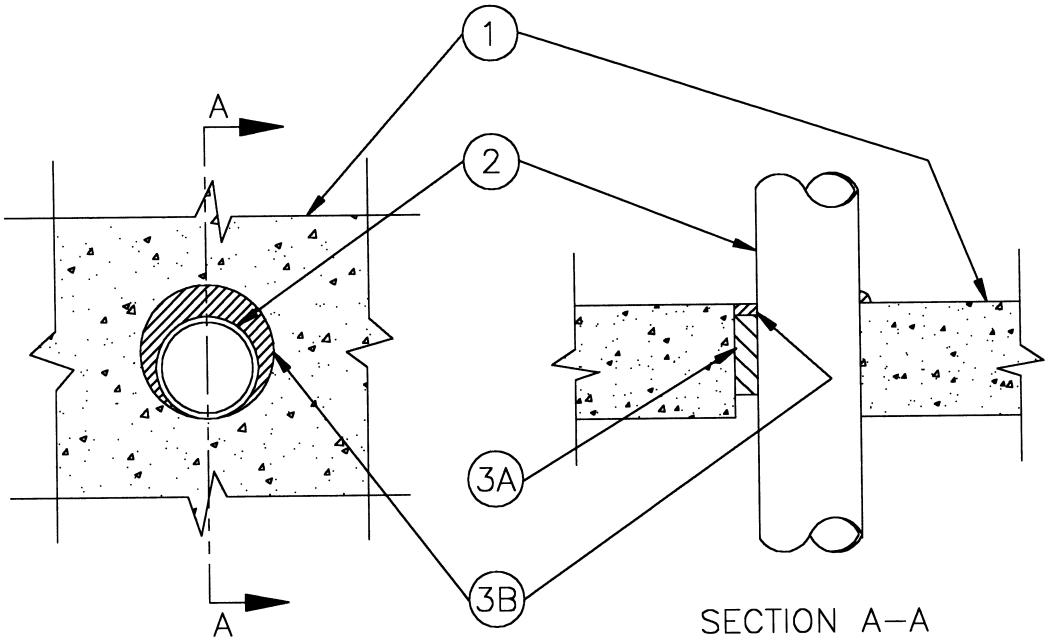

1. **Floor or Wall Assembly –** Min 5 in. thick normal weight (150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-3/4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Pipe –** Nom 2 in. diam (or smaller) SDR 11 chlorinated plyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems. One pipe to be installed either concentrically or eccentrically within the Firestop systems. The annular space between pipe and periphery of opening shall be min 3/8 in. to max 1 in. Pipe to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall
   Passive Fire Protection Partners – 3600EX, 4800DW

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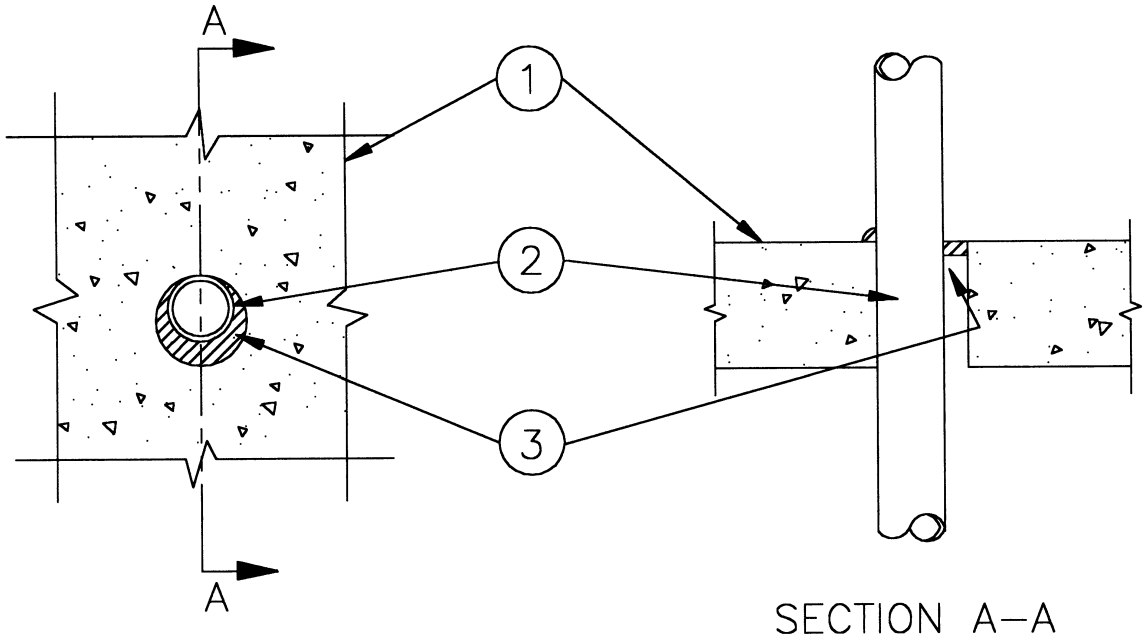
+ Bearing the UL Listing Mark

	F Rating – 2 Hr **T Rating – 2 Hr**	**C-AJ-2190**



SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through-Penetrant –** Nom 2 in. diam (or smaller) SDR 11 chlorinated polyvinyl chloride (CPVC) pipe or Schedule 40 solid core polyvinyl chloride (PVC) pipe for use in closed (process or supply) piping systems. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 3/8 in. to max 1/2 in. Pipe to be rigidly supported on both sides of floor or wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners –** 3600EX, 4800DW

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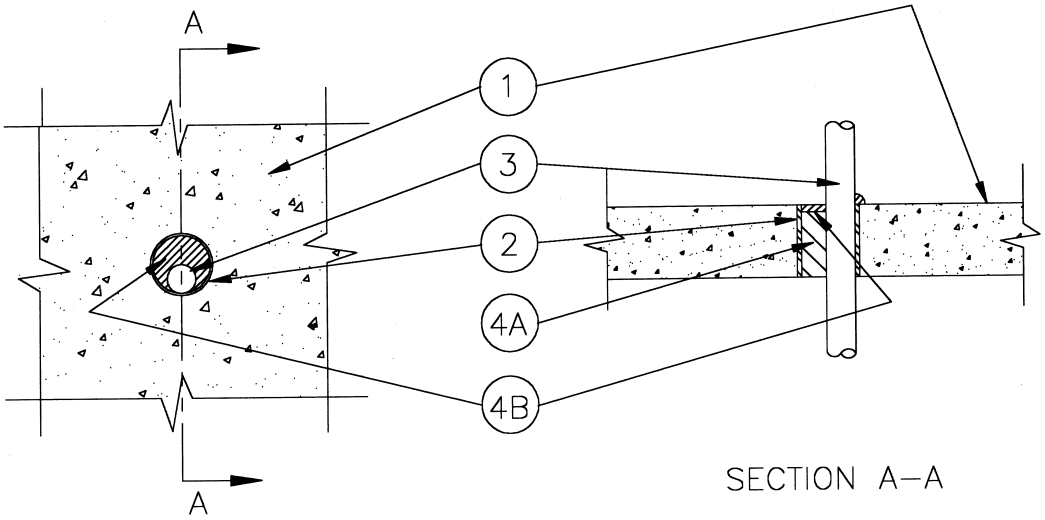

SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf). Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve –** (Optional) – Nom 4 in. diam (or smaller) EMT or Schedule 5 (or heavier) steel sleeve, cast or grouted into floor or wall assembly, flush with or max 2 in. above top surface of floor or both surfaces of wall assembly.

3. **Through Penetrants –** One non-metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe or tubing and sleeve or periphery of opening shall be min 0 in. (point contact) to max 1-5/8 in. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of non-metallic pipes or tubing may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process and supply) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR11 CPVC pipe for use in closed (process and supply) piping systems.
   C. **Crosslinked Polyethylene (PEX) Tubing –** Nom 3/4 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.
   D. **Rigid Nonmetallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70)

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/2 in. diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

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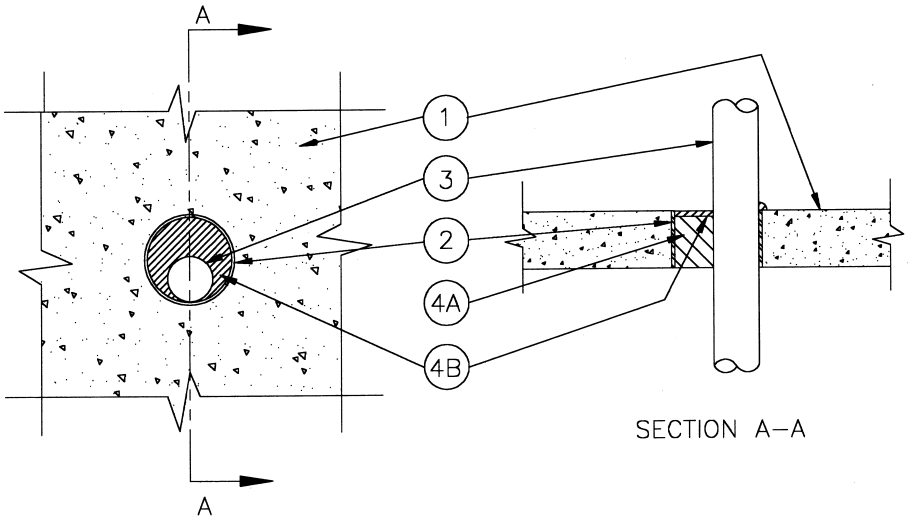

1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf). Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Sleeve –** (Optional) – Nom 3 in. diam (or smaller) Schedule 40 polyvinyl chloride (PVC) sleeve, cast or grouted into floor or wall assembly, flush with or max 2 in. above top surface of floor or both surfaces of wall assembly.

3. **Through Penetrants –** One non-metallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and sleeve or periphery of opening, shall be min 0 in. (point contact) to max 5/8 in. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of non-metallic pipes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process and supply) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR11 CPVC pipe for use in closed (process and supply) piping systems.
   C. **Rigid Nonmetallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 4B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and sleeve or concrete, a 1/2 in. diam bead of fill material shall be applied at the sleeve or concrete/penetrant interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

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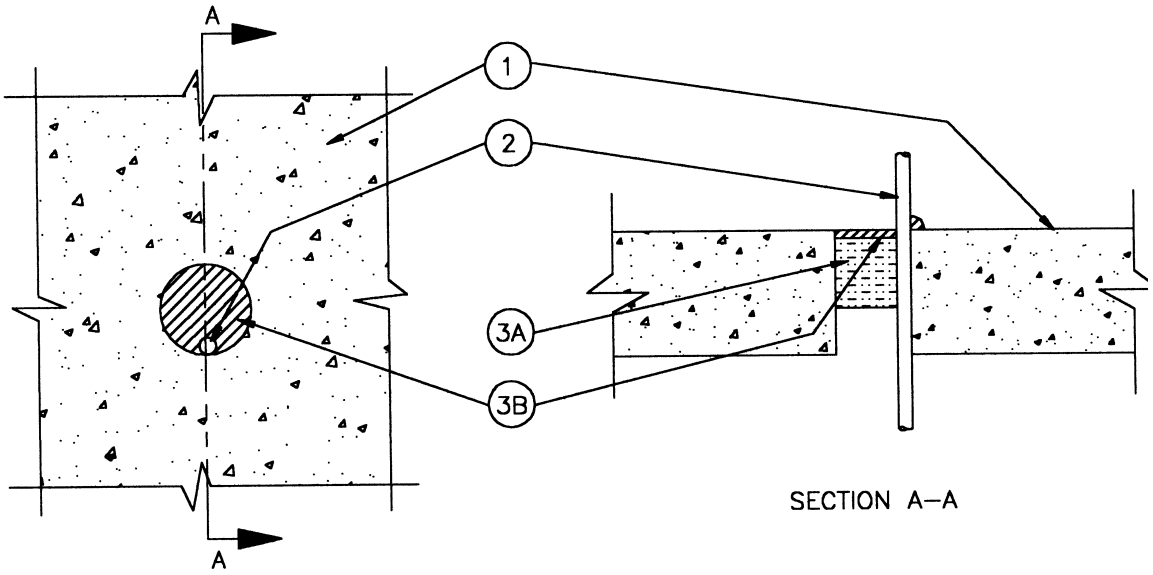

SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Non-metallic Tubing –** Nom 1 in. diam (or smaller) SDR 9 crosslinked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. Tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between tubing and periphery of opening shall be min 0 in. (point contact) to max 2-7/8 in. Tubing to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at concrete/penetrant interface on top surface of floor or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

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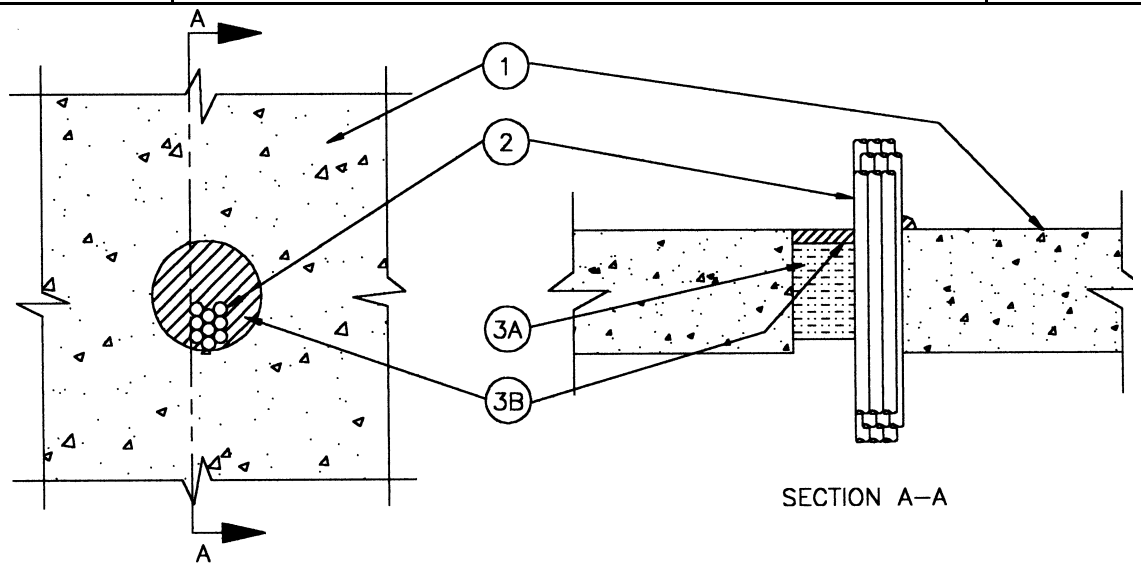


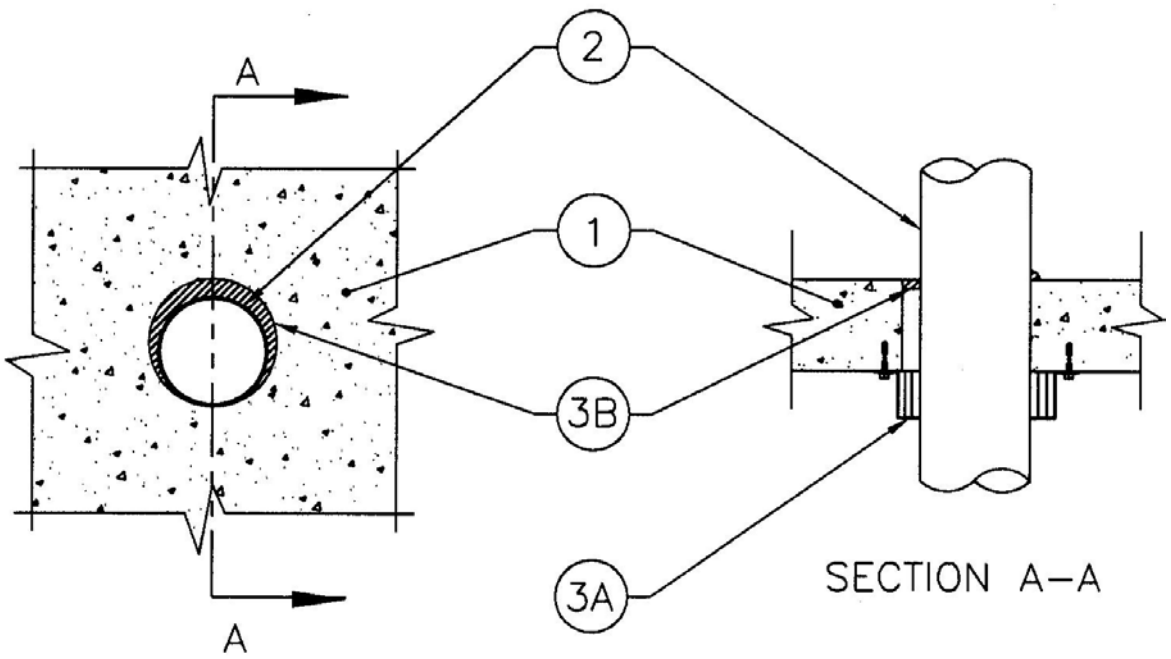
SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Non-metallic Tubing –** Nom 1 in. diam (or smaller) SDR 9 crosslinked polyethylene (PEX) tubing installed either concentrically or eccentrically within the firestop system. Aggregate cross-sectional area of tubing in opening to be max 40 percent of the cross-sectional area of the opening. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 2-7/8 in. Pipe to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of tubing group to max extent possible. At point contact location between tubing and concrete, a min 1/2 in. diam bead of fill material shall be applied at tubing/concrete interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

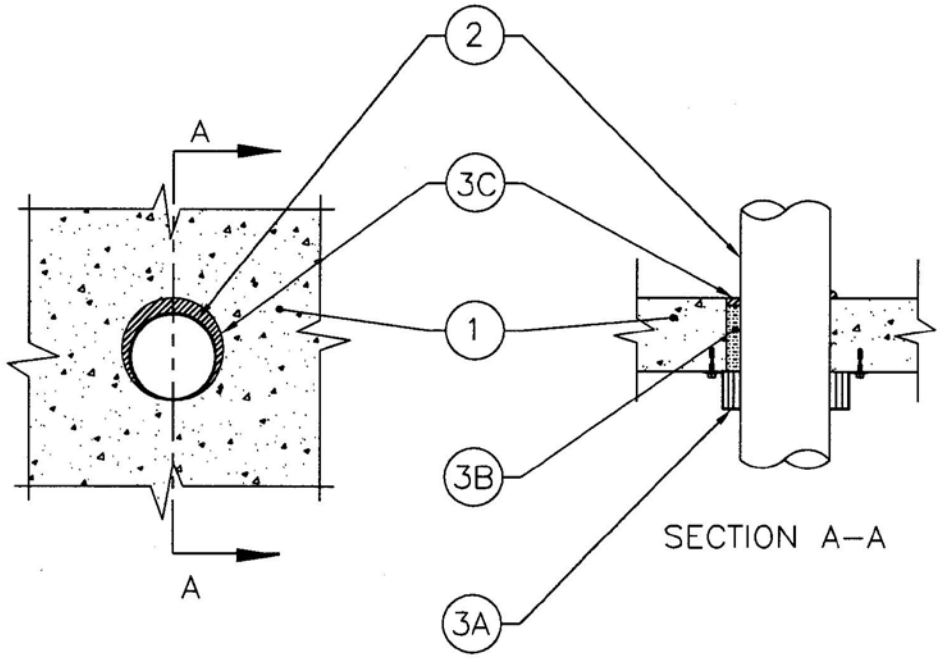


1. **Floor or Wall Assembly** – Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 7 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants** – One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe or conduit and periphery of the opening shall be min 0 in. (point contact) to max 1/2 in. Pipe or conduit to be rigidly supported on both sides of the floor or wall assembly. The following types and sizes of nonmetallic pipes or conduit may be used.
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 6 in. diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 6 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Rigid Nonmetallic Conduit++** – Nom 6 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Firestop Device* – Collar –** Collar to be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around pipes such that collar completely overlaps periphery of opening. Collar secured to underside of floor or both sides of wall with min 3/16 in. diam by min 1-1/4 in. long steel expansion bolts in conjunction with steel nuts and min 1-1/4 in. diam steel washers. Min of two, three or four anchor bolts, symmetrically located, for nom 2 in. diam (or smaller), nom 3 in. diam and nom 4 and 6 in. diam pipes, respectively.
   Passive Fire Protection Partners – Plastic pipe Collar (PPC) 1.5, 2.0, 3.0, 4.0 and 6.0
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of the wall assembly. At point contact location between penetrant and periphery of opening, an additional 1/2 in. diam bead of fill material shall be applied at the concrete penetrant interface on top surface of floor assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking



1. **Floor or Wall Assembly** – Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or min 5 in. thick reinforced lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 7 in. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants** – One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system for used in closed (process or supply) or vented (drain waste or vent) piping systems. The annular space between pipe and periphery of the opening shall be min 0 in. (point contact) to max 1/2 in. Pipe to be rigidly supported on both sides of the floor or wall assembly. The following types and sizes of nonmetallic pipes or conduit may be used.

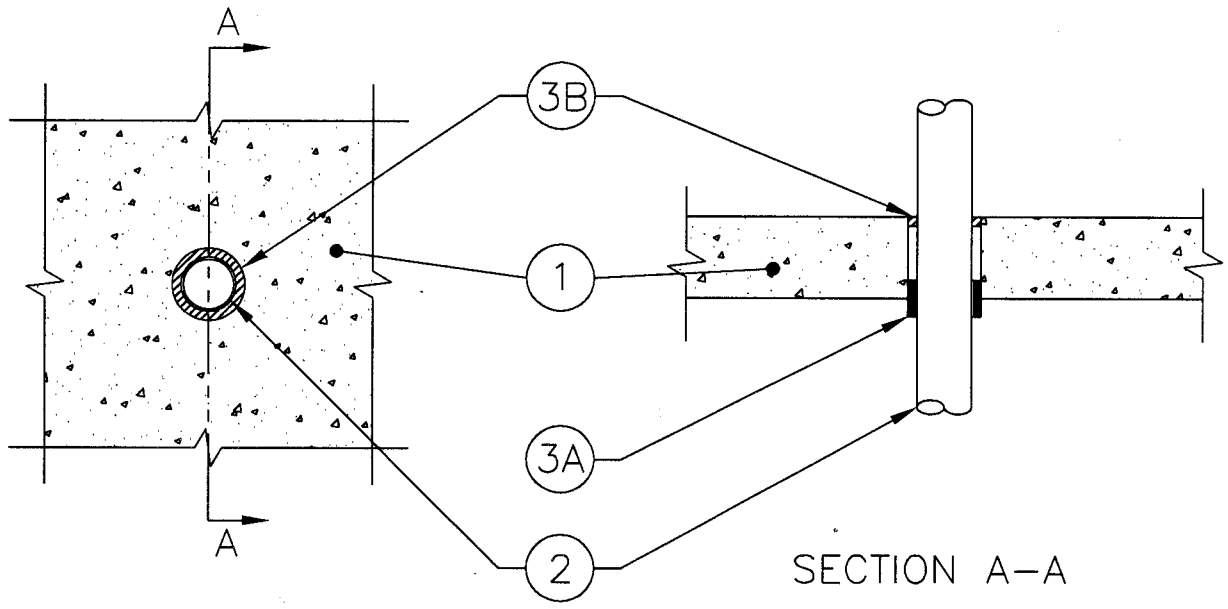
Pipe Type	Nom Diam, [in.]	F Rating [hr]	T Rating [hr]
PVC, ABS or FRPP	1-1/2 to 2	3	2-3/4
PP	1-1/2 to 2	3	3
PVC, ccPVC, ccABS or FRPP	3 to 4	2	2
PP	3 to 4	3	2-3/4
ABS, CPVC or Rigid Nonmetallic Conduit++	6	2	2

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Firestop Device* – Collar** –Collar to be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around pipes such that collar completely overlaps periphery of opening. Collar secured to underside of floor or both sides of wall with min 3/16 in. diam by min 1-1/4 in. long steel expansion. Min of two, three or four anchor bolts, symmetrically located, for nom 2 in. diam (or smaller), nom 3 in. diam and nom 4 and 6 in. diam pipes, respectively.
   Passive Fire Protection Partners – Plastic pipe Collar (PPC) 1.5, 2.0, 3.0, 4.0 and 6.0

B. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form, flush with bottom surface of floor assembly or both sides of wall. Packing material to be recessed from top surface of floor or both surfaces of wall assembly to accommodate the required thickness of fill material.

C. **Fill Void or Cavity Material* – Sealant** – Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of the wall assembly. At point contact location between penetrant and periphery of opening, an additional 1/2 in. diam bead of fill material shall be applied at the concrete penetrant interface on top surface of floor assembly.
Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Mark
++ Bearing the UL Listing Mark
** Tested in accordance to Canadian Code Requirements for closed (supply) piping systems. Not tested to 50 Pa pressure differential as required by Canadian Code Requirements for combustible DWV pipe.



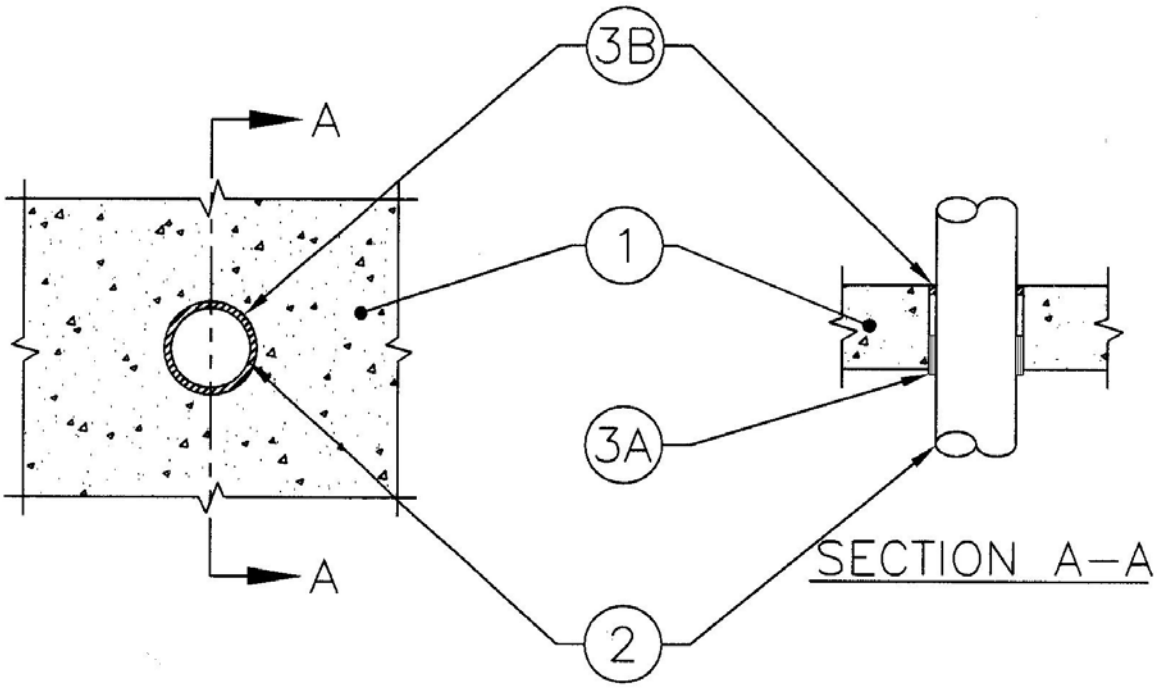
1. **Floor or Wall Assembly** – Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants** – One non-metallic pipe or conduit to be centered within the firestop system. The annular space between the penetrant and the periphery of the opening shall be 1/4 in. Pipe or conduit to be rigidly supported on both sides of the floor or wall. The following types and sizes of non-metallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 3 in. diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Rigid Non-metallic Conduit+ –** Nom 3 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   D. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Wrap Strip –** Nom 1/8 in. thick intumescent material supplied in 2 in. wide strips. Two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wrap strips extending 1/2 in. below bottom of floor or extending 1/2 in. beyond both surfaces of wall.
   Passive Fire Protection Partners – WS1
   B. **Fill Void or Cavity Material* – Sealant** – Min 1/2 in. thickness of sealant applied within annulus, flush with top surface of floor. Sealant not required for wall assemblies. An additional bead of sealant may or may not be applied over exposed edges of wrap strip and at wrap strip/floor or wall interface.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

CLASSIFIED UL US	**F Rating – 3 HR** **T Rating – 3 HR**	**C-AJ-2403**



1. **Floor or Wall Assembly** – Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 5-1/4 in.

   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Flame Retardant Polypropylene (FRPP) Pipe** – Nom 4 in. diam (or smaller) Schedule 40 (or heavier) FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space between the penetrant and the periphery of the opening shall be 3/8 in. for nom 4 in. diam pipes, 1/4 in. for pipes smaller than nom 4 in. Pipe to be rigidly supported on both sides of the floor or wall.

3. **Firestop System** - The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Material* – Wrap Strip –** Nom 1/8 in. thick intumescent material supplied in 2 in. wide strips. For nom 4 in. pipes, three layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. For pipes smaller than nom 4 in., two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wrap strips extending 1 in. below bottom of floor, or flush with or extending 1 in. beyond both surfaces of wall.

   Passive Fire Protection Partners – WS1

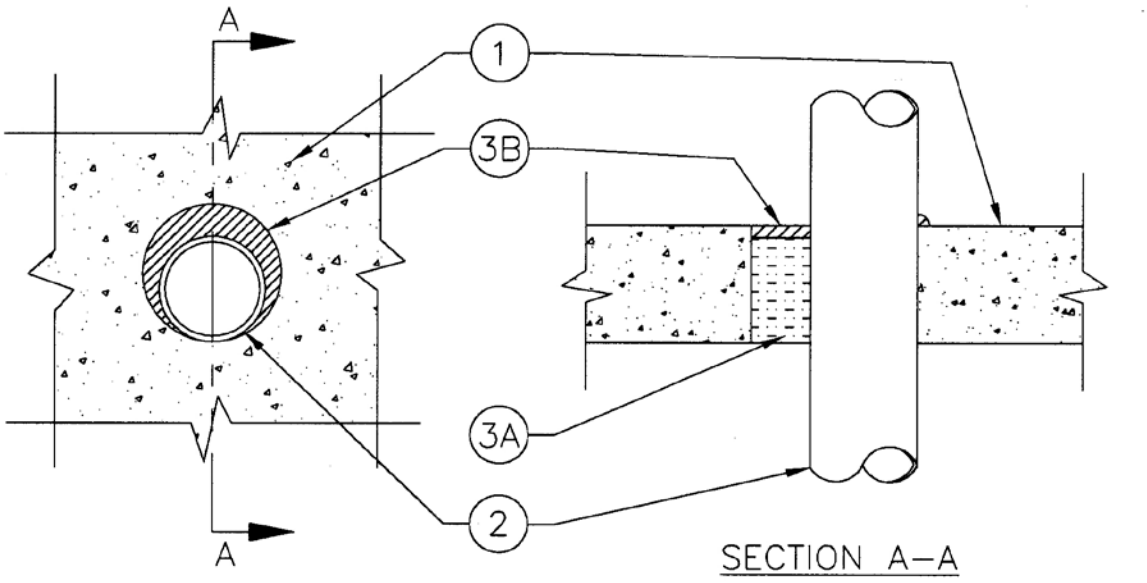
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within annulus, flush with top surface of floor. Sealant not required for wall assemblies.

   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

** Tested in accordance to Canadian Code Requirements for closed (supply) piping systems. Not tested to 50 Pa pressure differential as required by Canadian Code Requirements for combustible DWV pipe.

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Ratings — 3/4 Hr
	FH Rating — 2 Hr
	FTH Ratings — 3/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 8 in.

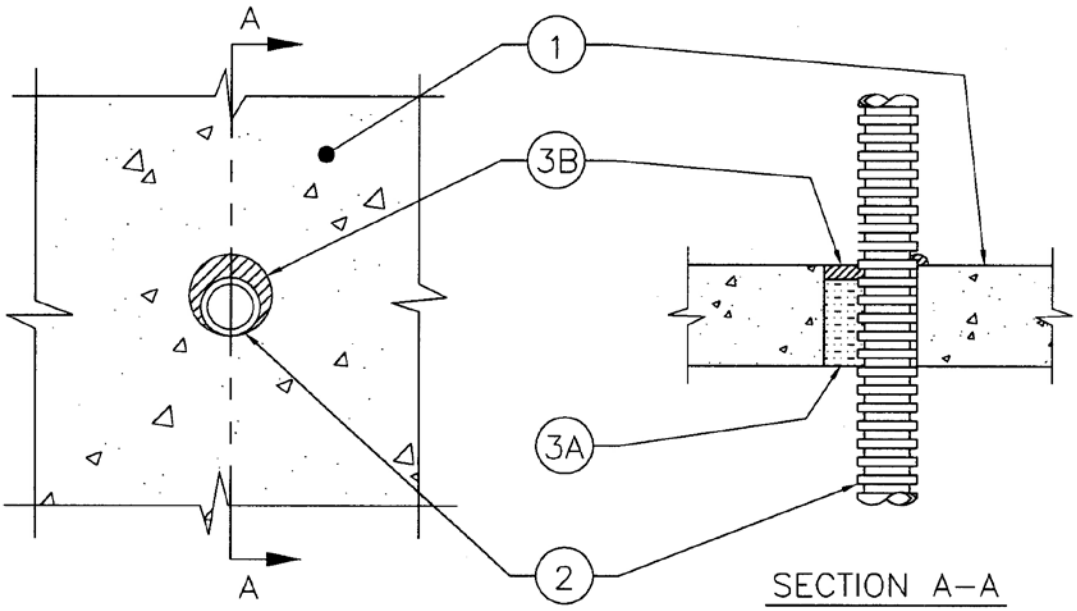
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant* – Glass Pipe –** Nom 6 in. diam (or smaller) glass pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. One pipe to be installed concentrically or eccentrically within the firestop system. Pipe coupling to be located a min. of 12 in. from floor or wall surfaces. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1-5/8 in. Pipe to be rigidly supported on both sides of floor or wall.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between pipe and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the periphery of concrete/pipe interface on the top surface of floor or both surfaces of wall.

Passive Fire Protection Partners – 3600EX

*Bearing the UL Classification Marking



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete or min 5 in. thick lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

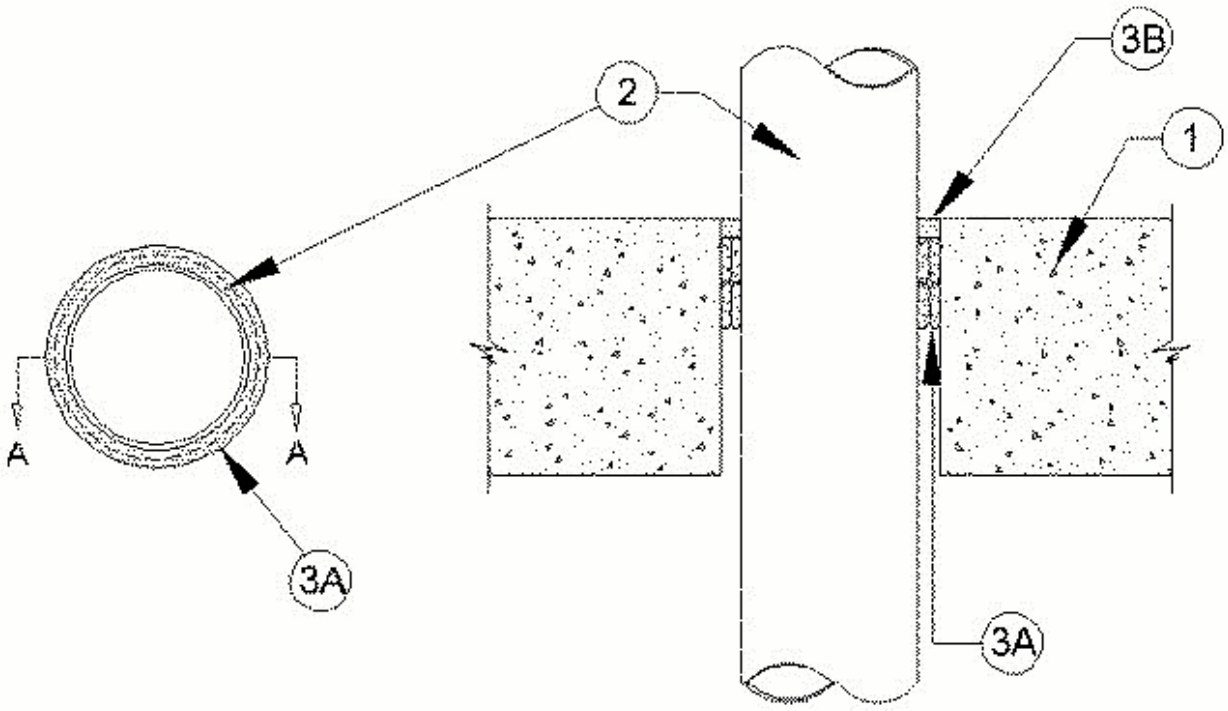
2. **Electrical Nonmetallic Tubing+ –** Nom 2 in. diam (or smaller) corrugated wall electrical nonmetallic tubing (ENT) constructed of polyvinyl chloride. One ENT to be installed either concentrically or eccentrically within the firestop system with an annular space of min 0 in. (point contact) to max 5/8 in. ENT installed in accordance with Article 331 of the National Electrical Code and rigidly supported on both sides of the floor or wall assembly.
   See **Electrical Nonmetallic Tubing** (FKHU) category in the Electrical Construction Materials Directory for names of manufacturers.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact locations between ENT and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the periphery of concrete/ENT interface on the top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

+ Bearing the UL Listing Mark
* Bearing the UL Classification Mark

	F Rating – 3 Hr T Rating – 2-3/4 and 3 Hr (See Item 3)	C-AJ-2691

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 2-3/4 and 3 Hr (See Item 3)	FT Rating — 2-3/4 and 3 Hr (See Item 3)
L Rating At Ambient — Less than 1 CFM/sq ft	FH Rating — 3 Hr
	FTH Rating — 2-3/4 and 3 Hr (See Item 3)



SECTION A-A

System tested with a pressure differential of 50 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Floor or Wall Assembly —** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening 5 in. (127 mm).

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants —** One nonmetallic pipe to be installed concentrically within the firestop system. Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in vented (drain, waste or vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Material* — Wrap Strip —** One stack of nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide or two stacks of nom 1/4 in. (6 mm) thick by 1 in. (25 mm) wide intumescent wrap strip individually wrapped around the outer circumference of the pipe with ends butted and held in place with tape or tie wire. Butted ends in successive laters shall be offset. Wrap strip slid into annualr space and recessed from the top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material. The pipe size, annular space, number of wrap strip layers and resulting T Rating is shown in the table below:

Nom Pipe Diam, In. (mm)	Annular Space, In. (mm)	No. of Wrap Strip Layers	T Rating, Hr
2 (51) or smaller	1/4 (6) to 5/16 (8)	1	2-3/4
3 (76) or smaller	1/2 in. (13) to 3/4 (19)	2	3

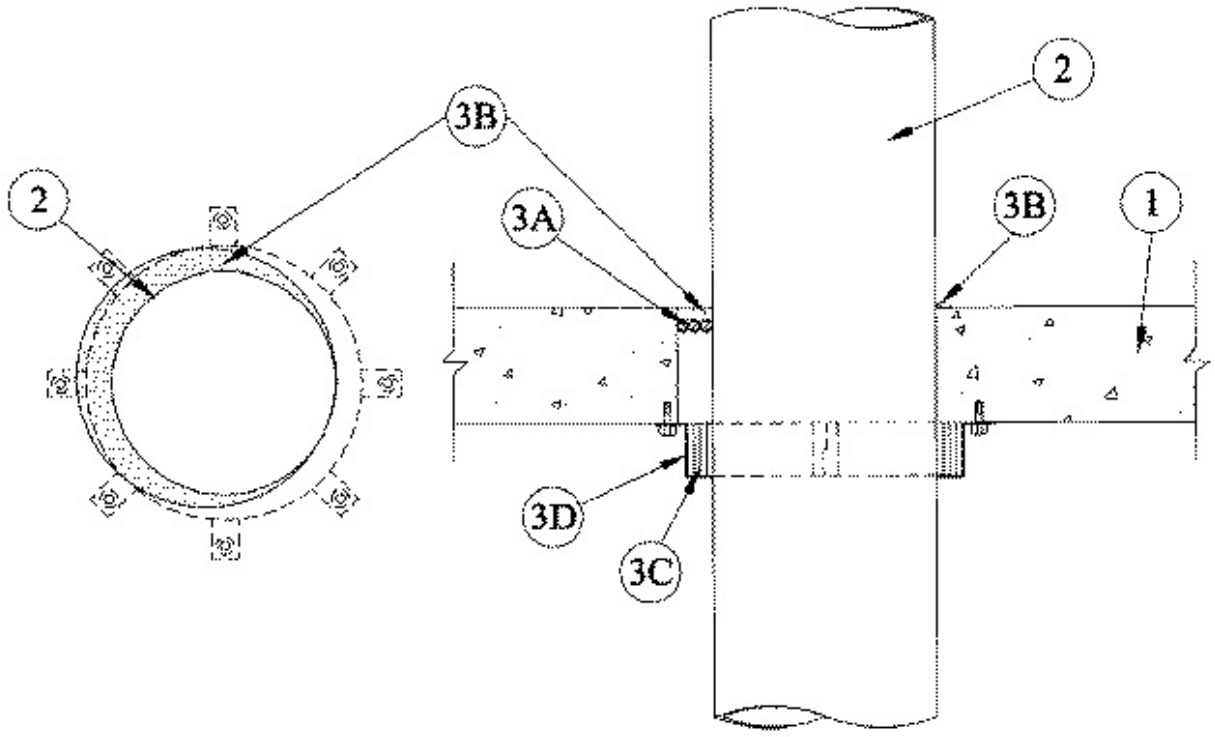
PASSIVE FIRE PROTECTION PARTNERS — WS2

   B. **Fill, Void or Cavity Material* — Caulk —** Min 6 mm (1/4 in.) thickness of fill material applied within the annulus, flush with the top surface of floor or both surfaces of wall.

PASSIVE FIRE PROTECTION PARTNERS — 3600EX

*Bearing the UL Classification Mark

F Rating — 3 Hr
T Rating — 1-1/2 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft
L Rating at 400 F — Less Than 1 CFM/sq ft



SECTION A-A

1. **Floor or Wall Assembly —** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 10 in.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants —** One nonmetallic pipe to be installed either eccentrically or concentrically within the firestop system. The annular space shall be min 0 in. (point contact) to max 1-3/8 in. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 8 in. diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 8 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Packing Material —** Foam backer rod firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall as required to accommodate the required thickness of fill material.

   B. **Fill, Void or Cavity Material* — Caulk —** Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall. At point contact location between concrete floor and pipe, a min 1/4 in. diam bead of fill material shall be applied to the concrete/pipe interface on top surface of floor.

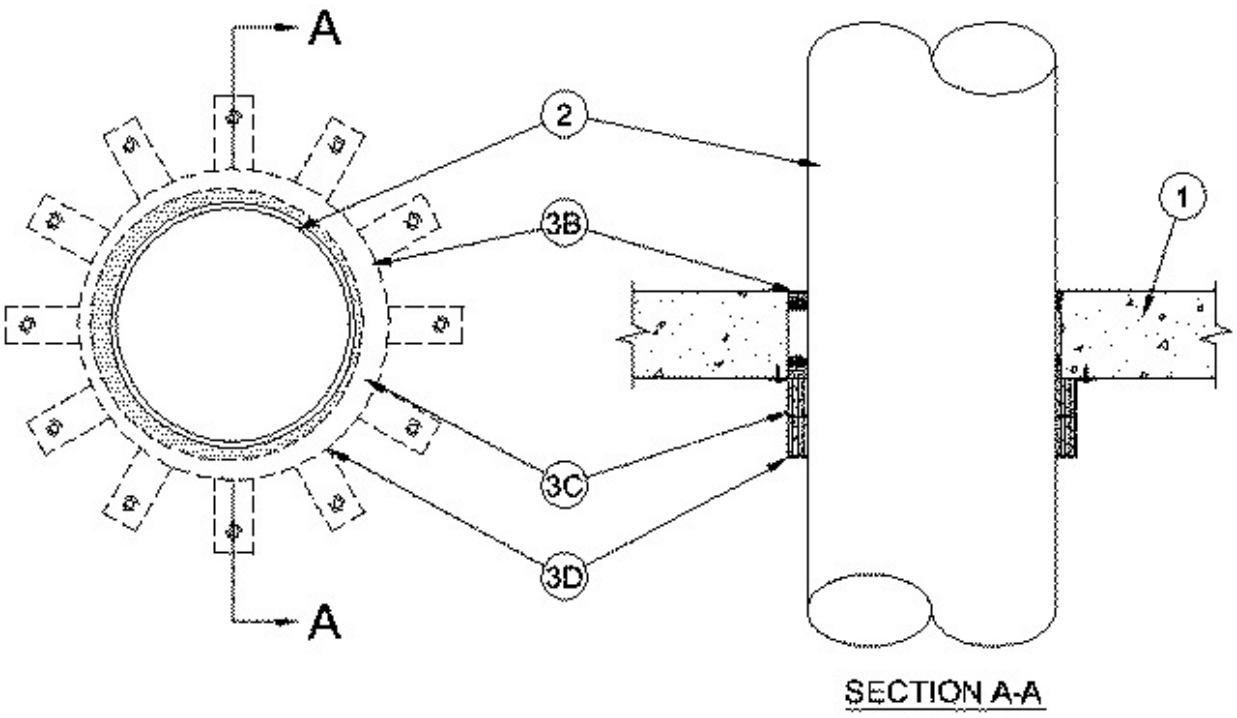
      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

   C. **Fill, Void or Cavity Material* — Wrap Strip —** Nom 1/4 in. thick by 2 in. wide intumescent wrap strip. Four layers of wrap strip are individually wrapped around the through-penetrant with ends butted and held in place wtih masking tape. Butted ends in successive layer shall be offset. Wrap strip butted tightly against bottom surface of floor or both surfaces of wall.

      PASSIVE FIRE PROTECTION PARTNERS — WS2

   D. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. deep with 1 in. wide by 1-1/2 in. long anchor tabs on 4 in. centers for securement to the underside of floor or both surfaces of wall. In addition, collars contain retainer tabs 1/2 in. wide by 3/4 in. long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. At the overlap, the two ends of the collar shall be transversely slit from opposite directions for a distance of 1-1/2 in., approximately 1/2 in. from the ends, and tucked together. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to bottom surface of the floor or both surfaces of wall at each anchor tab by means of min 1/4 in. diam by 1-1/4 in. long steel expansion bolts or steel Tapcon® concrete anchors in conjunction with 1/4 in. by 5/8 in. diam washers.

*Bearing the UL Classification Mark



SECTION A-A

1. **Floor or Wall Assembly —** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 14 in.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants —** One non-metallic pipe to be installed either eccentrically or concentrically within the firestop system with an annular space of min 1/4 in. to max 1 in. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of non-metallic pipe may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 10 or 12 in. diam Sch 40 solid core polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Packing Material —** Foam backer rod firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall as required to accommodate the required thickness of fill material.

   B. **Fill, Void or Cavity Material*—Caulk —** Min 1/2 in. thickness of fill material applied within the annulus, flush with both surfaces of floor or both surfaces of wall.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

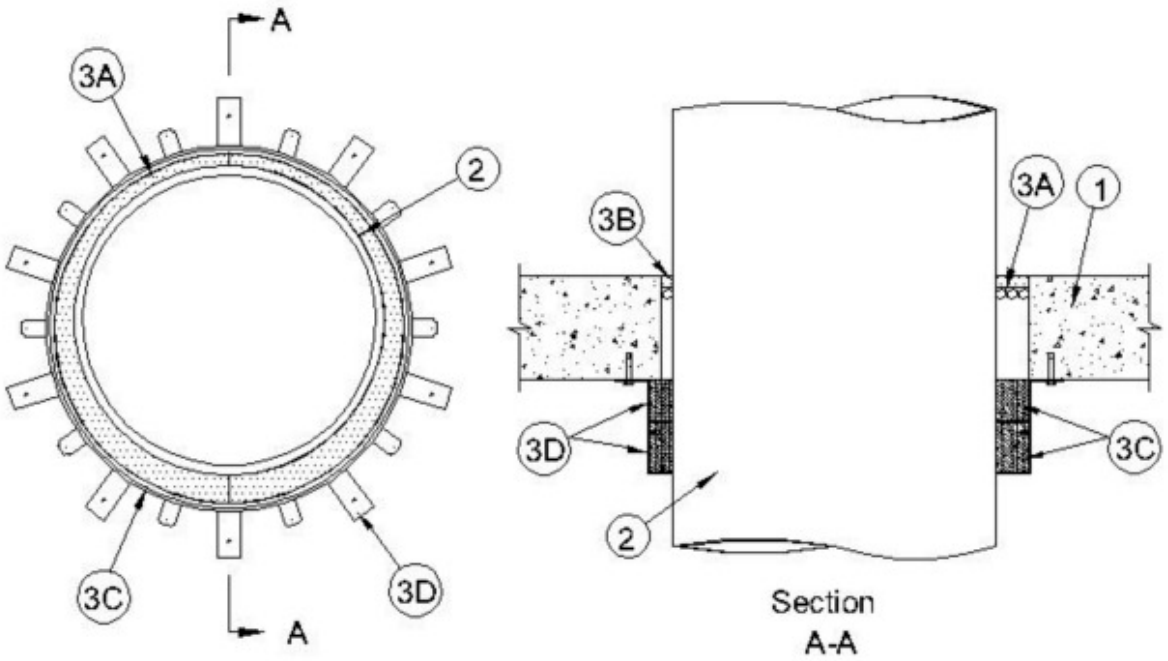
   C. **Fill, Void or Cavity Material* - Wrap Strip —** Nom 1/4 in. thick by 2 in. wide intumescent wrap strip faced on one side with a plastic film. Alternately, two nom 1/4 in. thick by 1 in. wide wrap strips may be butted together side by side to achieve the 2 in. width. Two stacks of four layers of 2 in. wide wrap strip are individually wrapped around the through-penetrant with film exposed and ends butted and held in place with masking tape. Butted ends in successive layers shall be offset. Wrap strip butted tightly against bottom surface of floor or both surfaces of wall.

      PASSIVE FIRE PROTECTION PARTNERS — WS2

   D. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. deep with 1 in. wide by 1-1/4 in. long anchor tabs on 4 in. centers for securement to the underside of floor or both surfaces of wall. In addition, collar contains retainer tabs 1/2 in. wide by 3/4 in. long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, with ends overlapping min 1 in. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Steel collar tightened around wrap strips and through pentetrant using min 1/2 in. wide by 0.028 in. thick stainless steel hose clamp installed at midheight of the collar. Collar secured to bottom surface of the floor or both surfaces of wall at each anchor tab by means of min 1/4 in. diam by 1-1/4 in. long steel expansion bolts or steel Tapcon® concrete anchors in conjunction with 1/4 in. by 5/8 in. diam washers spaced 4 in. OC. A second similar collar with wrap strips shall be installed in a like manner and butted tightly to the first collar. The anchor tabs of the lower collar are left unbent so they may mount to the outside surface of the upper collar using 1/4 sheet metal screws at each anchor tab. A second min 1/2 in. wide by 0.028 in. thick stainless steel hose clamp shall be installed around the second collar.

*Bearing the UL Classification Mark

F Rating — 3 Hr
T Rating — 2-3/4 Hr
L Rating at Ambient — Less than 1 CFM/ft^3
L Rating at 400° F — Less than 1 CFM/ft^3



1. **Floor or Wall Assembly —** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Max diam of opening is 16 in. (406 mm).

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant —** One nom 14 in. (356 mm) diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems. Pipe to be installed concentrically or eccentrically within the firestop system with a nom annular space of 1/2 in. (13 mm) to 1-1/2 in. (38 mm). Pipe to be rigidly supported on both sides of the floor or wall assembly.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Packing Material —** Foam baker rod firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.

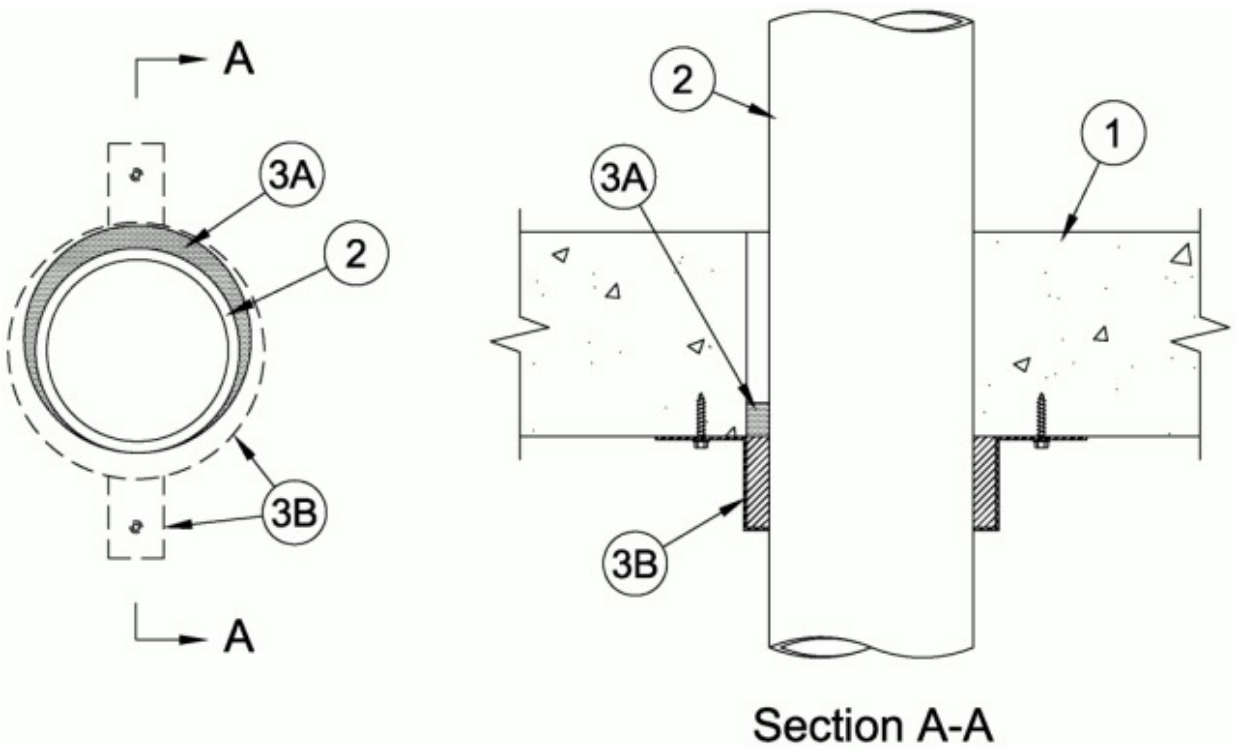
   B. **Fill, Void or Cavity Material* — Sealant —** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.
   PASSIVE FIRE PROTECTION PARTNERS — 3600EX

   C. **Fill, Void or Cavity Materials* - Wrap Strip —** Two stacks of five layers each of nom 1/4 in. thick intumescent elastomeric material faced on one side with a plastic film, supplied in 2 in. wide strips. Strips tightly wrapped around nonmetallic pipe (film side exposed) with the edges butted against the underside of the concrete floor or both sides of wall surface. Butted ends in successive layers shall be offset. Wrap strip layers temporarily held in position using tape, wire or equivalent. Second stack of wrap strip to be tightly butted to first stack after the retaining tabs of the steel collar (Item 3D) over the first stack of wrap strip are bent 90 deg toward pipe.
   PASSIVE FIRE PROTECTION PARTNERS — WS2

   D. **Steel Collar Assembly —** One 1 in. (25 mm) and two 2 in. (51 mm) collars used for installation around the stacks of wrap strip layers. Collars fabricated from coils of precut min 0.016 in. (0.41 mm) thick (No. 30 MSG) galv sheet steel available from wrap strip. Collars provided with min 1 in. (25 mm) wide by 1-1/4 in. (32 mm) long anchor tabs on 4 in. (102 mm) centers for securement to underside of concrete floor and both sides of concrete wall. In addition, collars contain retainer tabs, 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long located opposite the anchor tabs. The 1 in. (25 mm) wide collar shall be installed first over the wrap strip with ends overlapping min 1 in. (25 mm), flush with bottom of floor or both surfaces of wall. The retaining tabs on 1 in. (25 mm) wide collar are not to be bent. Collar secured to bottom surface of the floor or both surfaces of wall at each anchor tab by means of min 1/4 in. (6 mm) diam by 1-1/4 in. (32 mm) long steel expansion bolts or steel Tapcon® concrete anchors in conjunction with 1-1/4 in. (32 mm) diam fender washers. A 2 in. (51 mm) wide collar shall be wrapped over the 1 in. (25 mm) wide collar, flush with bottom surface of floor or both surfaces of wall, with ends overlapping min 1 in. (25 mm) secured with two 7/16 in. (11 mm) long steel screws. The retainer tabs are folded 90 deg towards the pipe to retain the first stack of wrap strip layers. The 2 in. (51 mm) wide collar to be fastened to the 1 in. (25 mm) collar with 7/16 in. (11 mm) long steel screws located approx 1/2 in. (13 mm) from floor or wall surface at the locations of each anchor tab on the 1 in. (25 mm) wide collar. The anchor tabs for the 2 in. (51 mm) wide collar are not secured to the floor. The other 2 in. (51 mm) wide is to be tightly wrapped around the second stack of wrap strip layers with ends overlapping min 1 in. (25 mm) secured with two 7/16 in. (11 mm) long steel screws. The retainer tabs are folded 90 deg towards the pipe to retain the second stack of wrap strip layers. The second 2 in. (51 mm) wide collar to be screwed to the first 2 in. (51 mm) collar with 7/16 in. (11 mm) long steel screws located through each anchor tab on the second 2 in. (51 mm) wide collar. A min 9/16 in. (14 mm) wide stainless steel hose clamp installed at base of the second 2 in. (51 mm) wide collar.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Floor or Wall Assembly —** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow-core **Precast Concrete Units***. Opening to be max 5/8 in. (16 mm) larger than outside diam of nonmetallic pipe. Max diam of opening is 4 in. (102 mm).

See **Concrete Blocks**(CAZT) and **Precast Concrete Units** (CFTV) categories in the Fire Resistance Directory for names or manufacturers.

2. **Nonmetallic Pipe —** Nom 3 in. (76 mm) diam (or smaller) nonmetallic pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipe may be used:

   A. **Polypropylene (PP) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Aquatherm Greenpipe SDR 7.4 with Faser PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.

   B. **Polypropylene (PP) Pipe —** Nom 2 in. (51 mm) diam (or smaller) Aquatherm Greenpipe SDR 11 PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.

   C. **Polypropylene (PP) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Aquatherm Climatherm SDR 11 with Faser PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Materials * - Caulk —** Min 1/2 in. (13 mm) thickness of caulk applied within annulus, flush with bottom of floor or both surfaces of wall assembly.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

   B. **Fill, Void or Cavity Material* - Wrap Strip —** (Not Shown) - As an alternate to Item 3B when max 2 in. (51 mm) diam pipe is used, single layer of nom 1/4 in. (6 mm) thick by 1 in. (25 mm) wide intumescent wrap strip wrapped around the outer circumference of the pipe on bottom of floor or on each side of the wall. Wrap strip installed with butted seam and such that edge of wrap strip is flush with the surface of floor or wall. Wrap strip temporarily secured with tape or tie wire.

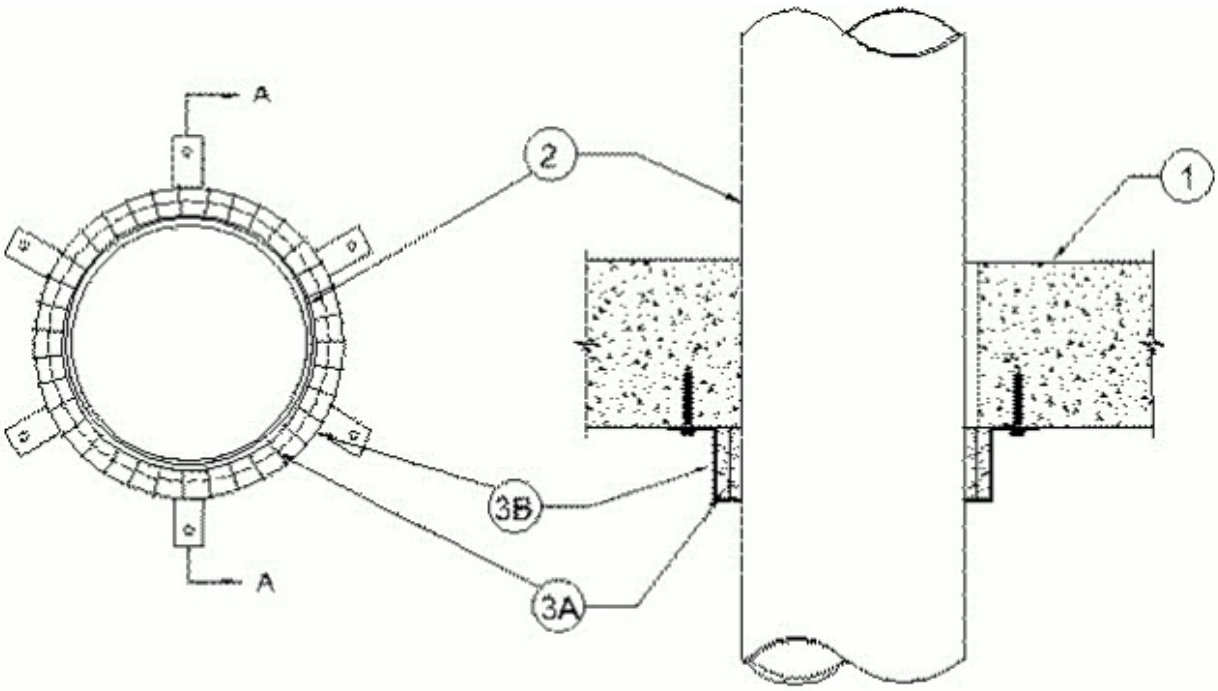
      PASSIVE FIRE PROTECTION PARTNERS — WS2

   C. **Steel Collar —** (Not Shown) - When Item 3C is used, a collar fabricated from coils of precut min 0.016 in. thick (0.41 mm) galv steel available from fill material manufacturer shall be installed to restrain wrap strip. Collar shall be nom 1 in. (25 mm) deep with 1 in. (25 mm) wide by 1-1/2 in. (38 mm) long anchor tabs for attachment to wall. In addition, collar provided with 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long retainer tabs opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. (25 mm). The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to bottom surface of floor or both surfaces of wall at each anchor tab by means of 1/4 in. (6 mm) diam by 1-1/4 in. (32 mm) long steel anchors in conjunction with 1/4 in. (6 mm) by 5/8 in. (16 mm) diam steel washers.

*Bearing the UL Classification Mark

	F Rating – 3 Hr T Rating – 3 Hr	C-AJ-2697

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 3 Hr	F Ratings — 2 Hr
T Rating — 3 Hr	FT Rating — 3 Hr
	FH Ratings — 3 Hr
	FTH Rating — 3 Hr



SECTION A-A

System tested with a pressure differential of 50 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Floor or Wall Assembly —** Min 114 mm (4-1/2 in.) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow-core **Precast Concrete Units***. Max diam of opening 7 in. (178 mm).

See **Concrete Blocks** (CAZT) and Precast Concrete Units* (CFTB) categories in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants —** One nonmetallic pipe to be installed eccentrically or concentrically within the firestop system. Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in vented (drain, waste or vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Material* — Wrap Strip —** Nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide intumescent wrap strip individually wrapped around the outer circumference of the pipe with ends butted and held in place with masking tape. Butted ends in successive layers shall be offset. Wrap strip tightly against the bottom surface of floor or both surfaces of wall. The pipe size, annular space and number of wrap strip layers are shown in the table below:

Nom Pipe Diam, In. (mm)	Annular Space, mm (In.)	No. of Wrap Strip Layers
6 (152) or smaller	0-3/8 (0 to 8)	3
4 (102) or smaller	0-1/2 (0 to 13)	2

PASSIVE FIRE PROTECTION PARTNERS — WS2

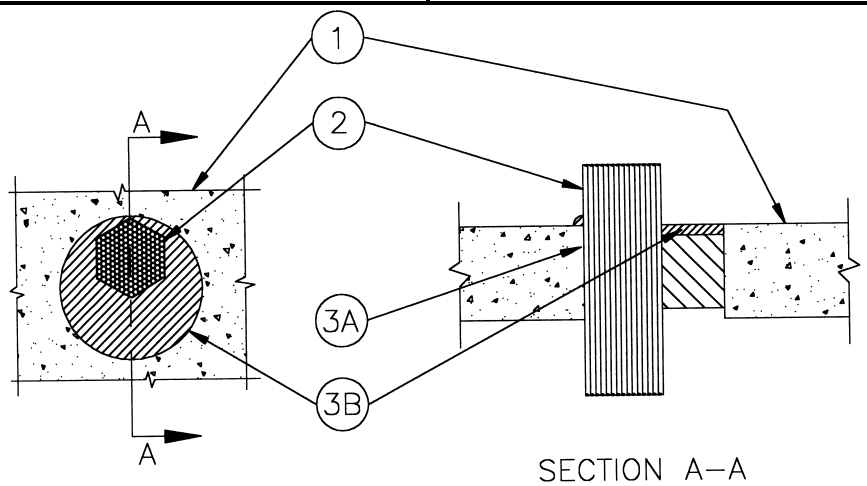
   B. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. (0.41 mm) thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. (51 mm) deep with 1 in. (25 mm) wide by 1-1/4 in. (32 mm) long anchor tabs on 4 in. (102 mm) centers for securement to the underside of floor or both surfaces of wall. In addition, collar contains retainer tabs ½ in. (13 mm) wide by 3/4 in. (19 mm) long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, with ends overlapping min 1 in, (25 mm). For 6 in. (152 mm) diam pipes two revolutions of steel collar or 1 revolution of steel collar with a nominal 1/2 in. (13 mm) wide by 0.028 in. (0.71 mm) thick stainless steel hose clamp at mid-height is required. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to bottom surface of the floor or both surfaces of wall at each anchor tab by means of min 1/4 in. (6 mm) diam by 1-1/4 in. (31 mm) long steel expansion bolts or steel Tapcon® concrete anchors in conjunction with 1/4 in. (6 mm) by 5/8 in. (16 mm) diam washers.

   C. **Fill, Void or Cavity Material* — Caulk —** (Not Shown) - When hollow-core floors are used, a min 6 mm (1/4 in.) thickness of caulk shall be applied within the annulus, flush with the top surface of floor.

PASSIVE FIRE PROTECTION PARTNERS — 3600EX

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 5 in. (127 mm) thick normal weight (150 pcf or 2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 10-1/4 in. (260 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 27 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 3-1/2 in. (89 mm). Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 3 50 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with (XLPE) insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with (XLPE) insulation.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

G. **Through Penetrating Product* –** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.
ALFEX CORP

H. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
SOUTHWIRE CO – Type MC, Type AC

3. **Firestop System –** The firestop system shall consist of the following:

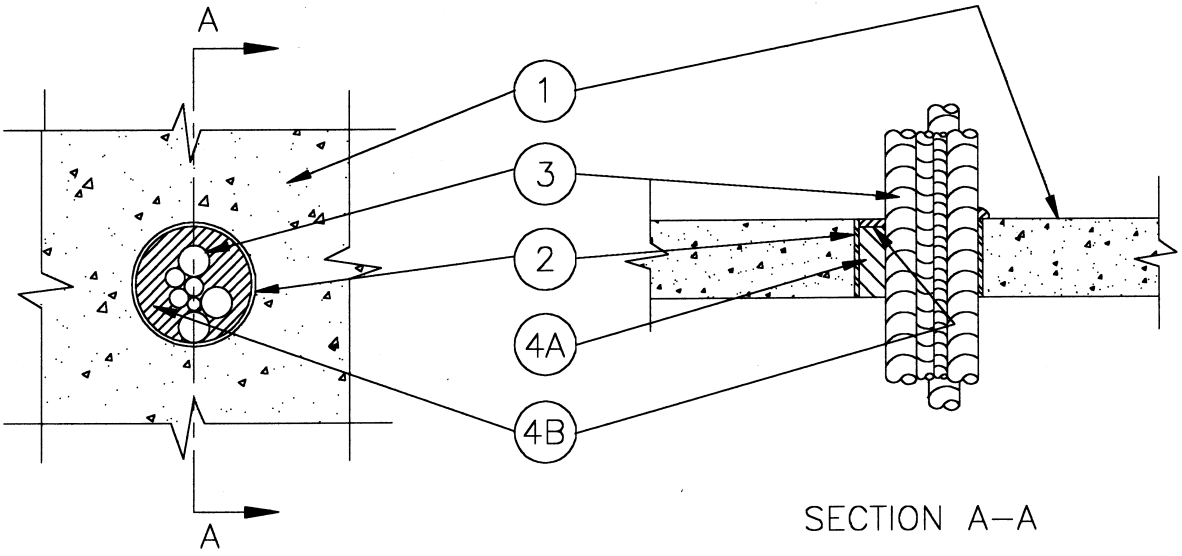
A. **Packing Material –** Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of cable group to max extent possible.
Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point of contact location between penetrant and concrete, a 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or both surfaces of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 8 in. (203 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve –** (Optional) – Nom 8 in. (203 mm) (or smaller) Schedule 40 (or heavier) steel sleeve, cast or grouted into wall or floor assembly, flush with or max 2 in. (51 mm) above top surface of floor or both surfaces wall assembly.

3. **Cables –** Aggregate cross sectional area of cables in opening to be max 27 percent of the cross sectional area of the opening. Cables installed either concentrically or eccentrically within the firestop system. The annular space between cables and sleeve or periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in.(89 mm). Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.
   B. 3/C 3 50 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   C. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.

D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.

E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with or without PVC jacket.

F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with or without PVC jacket.

G. **Through Penetrating Product* –** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.
ALFEX CORP

H. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
SOUTHWIRE CO – Type MC, Type AC

4. **Firestop System –** The firestop system shall consist of the following:

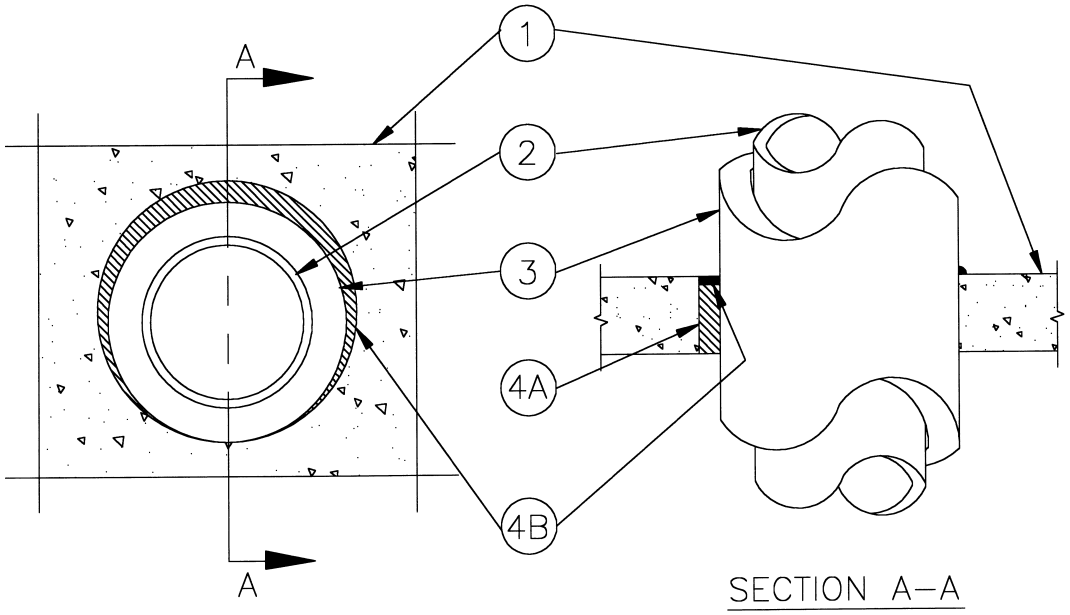
A. **Packing Material –** Min 4 in. (102 mm) or 4-1/4 in. (108 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for sealants B1 and B2, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as to accommodate the required thickness of fill material (Item 4B).

B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact location between cables and sleeve or concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the sleeve or concrete/cable interface on top surface of floor or both surfaces of wall.
Passive Fire Protection Partners – 3600EX, 4800DW

B1. **Fill Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between sleeve or concrete, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the sleeve or concrete/cable interface on top surface of floor or both surfaces of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1-3/4 Hr	FT Rating — 1-3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1-3/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 18 in. (457 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

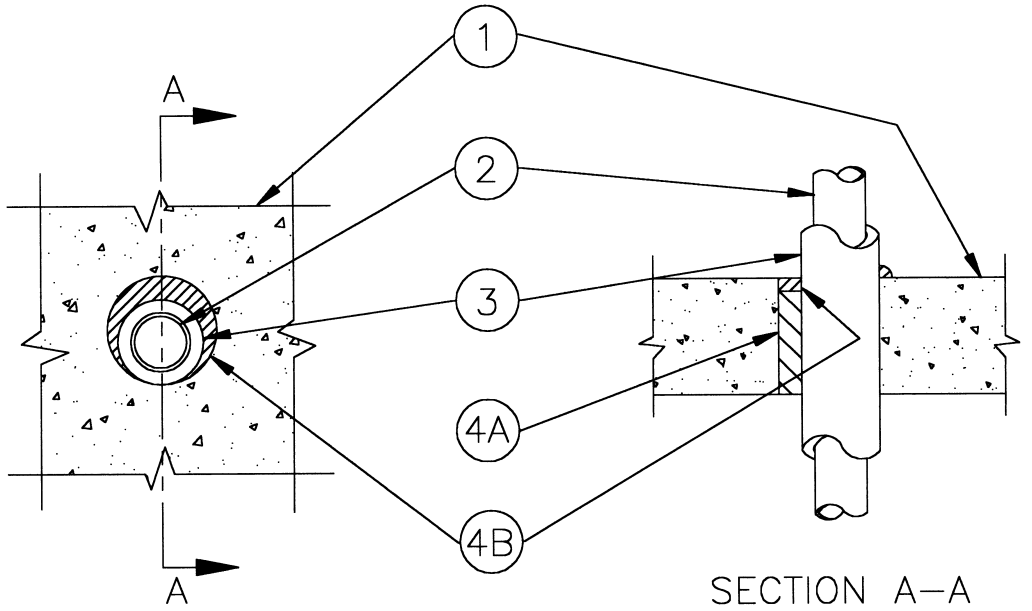
4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At the point contact location between pipe and concrete, a min 3/8 in. (10 mm) diam bead of fill material shall be applied at the concrete/pipe-covering interface on the top surface of floor and on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Marking

F Rating – 2 Hr
T Rating – 3/4 & 1-1/4 Hr (See Item 2)

C-AJ-5115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 3/4 & 1-3/4 Hr (See Item 2)	FT Ratings — 3/4 & 1-3/4 Hr (See Item 2)
	FH Rating — 2 Hr
	FTH Ratings — 3/4 & 1-3/4 Hr (See Item 2)



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4-1/2 in. (114 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

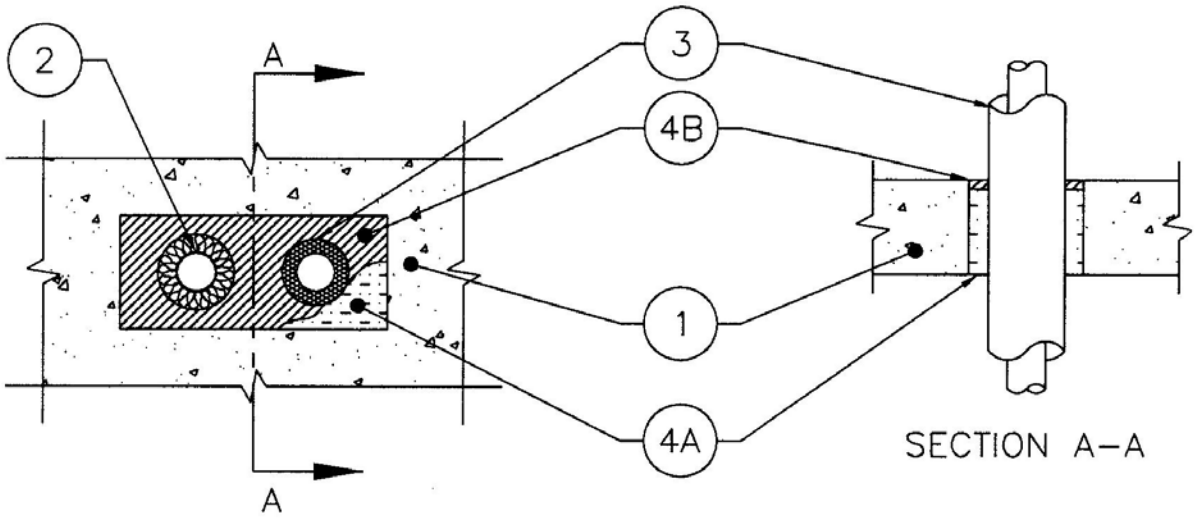
   T Rating is 1-1/4 Hr for penetrants A and B. T Rating is 3/4 Hr for penetrants C, D and E.

3. **Tube Insulation – Plastic+ –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm). See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the periphery of opening/tube insulation interface on top surface of floor assembly or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

+ Bearing the UL Recognized Component Mark
* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 3 Hr
	FTH Rating — 3/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min. 5-1/4 in. (133 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Block***. Max size of opening is 84 sq. in. (542 cm^2) with a max. dimension of 14 in. (356 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

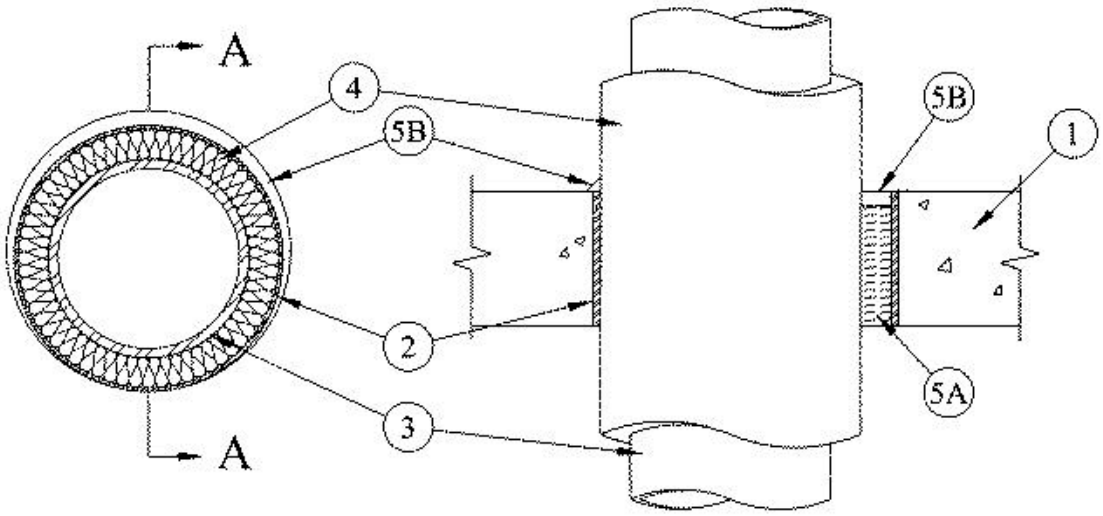
2. **Through Penetrants** – Two metallic pipes, conduits or tubing to be installed within the opening. Pipes, conduits or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe** – Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing** – Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe** – Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Coverings* –** One of the following pipe coverings should be used:
   A. **Pipe Covering* –** Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between insulation and periphery of opening shall be min. 7/8 in. (22 mm) to max. 2 in. (51 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. **Tube Insulation – Plastics+ –** Min 1/2 in. (13 mm) to max. 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between insulation and periphery of opening shall be min. 7/8 in. (22 mm) to max. 2 in. (51 mm).
   See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufactures. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94 – 5VA may be used.

4. **Firestop System** - The firestop system shall consist of the following:
   A. **Packing Material** – Min. 3-3/4 in. (95 mm) thickness of min. 4 pcf (64 kg/m^3) density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of sealant applied within annulus, flush with top surface of floor or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Mark
+ Bearing the UL Recognized Component Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1Hr



SECTION A-A

1. **Floor or Wall Assembly** – Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Min 5 in. thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks*.** See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve –** Nom 10 in. (254 mm) diam (or smaller) Schedule 40 (or heavier) steel cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

3. **Through Penetrants –** One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) SCH 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

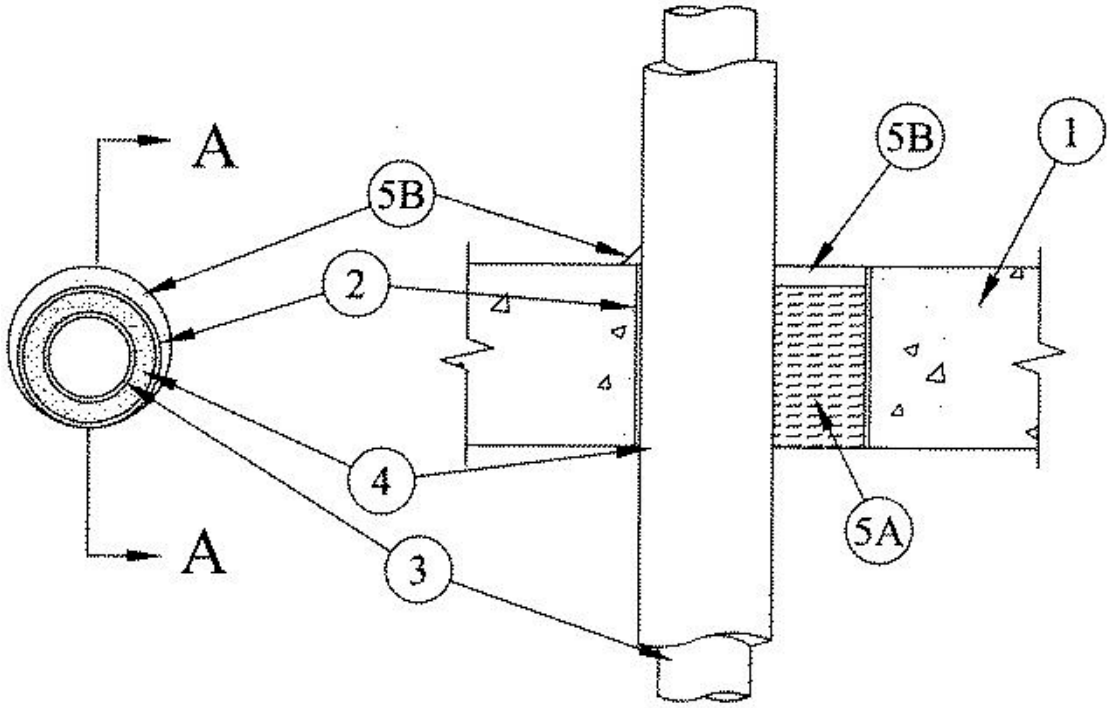
4. **Pipe Covering –** Max 1 in. (25 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm).

   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation tightly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor or with both surfaces of wall. At the point contact location between pipe covering and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/pipe covering interface on the top surface of floor and on both sides of wall.
   Passive Fire Protection Partners – 4800DW

* Bearing the UL Classification Mark
\+ Bearing the UL Recognized Component Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



SECTION A-A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Sleeve –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 polyvinyl chloride (PVC) pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

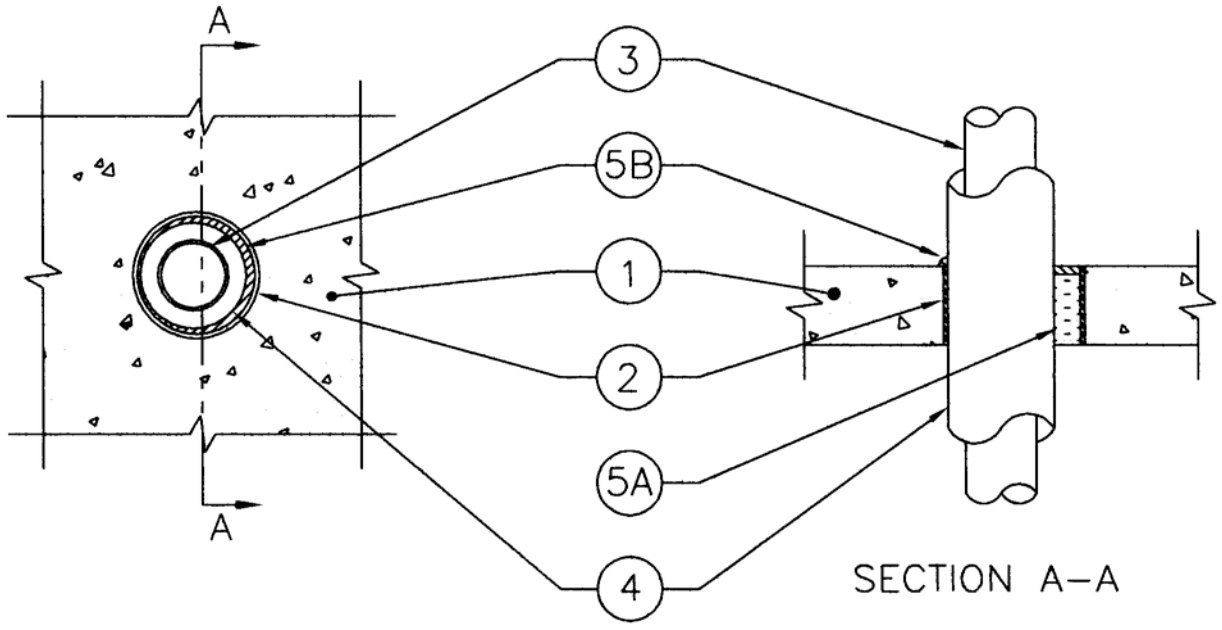
3. **Through Penetrants** – One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Tube Insulation – Plastic+ –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated pipe and the sleeve shall be min 0 in. (point contact) to max 2-3/8 in. (60 mm).
   See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At point contact location between pipe covering and sleeve, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the sleeve/pipe covering interface on top surface of floor assembly or both surfaces of wall assembly.
   Passive Fire Protection Partners – 4800DW

+Bearing the UL Recognized Component Mark
*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



1. **Floor or Wall Assembly** – Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 8 in. (203 mm).

   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Nonmetallic Sleeve –** Nom 8 in. (203 mm) diam (or smaller) Schedule 40 polyvinyl chloride (PVC) pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

3. **Through Penetrants –** One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) SCH 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Pipe Covering –** Max 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm).

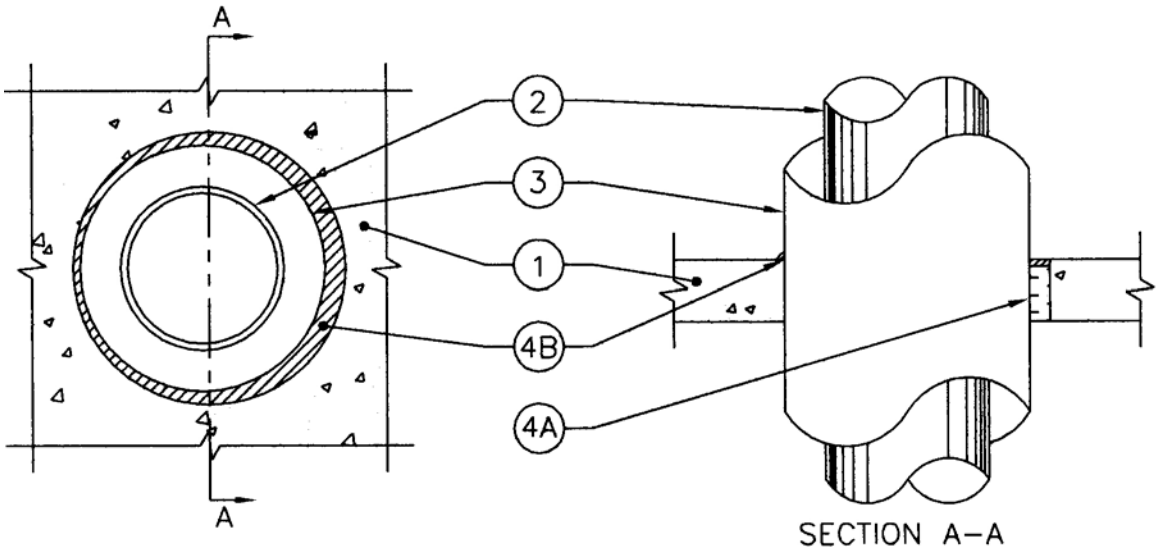
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation tightly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor or with both surfaces of wall. At the point contact location between pipe covering and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/pipe covering interface on the top surface of floor and on both sides of wall.

      Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Mark
+Bearing the UL Recognized Component Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*** Max diam of opening is 20-1/2 in. (521 mm).

   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) SCH 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

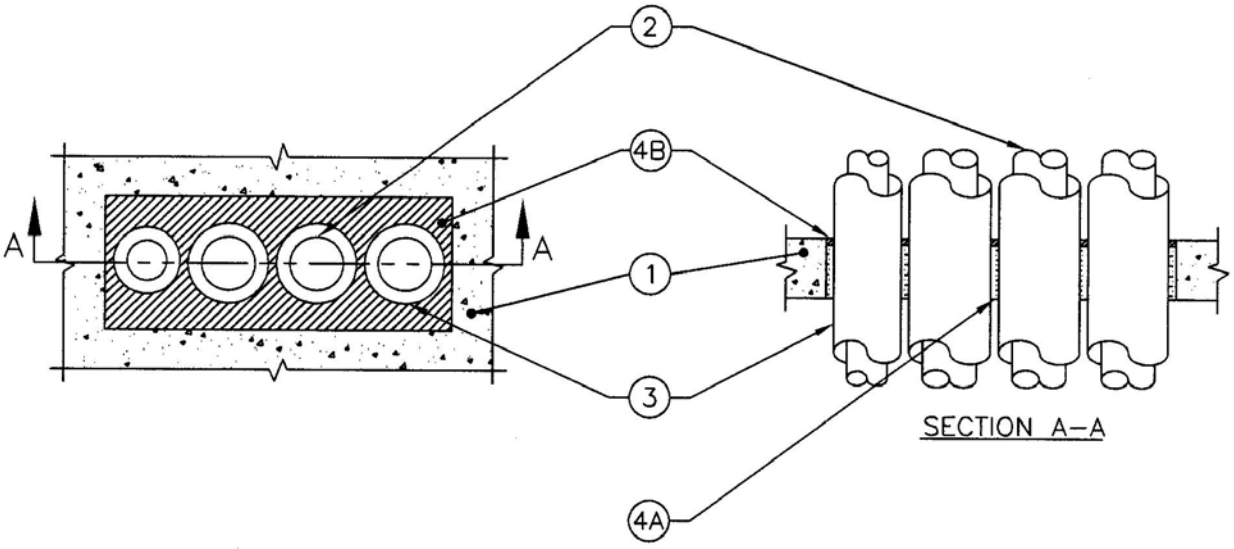
3. **Pipe Covering –** Max 3 in. (76 mm) thick Calcium Silicate insulation sized to the outside diam of pipe. Pipe insulation secured with min 8 AWG steel wire spaced max 12 in. (305 mm) O.C. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm).

   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation tightly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor or with both surfaces of wall. At the point contact location between insulated pipe and concrete, a min 1/2 in. (13 mm) bead of fill material shall be applied on top surface of floor or both sides of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Mark
+Bearing the UL Recognized Component Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0, 3/4 & 1 Hr (See Item 3)	FT Ratings — 0, 3/4 & 1 Hr (See Item 3)
	FH Rating — 2 Hr
	FTH Ratings — 0, 3/4 & 1 Hr (See Item 3)



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thickness reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600 kg/m3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks.*** Max area of opening to be 260 sq. in. (1677 cm^2) with a max dimension of 26 in. (660 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant** – Multiple metallic pipes or tubing to be installed within the firestop system. Penetrants rigidly supported of both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe** – Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe** – Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing** – Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe** – Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Coverings* –** One of the following pipe coverings may be used:
   A. **Pipe Covering* –** Nom 1 in. (25 mm) thick (or thinner) hollow cylindrical heavy density glass fiber units jacked on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated penetrants and periphery of the opening to be min 1/2 in. (13 mm) to max 4 in. (102 mm). The annular space between the insulated penetrants shall be min 1/2 in. (13 mm) to max 4 in. (102 mm).
   See **Pipe and Equipment Covering Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Development Index of 50 or less may be used.

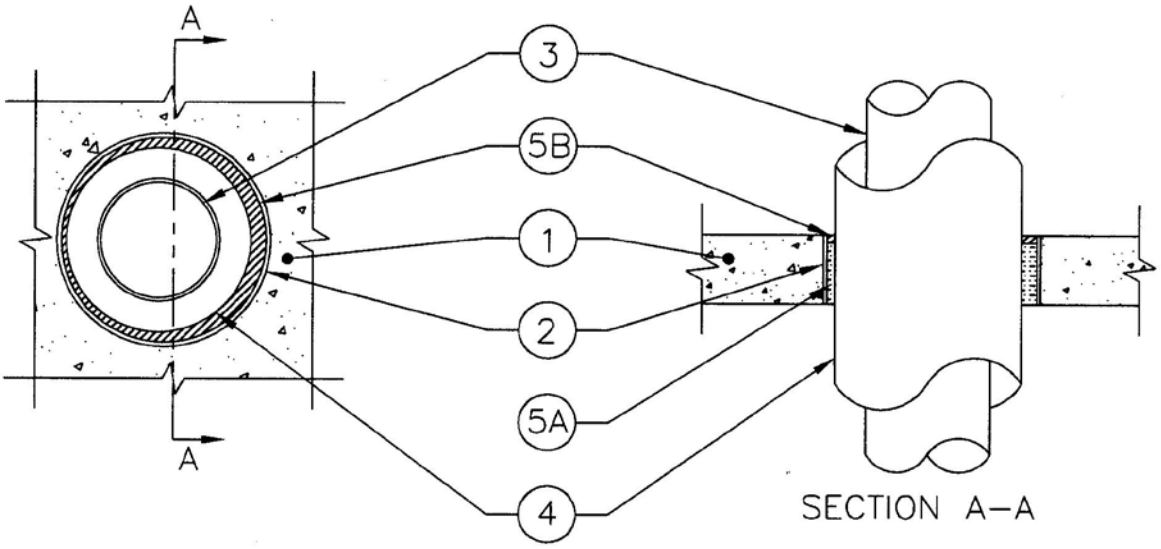
   B. **Tube Insulation – Plastics++ –** Nom 1 in. (25 mm) thick (or thinner) acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated penetrants and the periphery of the opening to be min 1/2 in. (13 mm) to max 4 in. (102 mm). The annular space between the insulated penetrants shall be min 1/2 in. (13 mm) to max 4 in (102 mm).
   See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

   The hourly T Rating is 1 hour for nom 2 in. (51 mm) diam (and smaller) penetrants with nom 3/4 in. (19 mm) thick (and thicker) pipe covering.
   The hourly T Rating is 0 hour for nom 2 in. (51 mm) diam (and smaller) penetrants with nom pipe covering less than nom 3/4 in. (19 mm) thick.
   The hourly T Rating is 3/4 hour for penetrants larger than nom 2 in. (51 mm) diam with nom 1 in. (25 mm) thick pipe covering.
   The hourly T Rating is 0 hour for penetrants larger than nom 2 in. (51 mm) diam with pipe covering less than nom 1 in. (25 mm) thick.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of the floor or both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material – Sealant** – Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100SL, 4100NS, 4800DW

* Bearing the UL Classification Mark
++ Bearing the UL Recognized Component Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 & 2 Hr (See Item 4)	FT Ratings — 0 & 2 Hr (See Item 4)
	FH Rating — 2 Hr
	FTH Ratings — 0 & 2 Hr (See Item 4)



1. **Floor or Wall Assembly** – Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete floor. Min. 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening to be 18 in. (457 mm). See **Concrete Blocks (CAZT)** category in the Fire Resistance Directory for names of Manufacturers.

2. **Metallic Sleeve –** Cylindrical steel sleeve fabricated from 24 gauge (or heavier) galv sheet metal and having a min 1 in. (25 mm) overlap along longitudinal seam. Sleeve friction fit, cast or grouted into opening, flush with the top and bottom surfaces of floor or both sides of wall assembly.

3. **Through Penetrant –** One metallic pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Pipe Covering* –** Max 2 in. (52 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and periphery of opening shall be min 1/2 in. (13 mm) to max 3/4 in. (19 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufactures. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Development Index of 50 or less may be used

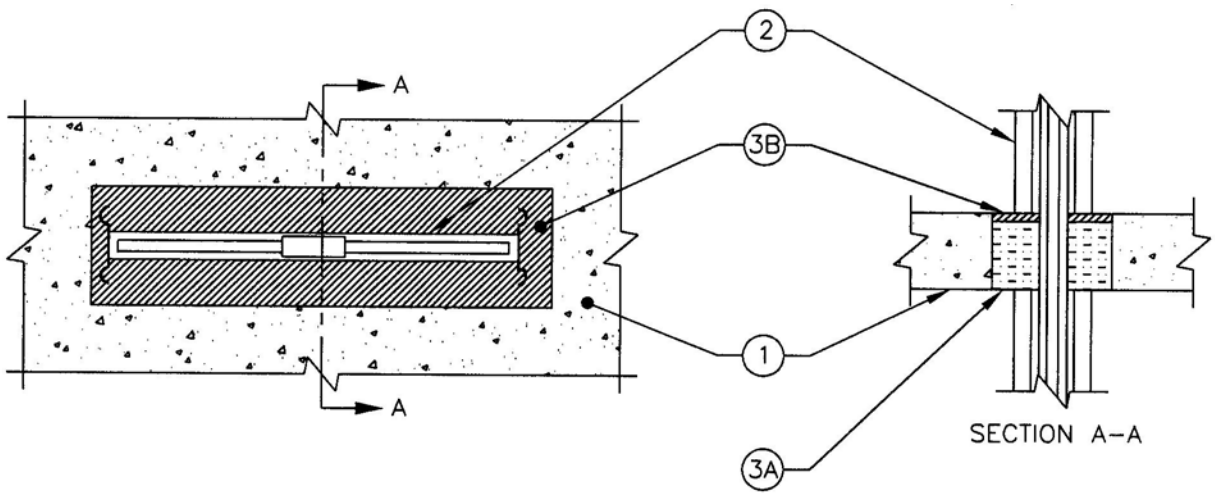
   The hourly T, FT and FTH Ratings of the firestop system is 2 Hr when 2 in. (51 mm) thick pipe covering is used. The hourly T, FT and FTH Rating of the firestop system is 0 Hr when pipe covering is less than 2 in. (51 mm) thick.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material* –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor or with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

***** Bearing the UL Classification Marking

	F Rating – 2 Hr **T Rating – 1 Hr**	**C-AJ-6028**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



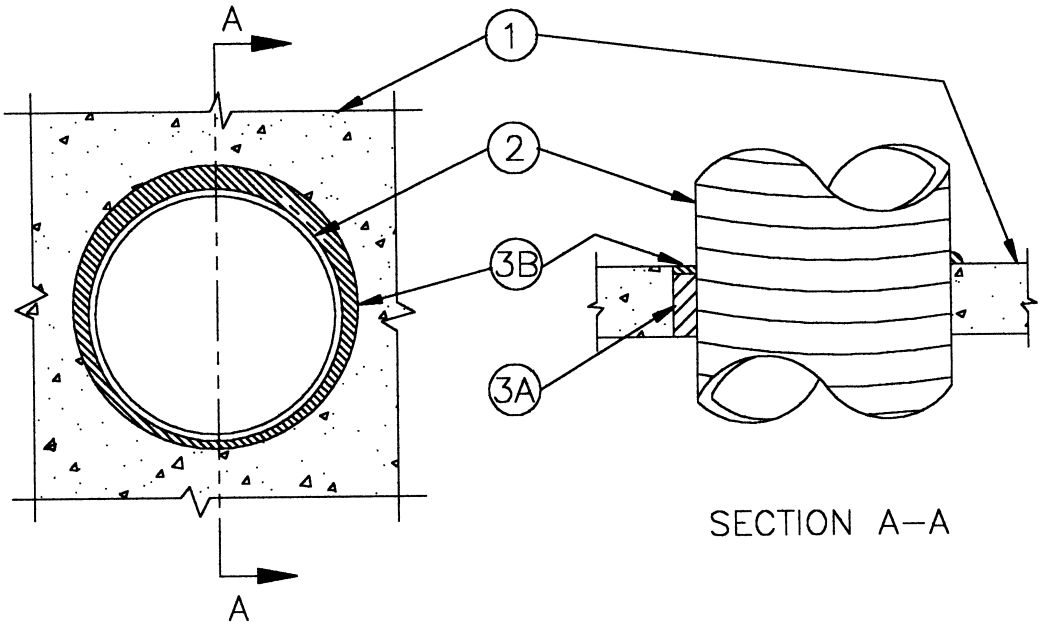
1. **Floor or Wall Assembly –** Min 4-1/4 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or min 5 in. thick reinforced lightweight or normal concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max area of opening to be 189 sq. in. with a max dimension of 27 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufactures.

2. **Busway+ –** Nom 24 in. wide (or smaller) by 4-1/2 in. deep "I" shaped aluminum and steel enclosure containing factory mounted copper or aluminum bars rated for 600V, 4000A. One busway to be installed within the opening. The annular space between the busway and the periphery of the opening shall be min 0 in. (point contact) to max 2-1/2 in Busway to be rigidly supported on both sides of floor and wall assembly. The busway shall bear the UL Listing Mark and shall be installed in accordance with all provisions of Article 364 of the National Electrical Code, NFPA No. 70.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed at 50 percent compression into opening as a permanent form. Packing material to be recessed from both surfaces of wall assembly as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall assembly.
   Passive Fire Protection Partners – 4800DW, 4100NS, 3600EX

* Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 1 Hr
	FTH Rating — 0 Hr



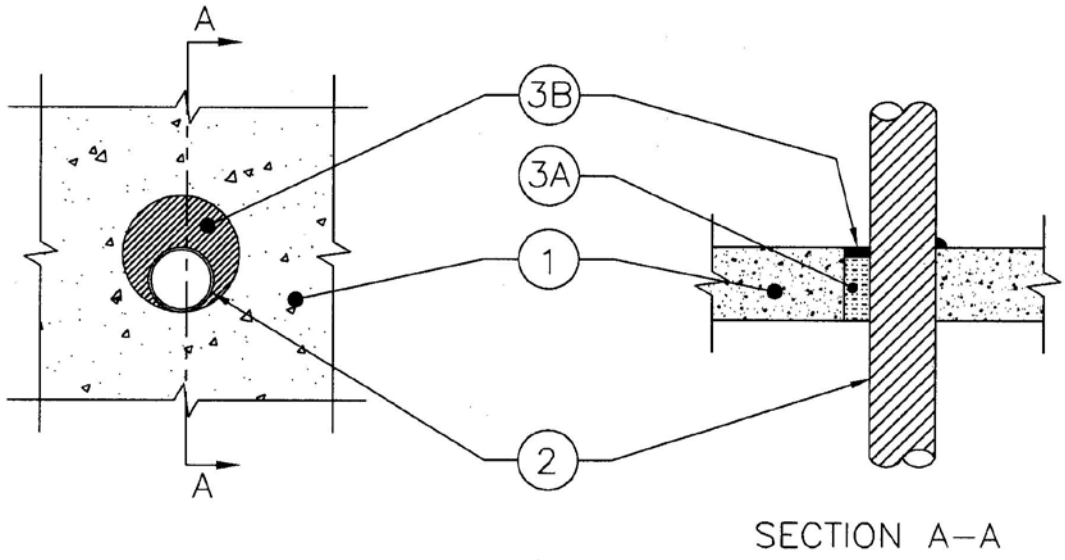
1. **Floor or Wall Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 18 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 16 in. (or smaller) No. 22 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 1/2 in. to max 1-1/2 in. Duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min. 4-3/4 in. (121 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 6 in. (152 mm).

   See **Concrete Blocks** (CAZT) in the Fire Resistance Directory for names of manufacturers.

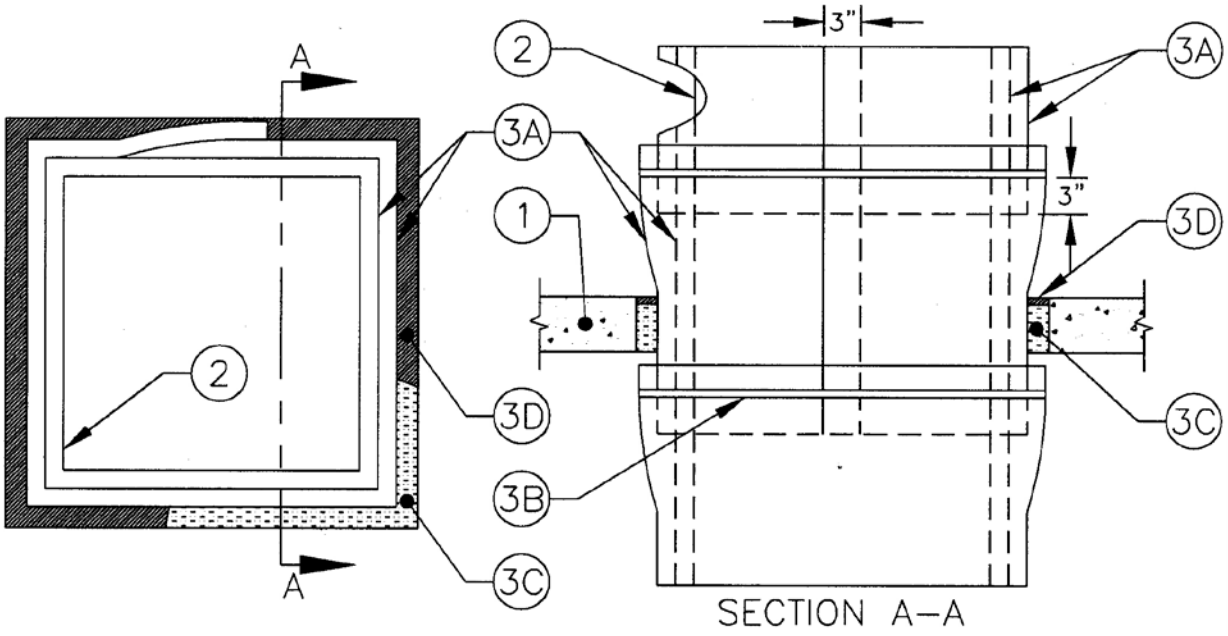
2. **Steel Duct –** Nom 4 in. (102 mm) diam (or smaller) No. 30 gauge (or heavier) galvanized steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm) Steel duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4-1/4 in. (108 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Materials* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. An additional 1/4 in. (6 mm) diam bead of fill material shall be applied at point contact location at duct/concrete interface on top surface of the floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI, 4100SL, 5100SP

*Bearing the UL Classification Mark

	F Rating – 2 Hr T Rating – 2 Hr	C-AJ-7072

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor or min 5 in. thick reinforced lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks*** Max area of opening is 1024 sq in. with max dimensions of 32 in.

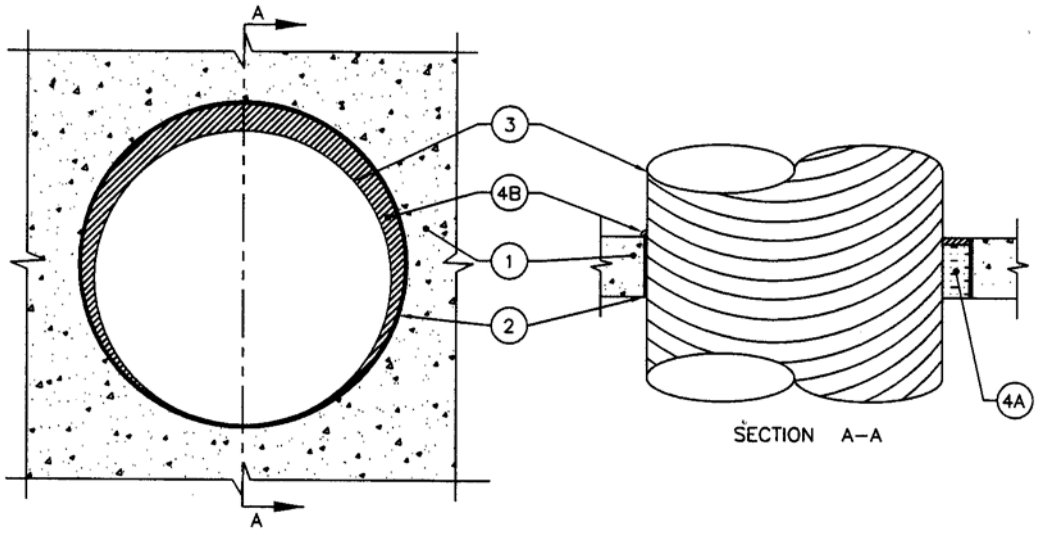
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant –** One nom 24 by 24 in. (or smaller) No. 16 gauge (or heavier) steel air or grease duct to be installed within the firestop system. Duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Duct Wrap Materials* – Duct Wrap –** Nom 1-1/2 in. thick blanket which may be unfaced, faced on one side, or encapsulated with a poly/aluminum foil scrim supplied in max 48 in. wide rolls. Prior to installing the duct wrap, all cut edges of the encapsulated duct wrap shall be sealed with min 3 in. wide pressure-sensitive aluminum foil tape. The steel air or grease duct shall be wrapped with two layers of duct wrap. Each layer of duct wrap shall be installed in accordance with the manufacturer's installation instructions. Inner layer of duct wrap shall be installed by cutting to size and tightly wrapping around the duct with butted transverse and longitudinal joints. Both transverse and longitudinal joints of outer layer shall be staggered from transverse and longitudinal joints of inner layer. Second layer of duct wrap shall be installed by cutting to size and tightly wrapping around the first layer with a transverse overlap of min 3 in. between adjacent pieces. Transverse joints of the second layer of duct wrap shall be staggered from the transverse joints of the first layer of duct wrap by a min 6 in. Longitudinal joints shall overlap a min of 3 in. In addition, the longitudinal joint of the second layer shall be offset min 6 in. from the longitudinal joints of the first layer. Each piece of duct wrap may be temporarily secured together with 1 in. wide filament tape spaced 12 in. OC. The annular space between the insulated duct and the periphery of opening shall be a nom 1 in.
      UNIFRAX I L L C – FyreWrap Duct 1.5 Insulation
   B. **Steel Banding Straps** – Nom 1/2 in. wide by 0.015 in. thick Type 302 stainless steel banding straps used in conjunction with 1/2 in. wide by 1 in. long Type 302 stainless steel crimp clips. Banding straps spaced a max 12 in. OC and 1-1/2 to 3 in. from transverse joint on outer layer of duct wrap.
   C. **Packing Material –** Min. 4 in. thickness of unfaced duct wrap material firmly packed into the opening as a permanent form. As an alternate to the unfaced duct wrap material, packing material shall consist of min 4 in. thickness of soluble amorphous wool blanket 8 pcf firmly packed into the opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3D).
   D. **Fill Void or Cavity Materials* – Sealant –** Min 1/2 in. thickness of sealant applied within annulus, flush with top surface of floor and with both surfaces of wall.
      Passive Fire Protection Partner – 3600EX, 4100NS, 4100SL, 4800DW

* Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114mm) thick floor or 5 in. (127mm) thick wall of reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m³)) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 24 in. (610mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Sleeve** – (Optional) – Nom 24 in. (610 mm) diam (or smaller) 22 gauge (or heavier) galvanized steel sleeve cast into floor or wall flush with floor or wall surfaces.

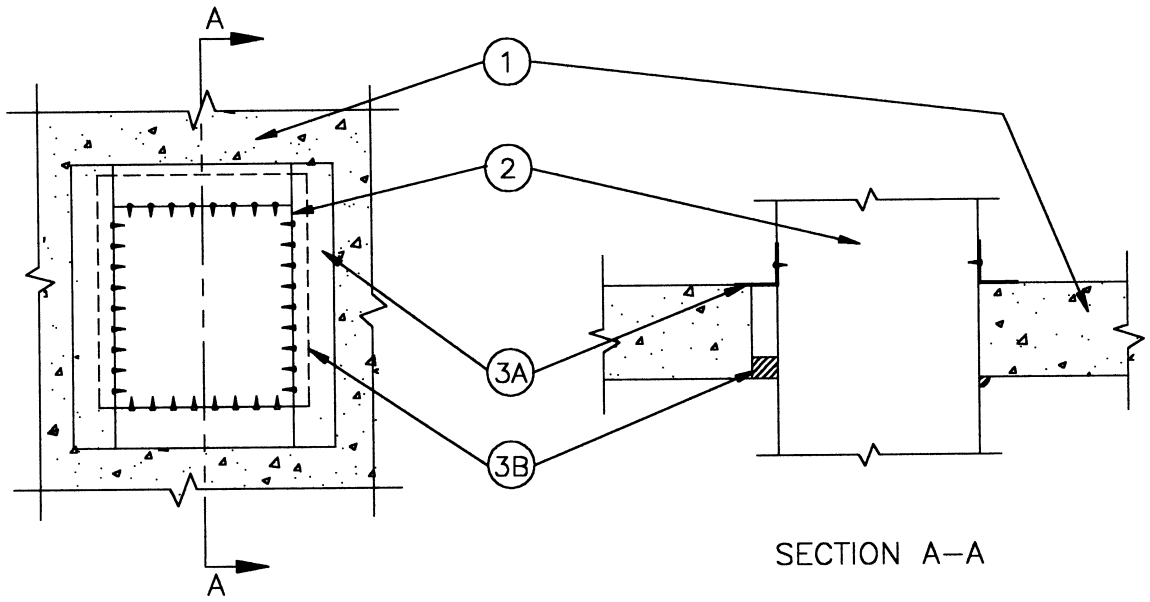
3. **Steel Duct –** Nom 22 in. (559mm) (or smaller) No. 22 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (0mm) to max 2 in. (51mm). Duct to be rigidly supported on both sides of floor or wall assembly.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4 in. (102mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. Min 1/2 in. (13mm) diam bead of caulk applied at point contact locations at penetrant/concrete interface on top surface of floor or both wall surfaces.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

	F Rating –2 Hr **T Rating – 1/2 Hr**	**C-AJ-7115**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max area of opening is 625 sq. in. (0.40 m^2) with a max dimension of 25 in. (635 mm). **See Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

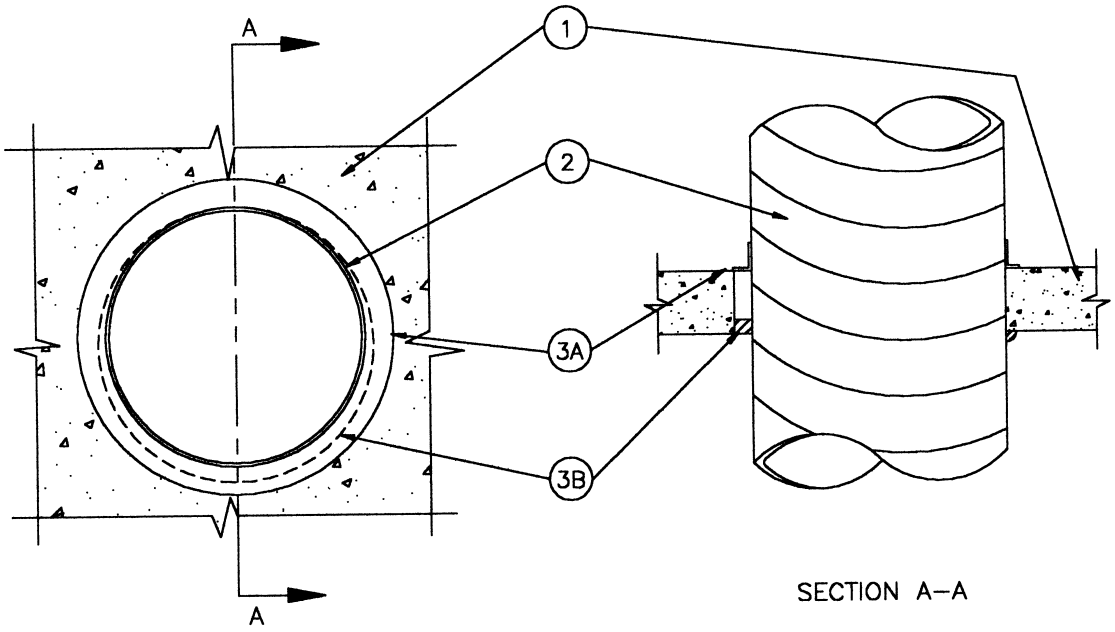
2. **Steel Duct –** Nom 24 in. (610 mm) by 24 in. (610 mm) (or smaller) 26 gauge (or heavier) square steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between the duct and periphery of opening shall be a min 0 in. (point contact) to max 1 in. (25 mm). Duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 16 gauge 1-1/2 in. (38 mm) galv steel angles rolled-formed and sized to lap duct a min of 1 in. (25 mm). Angles attached to duct on top side of floor or both sides of wall with min 1/2 in. (13 mm) long, No. 8 (or larger) sheet metal screws spaced a max 4 in. (102 mm) OC.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of fill material applied within annulus, flush with bottom surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

	F Rating – 2 Hr **T Rating –1/2 Hr**	**C-AJ-7116**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

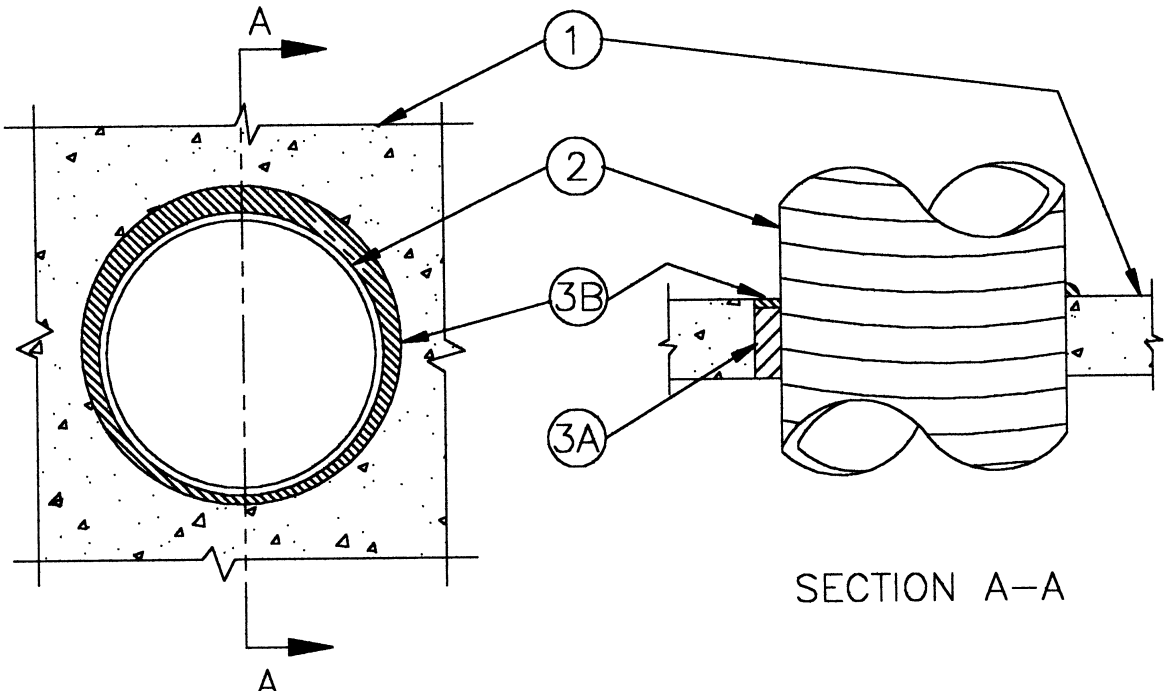
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 17 in. (432 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 16 in.(406 mm) diam (or smaller) No. 26 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 16 gauge 1-1/2 by 2 in. (38 by 51 mm) galv steel angles roll-formed and sized to lap duct a min of 1in. (25 mm). Angles attached to duct on top side of floor or both sides of wall with min 1/2 in. (13 mm) long No.8 (or longer) sheet metal screws spaced max 4 in. (104 mm) OC.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of fill material applied within annulus, flush with bottom surface of the floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 3 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

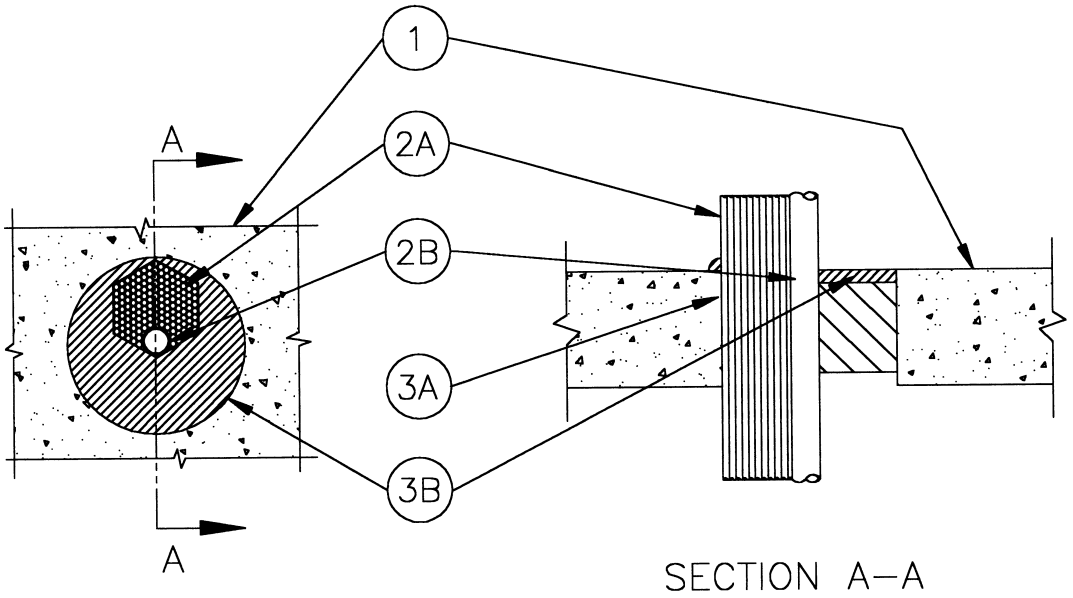
1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min. 4-3/4 in. (121mm) thick reinforced lightweight or normal concrete wall.. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 10 in. (254 mm)
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 8 in. diam. (203 mm) (or smaller) No. 30 gauge (or heavier) spiral-wound galvanized steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel Duct to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4-1/4 in. (108 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. An additional 1/4 in. (6 mm) diam. bead of fill material shall be applied at point contact location at penetrant/concrete interface on top surface of the floor or both surfaces of wall.
   Passive Fire Protection Partners – 3500SI

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 5 in. (127 mm) thick lightweight or normal weight (110-150 pcf or 1600-2400kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 10-1/4 in. (260 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Pipes, conduits, tubing or cables to be bundled within the opening such that the aggregate cross-sectional area of penetrants in opening to be max 27 percent of the cross-sectional area of the opening in floor or wall. The space between penetrants and periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in. (39 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:
   A. **Metallic Pipes –** The following types and sizes of metallic pipes, conduits or tubing may be used:
      A1. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
      A2. **Conduit –** Nom 2 in. (51 mm) diam (or smaller) steel electrical metallic tubing or steel conduit.
      A3. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

B. **Cables –** Any combination of the following types and sizes of cables may be used:
- B1. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
- B2. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
- B3. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
- B4. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
- B5. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
- B6. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

3. **Firestop System –** The firestop system shall consist of the following:

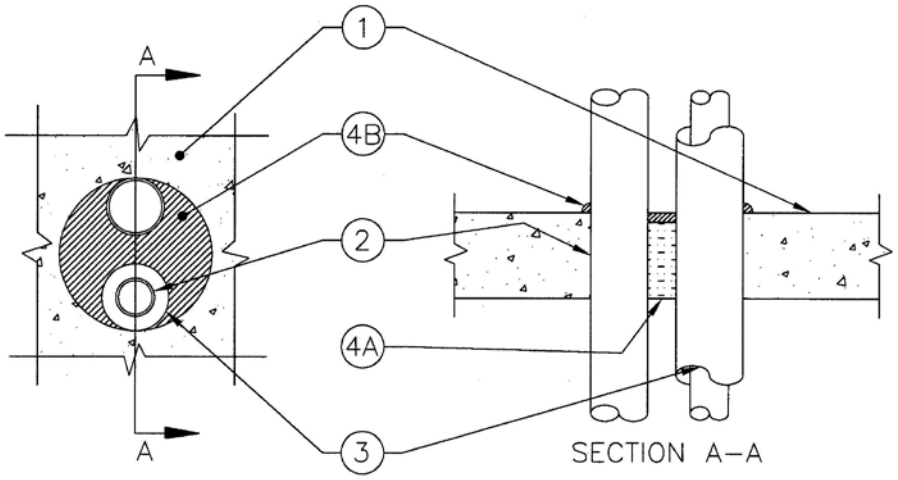
A. **Packing Material –** Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).

B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of penetrants to max extent possible.
Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

B2. **Fill, Void or Cavity Material* — Sealant —** Min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with top surface of floor or min 1/8 in. (3.2 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point of contact location between penetrant and concrete, a 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on the top surface of floor or both surfaces of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



1. **Floor or Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete floor or min 5 in. (127 mm) thick reinforced lightweight or normal weight concrete wall. Wall may also be constructed of any UL Classified **Concrete Block***. Max diam of opening is 8 in. (203 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Max two metallic pipes or tubing to be installed either concentrically or eccentrically within the firestop system. Penetrants to be rigidly supported on both sides of floor assembly. The annular space between uninsulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm). The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

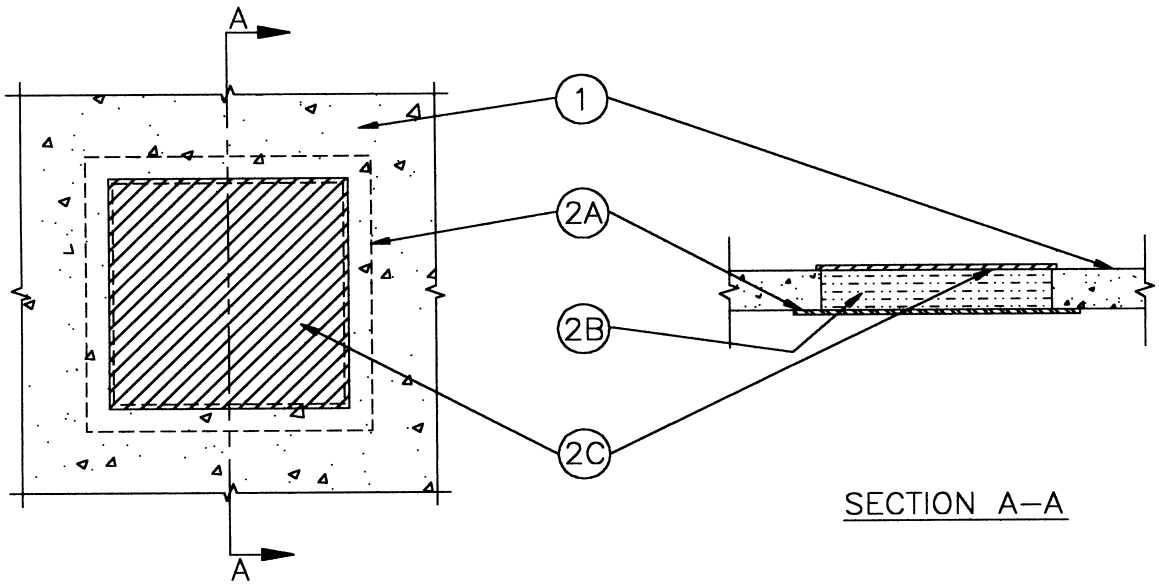
3. **Tube Insulation – Plastic+ -** Max 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. All copper pipes and tubing shall be provided with the tube insulation. The annular space between the insulated copper tube and the uninsulated metallic pipes shall be min 7/8 in. (22 mm). The annular space between the insulated penetrant and the periphery of the opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm).
   See **Plastics** (QMFZ2) category in the recognized Component Directory for manes of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The detail of the firestop system shall be as follows:
   A. **Packing Material –** Min 4 in. (102 mm) thickness min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in.(13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of the wall. Min 1/2 in. (13 mm) diam bead of fill material applied to the penetrant/concrete interface at the point contact locations on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*****Bearing the UL Classification Marking
+Bearing the UL Recognized Component Marking

	F Rating – 2 Hr T Rating – 2 Hr	C-BJ-0024

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr

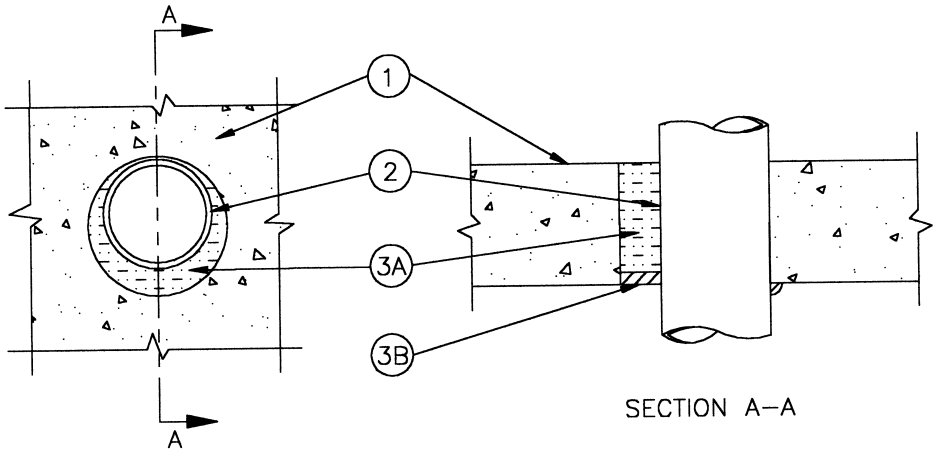


1. **Floor or Wall Assembly –** Min 5-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete floor or wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Opening to be 25 by 25 in. or 25 in diam.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Firestop System –** The firestop system shall consist of the following:
   - A. **Steel Support Plate –** Nom 24 ga. galv steel support plate to overlap min 3 in. onto bottom surface of concrete floor assembly or either side of the concrete wall assembly. Plate to be secured with min 1/4 in. diam by 1 in. long masonry anchors, spaced max 6 in. OC.
   - B. **Packing Material –** Min 5 in. or 5-1/2 in. thickness of min 4 pcf mineral wool batt insulation for sealants C1 and C2, respectively, compressed min 25 percent into opening as a permanent form. Packing material to be recessed from top surface floor or surface opposite of steel plate for wall assembly to accommodate the required thickness of fill material (Item 2C1).
   - C1. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the opening, flush with top surface floor or surface opposite of steel plate for wall assembly.
     Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW
   - C2. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. dry thickness of fill material sprayed or brushed on top surface of floor or surface opposite of steel plate for wall assembly to completely cover mineral wool and overlap a min of 1/2 in. onto concrete.
     Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



SECTION A–A

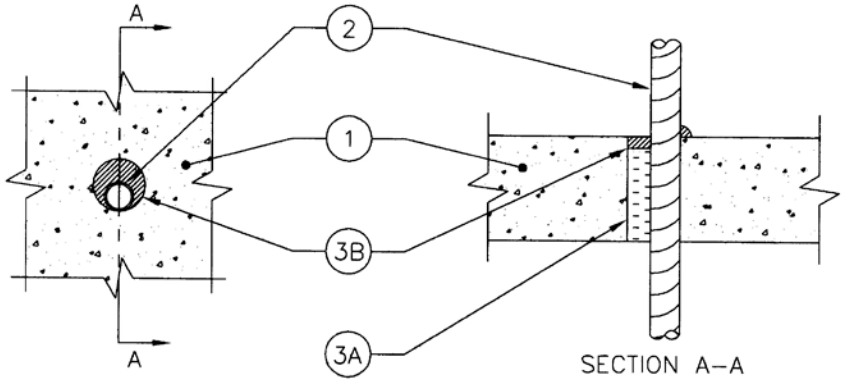
1. **Floor Assembly –** Min 5-1/2 in. (140 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified Concrete Block. Max diam of opening is 14-1/4 in. (368 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
   D. **Conduit** - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
   E. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   F. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   G. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 5 in. (127 mm) thickness of 4 pcf (64 kg/m^3) mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed from bottom surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied, within annulus, flush with bottom surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on bottom surface of floor assembly or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW,

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 5-1/2 in. (140 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 2-1/2 in. (64 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrating Product* – Flexible Metal Piping** – Nom. 1-1/4 in. (32 mm) diam (or smaller) steel Flexible Metal Piping to be installed either concentrically or eccentrically within the firestop system. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of floor or wall assembly.

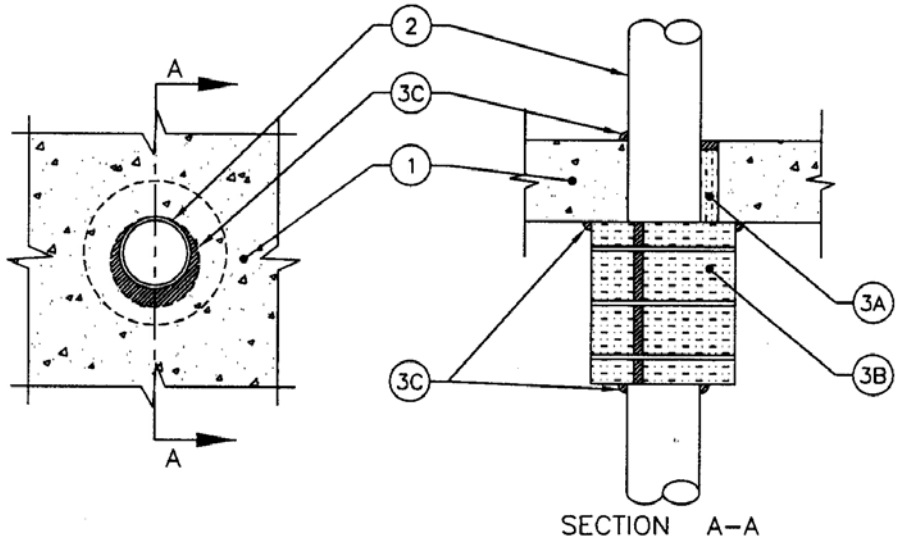
   GASTITE, DIV TITEFLEX

   2A **Stainless Steel Pipe –** (Not Shown) As an alternate to (item 2), nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of floor or wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4-1/2 in thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill Void or Cavity Materials* – Sealant –** Min 1 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At the point contact locations between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the penetrant/concrete interface on the top surface of floor or on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 7 in. (178 mm) thick floor or 7-1/2 in. (191 mm) thick wall of reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 5 in. (127 mm).
   A. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Iron Pipe** – One nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and the periphery of the opening shall be min 0 in. (0 mm) (point contact) to max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of floor or wall assembly.
   2A. **Stainless Steel Pipe –** (Not Shown) As an alternate to (item 2), nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of floor or wall assembly.

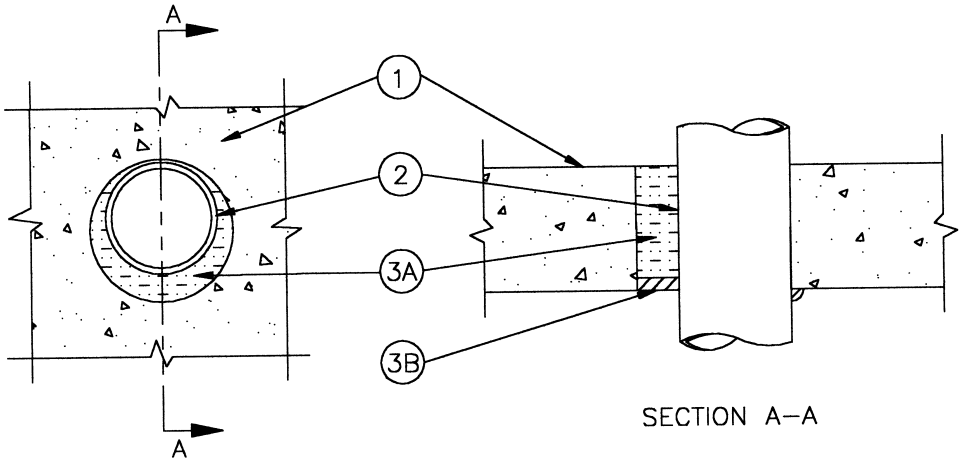
3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 6-1/2 in. (165 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.

B. **Pipe Covering –** Min 2 in. (51 mm) thick, min 4 pcf (64 kg/m^3) mineral wool batt insulation, cut to a min length of 18 in. (457 mm). Mineral wool batt to be tightly wrapped around the pipe with a tightly butted seam and secured around the pipe with a min of three 1/2 in. (51 mm) wide (or wider) stainless steel hose clamps spaced a max of 6 in. (152 mm) OC. The mineral wool batt shall be tightly butted to the bottom surface of floor extending downward a min of 18 in. (457 mm). In wall assemblies, the mineral wool batt shall be tightly butted to both surfaces of wall extending outward a min of 18 in. (457 mm).

C. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact locations at penetrant/concrete interface on top surface of floor. In wall assemblies, min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with both surfaces of wall prior to the installation of the pipe covering. The additional bead of sealant at the point contact locations shall not be used in wall assemblies. For both floor and wall assemblies, a min 1/2 in. (13 mm) diam bead of sealant shall be applied completely around the circumference the pipe covering/concrete interface and the pipe covering/pipe interface. A min 1/16 in. (1.6 mm) bead of sealant shall be applied along the entire length of the pipe covering seam.

Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

* Bearing the UL Classification Mark



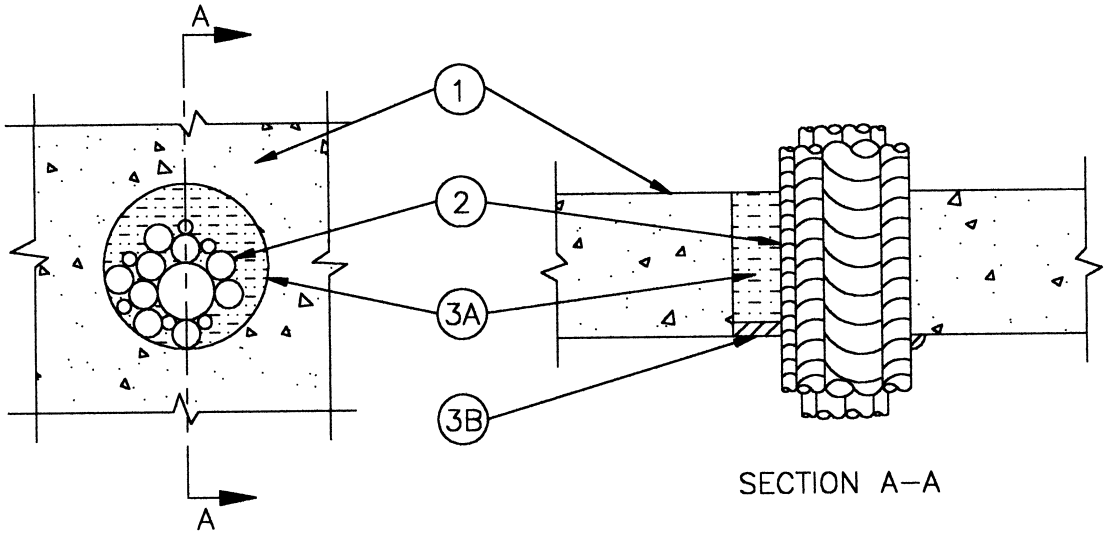
1. **Floor or Wall Assembly –** Min 5-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Block. Max diam of opening is 4 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One nonmetallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-5/8 in. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes, conduits or tubing may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 cellular core or solid core PVC pipe for use in closed (process or supply) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Nonmetallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70)
   D. **Crosslinked Polyethylene (PEX) Tubing –** Nom 1-1/2 in. diam (or smaller) PEX tubing for use in closed (process or supply) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 5 in. thickness of 4 pcf mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed from bottom surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with bottom surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on bottom surface of floor assembly or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 5-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Block. Max diam of opening is 6 in. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

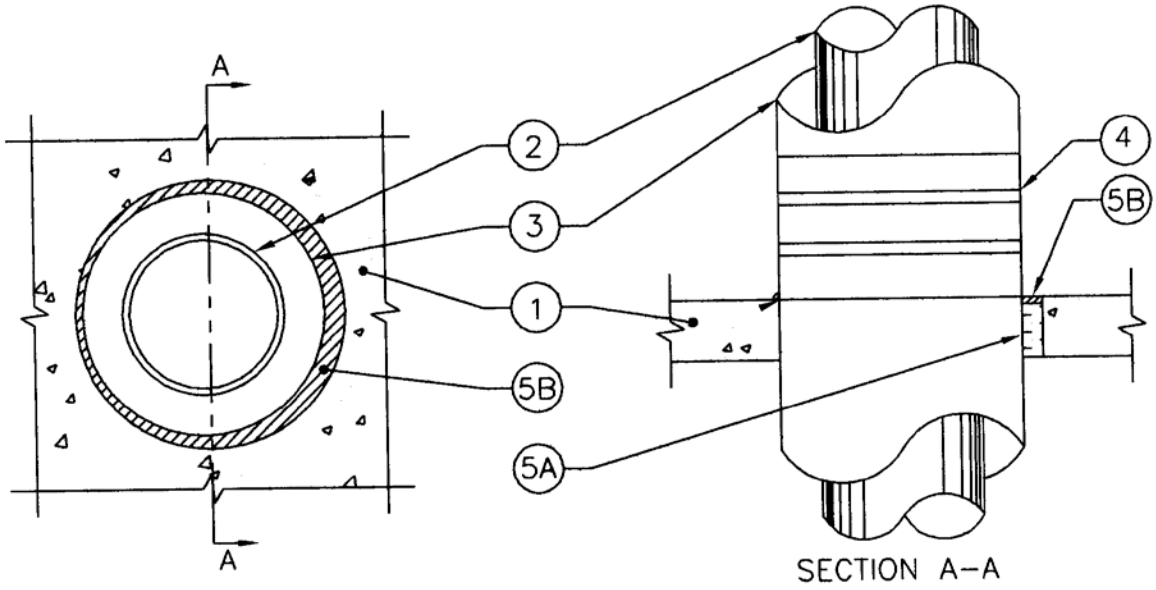
2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 65 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   - A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TECK cable with cross-linked polyethylene XLPE insulation, with or without PVC jacket.
   - B. 3/C 350 kcmil (or smaller) copper conductor aluminum clad or steel clad TECK cable with XLPE insulation, with or without PVC jacket.
   - C. 4/C No. 6 AWG (or smaller) copper conductor aluminum clad or steel clad TECK cable with XLPE insulation, with or without PVC jacket.
   - D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC jacket.
   - E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with PVC jacket.
   - F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with PVC jacket
   - G. FT-2 600V 8/3 SOW (or smaller) P-7K cable with PVC jacket.
   - H. FT-4 12 AWG (or smaller) cable with PVC jacket.
   - I. 3/C No. 3/0 AWG (or smaller) with or without copper ground, with or without PVC jacket or steel clad type MC.
   - J. B 4/C 6 AWG (or smaller) Teck 90 XLPE 1000 V FT-4 AWG 14 (or smaller) FMRC cable.
   - K. GRW90 XLPE 10 AWG (or smaller) cable.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 5 in. thickness of 4 pcf mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed from top or bottom surface of floor or from both surfaces of wall to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with top or bottom surface of floor or both surfaces of wall. At point contact location between penetrant and periphery of opening a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on top or bottom surface of floor assembly, respectively, or both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

	F Rating – 2 Hr T Rating – 2 Hr	C-BJ-5012

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Floor or Wall Assembly –** Min 5-1/2 in. (140 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 14 in. (356 mm).

   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

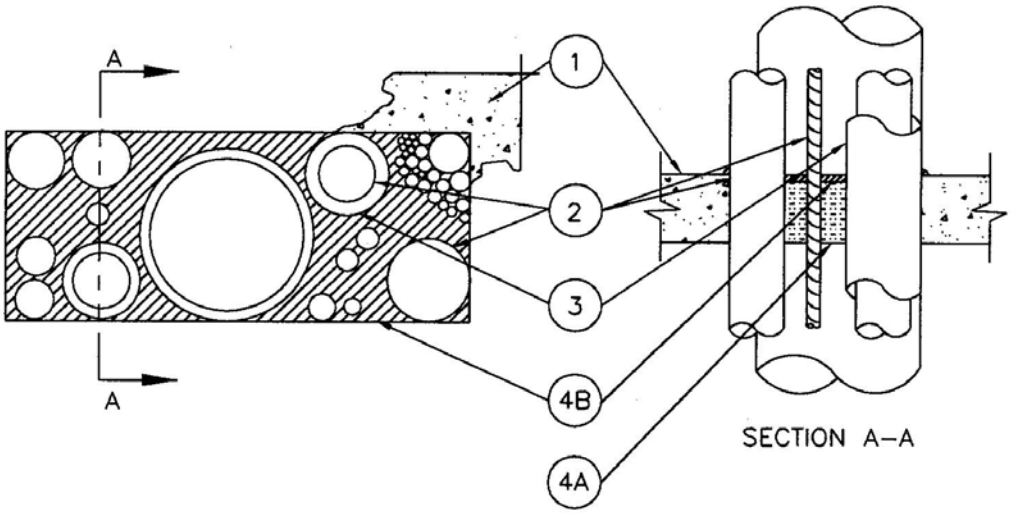
2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used :
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* – Cellular Glass Insulation –** Max 3 in. (76 mm) thick cellular glass units sized to the outside diam of the steel pipe and supplied in nom 24 in. (610 mm) long half sections or nom 18 in. (457 mm) long segments. The annular space shall be min 0 in. (point contact) to max 2 in. (51 mm). Pipe insulation installed on pipe in accordance with the manufacturer's instructions.

4. **Metal Jacket –** Min 12 in. (305 mm) long jacket formed on min 0.010 in. (0.25 mm) thick steel or aluminum sheet cut to wrap tightly around the pipe insulation with a min 2 in. (51 mm) lap. Jacket secured with min 1/2 in. (13 mm) wide stainless steel hose clamps or bands located within 2 in. (51 mm) of each end of the jacket and spaced a max of 10 in. (254 mm) OC. Jacket to be installed with edges abutting surface of caulk fill material (Item 5) on both surfaces of wall. Metal jacket to be used in addition to any other jacketing material which may be required or desired on the pipe insulation.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packaging Material –** Min 5 in. (127 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the periphery of opening/pipe covering interface on top surface of floor assembly or both surfaces of wall assembly.
   Passive Fire Protection Partner – 3600EX, 4100NS, 4100SL, 4800DW

* Bearing the UL Classification Mark



1. **Floor or Wall Assembly –** Min 5 1/2 in. (140 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.** Max size of opening is 476 sq. in. (3071 cm^2) with a max. dimension of 34 in. (864 mm) or a max 24 in. (610 mm) diam.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Penetrations installed either concentrically or eccentrically within the firestop system such that the aggregate cross-sectional area of penetrants in opening is max 58 percent the cross-sectional area of the opening in the assembly. The annular space between penetrants to be min 1/2 in. (13 mm) to max 3 in. (76 mm). The annular space between penetrants and periphery of opening shall be min 0 in. (point contact) to max 3 in. (76 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:
   A. **Metallic Penetrations –** The following types and sizes of metallic pipes, conduits or tubing may be used:
      A1. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
      A2. **Steel Pipe** – Nom. 4 in. (102 mm) diam. (or smaller) Schedule 5 (or heavier) steel pipe
      A3. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
      A4. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
      A5. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type M (or heavier) copper tubing.
      A6. **Steel Conduit –** Nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT) or nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
      A7. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

B. **Nonmetallic Penetrants** – For use in closed (process or supply) piping systems. The following types and sizes of nonmetallic pipes, conduit or tubing may be used:

B1. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid core PVC pipe.

B2. **Chlorinated Polyvinyl (CPVC) Pipe** – Nom 2 in. (51 mm) diam (or smaller) SDR17 CPVC pipe.

B3. **Cross-linked Polyethylene (PEX) Tubing** – Nom 1-1/2 in. (38 mm) diam (or smaller) SDR9 PEX tubing.

B4. **Electrical Nonmetallic Tubing++ –** Nom 2 in. (51 mm) diam (or smaller) corrugated wall ENT constructed of polyvinyl chloride (PVC) installed in accordance with the National Electrical Code (NFPA No. 70.)

C. **Cables –** Any combination of the following types and sizes of cables may be used:

C1. 4/0 (or smaller) bare or aluminum copper ground

C2. Max 3/C No. 6 AWG (or smaller) copper or aluminum armored cable conductors with PVC insulation.

C3. Max 3/C No. 14 AWG (or smaller) TEK cable with PVC insulation with or without PVC jacket.

C4. Max 25 pair AWG (or smaller) telephone cable with PVC insulation and jacket.

C5. Max 3/C 500 kcmil (or smaller) aluminum or copper cable with PVC jacket and insulation.

C6. Max 3/C No. 18 AWG copper cable with PVC jacket and insulation.

3. **Pipe Covering – (Optional) –** The following types or pipe insulation may be used with nom 4 in. (102 mm) diam or smaller pipes and tubing.

A. **Pipe Covering –** Max 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.

See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

B. **Tube Insulation – Plastics+ – (Optional) –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.

See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:

A. **Packing Material –** Min 5 in. (127 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of cables to max extent possible. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor assembly or both surfaces of wall assembly.

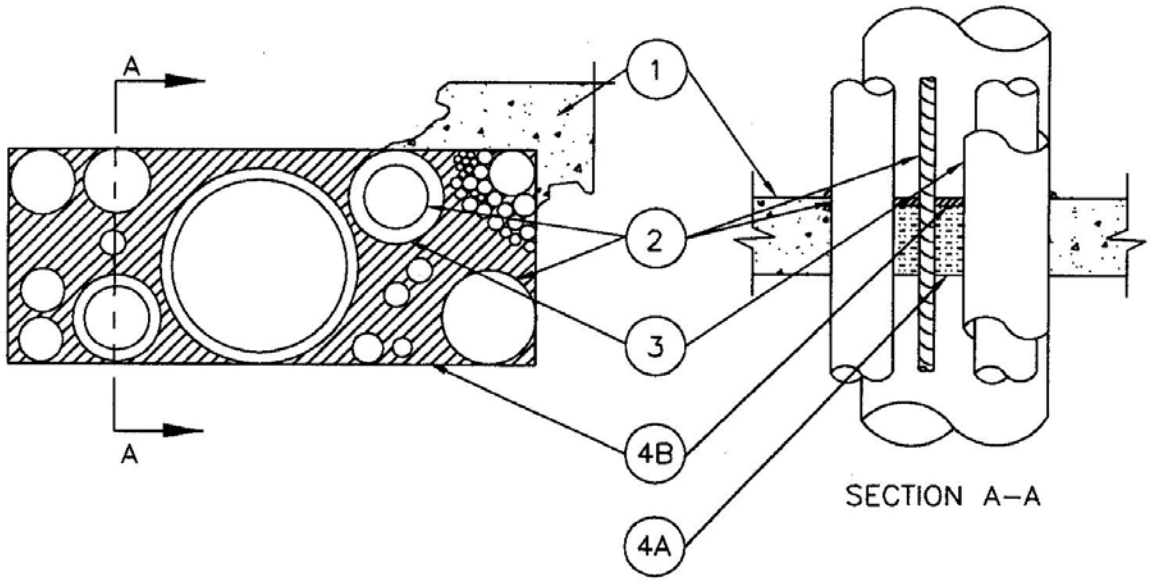
Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

\+ Bearing the UL Classification Mark

++ Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



1. **Floor or Wall Assembly –** Min 5 1/2 in. (140 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.** Max size of opening is 476 sq. in. (3071 cm^2) with a max. dimension of 34 in. (864 mm) or a max 24 in. (610 mm) diam.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Penetrations installed either concentrically or eccentrically within the firestop system such that the aggregate cross-sectional area of penetrants in opening is max 58 percent the cross-sectional area of the opening in the assembly. The annular space between penetrants to be min 1/2 in. (13 mm) to max 3 in. (76 mm). The annular space between penetrants and periphery of opening shall be min 0 in. (point contact) to max 3 in. (76 mm). Penetrants to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of penetrants may be used:

   A. **Metallic Penetrations –** The following types and sizes of metallic pipes, conduits or tubing may be used:

      A1. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.

A2. **Steel Pipe** – Nom. 4 in. (102 mm) diam. (or smaller) Schedule 5 (or heavier) steel pipe.
A3. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
A4. **Copper Pipe -** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
A5. **Copper Tubing -** Nom 6 in. (152 mm) diam (or smaller) Type M (or heavier) copper tubing.
A6. **Steel Conduit –** Nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT) or nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
A7. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

B. **Cables –** Any combination of the following types and sizes of cables may be used:
B1. 4/0 (or smaller) bare or aluminum copper ground
B2. Max 3/C No. 6 AWG (or smaller) copper or aluminum armored cable conductors with PVC insulation.
B3. Max 3/C No. 14 AWG (or smaller) TEK cable with PVC insulation with or without PVC jacket.
B4. Max 25 pair AWG (or smaller) telephone cable with PVC insulation and jacket.
B5. Max 3/C 500 kcmil (or smaller) aluminum or copper cable with PVC jacket and insulation.
B6. Max 3/C No. 18 AWG copper cable with PVC jacket and insulation.

3. **Pipe Covering – (Optional) –** The following types or pipe insulation may be used with nom 4 in. (102 mm) diam or smaller pipes and tubing.

A. **Pipe Covering –** Max 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.

See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

B. **Tube Insulation – Plastics+ – (Optional) –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.

See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:

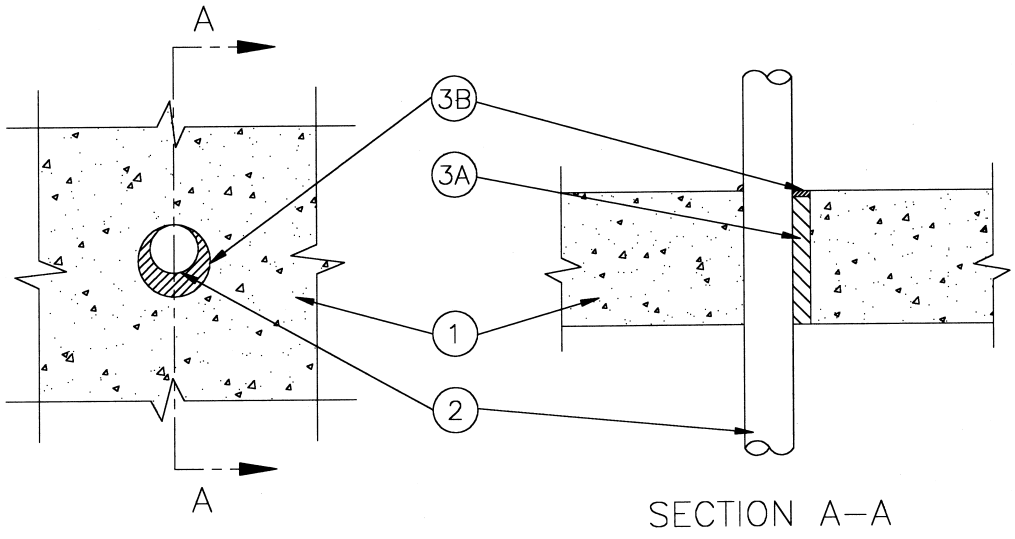
A. **Packing Material –** Min 5 in. (127 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of cables to max extent possible. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor assembly or both surfaces of wall assembly.

Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking
\+ Bearing the UL Recognized Component Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 4 Hr	F Rating — 4 Hr
T Rating — 1/4 & 3 Hr (See Item 2)	FT Rating — 1/4 & 3 Hr (See Item 2)
	FH Rating — 4 Hr
	FTH Rating — 1/4 & 3 Hr (See Item 2)



1. **Floor or Wall Assembly –** Min 11-1/2 in. (292 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 6 in. (152 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

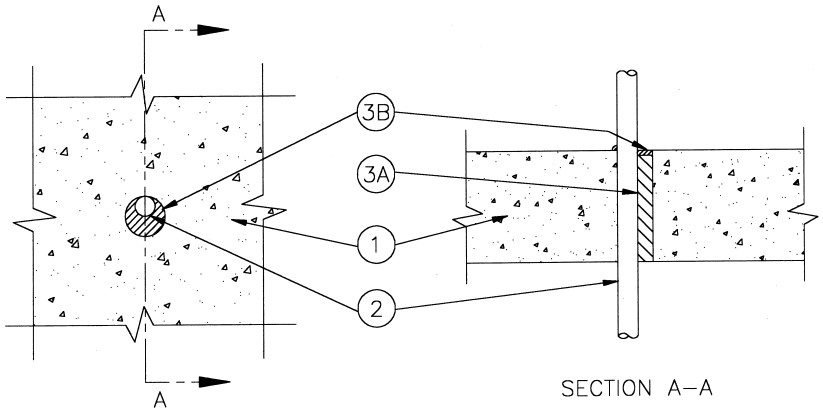
2. **Through Penetrants –** One metallic pipe or tubing, to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Pipe to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel conduit or steel electrical metallic tubing.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

   T and FTH Ratings are 3 hours for pipe/conduit A and B. T and FTH rating are 1/4 hour for pipe/tubing C, D, E and F.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 11 in. (279 mm) thickness of min 4 pcf or (64 kg/m^3) density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact locations between penetrant and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 4800DW, 3600EX

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Rating — 4 Hr
T Ratings — 4 Hr



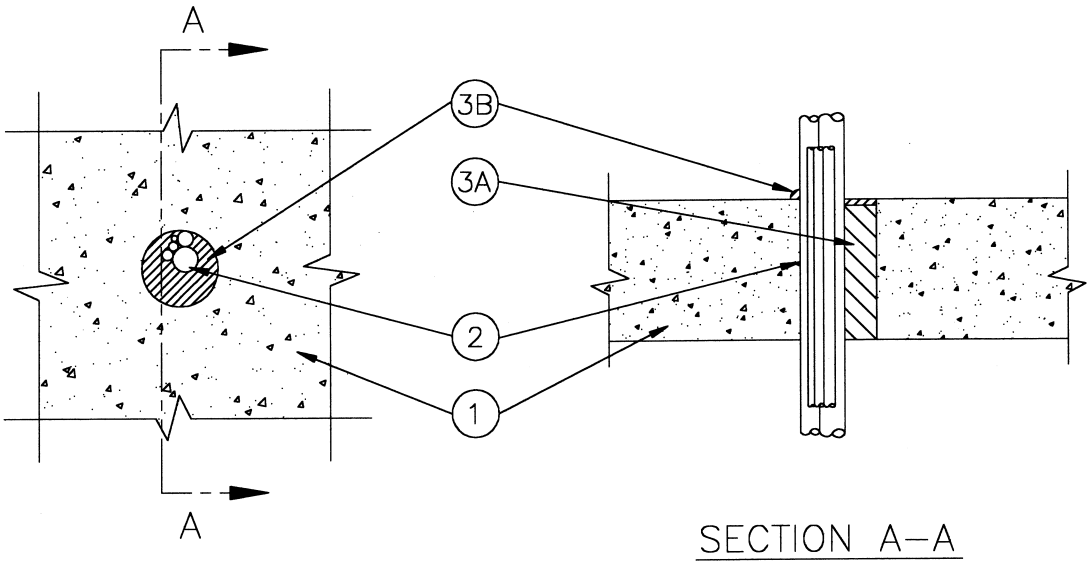
1. **Floor or Wall Assembly –** Min 11-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant –** One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes or conduit may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Crosslinked Polyethylene (PEX) Tubing^** – Nom 3/4 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.
   D. **Rigid Nonmetallic Conduit+** – Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 11 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material (Item 3B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor or both surfaces of wall. At point contact locations between penetrant and concrete, a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

+ Bearing the UL Listing Mark
* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 4 Hr	F Rating — 4 Hr
T Rating — 2-1/2 Hr	FT Rating — 2-1/2 Hr
	FH Rating — 4 Hr
	FTH Rating — 2-1/2 Hr



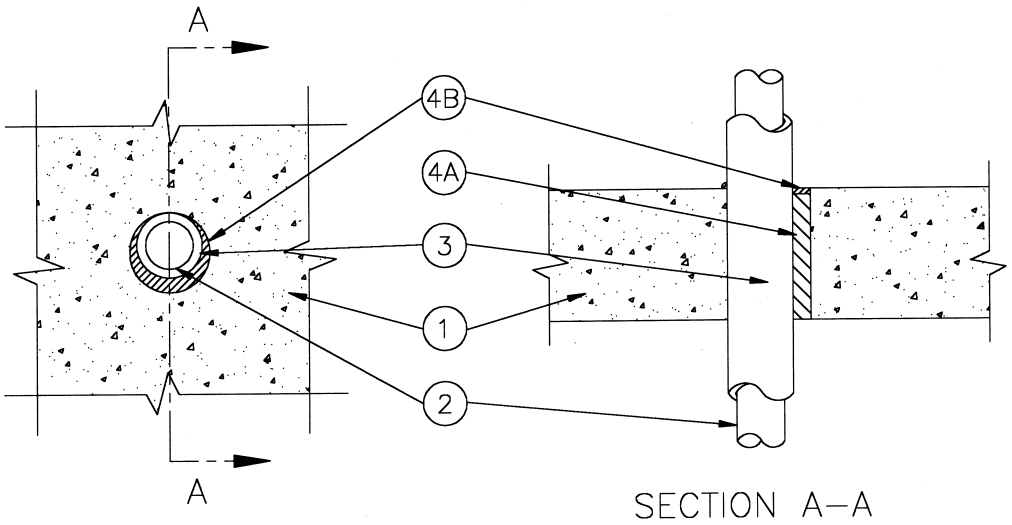
1. **Floor or Wall Assembly –** Min 11-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 6 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cables in opening to be max 27 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be min 0 in. (point contact) to max 3-1/2 in. Cable to be rigidly supported on both sides of floor or wall assembly. The following types of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TECK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.
   B. 3/C 3 50 kcmil (or smaller) copper conductor aluminum clad or steel clad TECK cable with XLPE insulation, with or without PVC jacket.
   C. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TECK cable with XLPE insulation, with or without PVC jacket.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with PVC jacket.
   F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with PVC jacket.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 11 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with top surface of floor or both surfaces of wall. Sealant to be forced into interstices of cable group to max extent possible. At point contact location between cable and concrete, a min 1/2 in. diam bead of fill material shall be applied at the concrete/cable interface on top surface of floor or both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 4 Hr	F Rating — 4 Hr
T Rating — 4 Hr	FT Rating — 4 Hr
	FH Rating — 4 Hr
	FTH Rating — 4 Hr



SECTION A–A

1. **Floor or Wall Assembly –** Min 11-1/2 in. (292 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 6 in. (152 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

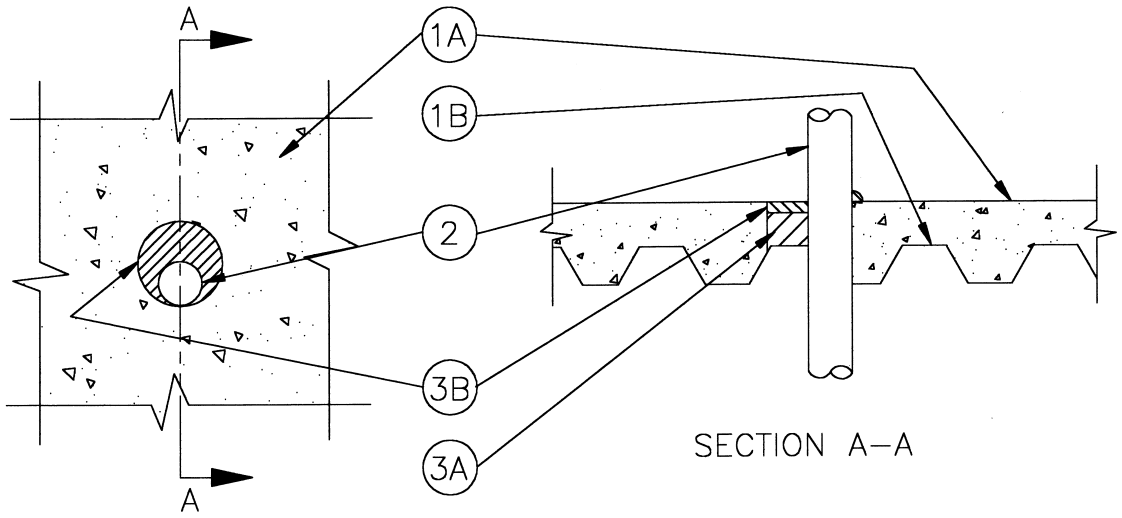
2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 11 in. (279 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as to accommodate the required thickness of fill material (Item 4B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At the point contact location between pipe and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/pipe covering interface on the top surface of floor and on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 1/4 & 1/2 Hr (See Item 2)	FT Ratings — 1/4 & 1/2 Hr (See Item 2)
	FH Rating — 2 Hr
	FTH Ratings — 1/4 & 1/2 Hr (See Item 2)



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. **Concrete –** Min 2 in. (51 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. (76 mm) deep galv fluted units as specified in the individual Floor-Ceiling Design. Max diam of opening is 6 in. (152 mm).

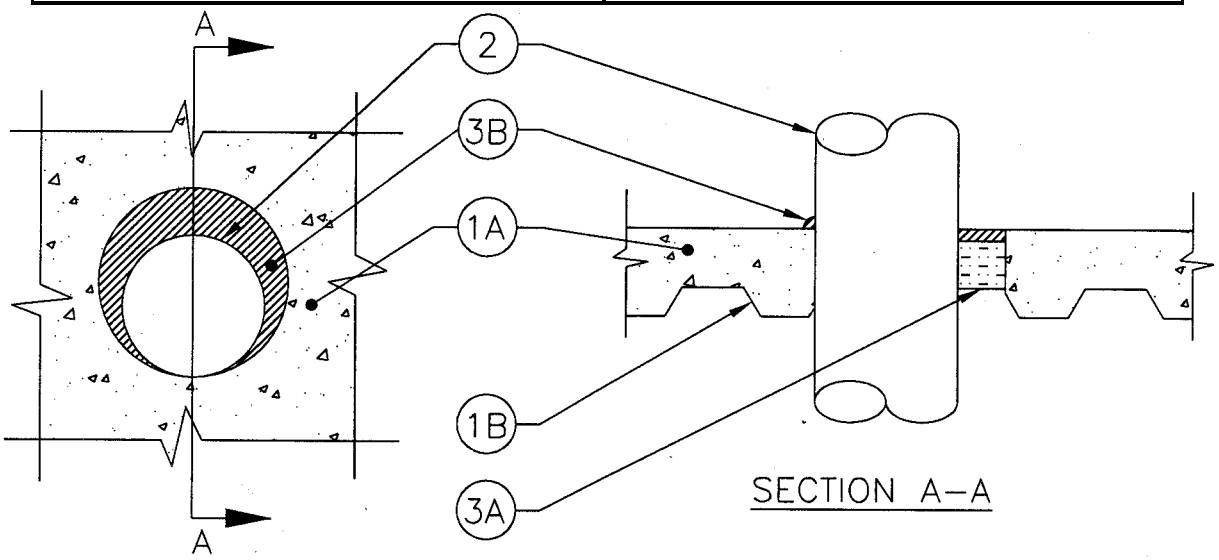
2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-7/8 in. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or steel electrical metallic tubing.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

   T rating is 1/2 hour for pipes/conduits A, B, and C. T rating is 1/4 hour for pipes/tubing D, E and F.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1-1/2 in. (38 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor. At point contact location between penetrant and concrete, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW,

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor - Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.
   B. **Steel Floor and Form Units* –** Composite or noncomposite max 3 in. (76 mm) deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 8 in. (203 mm)

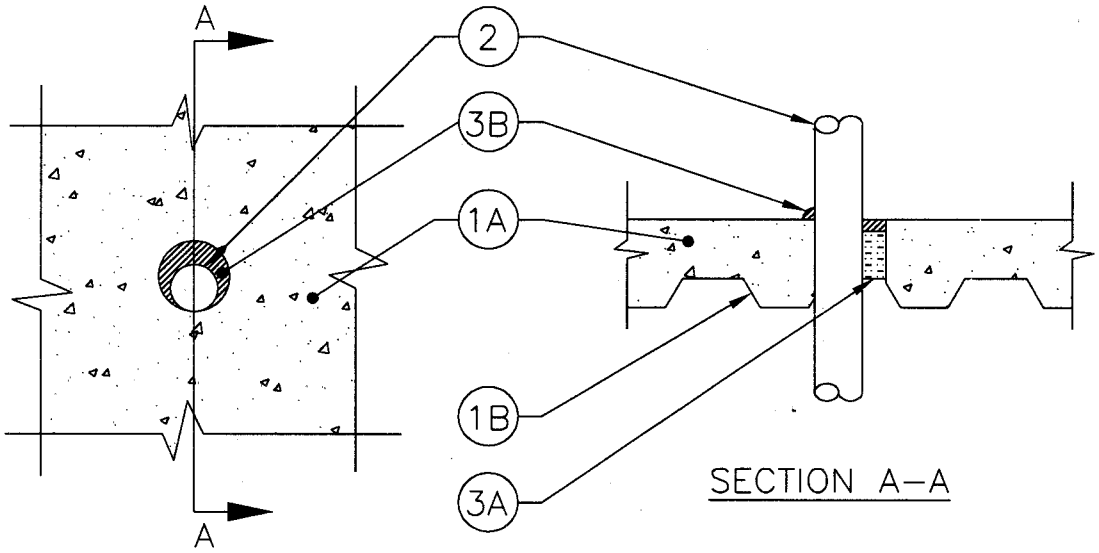
2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. As an option on the top surface of the floor assemblies, metallic riser clamps sized to fit the outer circumference of the penetrant and installed in accordance with the manufacturer's installation instructions. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit or nom 4 in. diam (or smaller) steel electrical metallic tubing.
   C. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   D. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 6 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of sealant shall be applied at the penetrant/concrete interface at the point contact location on the top surface of floor.

Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100–150pcf or 1600-2400 kg/m^3) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. (76 mm) deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 3 in. (76 mm).

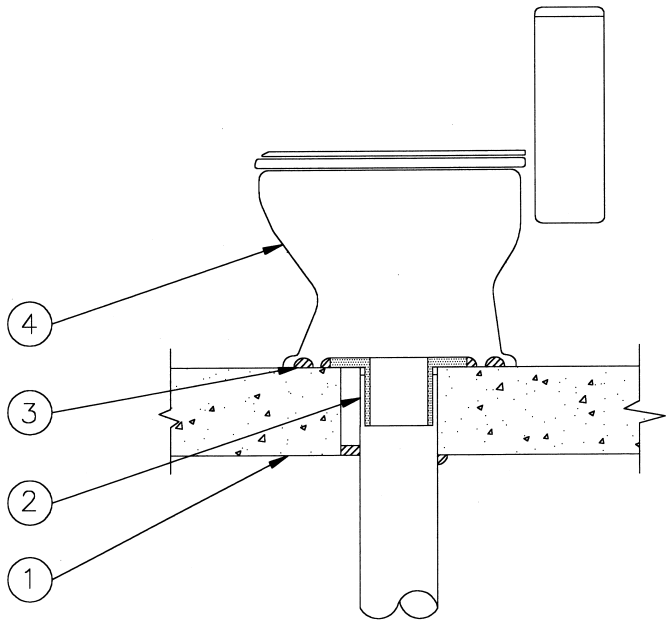
2. **Through Penetrating Product* – Flexible Metal Piping –** Nom 2 in. (51 mm) diam (or smaller) steel flexible metal piping. Max one flexible metal piping to be installed concentrically or eccentrically within the opening. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Piping to be rigidly supported on both sides of floor assembly. Plastic covering on piping may or may not be removed through and both sides of floor assembly.
   Omega-Flex Inc.

2A. **Stainless Steel Pipe** – (Not Shown) As an alternate to Item 2, nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. One pipe to be installed concentrically or eccentrically within opening. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Piping to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. thickness of min 4 pcf density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. diam bead of sealant shall be applied at the penetrant/concrete interface at point contact location on top surface of the floor.

   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking



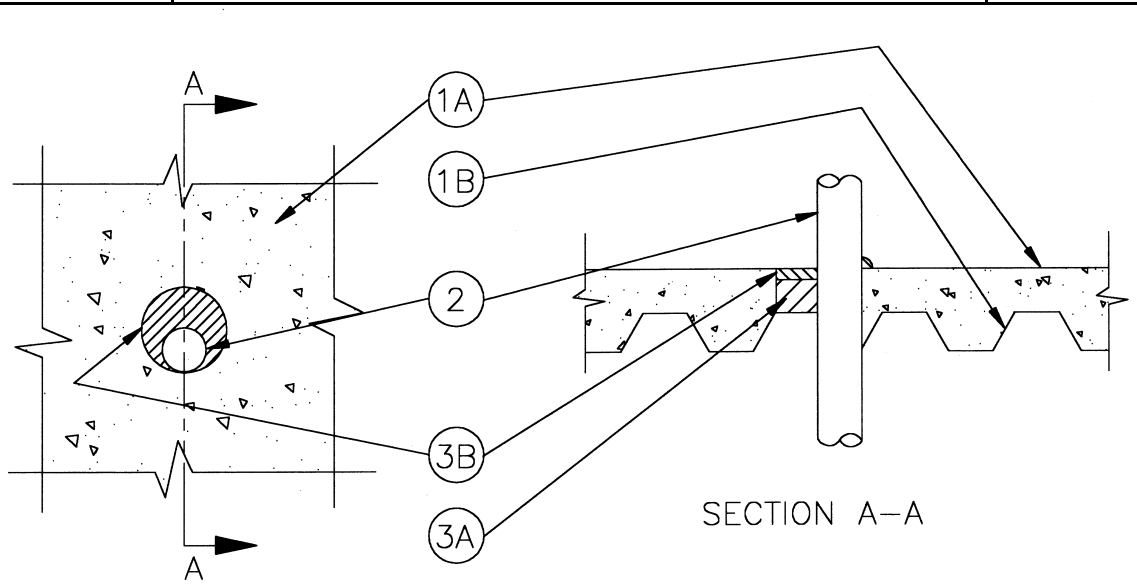
1. **Floor Assembly –** Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf). Max diam of opening is 6 in.

2. **Nonmetallic Pipe –** One nonmetallic drain pipe with max 4 in. diam toilet flange installed either concentrically or eccentrically within the firestop system. The annular space between drain pipe and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in. Pipe to be rigidly supported on lower side of floor assembly. The following types and sizes of nonmetallic pipes, fittings and flanges may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in vented (drain, waste or vent) piping system.
   B. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in vented (drain, waste or vent) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within the annulus, flush with bottom surface of floor. At point contact location between concrete and pipe, a min 1/2 in diam bead of fill material shall be applied at the pipe/concrete interface on bottom surface of floor assembly. A min 1/2 in. diam bead of fill material shall be applied around top edge of toilet flange. Prior to placement of water closet, a min 1/2 in. diam bead of fill material shall be applied to the bottom surface of the outer rim of the water closet.
   Passive Fire Protection Partners – 3600EX, 4800DW

4. **Water Closet –** Floor mounted vitreous china water closet.

* Bearing the UL Classification Marking

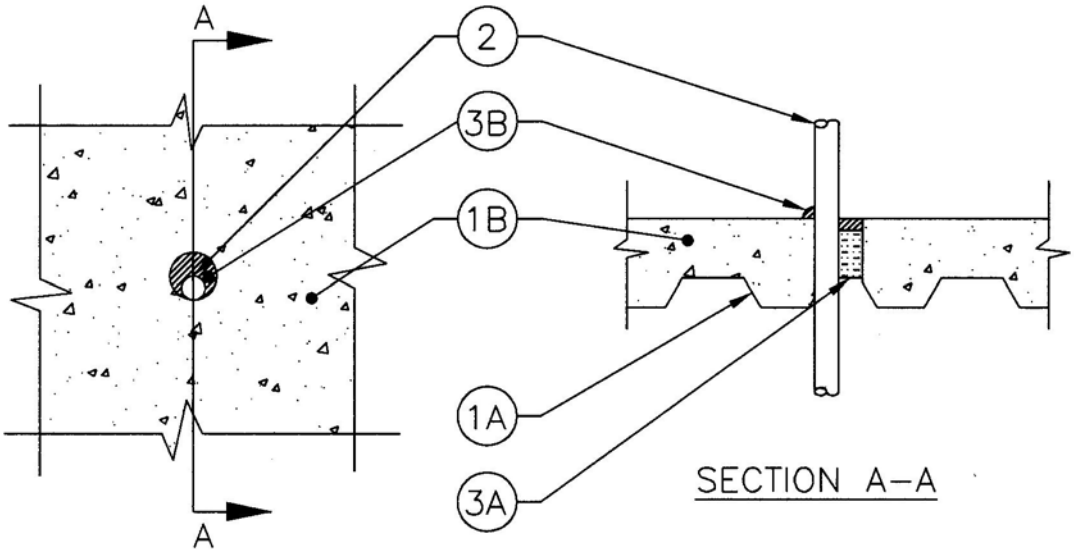


1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. **Concrete –** Min 2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep galv fluted units as specified in the individual Floor-Ceiling Design. Max diam of opening is 3-3/4 in.

2. **Nonmetallic Pipe –** Nom 2 in. diam (or smaller) SDR 11 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1-3/8 in. Pipe to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1-1/2 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with top surface of floor. At point contact location between pipe and concrete, a min 1/2 in. diam bead of fill material shall be applied at the concrete/pipe interface on top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

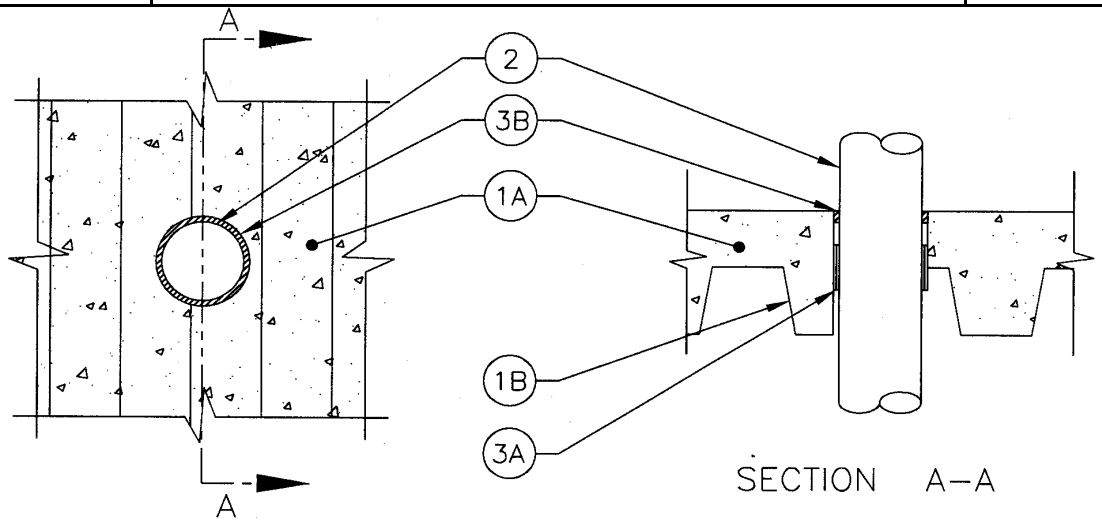


1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 2-1/2 in.

2. **Non-metallic Tubing –** Nom 1-1/2 in. diam (or smaller) SDR 9 crosslinked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. Tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between tubing and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. Tubing to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. thickness of min 4 pcf density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* - Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. diam bead of sealant shall be applied at penetrant/concrete interface at point contact location on the top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

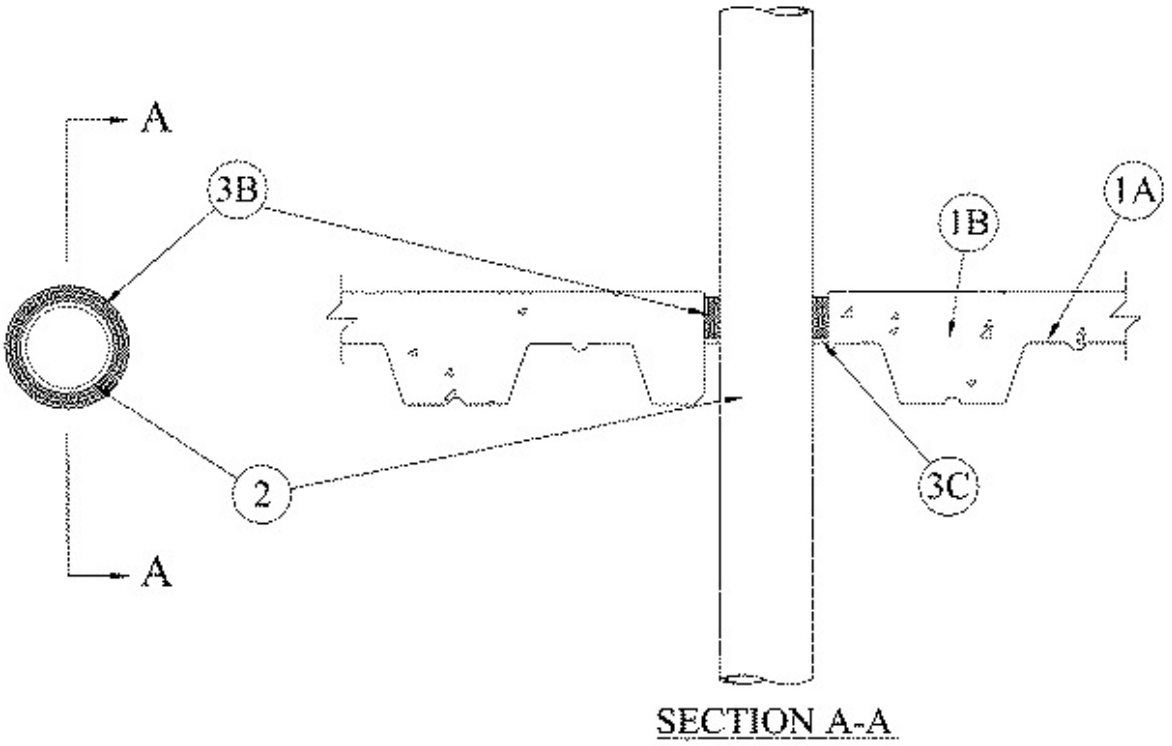


1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 4 in.

2. **Through Penetrants** – One non-metallic pipe or conduit to be centered within the firestop system. The annular space between the penetrant and the periphery of the opening shall be 1/4 in. Pipe or conduit to be rigidly supported on both sides of the floor. The following types and sizes of non metallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 cellular core or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 3 in. diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Non Metallic Conduit+ –** Nom 3 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   D. **Acrylonitrile Butadiene Stryrene (ABS) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Wrap Strip –** Nom 1/8 in. thick intumescent material supplied in 2 in. wide strips. Two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wrap strips flush with crest of steel deck flutes.
      Passive Fire Protection Partners – Wrap Strip WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor.
      Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking



SECTION A-A

1. **Floor Assembly —** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the material and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:

   A. **Concrete —** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.

   B. **Welded Wire Fabric —** 6 x 6 - W1.4 x W1.4

   C. **Steel Floor and Form Units* —** Composite or noncomposite 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening core-drilled through floor assembly is 5 in.

2. **Through Penetrants —** One nonmetallic pipe to be centered within the firestop system. The annular space between pipe and periphery of opening shall be nom 3/4 in. Pipe to be rigidly supported on both sides of floor assembly.The following types and sizes of nonmetallic pipes may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 3 in. diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   B. **Acrylonitrile Butadiene Styrene (ABS) Pipe —** Nom 3 in. diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 3 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

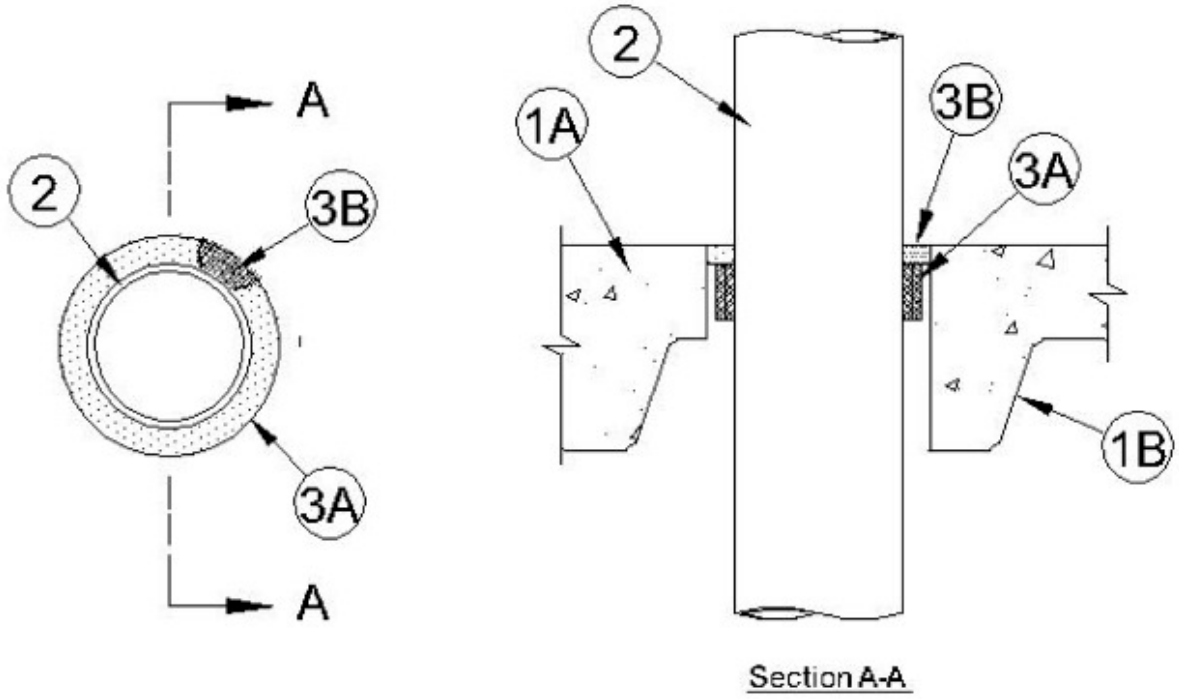
3. **Firestop System —** The details of the firestop systems shall be as follows:

   A. **Steel Sleeve —** (Optional – Not shown) — Nom 6 in. diam (or smaller) cylindrical sleeve formed from min 22 guage sheet steel. Sleeve is installed by coiling sheet steel to a diam smaller than the through opening and allowing it to uncoil. Sleeve shall have a min 1 in. overlap along longitudinal seam and shall be cast or grouted into floor assembly. The sleeve shall be installed flush with the valley of the fluted deck and may be flush with or project a max 2 in. above top surface of the floor.

   B. **Fill, Void or Cavity Materials* — Wrap Strip —** Nom 1/4 in. thick by 2 in. wide intumescent wrap strip. The wrap strip is continuously wrapped around the outer circumference of the pipe three times and slid into the annular space. When multiple strips are used to achieve the required total length, the ends are butted end to end and held in place with aluminum tape. The bottom edge of the wrap strip shall be positioned 1/4 in. above the crests of the steel floor units.
      PASSIVE FIRE PROTECTION PARTNERS — WS2

   C. **Fill, Void or Cavity Materials* — Caulk —** Min 1/4 in. thickness of fill material applied within the annulus, below the wrap strip, flush with the crests of the steel floor units.
      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

*Bearing the UL Classification Mark



Section A-A

1. **Floor Assembly —** The fire-rated unprotected concrete and steel or concrete floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Concrete —** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf, 1600-2400 kg/m^3) concrete.

   B. **Steel Floor and Form Units* —** Composite or noncomposite max 3 in. (76 mm) deep galv steel fluted units as specified in the individual Floor-Ceiling design. Max diam of opening is 6 in. (152 mm).

1A. **Floor Assembly —** As an option, floor may be constructed of min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf, 1600-2400 kg/m^3) concrete. Max diam of opening is 6 in. (152 mm).

2. **Through Penetrants —** One nonmetallic penetrant installed concentrically within the firestop system. The annular space between pipe and periphery of opening shall be 3/4 in. (19 mm). Pipe to be rigidly supported on both sides of the floor assembly. The following types and sizes of nonmetallic pipes may be used:

   A. **Polyvinyl Chloride XFR (PVC-XFR) Pipe —** Nom 4 in. (102 mm) diam Schedule 40 solid core PVC-XFR pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.

   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 4 in. (102mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Materials* — Wrap Strip —** 2 in. (51 mm) wide, two layers of nom 1/4 in. (6 mm) thick intumescent elastomeric material faced on one side with a plastic film, supplied in 1 or 2 in. (25 or 51 mm) wide strips. Wrap strips individually wrapped around nonmetallic pipe (film side exposed) with ends butted and held in place with tape or tie wire. Butted ends in successive layers shall be offset. Wrap strip recessed 1/2 in. (13 mm) from surface of concrete floor. Two stacks of two layers of wrap strip required when 1 in. (25 mm) wide wrap strips.

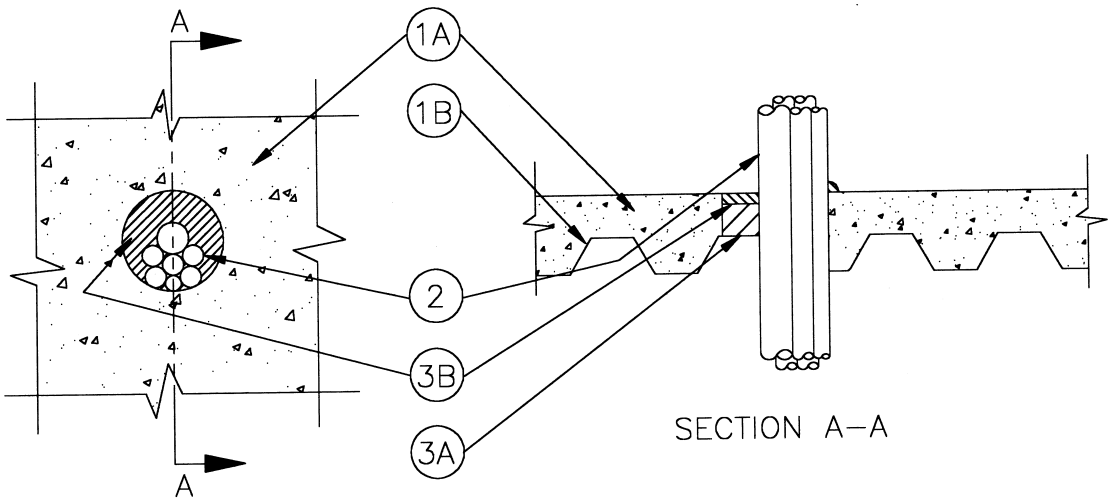
      PASSIVE FIRE PROTECTION PARTNERS — WS2

   B. **Fill, Void or Cavity Material* — Caulk —** Min 1/2 in. (51 mm) thickness of sealant applied within the annulus, flush with bottom surface of steel deck or concrete floor.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



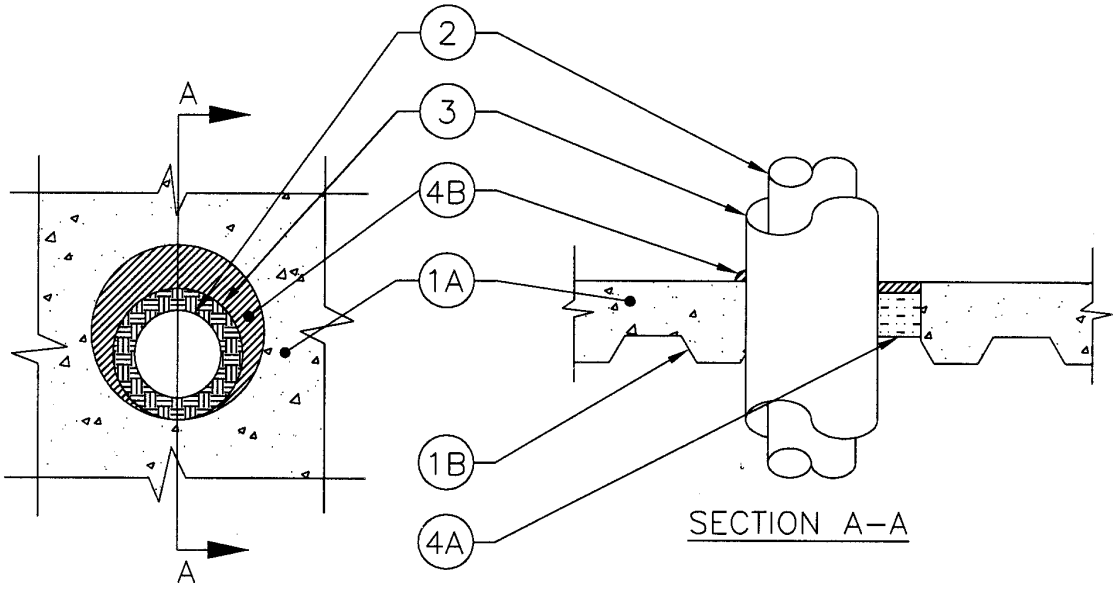
1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
   A. **Concrete –** Min 2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep galv fluted units as specified in the individual Floor-Ceiling Design. Max diam of opening is 6 in.

2. **Cables –** Aggregate cross-sectional area of cables in opening to be max 67 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 2-1/4 in. Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.
   B. 3/C 350 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   C. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with PVC jacket.
   F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with PVC jacket.
   G. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1-1/2 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening to max extent possible as a permanent form. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor. At point contact location between cable and concrete, a min 1/2 in. diam bead of fill material shall be applied at the concrete/cable interface on top surface of floor. Sealant to be forced into interstices of cable group to max extent possible.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 & 1 Hr (See Item 3)	FT Ratings — 0 & 1 Hr (See Item 3)
	FH Rating — 2 Hr
	FTH Ratings — 0 & 1 Hr (See Item 3)



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.
   B. **Steel Floor and Form Units* –** Composite or noncomposite max 3 in. (76 mm) deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 8 in.(203 mm).

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Nom 1 in. (25 mm) thick (or less) hollow cylindrical heavy density glass fiber units jacketed on the outside with and all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of opening shall be min 0 in. (point contact) to max 1-7/8 in. (148 mm).
   T Rating is 1 Hr for nom 1 in. (25 mm) thick pipe covering. T Rating is 0 Hr for pipe coverings less than nom 1 in. (25 mm) thick.
   See **Pipe and Equipment Covering – Materials (BRGU)** category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

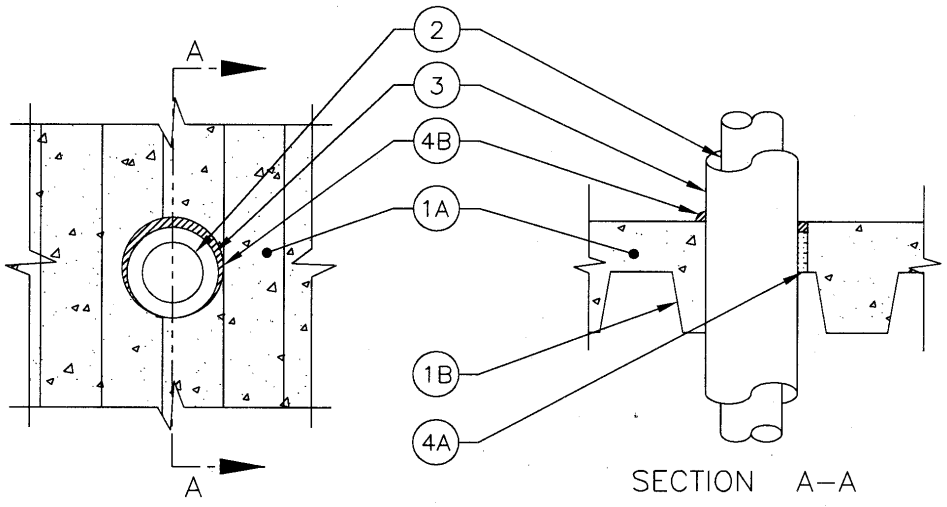
4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* - Sealant –** Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of sealant shall be applied at the pipe/concrete interface at the point contact location on top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

F Rating – 2 Hr
T Ratings – 0 & 1/2 Hr (See Item 3)

F-A-5023

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 & 1/2 Hr (See Item 3)	FT Ratings — 0 & 1/2 Hr (See Item 3)
	FH Rating — 2 Hr
	FTH Ratings — 0 & 1/2 Hr (See Item 3)



SECTION A–A

1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. (76 mm) deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 5 in. (127 mm).

2. **Through Penetrants** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tubing
   D. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Tube Insulation – Plastics+ –** Nom 3/4 in. (19 mm) thick (or less) acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. Th annular space between insulated pipe and edge of opening shall be min 0 in. (point contact) to max 3/8 in. (10 mm). **T Rating is 1/2 Hr for nom 3/4 in. (19 mm) thick tube insulation. T Rating is 0 Hr for tube insulation less than nom 3/4 in. (19 mm) thick.**

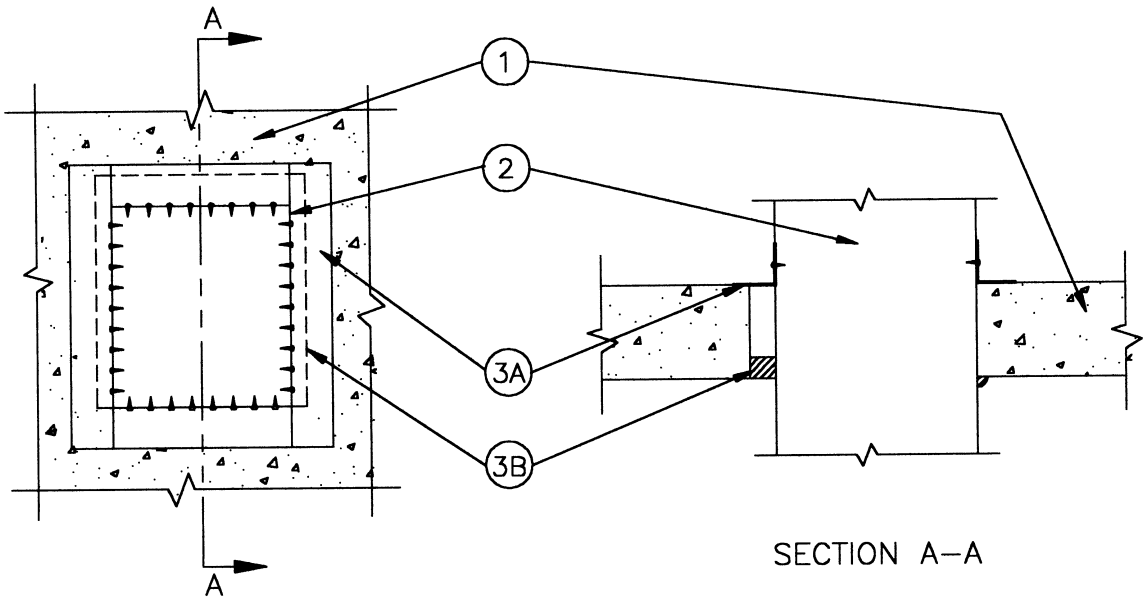
   See **Plastics+ – (QMFZ2)** category in the Plastics Recognized Component Directory for names of manufacturers. Any recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94 – 5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of sealant shall be applied at at the tube insulation/concrete interface at point contact location on the top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking
+ Bearing the UL Recognized Component Marking

	F Rating – 2 Hr **T Rating – 1/2 Hr**	**F-A-7003**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

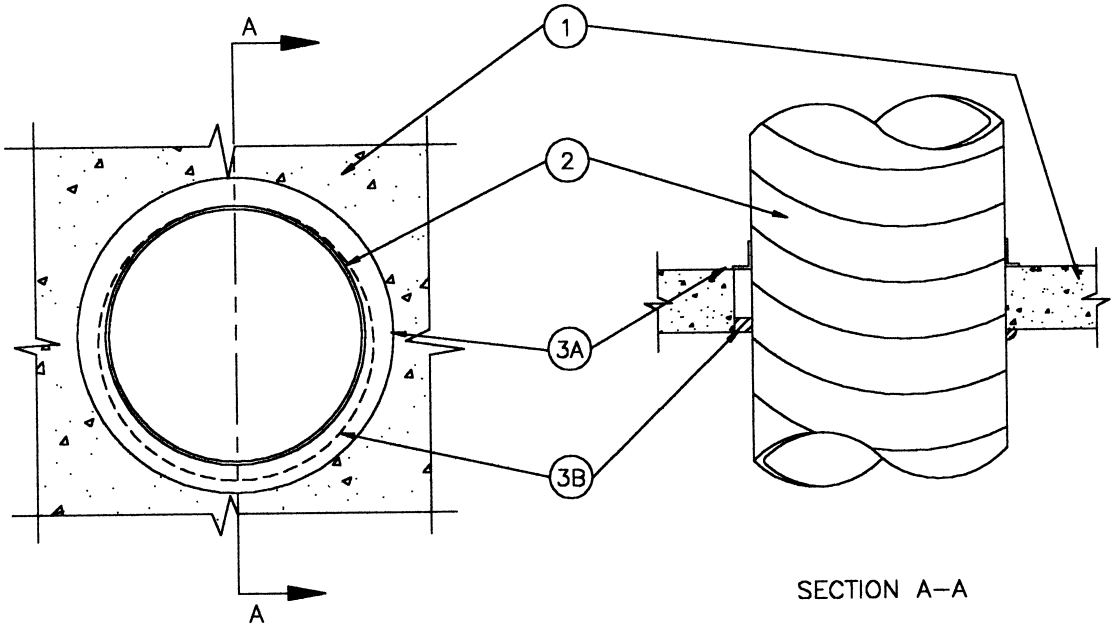
1. **Floor Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Max area of opening is 625 sq. in. with a max dimension of 25 in.

2. **Through Penetrant –** Nom 24 by 24 in. (or smaller) 26 ga. (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 16 gauge 1-1/2 by 1-1/2 in. galv steel angles. Angles attached to duct on unexposed side of floor with min 1/2 in. long, No. 8 (or larger) sheet metal screws. OC.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material applied within annulus, flush with top or bottom surface of floor. At the point contact location between penetrant and periphery of opening, min 1/2 in. diam bead of fill material shall be applied at the concrete/duct interface on exposed surface of floor.
   Passive Fire Protection Partners. – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

1. **Floor Assembly –** Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) structural concrete. Max diam of opening to be 17 in.

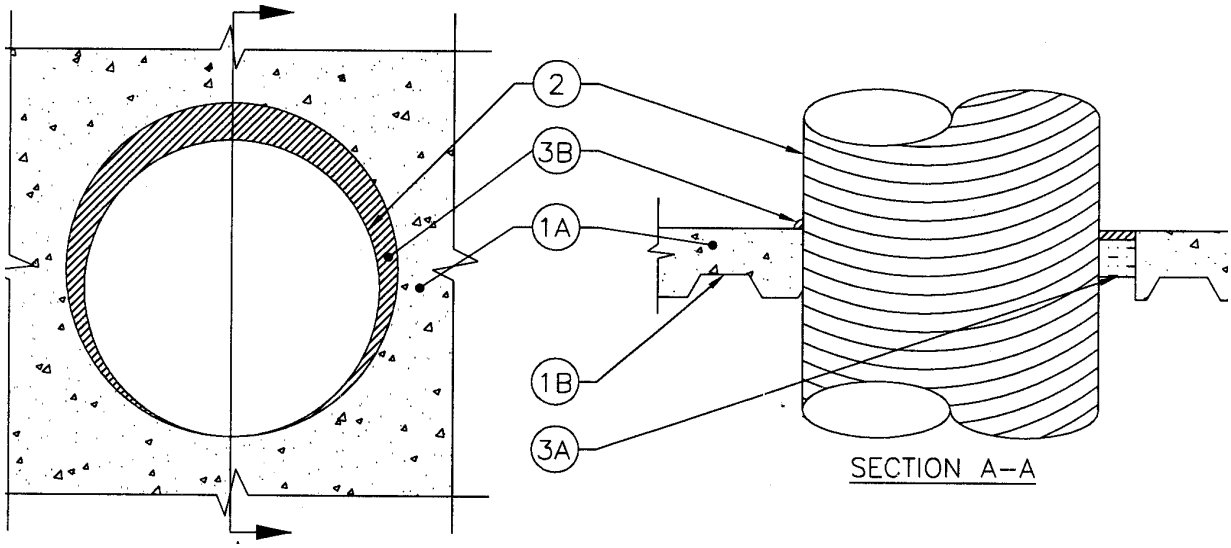
2. **Through-Penetrant –** Nom 16 in. diam (or smaller) No. 26 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Steel duct to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles -** Min 16 gauge 1-1/2 by 2 in. galv steel angles roll-formed and sized to lap duct a min of 1 ½ in. Angles attached to duct with min ½ in. long No.8 (or longer) sheet metal screws spaced max 4 in. OC.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. thickness of fill material shall be installed within annulus, between damper and periphery of opening, flush with top or bottom surface of floor. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the duct/concrete interface on exposed surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

	F Rating – 2 Hr T Rating – 1/2 Hr	F-A-7008

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 18 in.

2. **Steel Duct –** Nom 16 in. diam (or smaller) No. 22 gauge (or heavier) spiral wound steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between the duct and the periphery of the opening shall be min. 0 in. (point contact) to max 2 in. Duct to be rigidly supported on both sides of floor assembly.

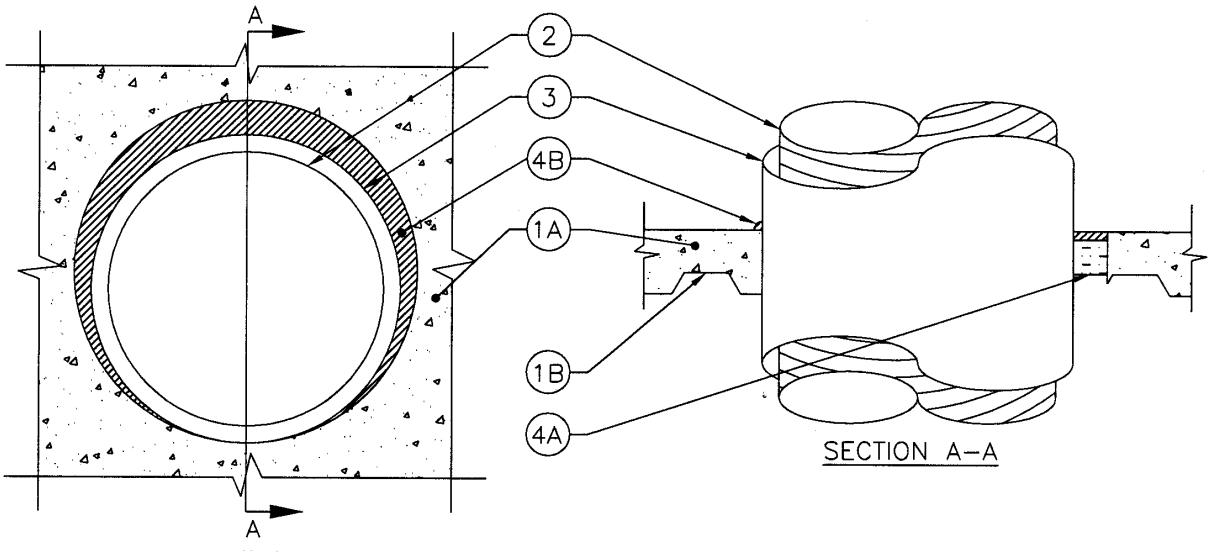
3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. diam bead of sealant shall be applied at the duct/concrete interface at the point contact location on the top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

F Rating – 2 Hr
T Rating – 0 & 1 Hr (See Item 3)

F-A-7010

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 0 & 1 Hr (See Item 3)	FT Ratings — 0 & 1 Hr (See Item 3)
	FH Rating — 2 Hr
	FTH Ratings — 0 & 1 Hr (See Item 3)



1. **Floor Assembly –** The fire-rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Concrete –** Min 2-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete.
   B. **Steel Floor and Form Units* –** Composite or non-composite max 3 in. deep fluted galv units as specified in the individual Floor-Ceiling design. Max diam of opening is 22 in

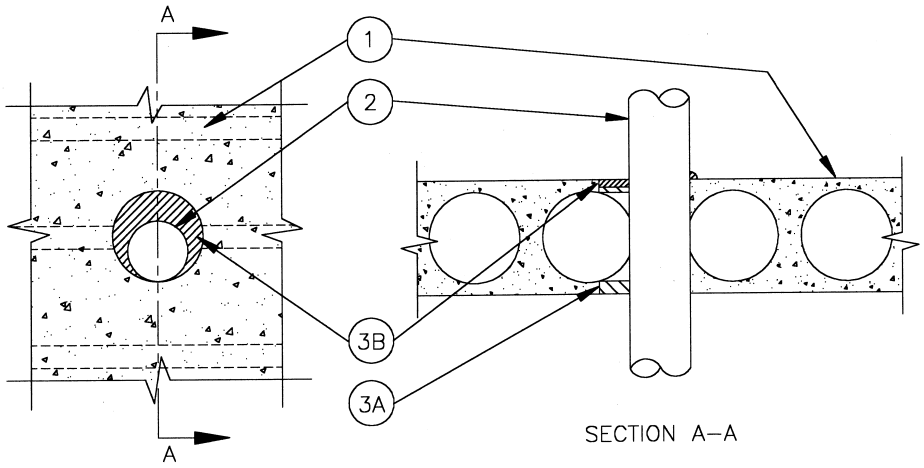
2. **Steel Duct –** Nom 16 in. diam (or smaller) No. 26 gauge (or heavier) spiral wound steel duct to be installed either concentrically or eccentrically within the opening. Duct to be rigidly supported on both sides of wall assembly.

3. **Duct Insulation* –** Nom 2 in. thick (or less) glass fiber blanket insulation jacketed on the outside with foil-scrim-kraft facing. Longitudinal and transverse joints sealed with foil-scrim-kraft tape. The annular space between the insulated duct and the edge of the through opening shall be min 0 in. (point contact) to max 2 in.
   T Rating is 1 Hr from nom 2 in. thick duct insulation. T Rating is 0 Hr for duct insulation less than nom 2 in. thick.
   See **Batts and Blankets (BKNV)** category in the Building Materials Directory for names of manufacturers. Any batts and blankets material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. thickness of min 4 pcf density mineral wool batt material firmly packed into opening as a permanent form. Packing material to be recessed form top surface of floor as required to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within the annulus, flush with top surface of floor. Min 1/2 in. diam bead of sealant shall be applied at the duct insulation/concrete interface at the point contact location on top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Ratings — 1/4 & 1/2 Hr (See Item 2)	FT Ratings — 1/4 & 1/2 Hr (See Item 2)
	FH Rating — 2 Hr
	FTH Ratings — 1/4 & 1/2 Hr (See Item 2)



SECTION A–A

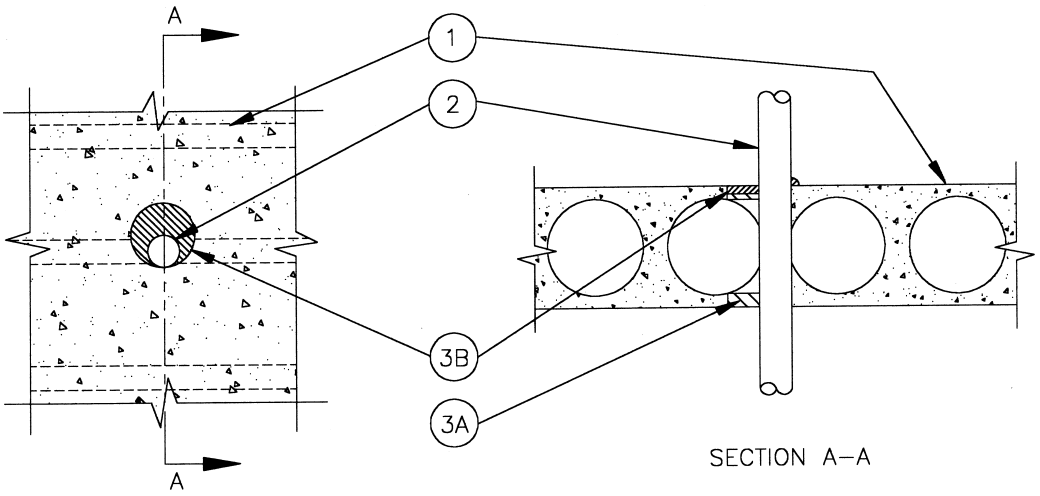
1. **Floor Assembly –** Min 8 in. (203 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) reinforced concrete. Floor may also be constructed of any min 8 in. thick UL Classified **Precast Concrete Units***. Max diam of opening is 6 in. (152 mm).
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufactures.

2. **Through Penetrants –** One metallic pipe, conduit, or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. As an option on the top surface of the floor assemblies, metallic riser clamps sized to fit the outer circumference of the penetrant and installed in accordance with the manufacturer's installation instructions. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or steel electrical meta tubing.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 4 in. diam (102 mm) (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

   T Rating is 1/2 hour for pipe/conduit A and B. T rating is 1/4 hour for pipe/tubing C, D, E and F.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening, as a permanent form, flush with top and bottom of floor assembly. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied, within annulus, flush with top surface of floor. At point contact location between penetrant and periphery of opening a 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/concrete interface on top surface of floor assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

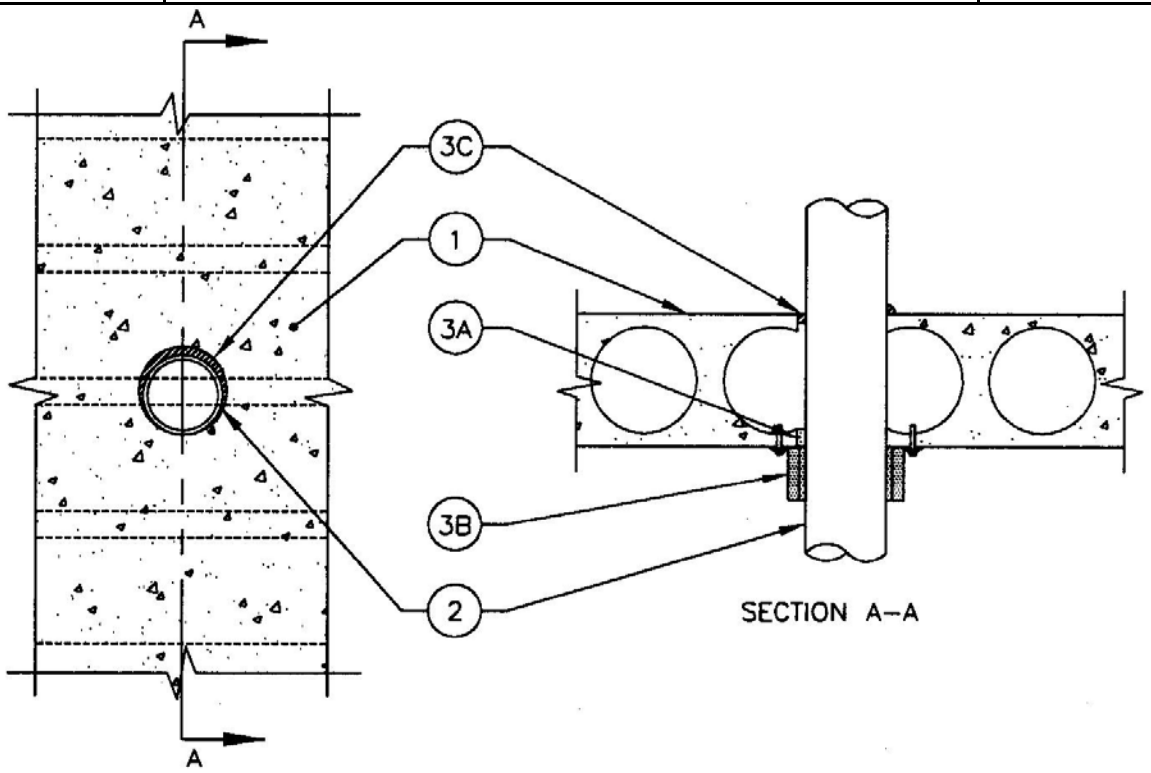


1. **Floor Assembly –** Min 8 in. thick lightweight or normal weight (100-150 pcf) reinforced concrete. Floor may also be constructed of any min 8 in. thick UL Classified **Precast Concrete Units***. Max diam of opening is 3-1/2 in.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufactures.

2. **Through Penetrants –** One non-metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and edge of through opening shall be min 0 in. (point contact) to max 1-1/8 in. Pipe or conduit to be rigidly supported on both sides of floor assembly. The following types and sizes of non-metallic pipes or conduits may be used:
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) piping systems.
   B. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Non-metallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening, as a permanent form, flush with top and bottom of floor assembly. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with top surface of floor. At point contact location between penetrant and periphery of opening a 1/2 in. diam bead of fill material shall be applied at the pipe/concrete interface on top surface of floor assembly.
      Passive Fire Protection Partners – 3600EX, 4800DW

+Bearing the UL Recognized Marking
*Bearing the UL Classification Marking

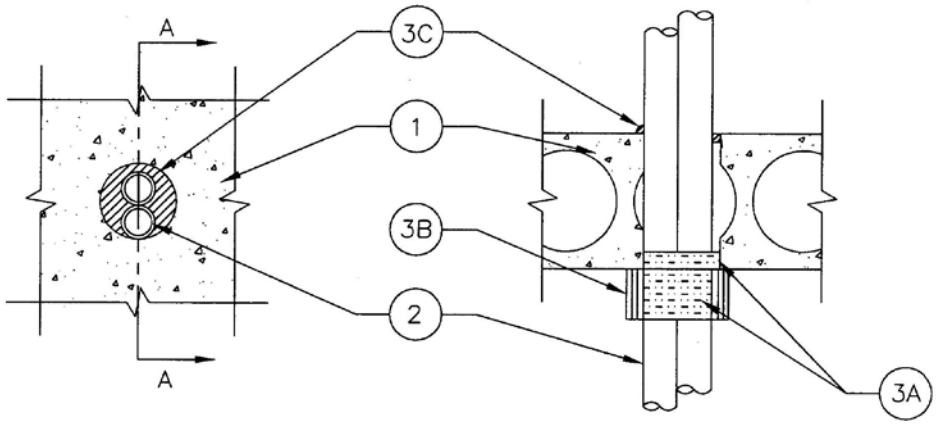


1. **Floor Assembly –** Min 8 in. thick UL Classified hollow-core **Precast Concrete Units***. Floor may also be constructed of any min 8 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Diam of opening shall be 1 in. larger than nom pipe diam.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufactures.

2. **Through Penetrants –** One non-metallic pipe to be installed within the opening with the annular space between pipe and periphery of opening to be min. 0 in. (point contact) to max 5/8 in. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of non-metallic pipes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems
   B. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 4 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 4 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form flush with bottom of floor assembly.
   B. **Firestop Device* – Collar** – Collar to be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around pipe and secured to underside of floor with min 3/16 in. diam by min 1-1/4 in. long steel expansion bolts in conjunction with steel nuts and min 1-1/4 in. diam steel washers. Min of two, three or four anchor bolts, symmetrically located, for nom 1 in. diam (or smaller), nom 3 in. diam and nom 4 in. diam pipes, respectively.
   Passive Fire Protection Partners – Plastic pipe Collar (PPC) 1.5, 2, 3 and 4
   C. **Fill Void or Cavity Material* – Sealant** – Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor. At point contact location between pipe and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the pipe/concrete interface on top surface of floor assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking



SECTION A–A

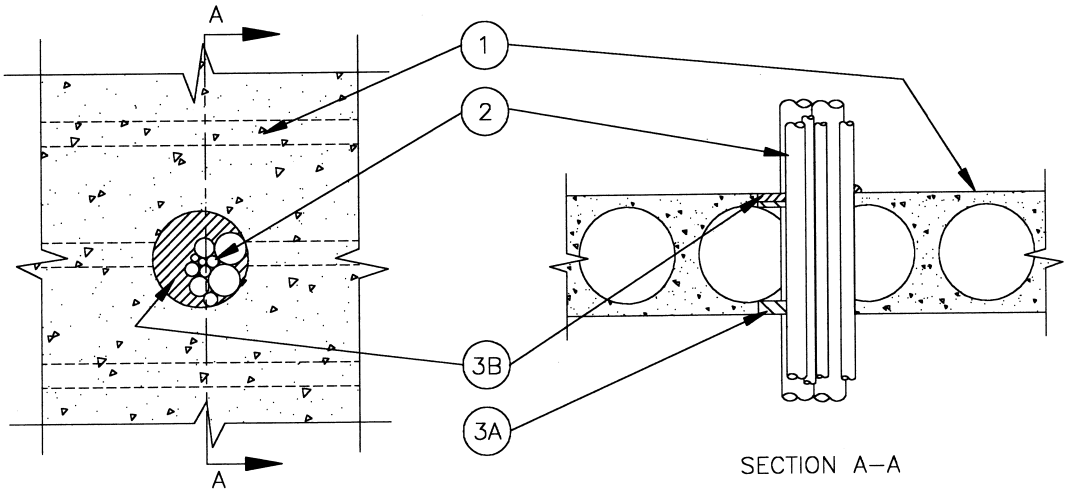
1. **Floor Assembly –** Min 8 in. thick UL Classified hollow-core **Precast Concrete Units***. Floor may also be constructed of any min 8 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Max diam of opening shall be 5 in.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufactures.

2. **Through Penetrants –** Two non-metallic pipe to be installed within the opening with the annular space between pipe and periphery of opening to be min. 0 in. (point contact) to max 1-1/8 in. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of non-metallic pipes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 1-1/2 in. diam Schedule 40 solid core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 1-1/2 in. diam SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form flush with bottom of floor assembly. An additional 2 in. thickness of min 4 pcf mineral wool to be installed within the firestop device collar (Item 3B) so as to completely fill all voids within the collar.
   B. **Firestop Device* – Collar** – Collar to be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around pipes such that collar completely overlaps periphery of opening. Collar secured to underside of floor with min 3/16 in. diam by min 1-1/4 in. long steel expansion bolts in conjunction with steel nuts and min 1-1/4 in. diam steel washers. Min of four anchor bolts, symmetrically located.
   Passive Fire Protection Partners – Plastic pipe Collar (PPC) 4
   C. **Fill Void or Cavity Material* – Sealant** – Min 1/2 in. thickness of fill material applied within annulus, flush with top surface of floor. At point contact location between pipe and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the pipe/concrete interface on top surface of floor assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



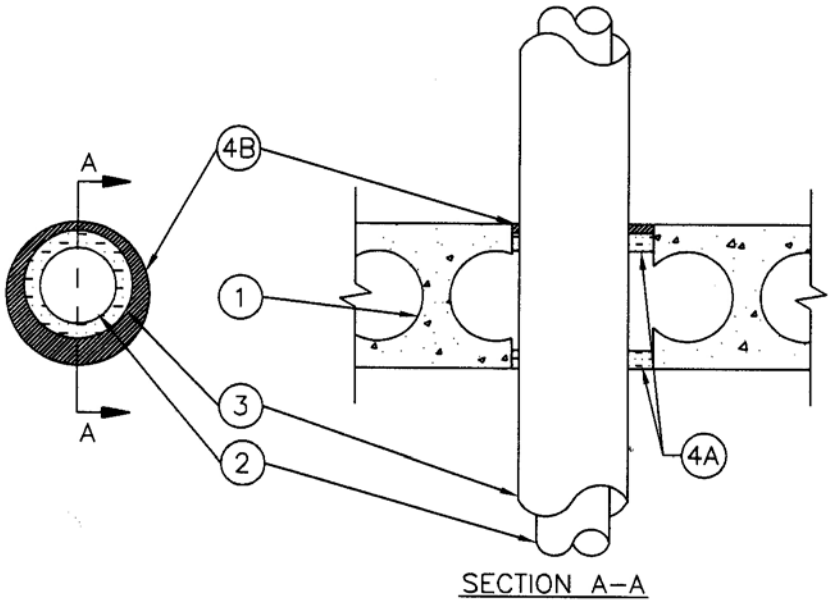
1. **Floor Assembly –** Min 8 in. thick lightweight or normal weight (100-150 pcf) reinforced concrete. Floor may also be constructed of any UL Classified **Precast Concrete Units***. Max diam of opening is 6 in.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cables in opening to be max 67 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 2-1/8 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.
   B. 3/C 3 50 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   C. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with PVC jacket.
   F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with PVC jacket.
   G. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
      SOUTHWIRE CO – Type MC, Type AC

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 1 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening, as a permanent form, flush with top and bottom of floor assembly. Packing material to be recessed from top surface of floor as to accommodate the required thickness of fill material (Item 3B).
   B. **Fill Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied, within annulus, flush with top surface of floor. At point contact location between penetrant and periphery of opening a 1/2 in. diam bead of fill material shall be applied at the pipe/concrete interface on top surface of floor assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



SECTION A–A

1. **Floor Assembly –** Min 8 in. (203 mm) thick UL Classified hollow-core **Precast Concrete Units*.** Floor may also be constructed of any min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m$^{3)}$) concrete. Max diam of opening shall be 7 in. (178 mm) in hollow-core floors. Max diam of opening shall be 8 in. (203 mm) in slabs.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant –** One metallic pipe or tube to be installed concentrically or eccentrically within the opening. Penetrant to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic tubes or pipes may be used:
   A. **Copper Tube –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   B. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   D. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

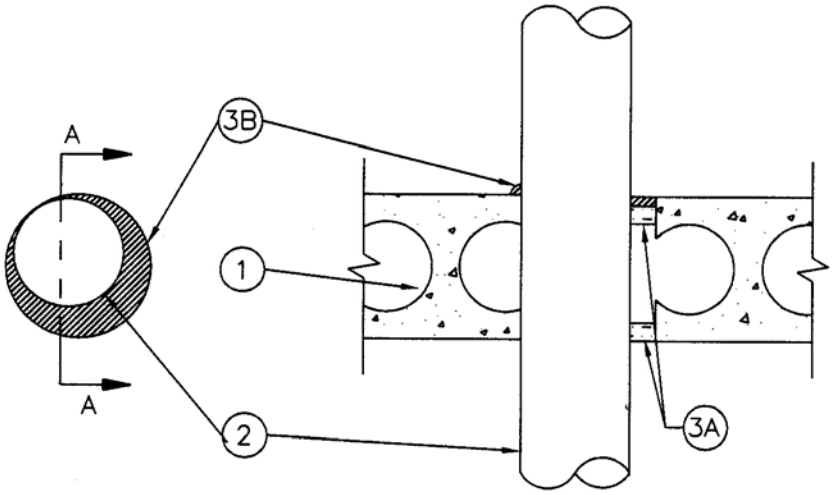
3. **Pipe Covering –** Nom 1 in. (25 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing tape. Traverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between pipe covering and periphery of opening shall be min 1/2 in. (13 mm) and max 1-3/8 in. (35 mm).

   See **Pipe and Equipment Covering Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Firestop System –** The details of the firestop system shall be as follows:
   A. **Packing Material –** Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form flush with bottom of floor assembly. Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form and recessed from top surface of floor to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Materials* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

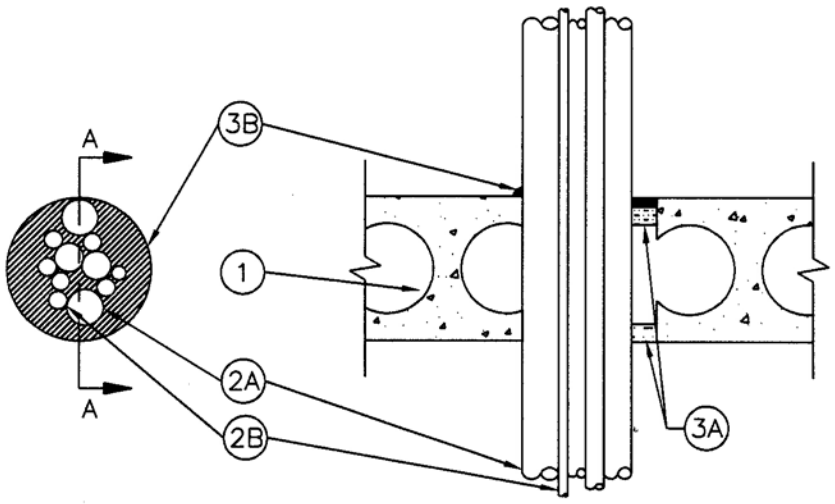
1. **Floor Assembly –** Min 8 in. (203 mm) thick UL Classified hollow-core **Precast Concrete Units*.** Floor may also be constructed of any min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m^3)) concrete. Max diam of opening shall be 7 in. (178 mm) in hollow-core floors. Max diam of opening shall be 10 in. (254 mm) in slabs.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 8 in. (203 mm) diam (or smaller) No. 20 gauge (or heavier) galvanized steel duct to be installed either concentrically or eccentrically within opening. The annular space between duct and periphery of opening shall be shall be min 0 in. (0 mm) (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of floor assembly.

3. **Firestop System –** The details of the firestop system shall be as follows:
   A. **Packing Material –** Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form flush with bottom of floor assembly. Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form and recessed from top surface of floor to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Materials* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of caulk applied at point contact locations at duct/concrete interface on top surface of floor. **Passive Fire Protection Partners –** 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

1. **Floor Assembly –** Min 8 in. (203 mm) thick UL Classified hollow-core **Precast Concrete Units*.** Floor may also be constructed of any min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m^3)) concrete. Max diam of opening shall be 7 in. (178 mm) in hollow-core floors. Max diam of opening shall be 8 in. (203 mm) in slabs.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

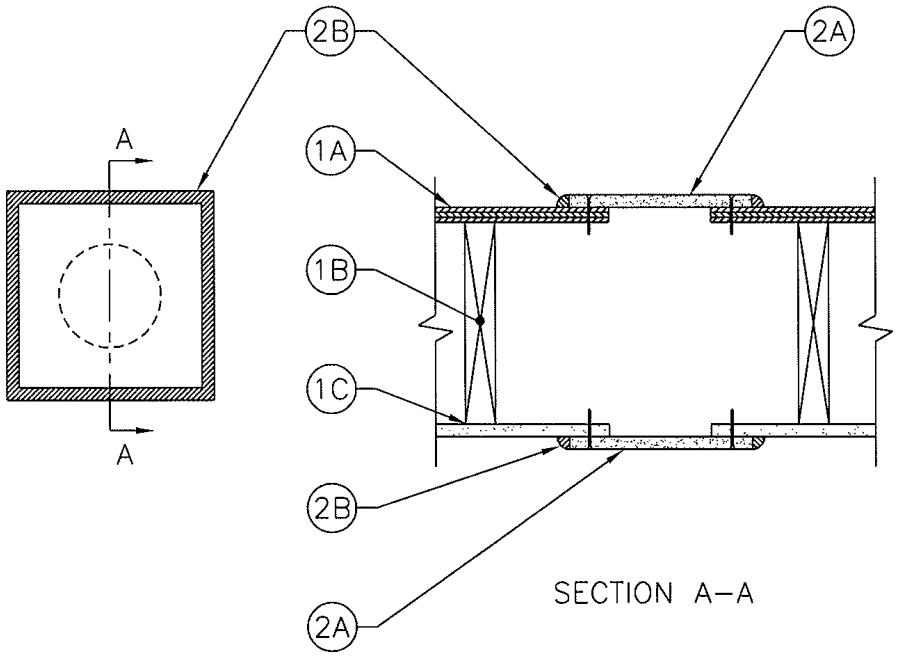
2. **Through Penetrants –** Pipes, conduits, tubing or cables to be installed within the opening such that the aggregate cross-sectional area of penetrants in opening is max 38 percent of the cross-sectional area of the opening in floor. The annular space between penetrants and periphery of opening shall be min 0 in. (0 mm) (point contact) and a max of 1-1/2 in. (38 mm). The space between penetrants shall be min 0 (point contact) and a max of 1-1/2 in. (38 mm). Penetrants to be rigidly supported on both sides of floor assembly. The following types and sizes of penetrants may be used:
   A. **Metallic Pipes** - The following types and sizes of metallic pipes, conduits or tubing may be used:
      A1. **Steel Pipe** - Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
      A2. **Conduit** - Nom 2 in. (51 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
      A3. **Copper Tubing** - Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
      A4. **Copper Pipe** - Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
      A5. **Iron Pipe** – Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
      A6. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

B. **Cables** – The following types and sizes of cables may be used
   B1. Max 7/C No. 12 AWG multiconductor power and control cables; XLPE or PVC insulation with XLPE or PVC jacket.
   B2. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene XLPE insulation, with or without PVC jacket.
   B3. 3/C 3 50 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   B4. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   B5. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with or without PVC jacket.
   B6. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with or without PVC jacket.
   B7. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with or without PVC jacket.
   B8. **Through Penetrating Product*** - Any cables, **Armored Cable**+ or **Metal Clad Cable**+ currently Classified under the **Through Penetrating Product** category. See **Through Penetrating Product** (XHLY) category in the Fire Resistance Directory for names of manufacturers

3. **Firestop System –** The details of the firestop system shall be as follows:
   A. **Packing Material –** Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form flush with bottom of floor assembly. Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form and recessed from top surface of floor to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Materials* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within annulus, flush with top surface of floor. Min 1/2 in. (13 mm) diam bead of caulk applied at point contact locations at penetrant/concrete interface on top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hr (See Item 1)	F Ratings — 1 & 2 Hr (See Item 1)
T Ratings — 1 & 2 Hr (See Item 1)	FT Ratings — 1 & 2 Hr (See Item 1)
	FH Ratings — 1 & 2 Hr (See Item 1)
	FTH Ratings — 1 & 2 Hr (See Item 1)



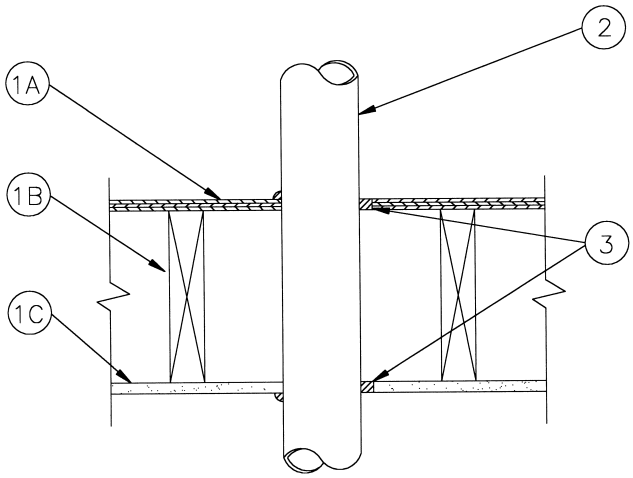
1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire rated wood joist Floor-Ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5-1/8 in. (130 mm).
   - B. **Wood Joists** – Nom 10 in. (254 mm) deep (or deeper) lumber trusses with bridging as required and with ends firestopped.
   - C. **Gypsum Board*** – Thickness, type number of layers as required in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. For 2 hr rated assemblies, second layer of gypsum board screw attached to furring channels. Max diam of opening is 5-1/8 in. (130 mm).
   - D. **Furring Channels** – (Not Shown) – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

   The F and T Ratings of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly.

2. **Firestop System –** The firestop system shall consist of the following:
   A. **Gypsum Board*** – Min 5/8 in. (16 mm) thick gypsum board patch sized approx 2 in. (51 mm) larger than diam of opening. Patch to be secured to gypsum ceiling and plywood floor with four steel drywall screws, one in each corner of each patch.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied around entire perimeter of patch on both sides of the assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/4 Hr

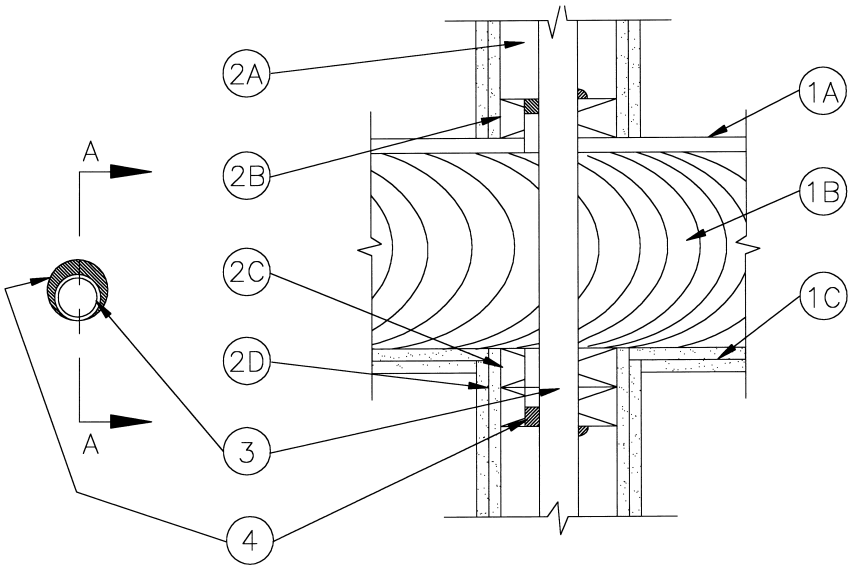


1. **Floor-Ceiling Assembly –** The 1 hr fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture-*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5-1/8 in.(130 mm).
   - B. **Wood Joists –** Nom 2 by 10 in. (38 by 241 mm) deep (or deeper) lumber joists spaced 16 in. (406 mm) OC with nom 1 by 3 in. (38 by 76 mm) lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design.
2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 1/4 in. (6 mm) to max 3/4 in.(19 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly, The following types and sizes of metallic pipe, conduit or tubing may be used:
   - A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   - B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   - C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit.
   - D. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT).
   - E. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   - F. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   - G. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the surface of ceiling.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 2 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L 500 series Floor-Ceiling Design in the UL Fire Resistance Directory, as summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm).
   - B. **Wood Joists* –** Non 10 in. (254 mm) deep (or deeper) lumber joists space 16 in. (406 mm) OC with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw attached to furring channels. Max diam of opening is 3 in. (76mm).
   - D. **Furring Channels (Not Shown) –** Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

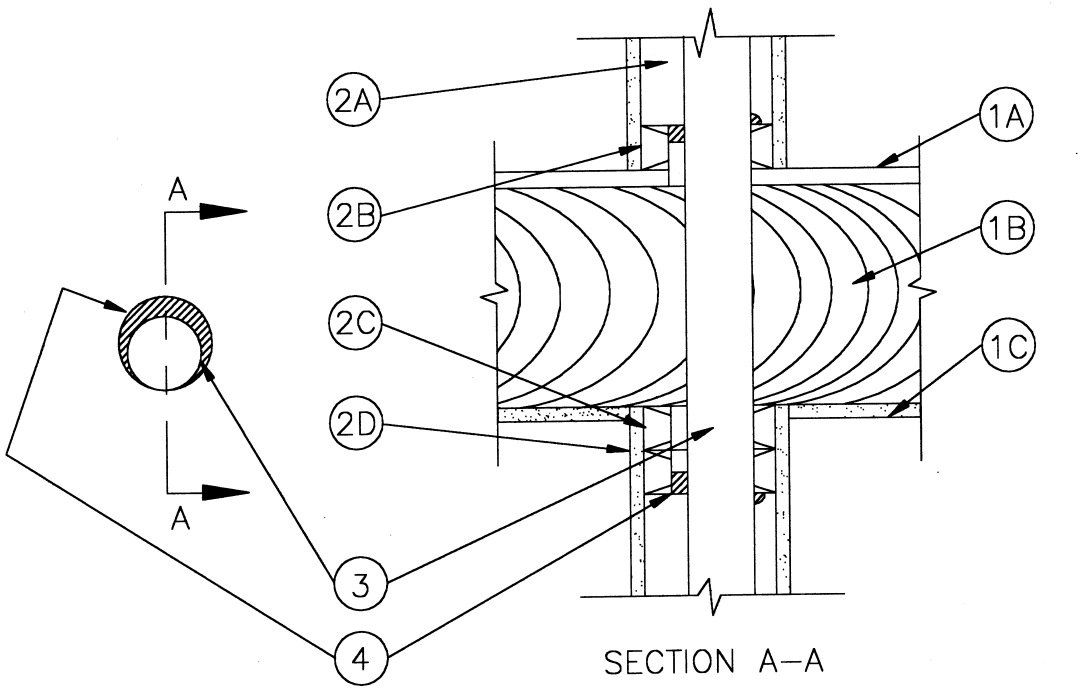
2. **Chase Wall – (Optional) –** The through penetrants (Item 2) may be routed through a 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features::
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 3 in. (76 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in.(51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 3 in. (76 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be shall be min 0 in. (point contact) to max 3/4 in. (19 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 2 in. (51 mm) diam (or smaller) steel electrical metallic tubing (EMT) or rigid steel conduit.
   D. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate or gypsum ceiling. Min 1/2 in. (13 mm) diam bead of fill material applied at the penetrant/plate interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 1 Hr
	FTH Rating — 0 Hr



1. **Floor-Ceiling Assembly –** The 1hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory as summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 5 in. (127 mm).
   - B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists spaced max 24 in. (610 mm) OC with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board nailed to wood joists. Max diam of opening is 5 in. (127 mm).

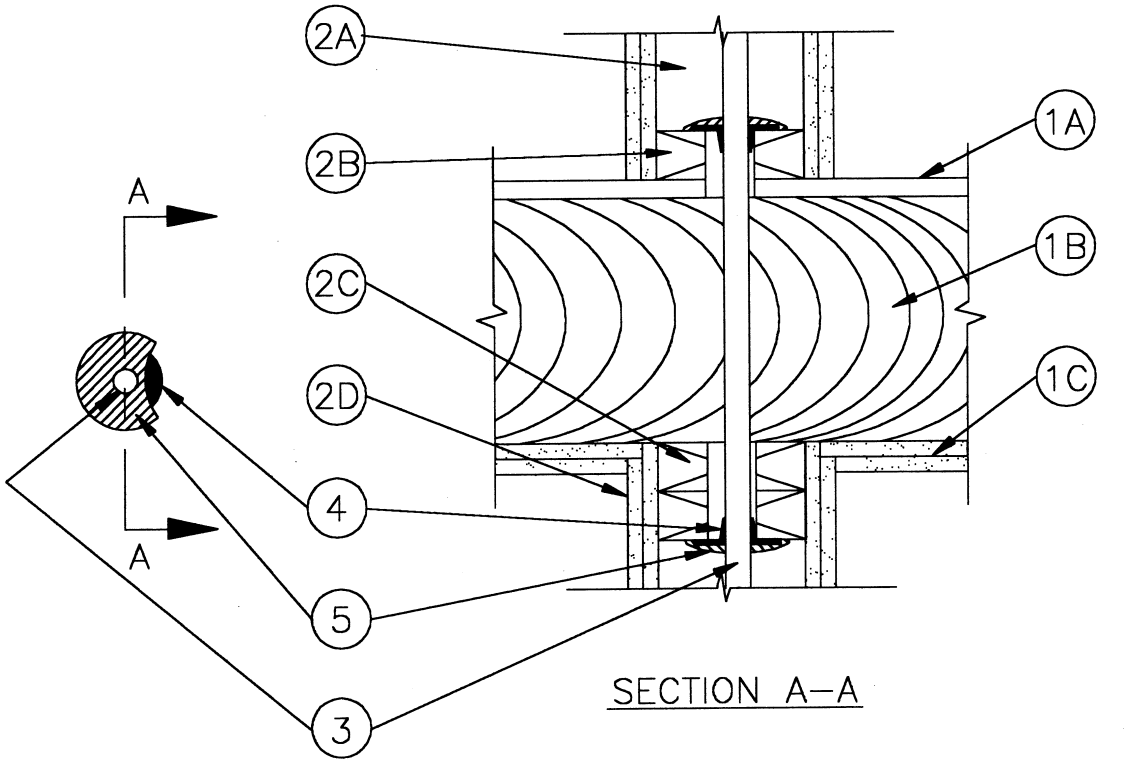
2. **Chase Wall** – (Optional) – The through penetrants (Item 3) are routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in.(51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be shall be min 0 in. (point contact) to max 3/4 in. (19 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipe, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate or gypsum ceiling. Min 1/2 in. (13 mm) diam bead of fill material applied at the penetrant/plate interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hr (See Item 1C and 2D)	F Ratings — 1 & 2 Hr (See Item 1C and 2D)
T Ratings — 0 Hr	FT Ratings — 0 Hr
	FH Ratings — 1 & 2 Hr (See Item 1C and 2D)
	FTH Ratings — 0 Hr



1. **Floor-Ceiling Assembly –** The 1 hr or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance. The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly. The general construction features of the floor-ceiling assembly are summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 2 in. (51 mm).
   - B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. Second layer of gypsum board screw attached to furring channels. Max diam of opening is 2 in. (51 mm).
   - D. **Furring Channels** – (Not Shown**) –** Resistant galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board in 2 hr rated assembly. Furring channels spaced max 24 in. (610 mm) OC.

2. **Chase Wall** – (Optional) – The through penetrants (Item 3) are routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 2 in. (51 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 2 in. (51 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

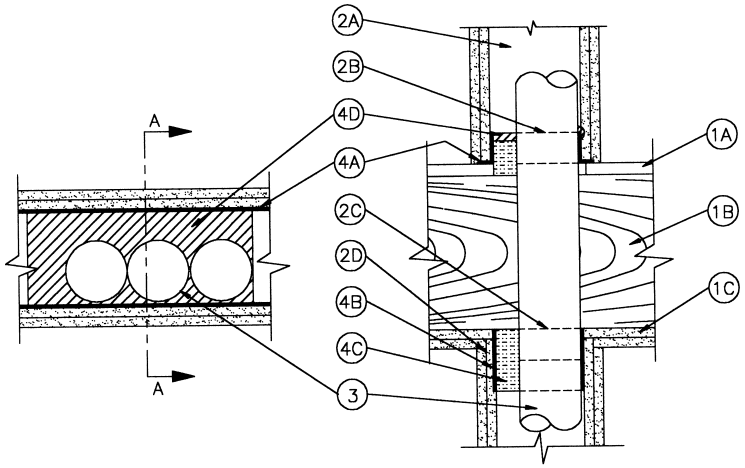
3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. When pipe insulator (Item 4) is not used, annular space between penetrant and periphery of opening shall be 0 in. (point contact) to max 7/8 in. (22 mm). Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 1 in. (25 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 1 in. (25 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 1 in. (25 mm) diam (or smaller) steel electrical metallic tubing or conduit.
   D. **Copper Tubing –** Nom 1 in. (25 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 1 in. (25 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 1 in. (25 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Pipe Insulator** – (Optional) – Nom 1 in. (25 mm) (or smaller) nonmetallic pipe insulator to be installed on either side of top plate, and/or on either side of sole plate. The annular space between pipe insulator and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm).

5. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied over surface of pipe insulator. Fill material to overlap onto plate, floor or gypsum ceiling a min 3/8 in. (10 mm). Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate or gypsum ceiling. At point contact locations between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/2 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. **Flooring System –** Lumber or plywood sub floor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max size of opening is 5-1/2 in. by 15 in. (140 by 381 mm).
   B. **Wood Joists*** – Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Floor-Ceiling Design.

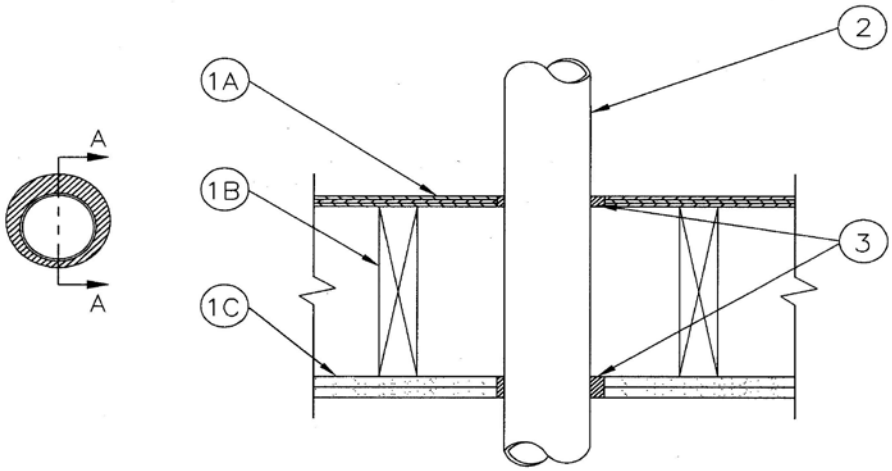
2. **Chase Wall** – (Optional) – The through penetrant (Item No. 3) may be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 15 in. (140 by 381 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 15 in. (140 by 381 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in individual Wall and Partition Design.

3. **Through Penetrants –** Max three metallic pipes, conduits or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrants and the periphery of opening and penetrants shall be min 0 in. (point contact) to max 2 in. (51 mm). The annular space between penetrants shall be min 0 in. (point contact) to max 2 in. (51 mm). Pipes, conduits or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe
   B. **Iron Pipe** – Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit** – Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or steel conduit.
   D. **Copper Tubing** – Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe** – Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Retaining Angles** – Min 1 in. by 1-1/2 in. (25 by 38 mm) 16 gauge (or heavier) steel angles used to bridge opening on both sides of wall at sole plate in single stud walls when sole plate is removed at opening in plywood floor. Angles to be cut to overlap a min of 2 in. (51 mm) onto sole plate on each side of opening with the 1-1/2 in. (38 mm) leg of angle secured to sole plate with a min of two nails or screws on each side of opening and on both sides of wall.
   B. **Steel Plates** – Min 3 in.(76 mm) wide 16 gauge (or heavier) steel plates used to bridge opening on both sides of wall at double top plate in single stud walls when top plates are removed at opening. Plates to be cut to overlap a min of 2 in. (51 mm) onto top plates on each side of opening and secured to top plates with a min of two nails or screws on each side of opening and on both sides of wall.
   C. **Packing Material** – Min 1-3/4 in. (44 mm) thickness of 4 pcf (64 kg./m^3) mineral wool batt insulation firmly packed into the opening within the sole plate/plywood subfloor and a min 3 in. (76 mm) thickness of 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening within the top plate. The packing material to be recessed from top surface of sole plate as required to accommodate the required thickness of fill material (Item 4D).
   D. **Fill, Void or Cavity Materials*** – **Sealant** – Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of sole plate. At the point contact location between pipe and sole plate, a min 1/2 in. (13 mm) diam bead of sealant shall be applied at the pipe/sole plate interface on top surface of plate. At the point contact location between pipe and retaining angle, a min 1/8 in. (3.2 mm) diam bead of sealant shall be applied at the pipe/retaining angle interface on top surface of plate.
   Passive Fire Protection Partners – 3600EX, 4100SL, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



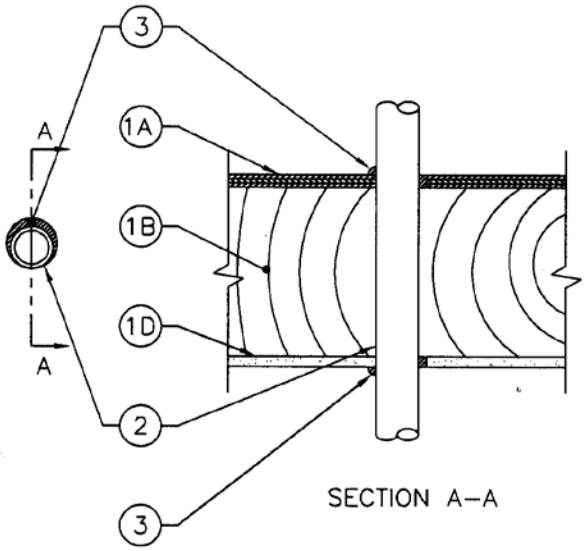
1. **Floor-Ceiling Assembly –** The 2 hr fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory, as summarized below:
   A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture* –** As specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5-1/2 in. (140 mm).
   B. **Wood Joists –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board* –** Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as described in the individual Floor-Ceiling Design.

2. **Through Penetrants –** One metallic pipe or tubing to be installed within the firestop system. Penetrant to be rigidly supported on both sides of floor-ceiling assembly. The annular space between penetrant and periphery of opening shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm) The following types and sizes of metallic pipe, conduit or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type M (or heavier) copper tubing for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   E. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or steel electrical metallic tubing (EMT).
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of sealant applied within the annular space, flush with top surface of plywood floor. Min 1-1/4 in. (32 mm) thickness of sealant applied within the annular space, flush with bottom surface of the ceiling.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hr (See Item 1)	F Ratings — 1 & 2 Hr (See Item 1)
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Ratings — 1 & 2 Hr (See Item 1)
	FTH Rating — 1 Hr



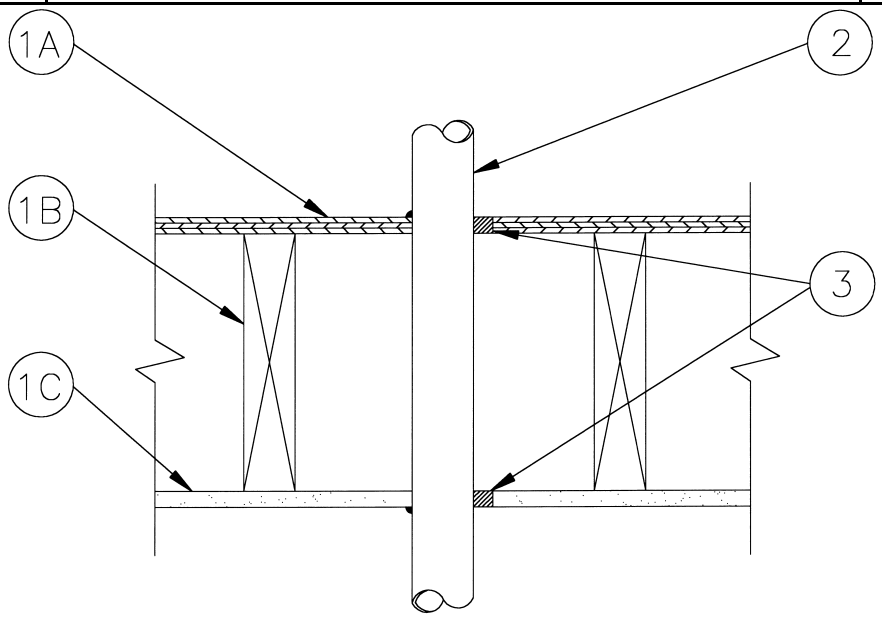
1. **Floor Assembly –** The 1 or 2 hr fire-rated wood joist, wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory. **The F Rating of the firestop system is equal to the rating of the floor-ceiling and wall assemblies.** The general construction features of the floor-ceiling assembly are summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm).
   - B. **Joists –** Nom 2 by 10 in. (51 by 254 mm) deep (or deeper) lumber joists spaced 16 in. (406 mm) OC or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Furring Channels –** (Not Shown) (As required) – Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   - D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm).

2. **Through Penetrating Products* – Flexible Metal Piping –** Nom 2 in. (51 mm) diam (or smaller) steel Flexible Metal Piping with or without plastic covering on piping. Max one flexible metal piping to be installed near center of circular through opening in floor assembly. The annular space between the piping and periphery of opening shall be min 0 in. (0 mm) (point contact) to max 1/2 in. (13 mm). Piping to be rigidly supported on both sides of floor assembly.
   OMEGA FLEX INC

2A. **Stainless Steel Pipe** – (Not Shown) As an alternate to Item 2, nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. Max one pipe to be installed through opening in floor assembly. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Piping to be rigidly supported on both sides of floor assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of sealant applied within annulus on top surface of floor. Min 5/8 in. (16 mm) thickness of sealant applied within annulus on bottom surface of ceiling. At point contact location, a min 1/2 in. (13 mm) bead of sealant shall be applied to the penetrant/gypsum board interface on bottom surface of ceiling and at penetrant/flooring interface on top surface of floor.
Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Marking

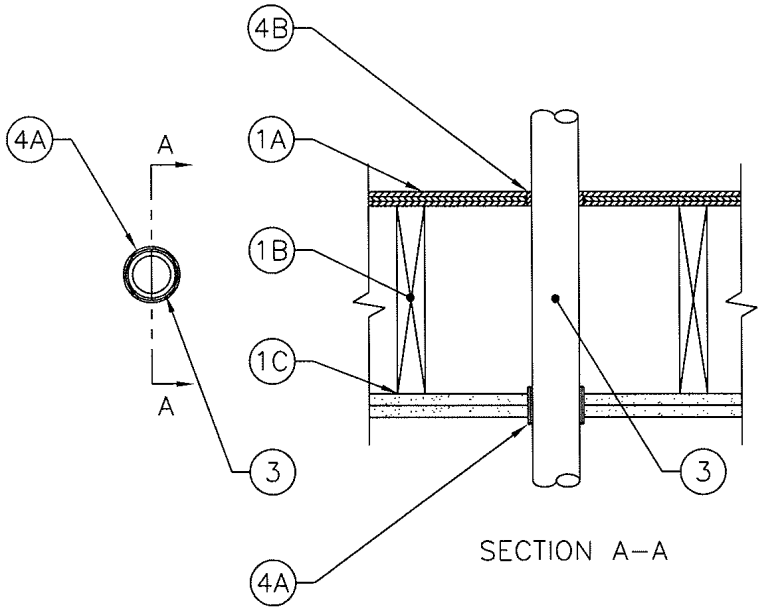


1. **Floor-Ceiling Assembly –** The fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/8 in.
   B. **Wood Joists –** Nom 2 by 10 in. deep (or deeper) lumber joists spaced 16 in. OC, with nom 1 by 3 in. lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board* –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design. I diam of opening is 3-1/8 in.

2. **Through Penetrant –** One non-metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. Pipe to be rigidly supported on both sides of floor assembly.
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 11 cellular or solid core chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems.
   B. **Polyvinyl Chloride (PVC) –** Nom 2 in. diam (or smaller) Schedule 40 (or heavier) PVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Nonmetallic Conduit+ –** Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of ceiling. Min 1/2 in. diam bead of fill material applied at the penetrant/floor and penetrant/ceiling interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking
+ Bearing the UL Listing Mark



1. **Floor-Ceiling Assembly –** The 2 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 series Floor-Ceiling Design in the UL Fire Resistance Directory, as summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Diam of opening is dependent on pipe size. See Item 4.
   - B. **Wood Joists*** – Nom 10 in. (254 mm) deep (or deeper) lumber joists spaced 16 in. (406 mm) OC with bridging as required and with ends firestopped.
   - C. **Wallboard, Gypsum*** – Two layers of 5/8 in. (16 mm) thick gypsum board as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of gypsum board screw attached to furring channels. Diam of opening is dependent on pipe size. See Item 4.
   - D. **Furring Channels** – (Not Shown) – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

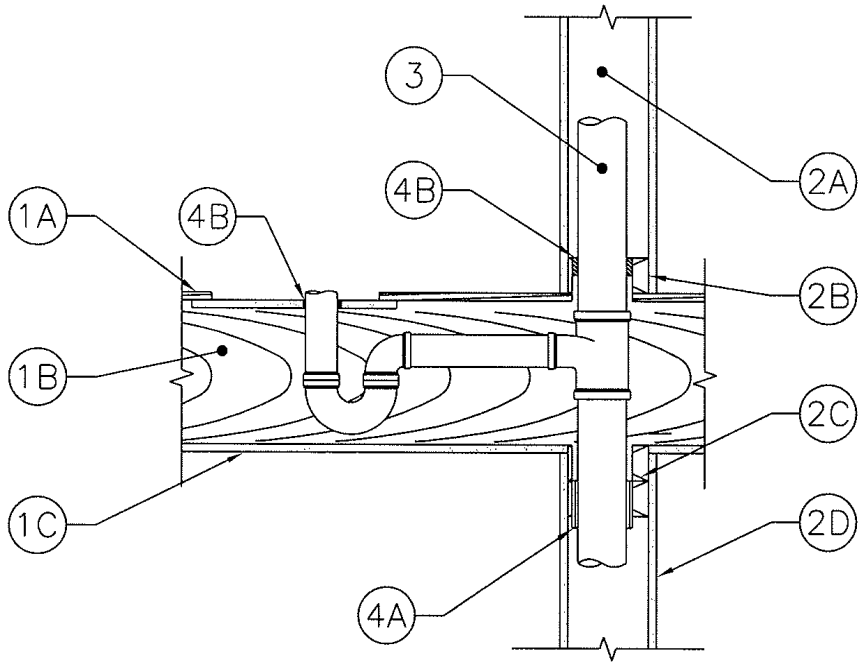
2. **Chase Wall** – (Optional, Not Shown) – The through penetrants (Item 3) are routed through a 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features.
   - A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   - B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is dependent on pipe size. See Item 4.
   - C. **Top Plate –** The double top plate shall consist of two nom 2 by 6 in. (51 by 102 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5-1/4 in. Diam of opening is dependent on pipe size. See Item 4.
   - D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Nonmetallic Penetrant –** One non-metallic pipe or conduit to be centered within the firestop system. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 3 in. (76 mm) diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   D. **Rigid Nonmetallic Conduit+ –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials* – Wrap Strip –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. The number of layers of wrap strips is dependent on the size of pipe, as shown in the table below. The layers of wrap strip are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wraps extending 1/2 to 1 in. (13 to 25 mm) below bottom of gypsum ceiling or lower top plate.
   Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within any annular space between the wrap strip and edge of opening, flush with bottom surface of ceiling.
   Passive Fire Protection Partners – 3600EX
   C. **Foil Tape** – (Not Shown) – Nom 4 mil by 4 in. (102 mm) wide foil tape wrapped tightly around exposed portion of the wrap strip and overlapped onto gypsum ceiling or lower top plate and pipe a min 1 in. (25 mm).

Nom Pipe Size in. (mm)	Pipe Type	Diam of Opening in. (mm)	Number of Wrap Strip Layers	T Rating Hr
1 to 1-1/4 (25 to 32)	PVC, ABS, CPVC, RNC	2 (51)	2	1
2 (51)	PVC, CPVC, RNC	3 (76)	2	1
3 (76)	PVC, CPVC, RNC	4-1/2 (114)	4	3/4

+ Bearing the UL Listing Mark
* Bearing the UL Classification Marking
****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**



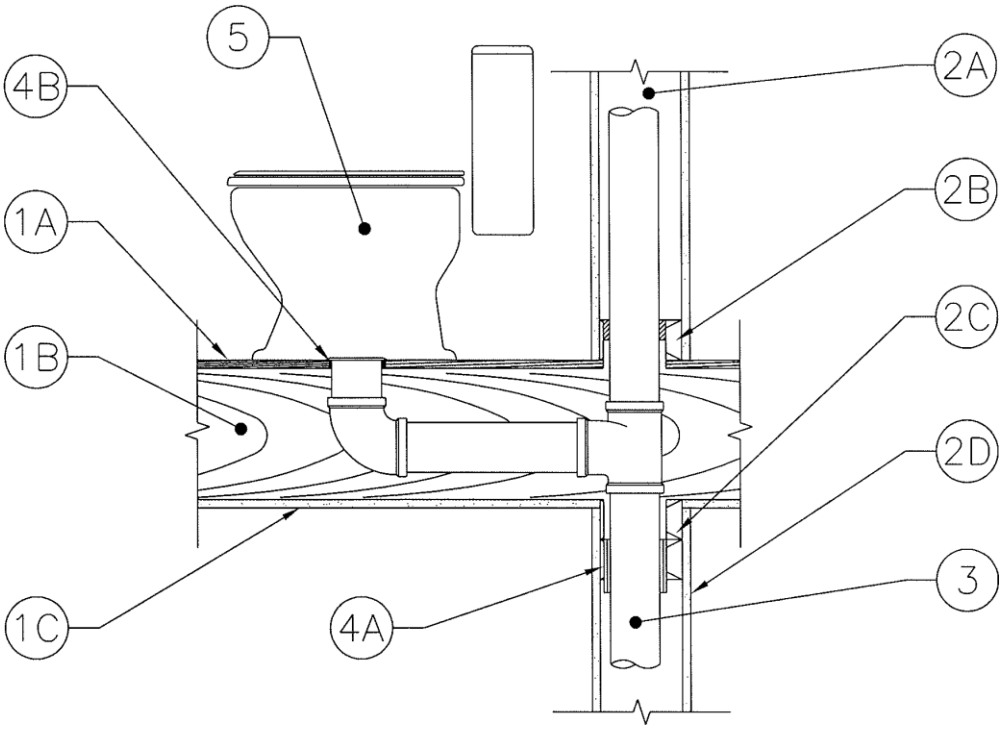
1. **Floor-Ceiling Assembly –** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory as summarized below:
   A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Rectangular cutout in flooring to be max 8 by 12 in. (203 by 305 mm).
   B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board*** – Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board nailed to wood joists. One piece of gypsum board, min 2 in. (51 mm) longer and wider than cutout in the flooring, screw-attached to bottom of flooring concentric with cutout by means of 1 in. (25 mm) long Type S steel screws spaced max 4 in. (102 mm) OC. Max diam of opening of gypsum board patch is 3 in. (76 mm).

2. **Chase Wall –** The through penetrants (Item 3) shall be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 1 in. (25 mm) larger than the nom pipe diam.
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 1 in. (25 mm) larger than the nom pipe diam.
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Nonmetallic Pipe –** One nonmetallic vent pipe provided with sanitary tee and branch drainpipe with or without p-trap to be installed either concentrically or eccentrically within the firestop system. The annular space between vent pipe and periphery of opening shall be shall be min 1/4 in. (6 mm) to max 3/8 in. (10 mm). The annular space between branch drainpipe and periphery of opening in gypsum board plate shall be min 1/4 in. (6 mm) to max 3/8 in. (10 mm). Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of nonmetallic pipes, fittings, tees and traps may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in vented (drain, waste or vent) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) SDR17 CPVC pipe for use in vented (drain, waste or vent) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in vented (drain, waste or vent) piping systems.

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials – Wrap Strip –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wraps extending 1/2 to 1 in. (13 to 25 mm) below bottom of lower top plate.
      Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within any annular space at gypsum board patch, flush with the tip surface of gypsum batch. Min 5/8 in. (16 mm) thickness of fill material applied within any annular space between the wrap strip and edge of opening, flush with lower top plate.
      Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking



1. **Floor-Ceiling Assembly –** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory as summarized below:
   A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Diam of opening is dependent on pipe size. See Item 4.
   B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board*** – Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board nailed to wood joists.

2. **Chase Wall –** The through penetrants (Item 3) are routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate** - Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is dependent on pipe size. See Item 4.
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is dependent on pipe size. See Item 4.
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

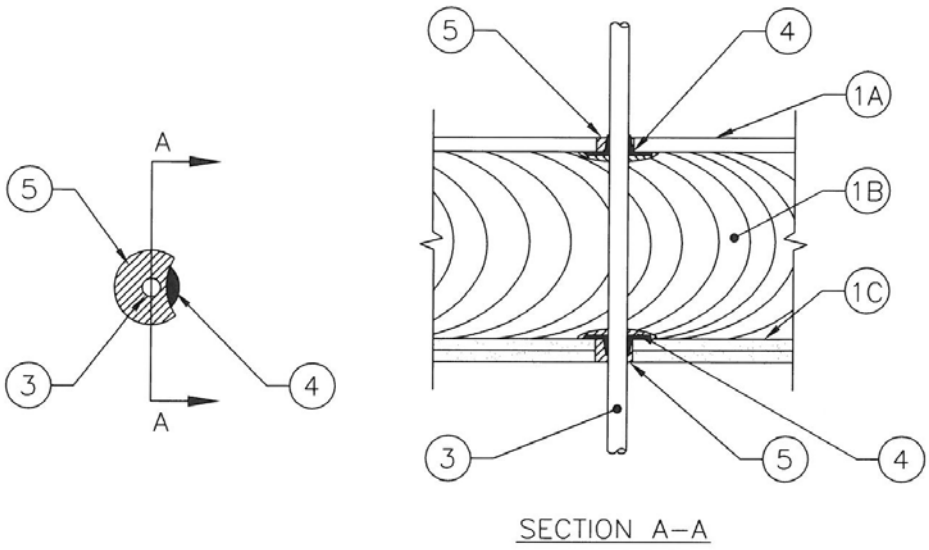
3. **Nonmetallic Pipe –** One nonmetallic vent pipe provided with sanitary tee and branch drainpipe with toilet flange to be centered within the firestop system. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of nonmetallic pipes, fittings and flanges may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in vented (drain, waste or vent) piping system.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 4 in. (102 mm) diam (or smaller) SDR17 CPVC pipe for use in vented (drain, waste or vent) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid core or cellular core ABS pipe for use in vented (drain, waste or vent) piping systems.

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials – Wrap Strip –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. The number of layers of wrap strips is dependent on the size of pipe, as shown in the table below. The layers of wrap strip are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wraps extending 1/2 to 1 in. (13 to 25 mm) below bottom of lower top plate.
   Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within any annular space between the wrap strip and edge of opening, flush with bottom lower top plate.
   Passive Fire Protection Partners – 3600EX
   C. **Foil Tape** – (Not Shown) – Nom 4 mil by 4 in. (102 mm) wide foil tape wrapped tightly around exposed portion of the wrap strip and overlapped onto lower top plate and pipe a min 1 in. (25 mm).

Nom Pipe Size in. (mm)	Pipe Type	Diam of Opening in. (mm)	Number of Wrap Strip Layers	T Rating Hr
3 (76)	PVC, CPVC, ABS	4-1/2 (114)	4	1
4 (102)	PVC, CPVC, RNC	5-1/2 (138)	5	3/4

5. **Water Closet –** Floor mounted vitreous china water closet.

* Bearing the UL Classification Marking



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Design in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the lesser rating of the floor-ceiling or wall assembly. The general construction features of the floor-ceiling assembly are as summarized below:
   A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 3).
   B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists with bridging as required and with ends firestopped.
   C. **Gypsum Board*** – Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. Second layer of gypsum board screw attached to furring channels. The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 3).
   D. **Furring Channels –** (Not shown) – Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard in 2 hr fire-rated assembly. Furring channels spaced max 24 in. (610 mm) OC.

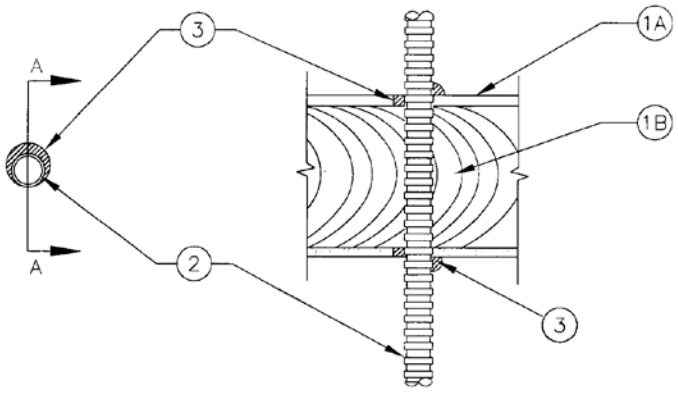
2. **Chase Wall** – (Optional) – The through penetrants (Item 3) are routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs -** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate** - Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 3).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 3).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Through Penetrant –** Nom 1 in. (25 mm) diam (or smaller) SDR17 chlorinated polyvinyl chloride (CPVC) pipe for use in vented (drain, waste or vent) or closed (process and supply) piping systems. When pipe insulator (Item 4) is not used, the annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. (19 mm). Pipe to be installed either concentrically or eccentrically within the firestop system. Pipe to be rigidly supported on both sides of floor assembly.

4. **Pipe Insulator –** (Optional) – Nom 1 in. (25 mm) (or smaller) nonmetallic pipe insulator to be installed on either side of top plate, and/or on either side of sole plate. The annular space between pipe insulator and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm).

5. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied over surface of pipe insulator. Fill material to overlap onto plate min 3/8 in. Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate or gypsum ceiling. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with bottom surface of lower top plate or gypsum ceiling. At point contact locations between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the point contact locations on both sides of the assembly.
Passive Fire Protection Partners – 3600EX

*Bearing the UL Classification Marking
****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following features:
   A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 2-1/2 in.
   B. **Wood Joists** – For 1 hr fire rated floor-ceiling assemblies, nom 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists , trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire rated floor-ceiling assemblies, nom 2 x 10 in. lumber joists spaced 16 in. OC with nom 1 by 3 in. lumber bridging and with ends firestopped.
   C. **Gypsum Board* –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design. Max diam of opening is 2-1/2 in.

   The F and T Ratings of the firestop system are equal to the rating of the floor-ceiling assembly.

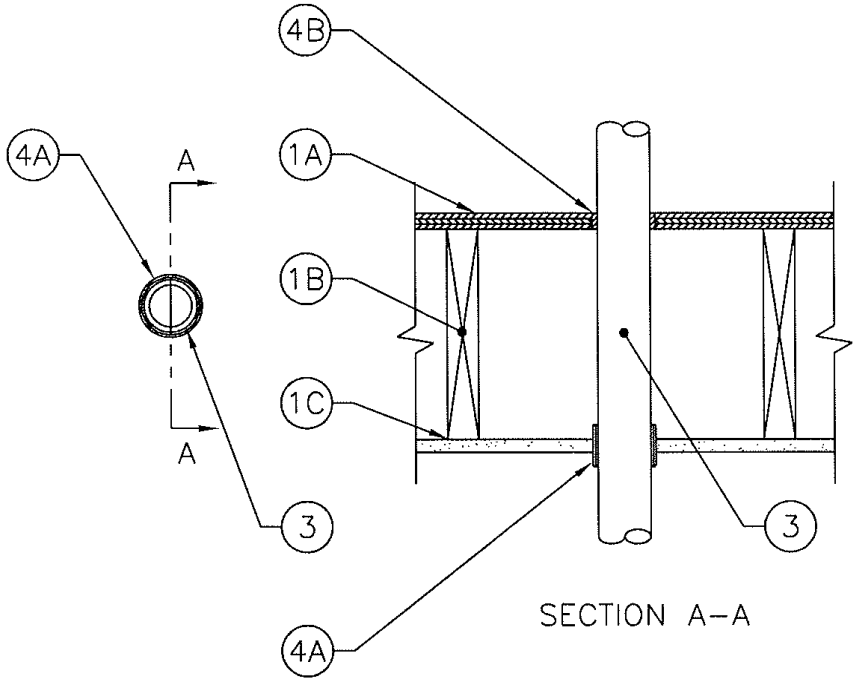
2. **Electrical Nonmetallic Tubing* (ENT)** – Nom 1-1/2 in. (or smaller) corrugated wall ENT constructed of polyvinyl chloride (PVC). One tube to be installed either concentrically or eccentrically within the firestop system. The annular space between tubing and periphery of opening shall be min 0 in. (point contact) to max ½ in. Tubing to be rigidly supported on top of floor assembly. ENT installed in accordance with Article 331 of the National Electrical Code (NFPA No. 70).

See **Electrical Nonmetallic Tubing** (FKHU) category in the Electrical Construction Material Directory for names of manufacturers.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. and 1-1/4 in. thickness of fill material applied within the annulus for 1 and 2 hour rated assemblies, respectively, applied within the annulus flush with the bottom surface of ceiling. An additional ½ in. diam bead of sealant shall be applied at the penetrant/plywood and penetrant/gypsum wall board inerfaces on the top and bottom surfaces of the floor-ceiling assembly, respectively.

   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classified Marking



1. **Floor-Ceiling Assembly –** The 1 hr fire rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Diam of floor opening is dependent of the pipe size (Item 4).
   - B. **Wood Joists –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required with ends firestopped.
   - C. **Gypsum Board*** – Thickness, type number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Diam of ceiling opening is dependent of the pipe size (Item 4).

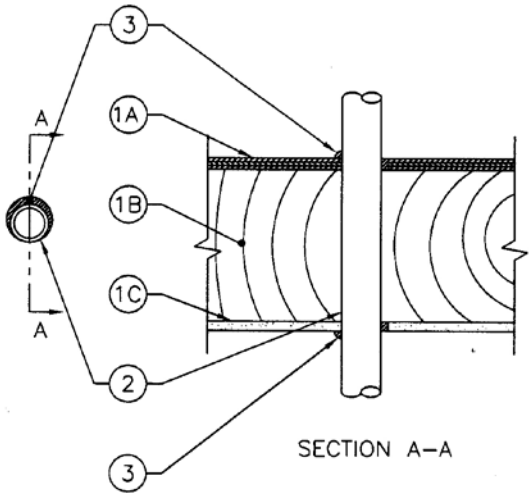
2. **Chase Wall** – (Optional, Not Shown) – The penetrant may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Design in the UL Fire Resistance Directory and which includes the following construction features:
   - A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   - B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is dependent of the pipe size (Item 4).
   - C. **Top Plate –** The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is dependent of the pipe size (Item 4).
   - D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

3. **Through Penetrants –** One nonmetallic pipe or conduit to be centered within the firestop system. Penetrant to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduit may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 4 in. (102 mm) diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   D. **Rigid Nonmetallic Conduit+ –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials – Wrap Strip –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. The number of layers of wrap strips is dependent on the size of pipe, as shown in the table below. The layers of wrap strip are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into opening with the bottom surface of wraps extending 1/2 to 1 in. (13 to 25 mm) below bottom of gypsum ceiling or lower top plate.
   Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within any annular space between the wrap strip and edge of opening, flush with bottom surface of ceiling.
   Passive Fire Protection Partners – 3600EX
   C. **Foil Tape** – (Not Shown) – Nom 4 mil by 4 in. (102 mm) wide foil tape wrapped tightly around exposed portion of the wrap strip and overlapped onto gypsum ceiling or lower top plate and pipe a min 1 in. (25 mm).

Nom Pipe Size in. (mm)	Pipe Type	Diam of Opening in. (mm)	Number of Wrap Strip Layers	T Rating Hr
1 to 1-1/4 (25 to 32)	PVC, ABS, CPVC, RNC	2 (51)	2	1
2 (51)	PVC, ABS, CPVC, RNC	3 (76)	2	1
3 (76)	PVC, ABS, CPVC, RNC	4-1/2 (114)	4	3/4
4 (102)	PVC, CPVC, RNC	5-1/2 (140)	5	3/4

* Bearing the UL Classification Marking
+ Bearing the UL Listing Mark
****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**



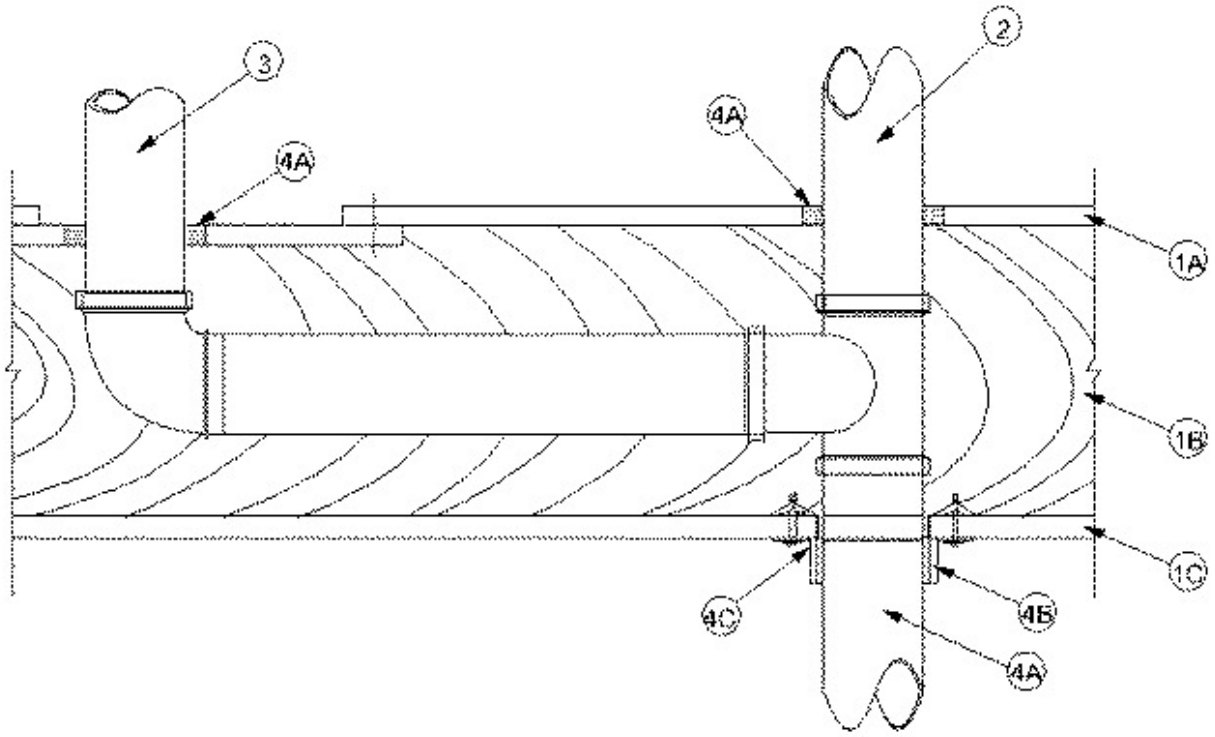
1. **Floor Assembly –** The 1 or 2 hr fire-rated wood joist, wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 2).
   - B. **Joists –** Nom 2 by 10 in. (51 by 254 mm) deep (or deeper) lumber joists spaced 16 in. (406 mm) OC or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm). The diam of opening is shall be 1 in. (25 mm) larger than the nom diam of the through penetrant (Item 2).
   - D. **Furring Channels** – (Not Shown) – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

   The hourly F Rating of the firestop system is equal the rating of the assembly in which it is installed. The hourly T Rating of the firestop system is 3/4 and 2 hr for 1 and 2 hr rated assemblies, respectively.

2. **Through Penetrant –** One nonmetallic pipe or conduit to be installed eccentrically or concentrically within the firestop system. The annular space between the penetrant and periphery opening at the gypsum board ceiling shall be min 0 in. (25 mm) (point contact) to max 5/8 in. (16 mm). The annular space between the penetrant and periphery opening at the plywood flooring shall be min 0 in. (0 mm) (point contact) to max 5/8 in. (16 mm). Pipe or conduit to be rigidly supported on both sides of the floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   - A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller), Schedule 40, solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems.
   - B. **Rigid Nonmetallic Conduit+ –** Nom 2 in. (51 mm) diam (or smaller), Schedule 40, PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   - C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of sealant applied within annulus on top surface of floor. Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of sealant applied within annulus on bottom surface of ceiling for 1 and 2 hr rated assemblies, respectively. At point contact location, a min 1/2 in. (13 mm) bead of sealant shall be applied to the penetrant/gypsum board interface on bottom surface of ceiling and at penetrant/flooring interface on top surface of floor.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking
**** Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**



1. **Floor-Ceiling Assembly —** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:

   A. **Flooring System —** Lumber of plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Rectangular cutout in flooring to be max 8 by 12 in. Max diam of opening shall be 5 in.

   B. **Wood Joists* —** Nom 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.

   C. **Gypsum Board* —** Nom 4 ft wide by 5/8 in. thick as specified in the individual Floor-Ceiling Design. Gypsum board nailed to wood joists. One or two piece 5/8 in. thick gypsum board or 3/4 in. thick plywood patch, min 4 in. longer and wider than the cutout in the flooring, screw-attached to bottom of flooring concentric with cutout by means of 1-1/4 in. long Type S steel screws spaced max 4 in. OC. Max diam of opening hole-sawed through the gypsum board or plywood patch to be 5 in. Max diam of opening in gypsum board ceiling to be 5 in.

1.1 **Chase Wall —** (Optional, not shown) — The through penetrant (Item No. 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. **Studs —** Nom 2 by 6 in. or double nom 2 by 4 in. lumber studs.

B. **Sole Plate —** Nom 2 by 6 in. or parallel 2 by 4 in. lumber plates, tightly butted. Max diam of opening is 5 in.

C. **Top Plate —** The double top plate shall consist of two 2 by 6 in. or two sets of parallel 2 by 4 in. lumber plates, tightly butted. Max diam of opening is 5 in.

D. **Gypsum Board* —** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

2. **Through Penetrant —** One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. Diam of opening in flooring, top plates and sole plates of optional chase wall shall be 1/2 in. larger than the outside diam of the pipe such that the annular space is min 0 in. (point contact) to max 1/2 in. Pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:

A. **Polyvinyl Chloride (PVC) Pipe —** Nom 4 in. diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.

B. **Acrylonitrile Butadiene Styrene (ABS) Pipe —** Nom 4 in. diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.

3. **Branch Piping —** (Optional) One nonmetallic pipe connected to through penetrant (Item 2) installed either concentrically or eccentrically within the opening in subfloor. Diam of opening in flooring shall be 1/2 in. larger than the outside diam of the pipe such that the annular space is min 0 in. (point contact) to max 1/2 in. The following types and sizes of nonmetallic pipes may be used:

A. **Polyvinyl Chloride (PVC) Pipe —** Nom 4 in. diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

B. **Acrylonitrile Butadiene Styrene (ABS) Pipe —** Nom 4 in. diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

4. **Firestop System —** The details of the firestop system shall be as follows:

   A. **Fill, Void or Cavity Materials* — Caulk —** Min 3/4 in. thickness of caulk applied within annular space around perimeter of through penetrant and branch piping, flush with top surface of floor.

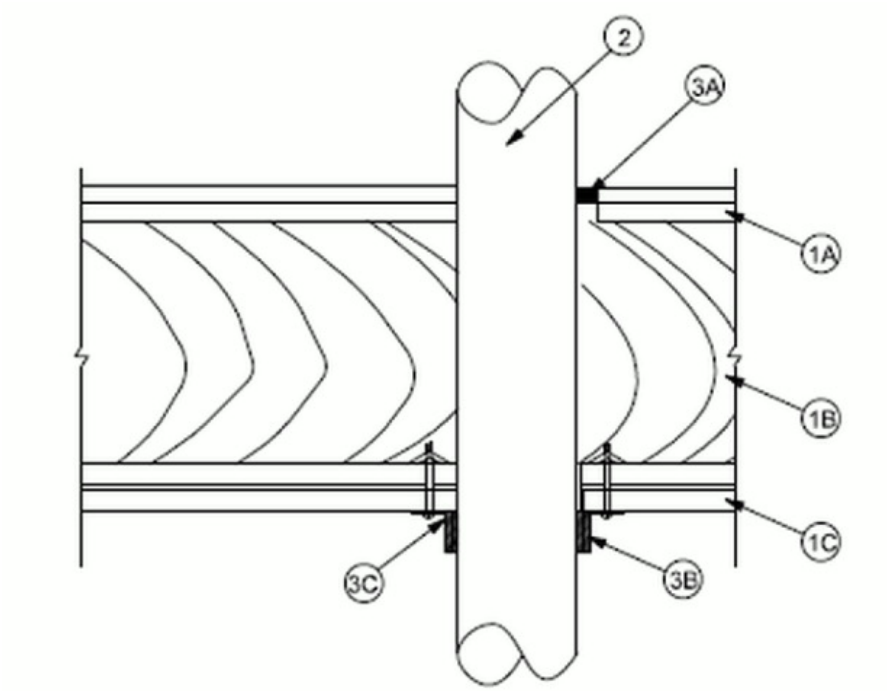
   PASSIVE FIRE PROTECTION PARTNERS — 3600EX

   B. **Fill, Void or Cavity Material* — Wrap Strip —** Nom 1/4 in. thick by 2 in. wide intumescent wrap strip. Two layers of wrap strip are individually wrapped around the through-penetrant with ends butted and held in place with masking tape. Butted ends in successive layer shall be offset. Wrap strip butted tightly against bottom surface of gypsum board ceiling or bottom top plates.

   PASSIVE FIRE PROTECTION PARTNERS — WS2

   C. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. deep with 1 in. wide by 1-1/2 in. long anchor tabs on 4 in. centers for securement to bottom surface of gypsum board ceiling by means of 1-1/2 in. long laminate screws or 1/8 in. diameter by 2 in. long hollow wall anchors with 3/4 in. washers at each anchor tab. When chase wall is used, collar to be secured to bottom top plate with min 3/4 in. long No. 10 (or larger) wood screws. In addition, collar contains retainer tabs 1/2 in. wide by 3/4 in. long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. The retainer tabs are folded 90 deg towards the pipe to retain the wrap strip.

*Bearing the UL Classification Mark



System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Floor Ceiling Assembly —** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The 2 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in Design Nos. L505, L511 or L536 in the UL Fire Resistance Directory.

   A. **Flooring System —** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Diam of floor opening to be max 1/2 in. (13 mm) larger than outside diam of through penetrant (Item 3). Max diam of floor opening is 5 in. (127 mm).

   B. **Wood Joists* —** For 1 hr fire rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists spaced 16 in. (406 mm) OC with nom 1 by 3 in. (25 by 76 mm) lumber bridging and with ends firestopped.

C. **Furring Channels —** (Not Shown) — In 2 hr fire-rated assemblies, resilient galv steel furring installed perpendicular to wood joists between first and second layers of gypsum board (Item 1D). Furring channels spaced max 24 in. (610 mm) OC. In 1 hr fire rated assemblies, resilient galv steel furring (when required) installed perpendicular to wood joists between gypsum board and wood joists as specified in the individual Floor-Ceiling Design. Furring channels spaced max 24 in. (610 mm) OC.

D. **Gypsum Board* —** Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board secured to wood joists or furring channels as specified in the individual Floor-Ceiling Design. Second layer of gypsum board (2 hr fire rated assembly) screw-attached to furring channels as specified in the individual Floor-Ceiling Design. Diam of ceiling opening to be max 1/2 in. (13 mm) larger than outside diam of through penetrant (Item 2). Max diam of ceiling opening is 5 in. (127 mm).

The F and T Ratings of the firestop system are dependent upon the hourly fire rating of the floor-ceiling assembly and the type of through penetrant as shown in Item 3.

2. **Through Penetrants —** One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The space the between pipe or conduit and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:

A. **Polyvinyl Chloride (PVC) Pipe —** Nom 4 in. (102 mm) diam Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 4 in. (102 mm) diam SDR 13.5 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

C. **Electrical Nonmetallic Tubing (ENT+) —** Nom 2 in. (51 mm) diam (or smaller) corrugated-wall electrical nonmetallic tubing (ENT) constructed of polyvinyl chloride (PVC) and installed in accordance with the National Electrical Code (NFPA No. 70).

See **Electrical Nonmetallic Tubing** (FKHU) category in the Electrical Construction Materials Directory for names of manufacturers.

D. **Rigid Nonmetallic Conduit (RNC)+ —** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

E. **Acrylonitrile Butadiene Styrene (ABS) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System —** The details of the firestop system shall be as follows:

   A. **Fill, Void or Cavity Materials* — Caulk —** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of the floor. Min 5/8 in. (16 mm) thickness of fill material within the annulus, flush with bottom surface of ceiling. Min 3/8 in. (10 mm) diam bead of fill material applied at point contact locations.

   PASSIVE FIRE PROTECTION PARTNERS — 3600EX

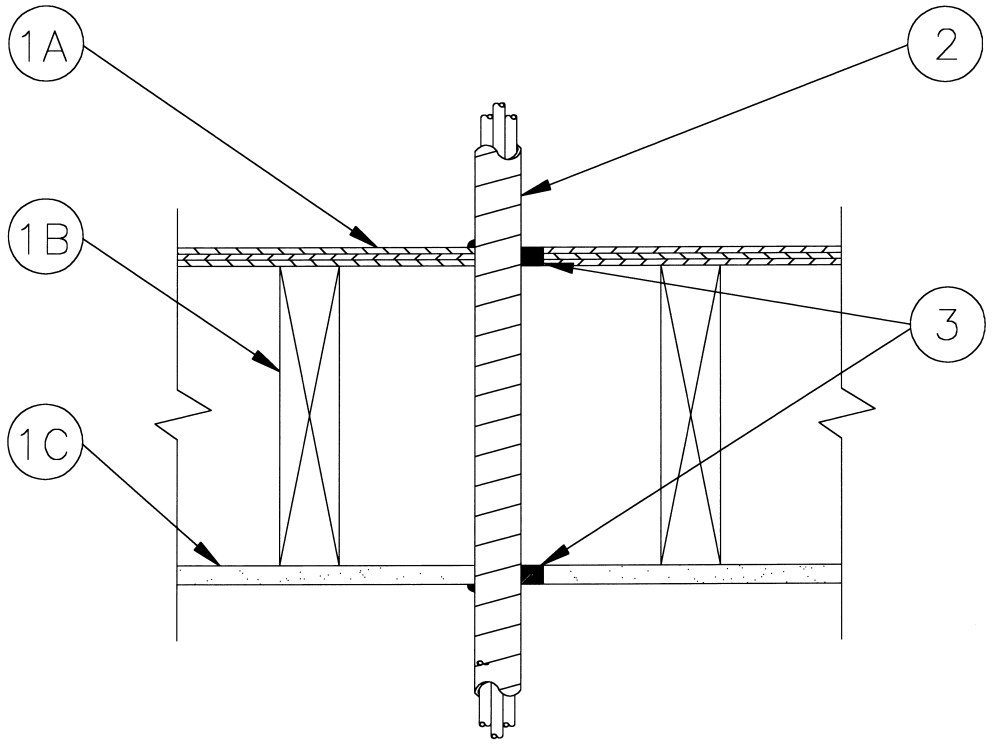
   B. **Fill, Void or Cavity Material* — Wrap Strip —** Nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide wrap strip shall be used in conjunction with the steel collar (Item 3C). Layers of wrap strip are individually wrapped around the pipe or pipe and coupler with ends butted and held in place with tape. Butted ends in successive layers shall be offset. The edge of the wrap strip shall abut the surface of the ceiling. The pieces of wrap strip shall be temporarily secured in position using masking tape.

   PASSIVE FIRE PROTECTION PARTNERS — WS2

   C. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. (51 mm) deep with 1 in. (25 mm) wide by 1-1/4 in. (32 mm) long anchor tabs on 4 in. (101 mm) centers for securement to the wall. In addition, the collar contains retainer tabs, 3/4 in. (19 mm) wide, located opposite the anchor tabs. The collar shall be wrapped over the pipe and overlapped min 2 in. (51 mm). The retainer tabs opposite the anchor tabs are folded 90 degrees towards the pipe to maintain the annular space around the pipe and to retain the caulk (Item 3A). Steel collar is slid along the pipe until butts the bottom surface of the ceiling. Collar secured to surface at each anchor tab with 1-1/2 in. (38 mm) long laminate screws or 1/8 in. (3 mm) by 2 in. (51 mm) long hollow wall anchors. Collar installed on bottom of ceiling only.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



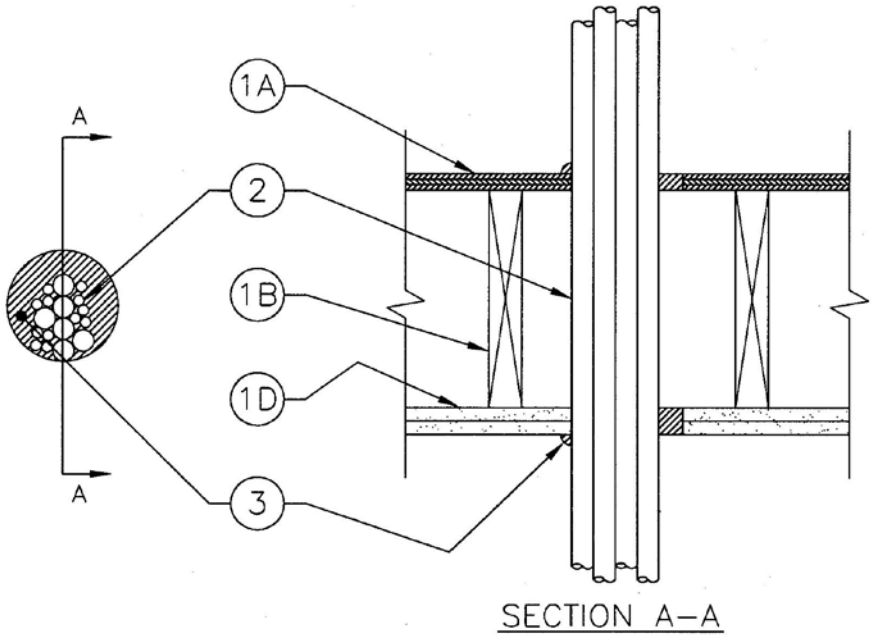
1. **Floor-Ceiling Assembly –** The 1 hr fire rated wood truss or combination wood and steel truss floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 5-1/8 in.
   - B. **Wood Joists –** Nom 2 by 10 in. deep (or deeper) lumber joists spaced 16 in. OC with nom 1 by 3 in. lumber bridging and with ends firestopped or steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Nom 5/8 in. thick as specified in the individual Floor-Ceiling Design.

2. **Cables –** Max one cable to be installed concentrically or eccentrically within the firestop system. The annular space between cable and periphery of opening shall be min 0 in. (point contact) to max 3/4 in. Cable to be rigidly supported on both sides of floor assembly. The following types of cables may be used:
   A. Max 3/C No. 3/0 AWG with 1 No. 8 AWG bare copper ground, aluminum-clad or steel-clad TEK cable, with or without polyvinyl chloride jacket.
   B. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of ceiling. Min 1/4 in. diam bead of fill material applied at the cable/floor and cable/ceiling interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/4 Hr (See Item 1)	FT Ratings — 1 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 1-1/4 Hr (See Item 1)



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory as summarized below:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 5-1/8 in. (130 mm).
   - B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists spaced 16 in. (406 mm) OC with bridging as required and with ends firestopped.
   - C. **Furring Channels** – (Not Shown) Resistant galv steel furring channels installed perpendicular to wood joists, between first and second layers of wallboard (Item 1D), spaced max 24 in. OC. (610 mm).
   - D. **Gypsum Board* –** Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. For 2 hr assemblies, Second layer of gypsum board screw attached to furring channels. Max diam of opening is 5-1/8 in. (130 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed. The hourly T Rating is 1 and 1-1/4 for 1 and 2 hr rated assemblies, respectively.

1A. **Chase Wall** – (Optional, Not Shown) – The penetrant may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Design in the UL Fire Resistance Directory and which includes the following construction features:

A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.

B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5-1/8 in. (130 mm).

C. **Top Plate –** The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5-1/8 in. (130 mm).

D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

2. **Cables** – Aggregate cross-sectional area of cable in opening to be max 39 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of cables may be used:

A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.

B. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.

C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.

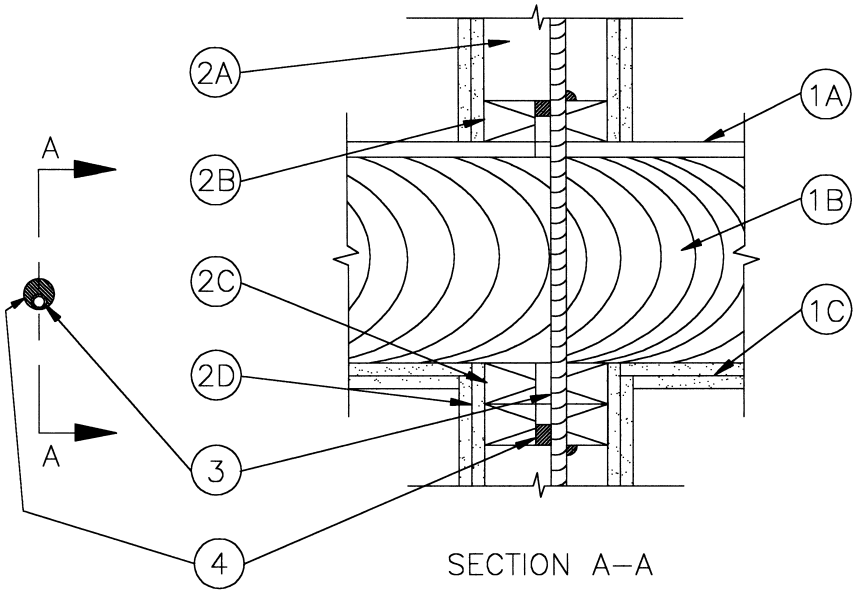
D. 4/C No. 6 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.

E. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of plywood floor. Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with bottom surface of the ceiling. **Passive Fire Protection Partners** – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/4 Hr (See Item 1)	FT Ratings — 1 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 1-1/4 Hr (See Item 1)



1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in Design Nos. L500 in the UL Fire Resistance Directory, as summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 1-1/2 in. (38 mm).
   - B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists spaced 16 in. OC with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. For 2 hr rated assemblies, second layer of gypsum board screw attached to furring channels. Max diam of opening is 1-1/2 in. (38 mm).
   - D. **Furring Channels** – (Not Shown) – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed. The T Rating is 1 and 1-1/4 hr for 1 and 2 hr rated assemblies, respectively.

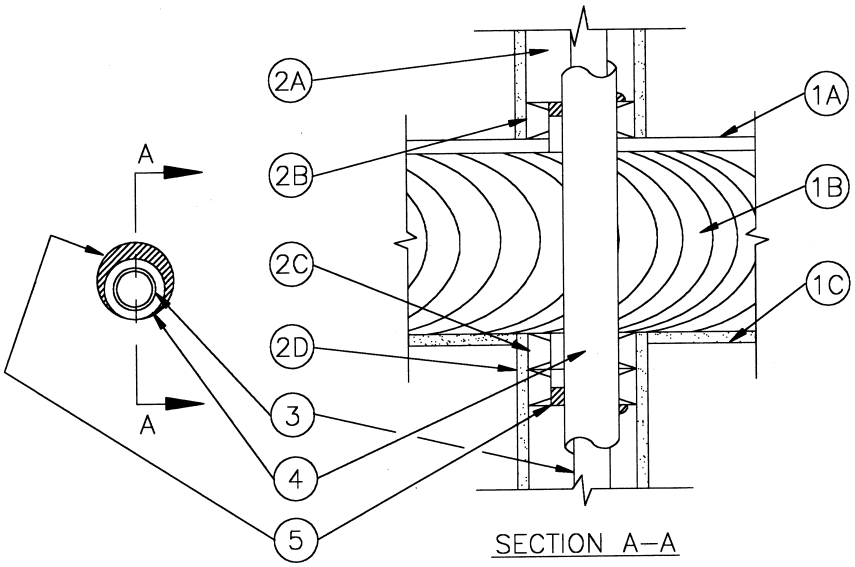
2. **Chase Wall** – (Optional) – The through penetrants (Item 3) are routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 1-1/2 in. (38 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 1-1/2 in. (38 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

3. **Cables –** One cable to be installed either concentrically or eccentrically within the firestop system. The annular space between cable and periphery of opening shall be min 0 in. (point contact) to max 3/4 in. (19 mm). Cable to be rigidly supported on both sides of assembly. The following types of cables may be used:
   A. Multiple fiber optical cable with polyvinyl chloride jacket and having a max 3/4 in. diam.
   B. Type FT-1 coaxial cable with polyvinyl chloride jacket.
   C. Max 3/C No. 10 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   D. Max 2/C with ground No. 14 AWG (or smaller) NM cables with polyvinyl chloride insulation and with PVC jacket.
   E. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

4. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 5/8 or 1-1/4 in. (16 or 32 mm) thickness of fill material applied within the annulus, flush with bottom surface of gypsum ceiling or lower top plate for 1 and 2 hr rated assemblies, respectively. Min 1/2 in. (13 mm) diam bead of fill material applied at the cable/plate interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/4 Hr (See Item 1)	FT Ratings — 1 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 1-1/4 Hr (See Item 1)



1. **Floor-Ceiling Assembly –** The 1 and 2 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory as summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of opening is 4-7/8 in. (124 mm).
   - B. **Wood Joists* –** Nom 10 in. (254 mm) deep (or deeper) lumber joists with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. For 2 hr rated assemblies, second layer of gypsum board screw attached to furring channels. Max diam of opening is 4-7/8 in. (124 mm).
   - D. **Furring Channels** – (Not Shown) – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board (Item 1C) and spaced max 24 in. (610 mm) OC.

     The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed. The T Rating is 1 and 1-1/4 hr for 1 and 2 hr rated assemblies, respectively.

2. **Chase Wall –** (Optional) – The through penetrants (Item 3) are routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 4-7/8 in. (124 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 4-7/8 in. (124 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

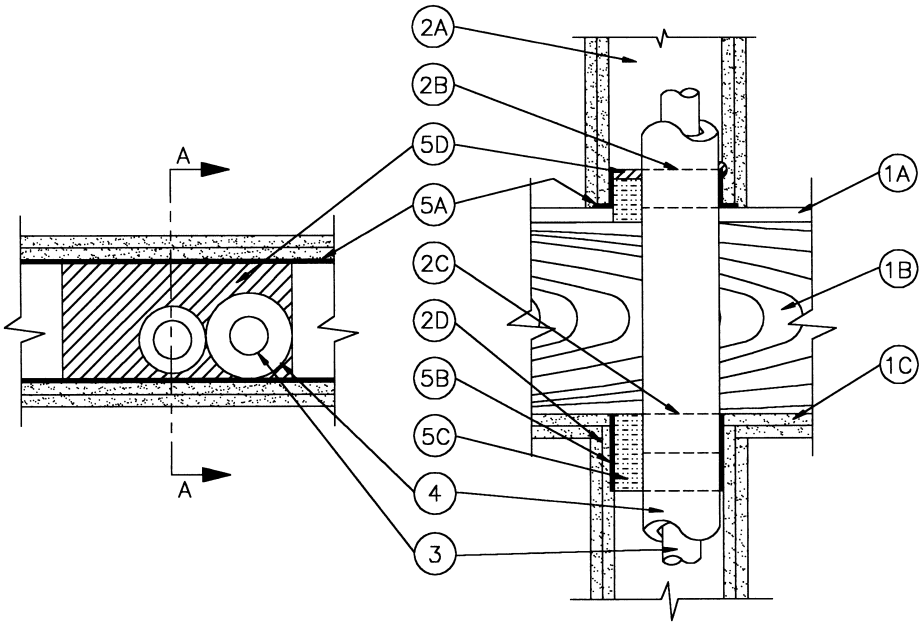
3. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipe or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Tube Insulation-Plastics+ –** Nom 1/2 in. (13 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between insulation and periphery of opening shall be shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm).
   See **Plastics**+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

5. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or top surface of sole plate. Min 5/8 in. (16 m) and 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with bottom surface of gypsum ceiling or lower top plate for 1 and 2 hr rated assemblies, respectively. Min 1/2 in. (13 mm) diam bead of fill material applied at the tube insulation/plate or floor interfaces at point contact locations on both sides of assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

+ Bearing the UL Recognized Component Mark
* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/4 Hr (See Item 1)	FT Ratings — 1 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 1-1/4 Hr (See Item 1)



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max size of opening is 5-1/2 in. by 12 in. (140 by 305 mm).
   - B. **Wood Joists* –** For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists with ends firestopped.
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of gypsum board nailed to wood joists. For 2 hr assemblies, second layer of gypsum board screw attached to furring channels. Max size of opening is 5-1/2 in. by 12 in. (140 by 305 mm).
   - D. **Furring Channels –** (Not Shown) – Resistant galv steel furring channels installed perpendicular to wood joists, between first and second layers of gypsum board in 2 hr rated assemblies. Furring channels spaced max 24 in. (610 mm) OC.

   The F Rating of the firestop system is equal to the fire rating of the floor-ceiling assembly. The T Rating are 1 and 1-1/4 hr for 1 and 2 hr rated assemblies, respectively.

2. **Chase Wall –** The through penetrant (Item 3) shall be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 12 in. (140 by 305 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102) lumber plates, tightly butted. Max size of opening is 5-1/2 by 12 in. (140 by 305 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in individual Wall and Partition Design.

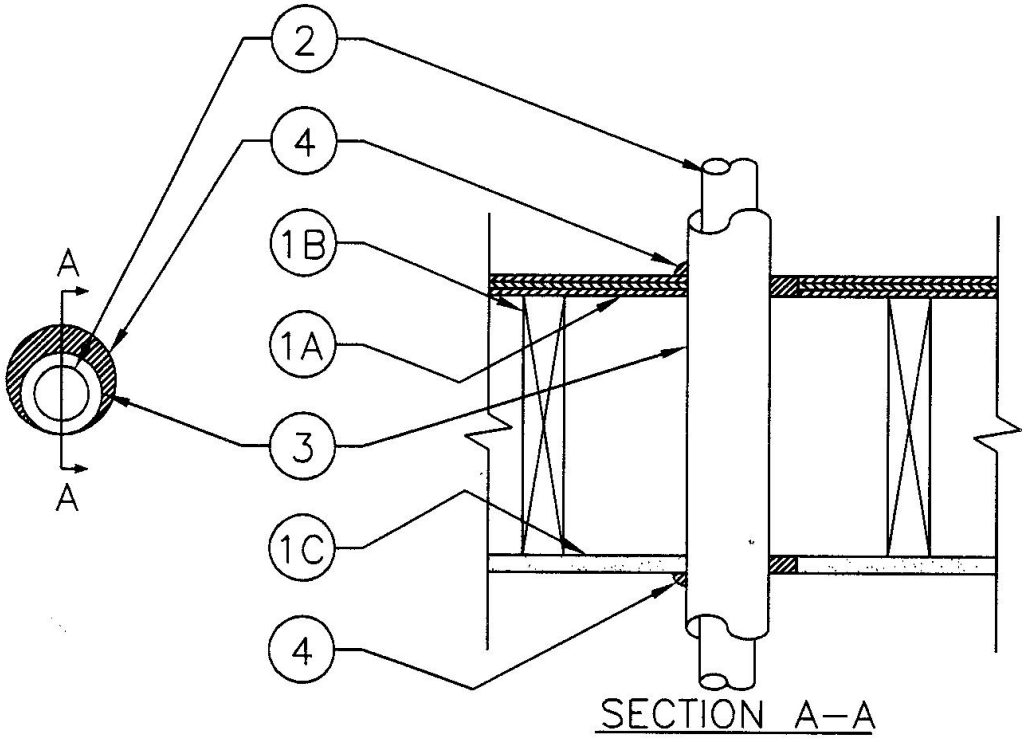
3. **Through Penetrants** – Two metallic pipes or tubing to be installed either concentrically or eccentrically within the firestop system. Pipes or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipe or tubing may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   D. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

4. **Pipe Covering –** The penetrants shall be provided with one of the following pipe coverings. The annular space between the pipe coverings and the periphery of the opening shall be a min 0 in. (point contact) to max 5-3/8 in. (137 mm). The annular space between the insulated penetrants shall be a min 0 in. (point contact) to max 5-3/8 in. (137 mm).
   A. **Tube Insulation Plastics+ –** Nom 1/2 in. (13 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
      See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   B. **Pipe Coverings* –** Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
      See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 1 in. by 1-1/2 in. (25 by 38 mm) 16 gauge (or heavier) steel angles used to bridge opening on both sides of wall at sole plate in single stud walls when sole plate is removed at opening in plywood floor. Angles to be cut to overlap a min 2 in. (51 mm) onto the sole plate on each side of opening with the 1-1/2 in. (38 mm) leg of angle secured to sole plate with a min of two nails or screws on each side of opening and on both sides of wall.
   B. **Steel Plates –** Min 3 in. (76 mm) wide 16 gauge (or heavier) steel plates used to bridge opening on both sides of wall at double top plate in single stud walls when top plates are removed at opening. Plates to be cut to overlap a min 2 in. (51 mm) onto top plates on each side of opening and secured to top plates with a min of two nails or screws on each side of opening and on both sides of wall.
   C. **Packing Material –** Min 1-3/4 in. (44 mm) thickness of 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening within the sole plate/plywood subfloor and a min 3 in. (76 mm) thickness of 4 pcf (64 kg /m^3) mineral wool batt insulation firmly packed into the opening within the top plate. The packing material to be recessed from top surface of sole plate as required to accommodate the required thickness of fill material (Item 5D).
   D. **Fill, Void or Cavity Materials* – Sealant** – Min 1/2 in. (13 mm) thickness of sealant applied within the annulus, flush with top surface of sole plate. At the point contact location between insulated pipe and sole plate, a min 1/2 in. (13 mm) diam bead of sealant shall be applied at the insulated pipe/sole plate interface on top surface of plate. At the point contact location between insulated pipe and retaining angle, a min 1/8 in. (3.2 mm) diam bead of sealant shall be applied at the insulated pipe/retaining angle interface on top surface of plate.
   Passive Fire Protection Partners – 3600EX, 4100SL, 4800DW

* Bearing the UL Classification Marking
+ Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. **Floor Assembly –** The 1 hour fire rated wood truss or combination wood and steel truss Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 Series Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5 in. (127 mm).
   - B. **Wood Joists –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5 in. (127 mm).

2. **Through Penetrant** – Max one metallic pipe or tubing to be installed either concentrically or eccentrically within the opening. Pipe or tubing to be rigidly supported of both sides of floor-ceiling assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe** – Nom 2 in. (51 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe** – Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing** – Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe** – Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering** – The annular space between the insulated penetrants and periphery of the opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm). The following types and sizes of pipe coverings may be used with the metallic pipes or tubes:

   A. **Pipe Covering*** - Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory applied self-sealing lap-tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.

      See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

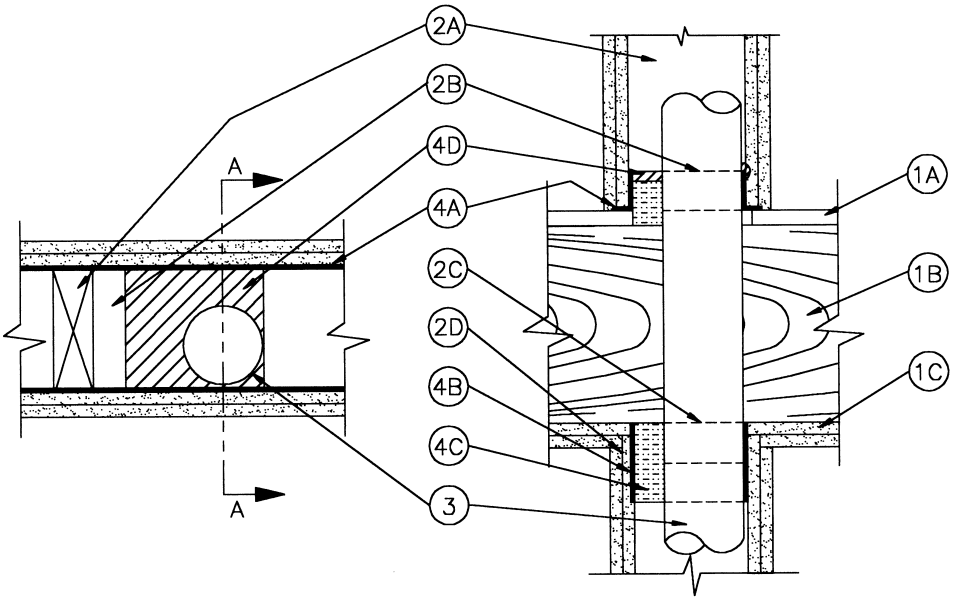
   B. **Tube Insulation – Plastics+ –** Nom 1/2 in. (13 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.

      See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Fill, Void or Cavity Material* – Sealant** – Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of plywood floor. Min 5/8 in. (16 mm) thickness of sealant applied within the annulus, flush with the bottom surface of ceiling. An additional 1/2 in. (13 mm) diam bead of sealant shall be applied at pipe covering/plywood and pipe covering/gypsum board interfaces on the top and bottom surfaces of the floor-ceiling assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking
\+ Bearing the UL Recognized Component Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2 and 1 Hr (See Item 1)	FT Ratings — 1/2 and 1 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2 and 1 Hr (See Item 1)



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max size of opening is 5-1/2 in. by 6 in. (140 by 152 mm)
   B. **Wood Joists* –** For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254) lumber joists with bridging and with ends firestopped.
   C. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Floor-Ceiling Design.
   D. **Furring Channels (Not Shown)** – Resilient galv steel furring channels installed perpendicular to wood joists between first and second layers of gypsum board in 2 hr rated assemblies. Furring channels spaced max 24 in. (610 mm) OC.

   The F Rating of the firestop systems is equal to the rating of the floor-ceiling assembly. The T Ratings are 1/2 hr and 1 hr for 1 hr and 2 hr rated assemblies, respectively.

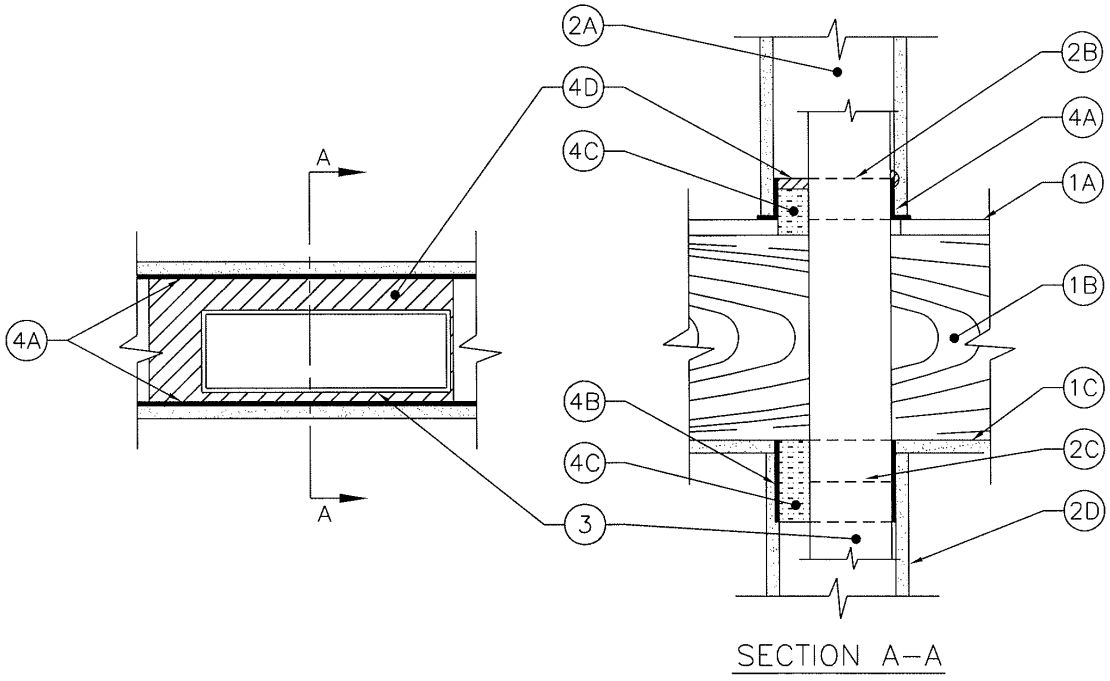
2. **Chase Wall –** The through penetrant (Item 3) is routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs. Max size opening is 5-1/2 in. by 6 in. (140 by 152 mm).
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in.(51 by 102 mm) lumber plates, tightly butted. Max size opening is 5-1/2 in. by 6 in. (140 by 152 mm).
   C. **Top Plate –** The double top plate shall consist of two 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 6 in. (140 by 152 mm).
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in individual Wall and Partition Design.

3. **Round Duct –** Nom 4 in. (102 mm) diam (or smaller) No. 30 ga. (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrants or periphery of opening and penetrant shall be min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of floor-ceiling assembly.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 1 in. by 1-1/2 in. (25 by 38 mm) 16 gauge (or heavier) steel angles used to bridge opening on both sides of wall at sole plate in single stud walls when sole plate is removed at opening in plywood floor. Angles to be cut to overlap a min of 2 in. (51 mm) onto sole plate on each side of opening with the 1-1/2 in. (38 mm) leg of angle secured to sole plate with a min of two nails or screws on each side of opening and on both sides of wall.
   B. **Steel Plates –** Min 3 in. (76 mm) wide 16 gauge (or heavier) steel plates used to bridge opening on both sides of wall at double top plate in single stud walls when top plates are removed at opening. Plates to be cut to overlap a min of 2 in. (51 mm) onto top plates on each side of opening and secured to top plates with a min of two nails or screws on each side of opening and on both sides of wall.
   C. **Packing Material –** Min 1-3/4 in. (44 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening within the sole plate/plywood subfloor and a min 3 in. (76 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into top plate as a permanent form sole plate as a permanent form. The packing material to be recessed from top surface of sole plate as required to accommodate the required amount of fill material (Item 4D).
   D. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of sole plate. At point contact location between duct and sole plate, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the duct/sole plate interface on top surface of plate. At the point contact location between duct and retaining angle, a min 1/8 in. (3.2 mm) diam bead of sealant shall be applied at the duct/retaining angle interface on top surface of plate.
   Passive Fire Protection Partners – 3600EX, 4100SL, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. **Flooring System –** Lumber or plywood sub floor with finish floor of lumber plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max size of opening is 5-1/2 in. by 14 in. (140 by 356 mm).
   B. **Wood Joists –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   C. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Floor-Ceiling Design.

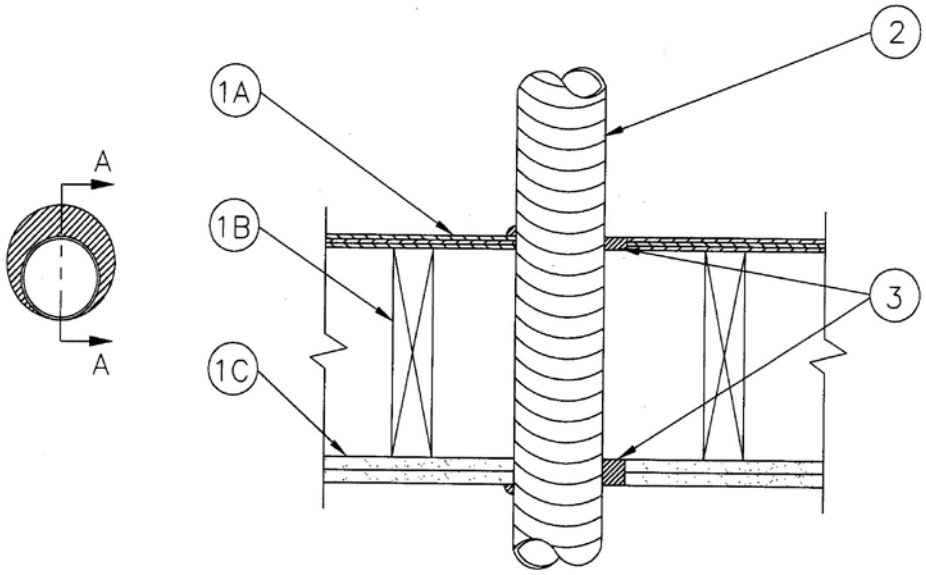
2. **Chase Wall –** The through penetrant (Item 3) shall be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly and be constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double 2 by 4 in. (51 by 102 mm) lumber studs.
   B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 14 in. (140 by 356 mm).
   C. **Top Plate –** The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max size of opening is 5-1/2 by 14 in. (140 by 356 mm)
   D. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in individual Wall and Partition Design.

3. **Steel Duct –** Nom 12 by 4 in. (305 by 102 mm) (or smaller) 30 gauge. (or heavier) rectangular galvanized steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and the periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of floor assembly.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Retaining Angles –** Min 1 in. by 1-1/2 in., (25 by 38 mm) 16 gauge (or heavier) steel angles used to bridge opening on both sides of wall at sole plate in single stud walls when sole plate is removed at opening in plywood floor. Angles to be cut to overlap a min of 2 in. (51 mm) onto sole plate on each side of opening with the 1-1/2 in. (38 mm) leg of angle secured to sole plate with a min of two nails of screws on each side of opening and on both sides of wall.
   B. **Steel Plates –** Min 3 in. (76 mm) wide 16 gauge (or heavier) steel plates used to bridge opening on both sides of wall at double top plate in single stud walls when top plates are removed at opening. Plates to be cut to overlap 2 in. (51 mm) on top plates on each side of opening and secured to top plates with a min of two nails or screws in each side of opening and both sides of wall.
   C. **Packing Material –** Min 1-3/4 in. (44 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening within the sole plate/plywood subfloor and a min 3 in. (76 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into top plate as a permanent form. The packing material to be recessed from top surface of sole plate to accommodate the required amount of fill material (Item 4D).
   D. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of sole plate. At point contact location between duct and sole plate, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the duct/sole plate interface on top surface of plate. At the point contact location between duct and retaining angle, a min 1/8 in. (3.2 mm) diam bead of sealant shall be applied at the duct/retaining angle interface on top surface of plate.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire rated wood joist Floor-Ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 5 in.
   B. **Wood Joists** – For 1 hr fire-rated floor-ceiling assemblies, nom 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. lumber joists spaced 16 in. OC with nom 1 by 3 in. lumber bridging and with ends firestopped.
   C. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of ceiling opening is 5 in.

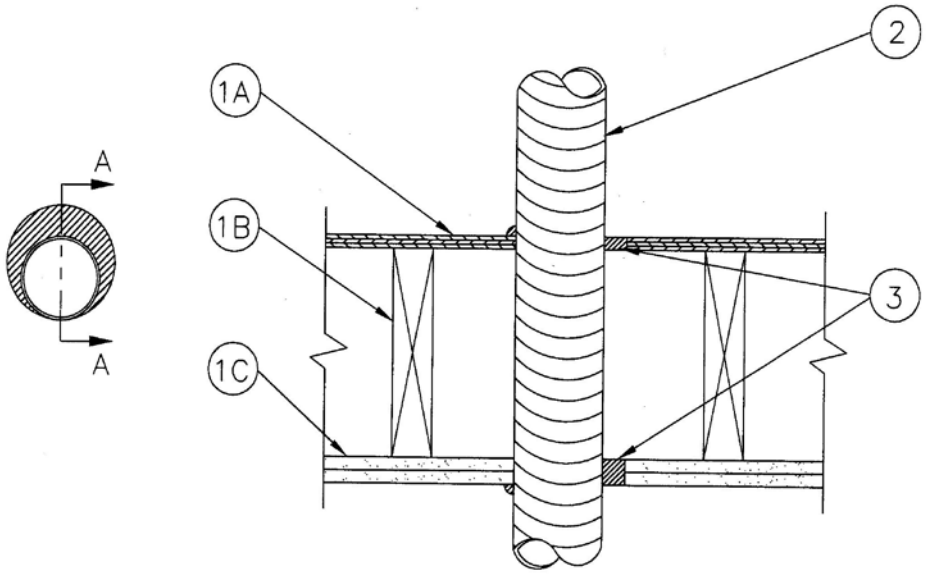
   The F and T Ratings of the firestop system are equal to the rating of the floor-ceiling assembly.

2. **Steel Duct –** Nom 4 in. (or smaller) No. 30 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Steel duct to be rigidly supported on both sides of floor-ceiling assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. thickness of fill material applied within the annulus, flush with top surface of plywood floor. Min 5/8 in. and 1-1/4 in. thickness of fill material applied within the annulus, flush with bottom surface of the ceiling for 1 and 2 hr rated assemblies, respectively. An additional 1/2 in. diam bead of sealant shall be applied at the penetrant/plywood and penetrant/gypsum board interfaces on the top and bottom surfaces of the floor-ceiling assembly, respectively.
Passive Fire Protection Partners – 3600EX, 4800DW,

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2 and 1 Hr (See Item 1)	FT Ratings — 1/2 and 1 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2 and 1 Hr (See Item 1)



1. **Floor-Ceiling Assembly –** The 1 or 2 hr fire rated wood joist Floor-Ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 9 in. (229 mm).
   B. **Wood Joists** – For 1 hr fire-rated floor-ceiling assemblies, nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber with lumber bridging and with ends firestopped.
   C. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of ceiling opening is 9 in. (229 mm).

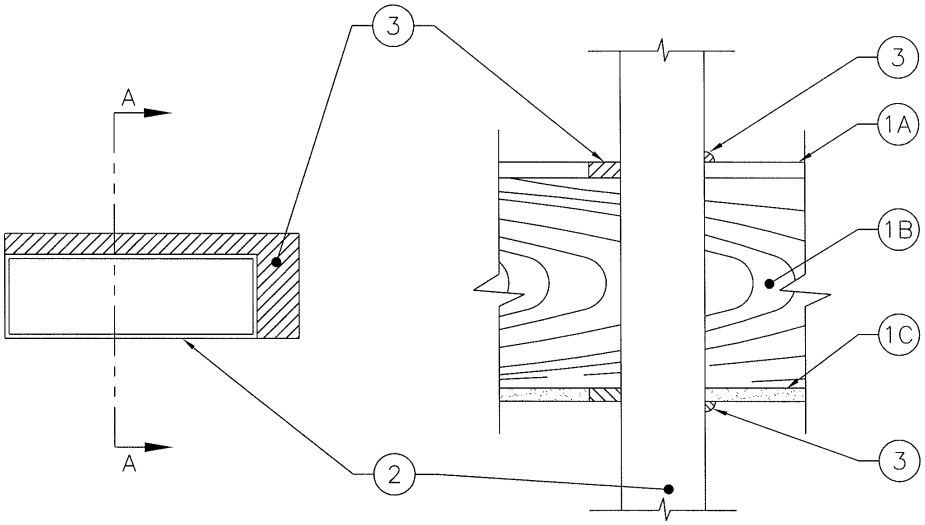
   The F Rating of the firestop systems is equal to the rating of the floor-ceiling assembly. The T Ratings are 1/2 hr and 1 hr for 1 hr and 2 hr rated assemblies, respectively.

2. **Steel Duct –** Nom 8 in. (or smaller) No. 30 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Steel duct to be rigidly supported on both sides of floor-ceiling assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of plywood floor. Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with bottom surface of the ceiling for 1 and 2 hr rated assemblies, respectively. An additional 1/2 in. (13 mm) diam bead of sealant shall be applied at the duct/floor and duct/ceiling interfaces at the point contact locations on both sides of the assembly.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/4 Hr



SECTION A–A

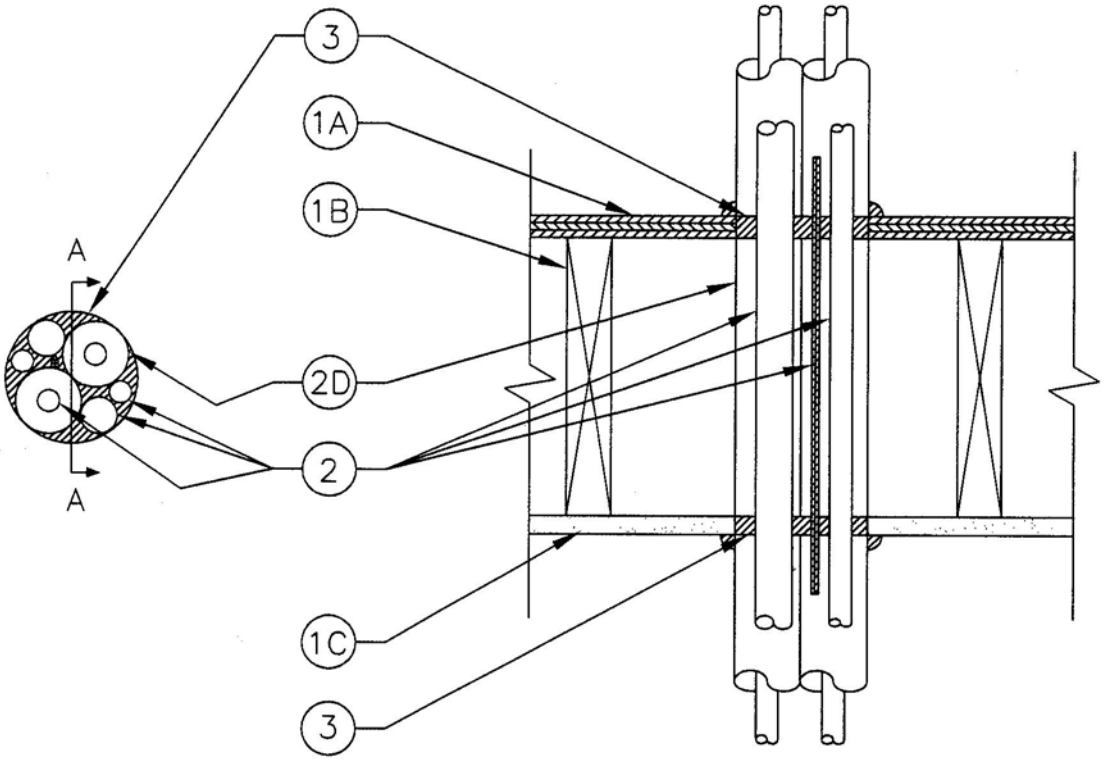
1. **Floor-Ceiling Assembly –** The 1 hr fire rated wood joist Floor-Ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   - A. **Flooring System –** Lumber of plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max size of floor opening is 5-1/2 by 14 in. (140 by 356 mm).
   - B. **Wood Joists** – Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max size of ceiling opening is 5-1/2 by 14 in. (140 by 356 mm).

2. **Steel Duct –** Max 12 by 4 in. (305 by 102 mm) No. 24 gauge (or heavier) rectangular galv steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of floor-ceiling assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of plywood floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with bottom surface of the ceiling. An additional 1/2 in. (13 mm) diam bead of sealant shall be applied at the duct/floor and duct/ceiling interfaces at the point contact locations on both sides of the assembly.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classified Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 3/4 Hr



SECTION A–A

1. **Floor Assembly –** The 1 hour fire rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner described in the individual L500 series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following features:
   - A. **Flooring System –** Lumber or plywood subfloor with finish floor of lumber, plywood or **Floor Topping Mixture*** as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 4-1/2 in. (114 mm).
   - B. **Wood Joists –** Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or **Structural Wood Members*** with bridging as required and with ends firestopped.
   - C. **Wallboard, Gypsum* -** Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening to be 4-1/2 in. (114 mm).

2. **Through Penetrant** – Pipes, conduit, tubing or cables to be bundled within the opening such that the aggregate cross-sectional area of penetrants in opening to be max 75 percent of the cross-sectional area of the opening in the floor-ceiling. Annular space between penetrants and periphery of opening to be min 0 in. (point contact) to max 3/4 in. (19 mm). A min 1/4 in. (6 mm) annular space shall be maintained between uninsulated metallic penetrants and nonmetallic penetrants and cables. The space between uninsulated metallic penetrants and insulated metallic penetrants to be min 0 in. (point contact) to max 3/4 in. (19 mm) The space between insulated metallic penetrants and nonmetallic penetrants and cables to be min 0 in. (point contact) to max 3/4 in. (19 mm). Penetrants to be rigidly supported of both sides of floor. The following types and sizes of penetrants may be used:

   A. **Metallic Penetrants –** The following types and sizes of metallic pipes, conduits or tubing may be used:

      A1. **Steel Pipe** – Nom 3/4 in. (19 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.

      A2. **Iron Pipe** – Nom 3/4 in. (19 mm) diam (or smaller) cast or ductile iron pipe.

      A3. **Conduit** – Nom 3/4 in. (19 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.

      A4. **Copper Tubing** – Nom 3/4 in. (19 mm) diam (or smaller) Type L (or heavier) copper tubing.

      A5. **Copper Pipe** – Nom 3/4 in. (19 mm) diam (or smaller) Regular (or heavier) copper pipe.

      A6. **Stainless Steel Pipe –** Nom 3/4 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

   B. **Non-Metallic Penetrants –** For use in closed (process or supply) piping systems. The following types and sizes of non-metallic pipes, conduit or tubing may be used:

      B1. **Polyvinyl Chloride (PVC) Pipe –** Nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 40 solid core PVC pipe.

      B2. **Chlorinated Polyvinyl (CPVC) Pipe –** Nom 1-1/4 in. (32 mm) diam (or smaller) SDR17 CPVC pipe.

      B3. **Cross-Linked Polyethylene (PEX) Tubing –** Nom 1-1/4 in. (32 mm) diam (or smaller) SDR 9 PEX tubing.

      B4. **Electrical Non-Metallic Tubing++** – Nom 1-1/4 in. (32 mm) diam (or smaller) corrugated wall ENT constructed of PVC installed in accordance with the National Electrical Code (NFPA No. 70).

   C. **Cables –** Any combination of the following type and sizes of cables may be used:

      C1. Max 3/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TECK 90 cable.

      C2. Max 3/C No. 14 AWG (or smaller) MC (BX) copper cable with polyvinyl chloride insulation and jacket materials.

      C3. Max 3/C No. 14 AWG (or smaller) copper conductor cable with PVC insulation and jacket.

      C4. Max 25 pair 22 AWG (or smaller) aluminum or copper cable with PVC jacket and insulation.

   D. **Tube Insulation – Plastics+ – (Optional) –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing to be installed on metallic or tubes only.

      See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

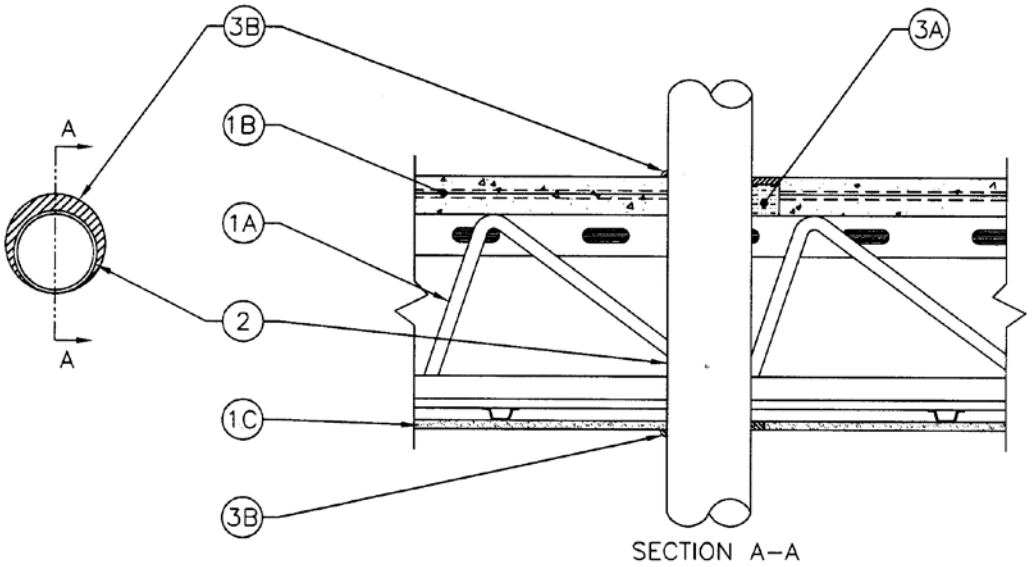
3. **Fill, Void or Cavity Material* – Sealant** – Min 3/4 in (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor. At point contact location a min 1/2 in. (13 mm) diam bead of fill material to be applied at penetrant/flooring interface. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the surface of ceiling. At point contact location a min 1/2 in. (13 mm) diam bead of fill material to be applied at penetrant/gypsum board interface.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW,

* Bearing the UL Classification Mark
+ Bearing the UL Recognized Component Marking
++ Bearing the UL Listing Marking

F Rating – 1, 1-1/2 and 2 Hr (See Item 1)
FT Rating – 1/4 Hr
FH Rating – 0 Hr
FTH Rating – 0 Hr

F-E-1038

CAN/ULC S115
F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
FT Rating — 1/4 Hr
FH Rating — 0 Hr
FTH Rating — 0 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1, 1-1/2 or 2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).
   C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.

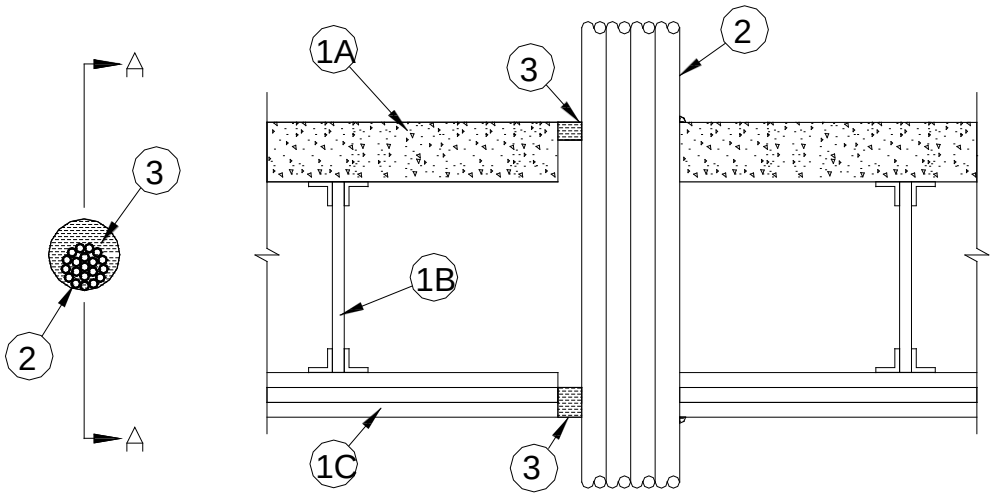
2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (0 mm) (point contact) to a max 1-3/4 in. (48 mm) is required within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Sch 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   D. **Copper Tube –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Stainless Steel Pipe —** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min. 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor surface to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus flush with bottom surface of the ceiling. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact locations at pipe covering/floor interface on top surface of floor and at pipe covering/ceiling interface on bottom surface of ceiling.

      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 1Hr



Section A-A

1. **Floor-Ceiling Assembly –** The 1 or 2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   - A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   - B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 5-1/8 in. (130 mm).
   - C. **Gypsum Board*** – Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening shall is 5-1/8 in. (130 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.

1A. **Chase Wall –** (Optional, not shown) – The through penetrants (Item 2) may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall constructed of the material and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features.

A. **Studs –** Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.

B. **Sole Plate –** Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5-1/8 in. (130 mm).

C. **Top Plate –** The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5-1/8 in. (130 mm).

D. **Gypsum Board* –** Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.

2. **Cables** – Aggregate cross-sectional area of cable in opening to be max 39 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of cables may be used:

A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.

B. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.

C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.

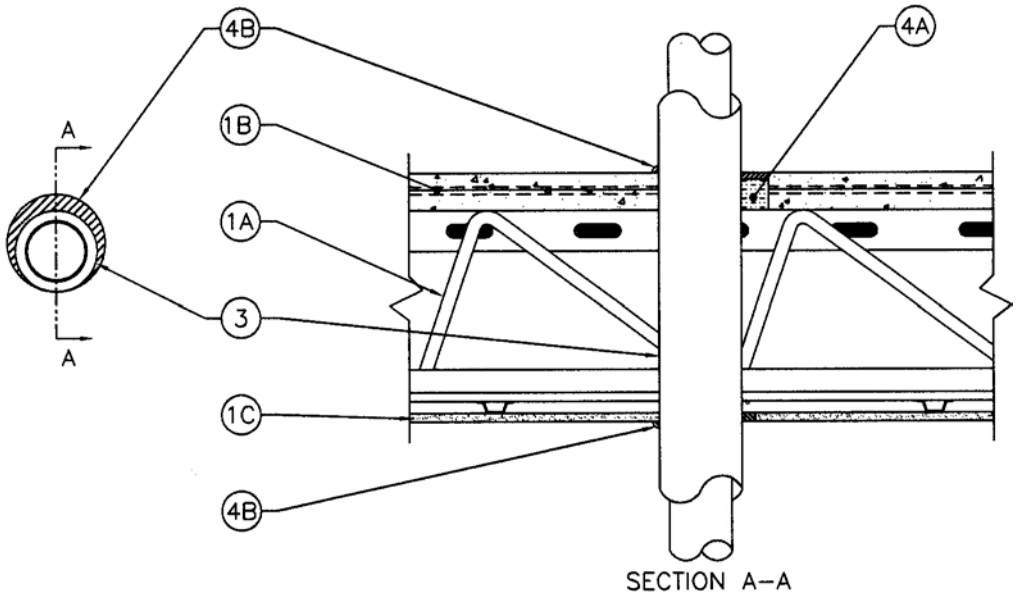
D. 4/C No. 6 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.

E. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with PVC insulation, with PVC jacket.

3. **Fill, Void or Cavity Material* – Sealant –** Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of concrete floor. Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with bottom surface of the ceiling. **Passive Fire Protection Partners** – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)	F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
	FTH Rating — 3/4Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1, 1-1/2 or 2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   - A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   - B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).
     - C1. **The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.**

2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes or tubing may be used:
   - A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Sch 40 (or heavier) steel pipe.
   - B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   - C. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   - D. **Copper Tube –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   - E. **Stainless Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Pipe Coverings* –** Nom 1 in. (25 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. An annular space of min 0 in. (0 mm) (point contact) to a max 1 in. (25 mm) is required within the firestop system.
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

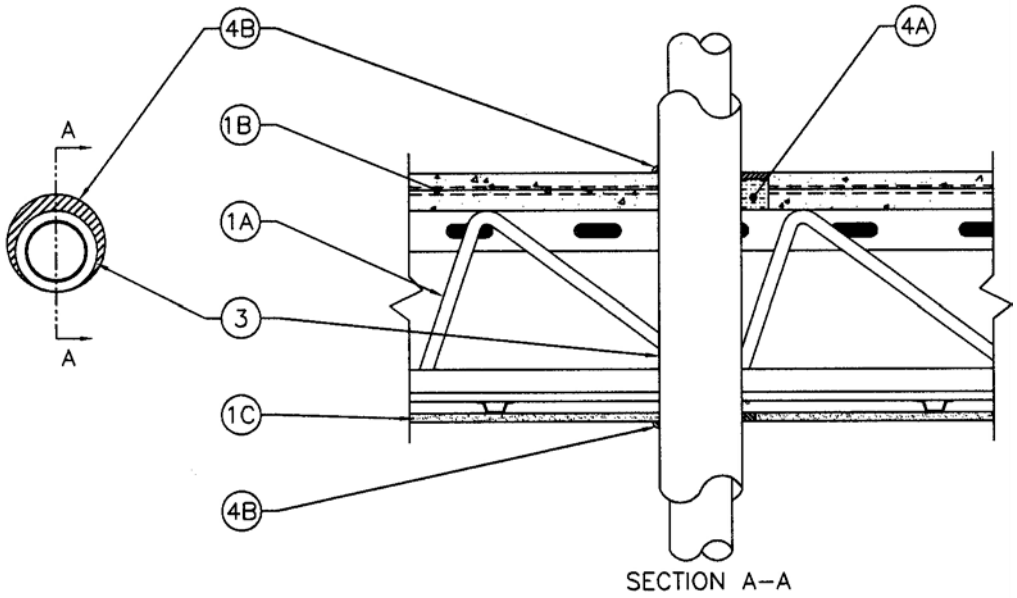
4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min. 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus flush with bottom surface of ceiling. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact locations at pipe covering/floor interface on top surface of floor and at pipe covering/ceiling interface on bottom surface of ceiling
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

F Ratings – 1, 1-1/2 and 2 Hr (See Item 1)
FT Rating – 3/4 Hr
FH Rating – 0 Hr
FTH Rating – 0 Hr

F-E-5016

CAN/ULC S115
F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
FT Rating — 3/4 Hr
FH Rating — 0 Hr
FTH Rating — 0 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1, 1-1/2 or 2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).
   C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening is 6 in. (152 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.

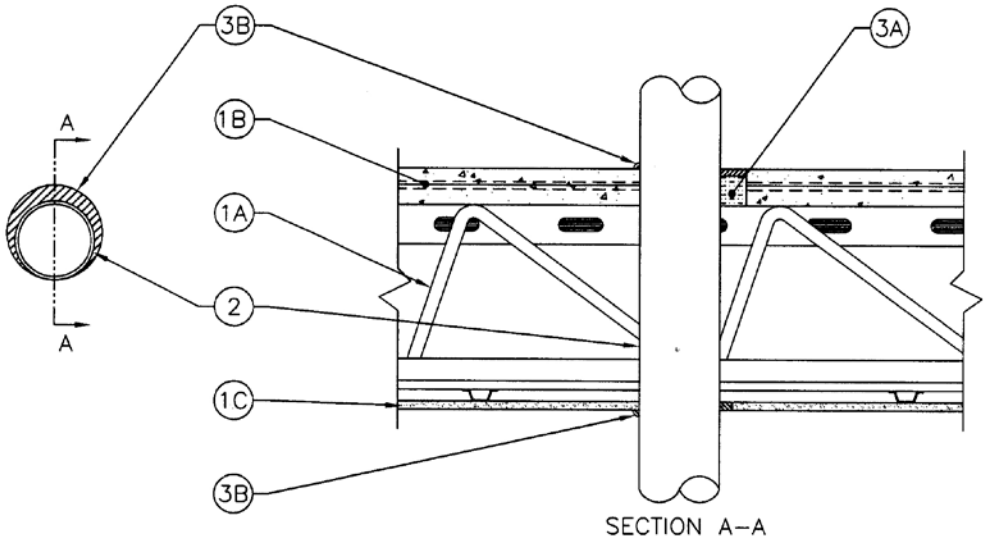
2. **Through Penetrants –** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe** – Nom 3 in. (76 mm) diam (or smaller) Sch 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   D. **Copper Tube** – Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Stainless Steel Pipe —** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Pipe Coverings* –** Nom 1 in. (25 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. An annular space of min 0 in. (0 mm) (point contact) to a max 1 in. (25 mm) is required within the firestop system.
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min. 2 in. (51 mm) thickness of min 64 kg/m^3 mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus flush with bottom surface of ceiling. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact locations at pipe covering/floor interface on top surface of floor and at pipe covering/ceiling interface on bottom surface of ceiling
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)	F Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Ratings — 1, 1-1/2 and 2 Hr (See Item 1)
	FTH Rating — 1/2 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1, 1-1/2 or 2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   - A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   - B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 10 in. (254 mm).
   - C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening is 9 in. (229 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.

2. **Steel Duct –** Nom 8 in. (203 mm) (or smaller) No. 20 gauge (or heavier) galvanized steel duct to be installed either concentrically or eccentrically within opening. The annular space between duct and periphery of opening in the concrete floor shall be shall be min 0 in. (0 mm) (point contact) to max 2 in. (51 mm). The annular space between duct and periphery of opening in the gypsum board ceiling shall be shall be min 0 in. (0 mm) (point contact) to max 1 in. (25 mm). Duct to be rigidly supported on both sides of floor assembly.

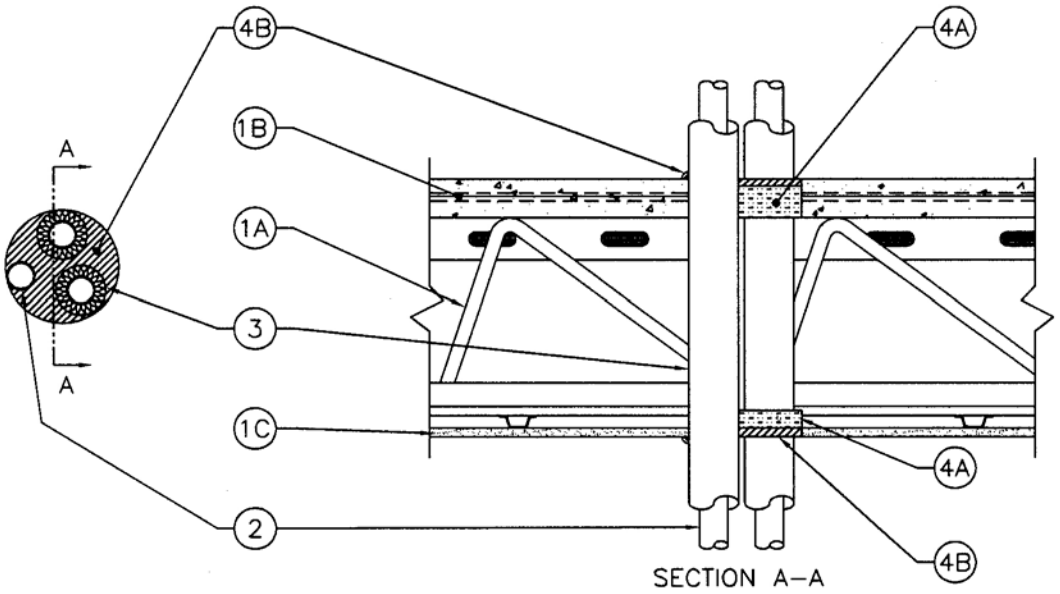
3. **Firestop System –** The firestop system shall consist of the following:
   A. **Packaging Material –** Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into floor opening as a permanent form. Packing material to be recessed from top surface of floor to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Materials* – Sealant –** Min 1/2 in. (16 mm) thickness of sealant applied within annulus, flush with top surface of floor. Min 5/8 in. (16 mm) thickness of sealant applied within annulus, flush with bottom surface of ceiling. Min 1/2 in. (12 mm) diam bead of sealant applied at point contact locations at duct/floor interface on top surface of floor and at duct/ceiling interface.
   Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

* Bearing the UL Classification Marking

F Rating – 1 and 1-1/2 Hr (See Item 1)
T Rating – 3/4 Hr

F-E-8006

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 1-1/2 Hr (See Item 1)	F Ratings — 1 and 1-1/2 Hr (See Item 1)
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Ratings — 1and 1-1/2 Hr (See Item 1)
	FTH Rating — 3/4 Hr



SECTION A–A

1. **Floor-Ceiling Assembly –** The 1 or 1-1/2 Hr fire rated concrete and steel joist Floor-Ceiling assembly shall be constructed of the materials and in the manner described in the individual G500-Series Design in the UL Fire Resistance Directory, as summarized below:
   A. **Joists –** Steel joists or **Structural Steel Members*** as specified in the individual G500-Series Design.
   B. **Flooring –** Normal or lightweight concrete as specified in the individual G500-Series Design. Max diam of opening is 8 in. (203 mm).
   C. **Gypsum Board* –** Min 5/8 in. (16 mm) thick, screw-attached to furring channels as specified in the individual G500-Series Design. Max diam of opening is 8 in. (203 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the floor-ceiling assembly in which it is installed.

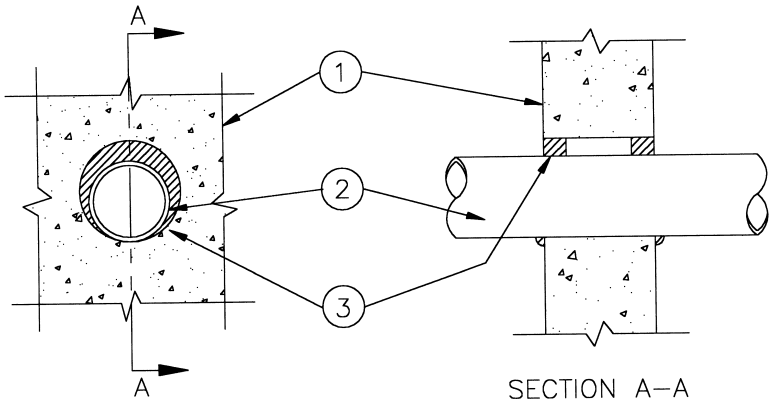
2. **Through Penetrants –** A max of three pipes or tubing to be installed within the opening. Annular space between penetrants and periphery of opening to be min 0 in. (0 mm) (point contact) to max 3/4 in. (19 mm). A min 1/2 in. (13 mm) to max 1-1/2 in. (38 mm) annular space shall be maintained between uninsulated metallic penetrants and insulated penetrants. The space between insulated penetrants to be min 1/4 in. (6 mm) to max 1-1/2 in. (38 mm). The following types and sizes of penetrants may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tube.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Tube Insulation – Plastics –** (Optional) – Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing to be installed on metallic pipe or tubes only.
   See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into floor opening as a permanent form. Packing material to be recessed from top surface of floor to accommodate the required thickness of fill material. Min 1 in. (25 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into ceiling opening as a permanent form. Packing material to be recessed from bottom surface of ceiling to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of the floor. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus flush with bottom surface of ceiling. Min 1/2 in. (13 mm) diam bead of sealant applied at point contact locations at pipe covering/floor interface on top surface of floor and at pipe covering/ceiling interface on bottom surface of ceiling
      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2, 3 and 4 Hr (See Item 1)	F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 0 and 1/4 Hr (See Item 2)	FT Ratings — 0 and 1/4 Hr See Item 2)
	FH Ratings — 1, 2, 3 and 4 Hr (See Item 1)
	FTH Ratings — 0 and 1/4 Hr (See Item 2)



SECTION A–A

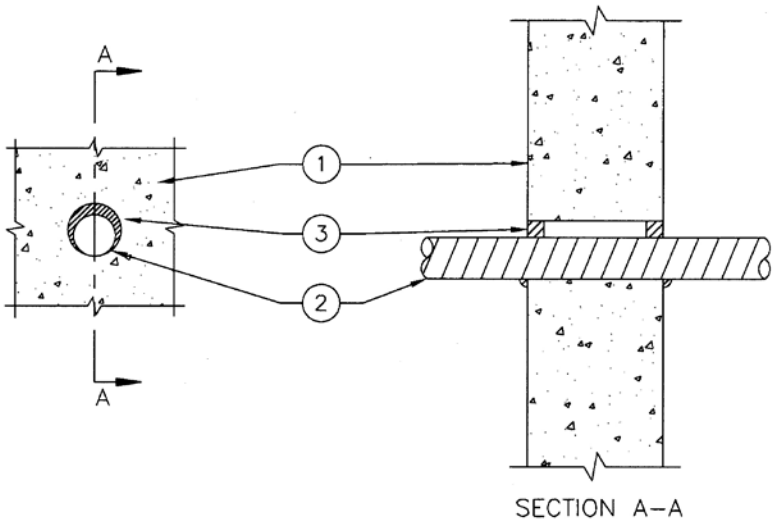
1. **Wall Assembly –** Min 4-7/8 in., 6-1/8 in., 7-3/8 in. or 8-5/8 in. (124, 156, 187 and 219 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete for 1, 2, 3 or 4 hour rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 25 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-3/8 in. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** The following types and sizes of steel pipes may be used:
      A1. Nom 4 in. diam (or smaller) Schedule 7 (or heavier) steel pipe.
      A2. Nom 8 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
      A3. Nom 10 in. diam (or smaller) Schedule 20 (or heavier) steel pipe.
      A4. Nom 24 in. diam (or smaller) Schedule 40 (or heavier) steel pipe.
      When steel pipe is used, T Rating is 1/4 hr for nom 4 in. diam (or smaller) and 0 hr for steel pipes greater than nom 4 in. diam.
   B. **Iron Pipe –** Nom 24 in. diam (or smaller) cast or ductile iron pipe. When iron pipe is used T Rating is 1/4 hr.
   C. **Conduit –** Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT). When EMT is used T Rating is 1/4 hr.
   D. **Copper Tubing –** Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing. When copper tube is used T Rating is 0 hr.
   E. **Copper Pipe –** Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe. When copper pipe is used T Rating is 0 hr.
   F. **Stainless Steel Pipe —** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material for 1 hr rated wall assemblies and 1 in. thickness of fill material for 2, 3 and 4 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be installed at the concrete/penetrant interface on both surfaces of wall.
Passive Fire Protection Partners – 4800DW, 4100NS, 3600EX

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 1-1/4 Hr (See Item 1)	FT Ratings — 3/4 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Rating — 3/4 and 1-1/4 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** Min 4-7/8 in. or 6-1/8 in. thick lightweight or normal weight (100-150 pcf) concrete for 1or 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-1/2 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

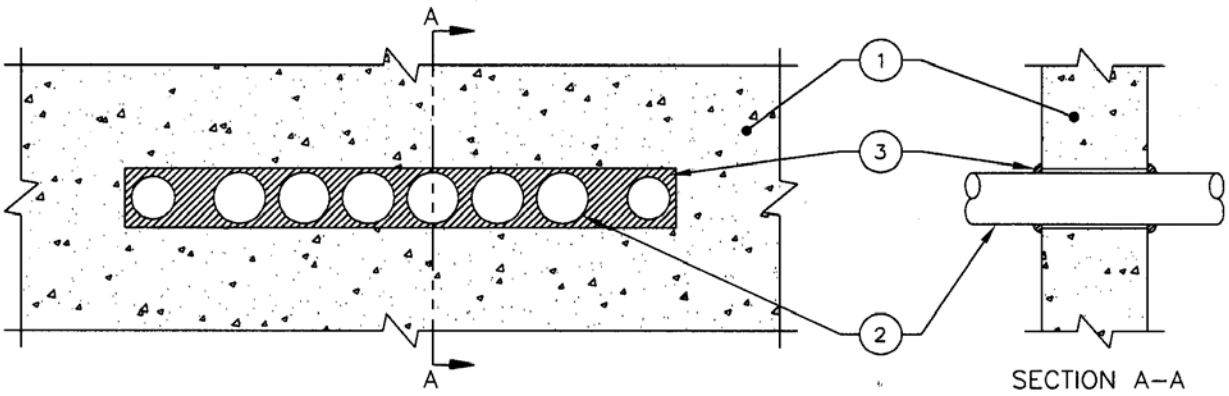
2. **Through Penetrating Products*** – **Flexible Metal Piping –** Nom. 2 in. diam (or smaller) steel flexible metallic piping. Max one flexible metal piping to be installed either concentrically or eccentrically within opening. The annular space between piping and periphery of opening shall be min 0 (point contact) in. to max 1 in. Piping to be rigidly supported on both sides of wall assembly. Plastic covering on piping may or may not be removed on both sides of wall assembly.
   Omegaflex Inc. – TracPipe Flexible Gas Piping

2A. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe to be installed concentrically or eccentrically within opening. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 and 1 in. thickness of fill material for 1 and 2 hr fire-rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. An additional 1/2 in. diam of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



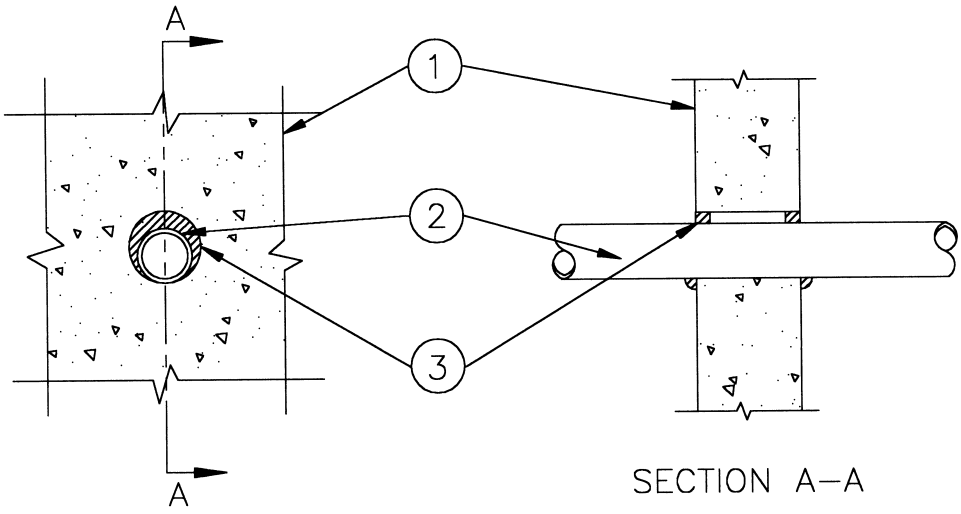
1. **Wall Assembly** – Min 6-1/8 in. (156 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max height of opening is 3-1/2 in. (89 mm). Max width of opening is 32 in. (914 mm).
   See **Concrete Blocks** (CAZT) category in the UL Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** Max eight multiple sized pipes installed in single layer array within the firestop system. The annular space between the penetrants and between the penetrants and the edges of the opening shall be min 3/8 in. (10 mm) to max 3/4 in. (19 mm). Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipe or conduit may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 3 in. (76 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular copper pipe.
   F. **Stainless Steel Pipe —** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill Void or Cavity Materials* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed to completely fill annular space between penetrants and concrete flush with each surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)
F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 1, 2, 3 and 4 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** Min 4-7/8, 6-1/8, 7-3/8 and 8-5/8 in. thick normal weight or lightweight (100-150 pcf) concrete for 1, 2, 3 and 4 hour rated wall assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks.** Max diam of opening is 3-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

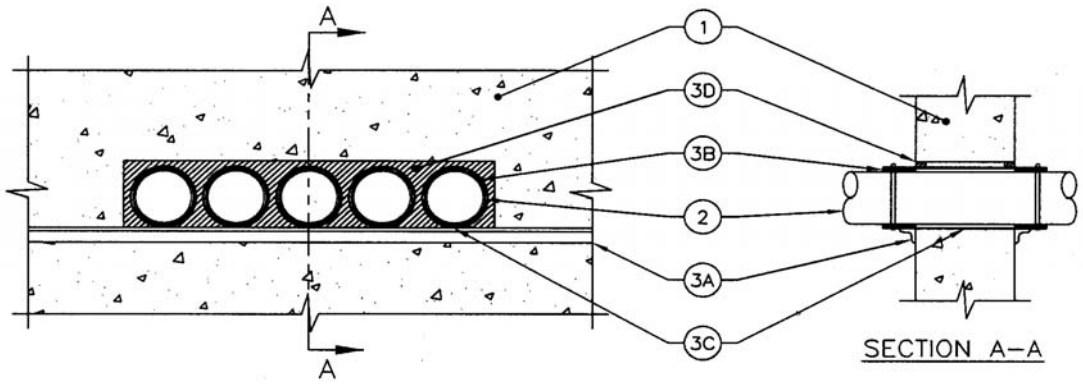
   The F and T Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants –** One nonmetallic pipe or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. to max 7/8 in. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or tubing may be used:
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** – Nom 2 in. diam (or smaller) SDR11 CPVC pipe for use in closed (process or supply) piping systems.
   B. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 (or heavier) cellular or solid core PVC pipe for use in closed (process or supply) piping systems.
   C. **Crosslinked Polyethylene (PEX) Tubing –** Nom 3/4 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material for 1 hr rated wall assemblies and 1 in. thickness of fill material for 2, 3 or 4 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the concrete/penetrant interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)
F Ratings — 2 Hr
T Ratings — 1 Hr



1. **Wall Assembly** – Min 6-1/8 in. (156 mm) thick lightweight or normal weight 100-150 pcf (1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max height of opening is 4-1/2 in. (114 mm). Max width of opening is 22-3/4 in. (578 mm).
   See **Concrete Blocks** (CAZT) category in the UL Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant** – Max of five nonmetallic pipes or conduits to be installed concentrically or eccentrically within opening. The annular space between pipe and periphery of opening shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm). Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of penetrants may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping.
   B. **Rigid Non Metallic Conduit+ –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** – Nom 3 in. (76 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. Min 1 by 1 by 1/4 in. (25 by 25 by 6 mm) steel secured to wall with masonry anchors on both sides of the opening. Angles to be installed below the penetrants such that all penetrants and their steel sleeves (Item 3C) are fully supported on both sides of wall by the angles.
   B. **Fill, Void or Cavity Material* – Wrap Strip –** Two layers of nom 0.1 in. (2.5 mm) thick by 1.98 in. (50 mm) wide intumescent wrap strip individually wrapped around the outer circumference of each penetrant such that the wrap strip is flush with both surfaces of wall and extending outward. Butted ends in successive layers shall be offset. Wrap strip secured with foil tape.
   Passive Fire Protection Partners – WS1

C. **Steel Sleeves –** Min 28 gauge galv steel sized to be 4 in. (102 mm) longer than the width of the wall. Sleeves to be wrapped around each penetrant and extending 2 in. (51 mm) beyond both sides of wall and tightly secured around the wrap strip layers on each penetrant with 1/2 in. (13 mm) wide stainless steel hose clamps located approx 1/2 in. (13 mm) from each end of sleeve.

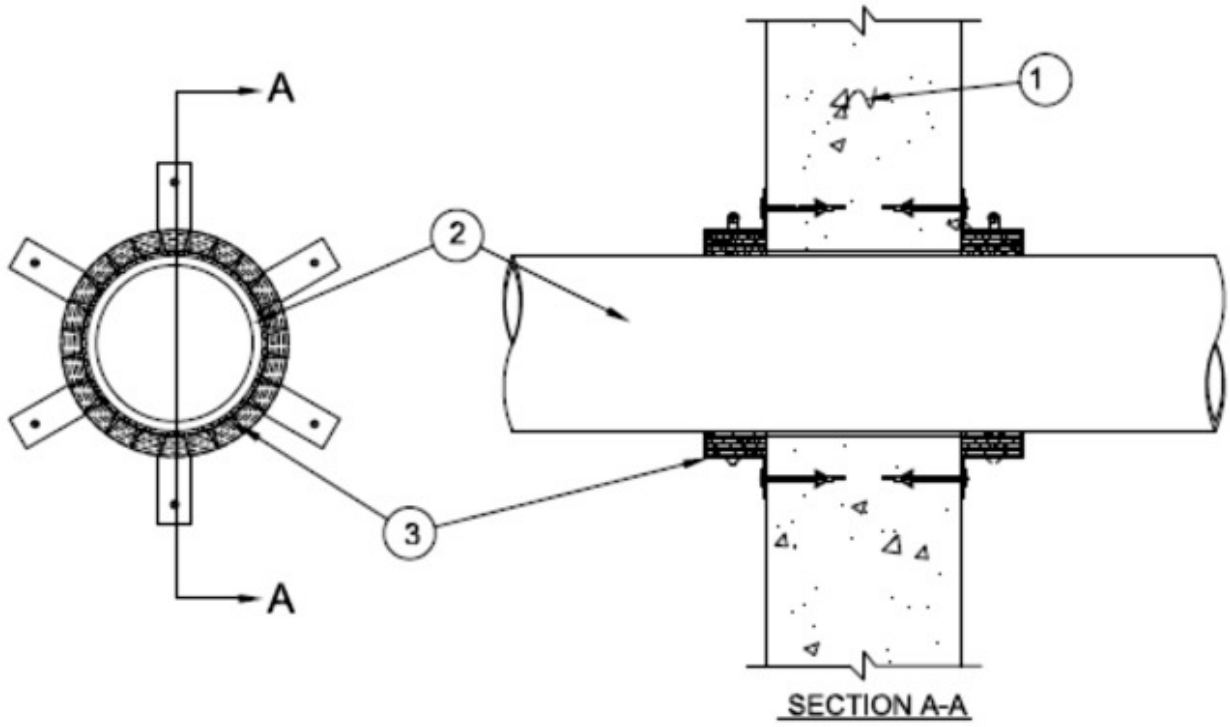
D. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Listing Mark

F Rating — 4 Hr
T Rating — 4 Hr

W-J-2263

ANSI/UL1479 (ASTM E814)
F Rating — 4 Hr
T Rating — 4 Hr



1. **Wall Assembly —** Min 6 in. (152 mm) thick lightweight or normal weight (100-150 pcf or 1600 - 2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 5 in. (127 mm).

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants —** Nom 4in. (102 mm) diam (or smaller). Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of wall assembly.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Fill, Void or Cavity Materials * — Caulk —** (Optional) — Min thickness of 5/8 in. (16 mm) of caulk applied within annulus flush with both surfaces of wall assembly.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

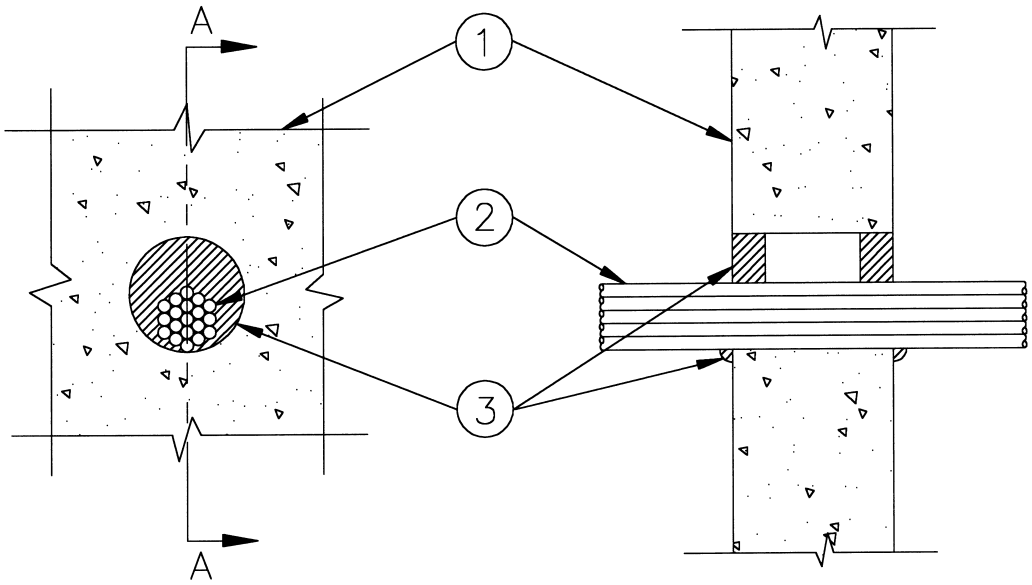
   B. **Fill, Void or Cavity Material* — Wrap Strip —** Two layers of nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide intumescent wrap strip individually wrapped around the outer circumference of the pipe such that wrap strip is flush with both surfaces of wall. Butted ends in successive layers shall be offset. Wrap strip secured with tape, wire or tie wire.

      PASSIVE FIRE PROTECTION PARTNERS — WS2

   C. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. (51 mm) deep with 1 in. (25 mm) wide by 1-1/2 in. (38 mm) long anchor tabs on 4 in. (102 mm) centers to secure to both surfaces of wall. In addition, collar contains retainer tabs, 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to both surfaces of wall at each anchor tab by means of 1/4 in. diam by 1-1/4 in. (32 mm) long masonry type anchors in conjunction with 1/4 in. by 5/8 in. (6 by 16 mm) diam washers.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Rating — 3/4 Hr



SECTION A–A

1. **Wall Assembly –** Min 4-7/8 or 6-1/8 in. thick lightweight or normal weight (100-150 pcf) concrete for 1 or 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 44 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

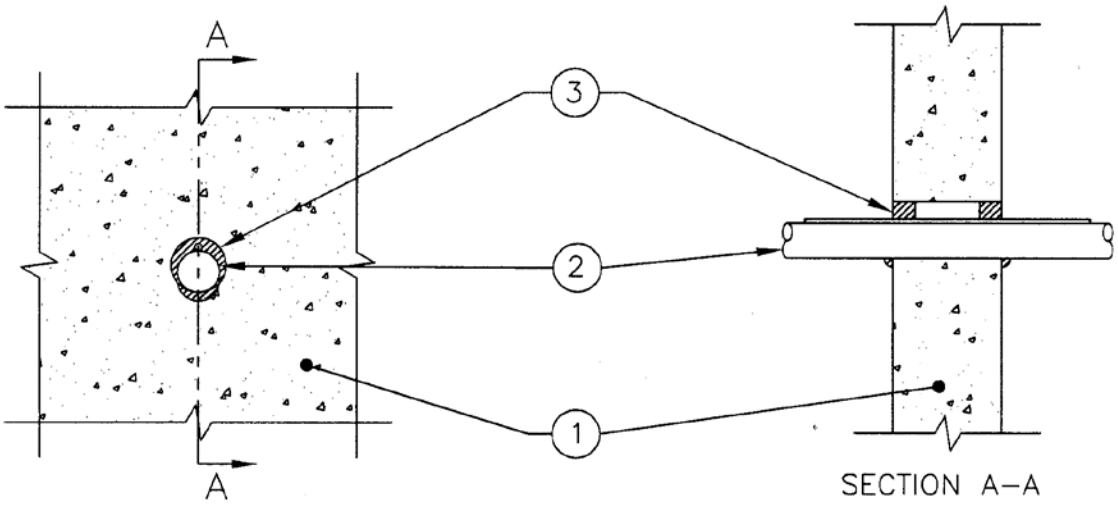
3. **Wall Assembly –** Min 4-7/8 or 6-1/8 in. thick lightweight or normal weight (100-150 pcf) concrete for 1 or 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-1/8 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

4. **Cables –** Aggregate cross-sectional area of cable in opening to be max 44 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

5. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 or 1-1/4 in. thickness of fill material for 1 or 2 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. Sealant to be forced into interstices of cable group to max extent possible. At the point contact location between cable(s) and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the concrete/cable interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



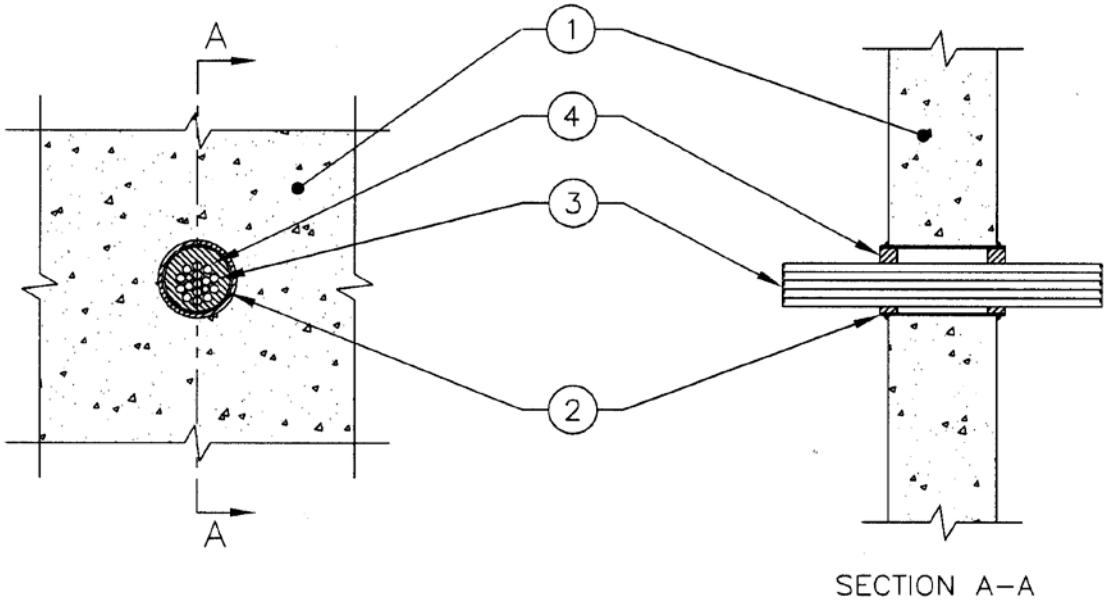
1. **Wall Assembly –** Min 5 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 2 in. (51 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (0 mm) (point contact) to max 1 in. (25 mm). Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.
   D. 4/C No. 6 AWG (or smaller) copper conductor with ground, with PVC or XLPE insulation.
   E. **Through Penetrating Product* –** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.

3. **Fill, Void or Cavity Material* – Putty –** Min 1-1/4 in. (32 mm) thickness of putty applied within the annulus, flush with both surfaces of wall. At the point contact location between cable(s) and wall, a min 1/4 in. (6 mm) diam bead of putty shall be applied at the wall/cable interface on both surfaces of wall.
   Passive Fire Protection Partners – 3300PS

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 2 Hr
	FTH Rating — 1 Hr



SECTION A–A

1. **Wall Assembly –** Min 5 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 5 in. (127 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

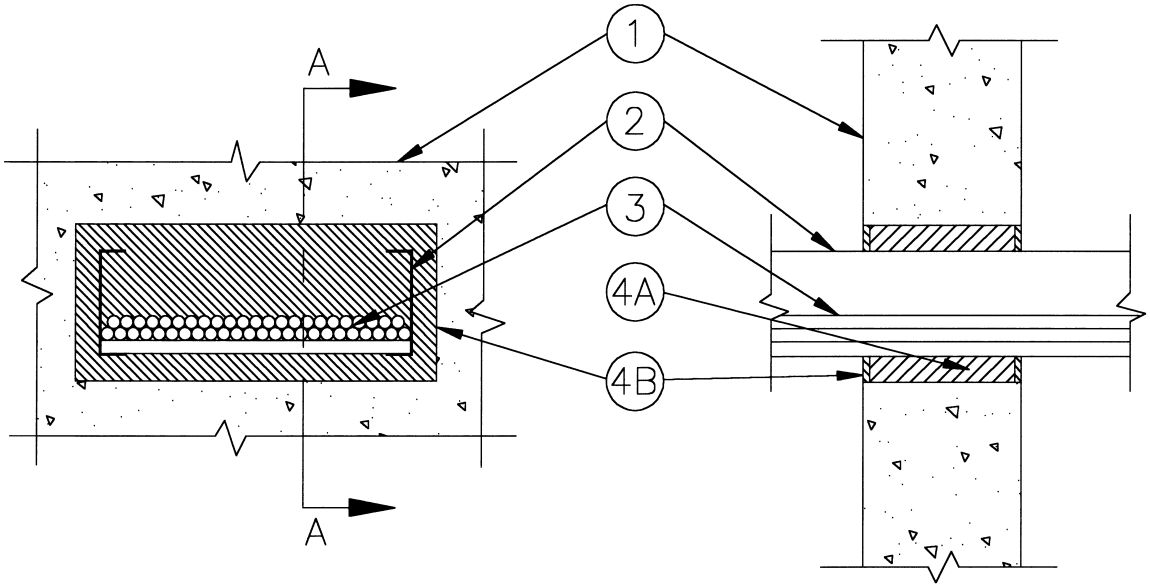
2. **Steel Sleeve –** Cylindrical sleeve fabricated from min 0.018 in. (0.046 mm) thick (No. 28 gauge) galv sheet steel and having a min 1 in. (25 mm) lap along the longitudinal seam. Length of sleeve to be 1/2 in. (13 mm) to 1 in. (25 mm) greater than the thickness of wall. Sleeve to be friction-fitted into opening with ends of sleeve extending 1/4 in. (6 mm) to 1/2 in. (13 mm) beyond each surface of wall.

3. **Cables –** Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between cables and sleeve shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm). Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE

4. **Fill, Void or Cavity Material* – Putty –** Min 1 in. (25 mm) thickness of putty applied within the annulus, flush with both ends of sleeve. An additional 1/4 in. (6 mm) bead of putty to be applied around entire perimeter of sleeve at the sleeve/wall interface on both sides of wall.
Passive Fire Protection Partners – 3300PS

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Ratings — 2 Hr
	FTH Rating — 3/4 Hr



SECTION A–A

1. **Wall Assembly –** Min 6-1/8 in. (156 mm) thick normal weight or lightweight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** The opening shall be sized to be 2 in. (51 mm) wider and 2 in. (51 mm) higher than the width and depth of the cable tray.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

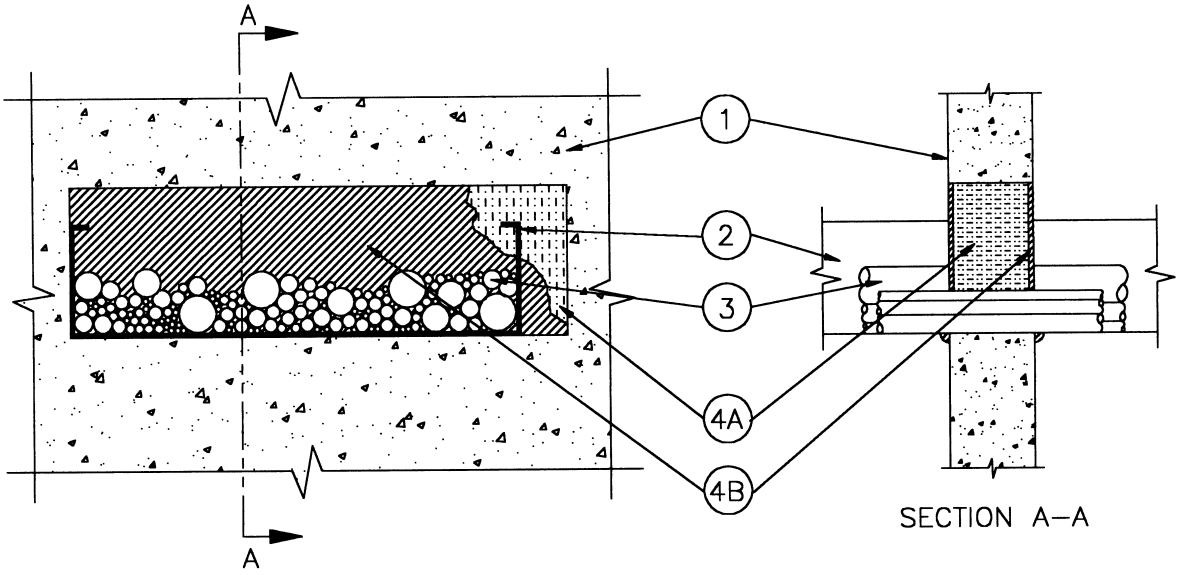
2. **Cable Tray+ –** Max 12 in. (305 mm) wide by max 4 in. (102 mm) deep open-ladder cable tray with channel-shaped side rails formed of min 0.058 in. (1.5 mm) thick steel or aluminum with 1 in. (25 mm) wide by 1 in. (25 mm) deep rungs spaced 9 in. (229 mm) OC. One cable tray to be installed in the opening. The annular space between the cable tray and the periphery of the opening shall be 1 in. (25 mm). Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables –** Aggregate cross-sectional area of cables in cable tray to be max 45 percent of the cross-sectional area of the cable tray based on a max 3 in. (76 mm) cable loading depth within the cable tray. Any combination of the following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC aluminum clad or steel clad TEK cable with XLPE insulation.
   D. Max 25 pair No. 20 AWG (or smaller) copper conductor cable with PVC jacketed cable with PVC insulation.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   F. 4/C No. 6 AWG (or smaller) copper conductor cable with PVC jacketed cable with XLPE insulation.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 4-3/8 in. (111 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material (Items B1 and B2).
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material brushed or sprayed on each side of wall assembly, completely covering mineral wool insulation and overlapping a min 1/2 in. (13 mm) onto concrete. At point contact location between penetrant and periphery of the opening, a min 1/2 in. (13 mm) overlap of fill material shall be applied onto penetrant and concrete on both surfaces of the wall.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternative to Item B1, min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. Sealant to be forced into interstices of cables to max extent possible.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Mark
+ Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 3/4 Hr



1. **Wall Assembly –** Min 4-7/8 in. (124 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max area of opening is 208 sq. in. (1342 cm^2) with max dimension of 26 in. (660 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray+ –** Max 24 in. (610 mm) wide by max 6 in. (152 mm) deep 15 gauge (or heavier) aluminum or steel cable tray installed within the opening. The annular space between the cable tray and the periphery of the opening shall be min 0 in. (point contact) to max 2 in. Cable tray to be rigidly supported on both sides of wall assembly.

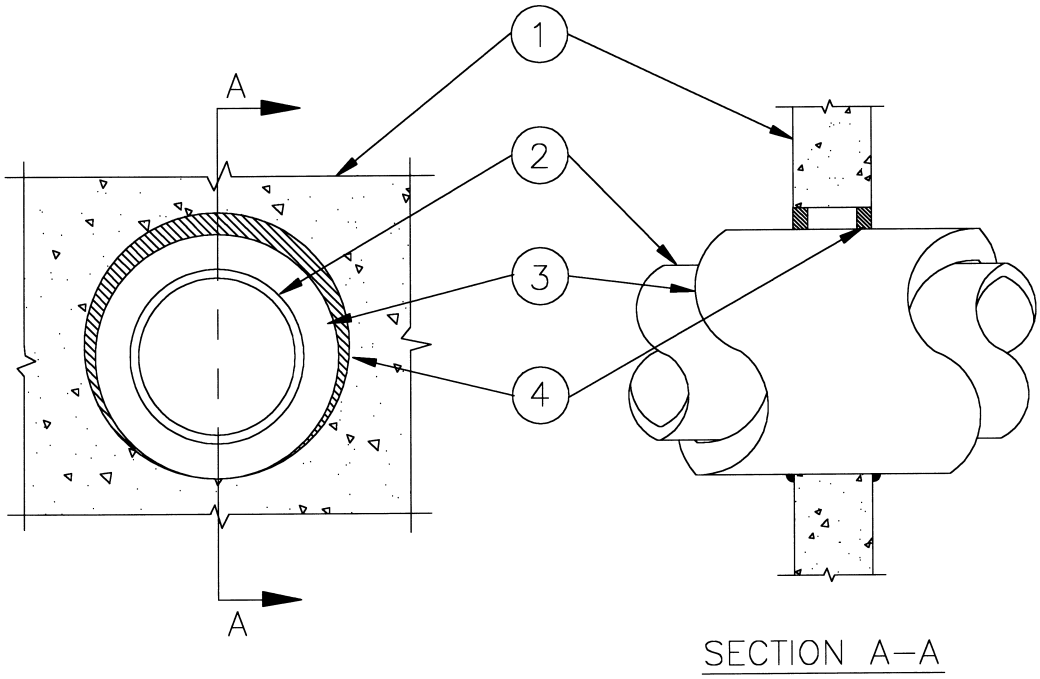
3. **Cables –** Aggregate cross-sectional area of cables in opening to be max 40 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be shall be min 0 in. (point contact) to max 5-3/4 in. (146 mm). Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TECK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TECK cable with XLPE insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TECK cable with XLPE insulation.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC

4. **Cables –** Aggregate cross-sectional area of cables in opening to be max 40 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be shall be min 0 in. (point contact) to max 5-3/4 in. (146 mm). Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TECK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TECK cable with XLPE insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TECK cable with XLPE insulation.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor PVC jacketed cable with PVC insulation.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

5. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. (92 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as to accommodate the required thickness of fill material (Items B1 and B2).
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material sprayed or brushed on each side of wall assembly, completely covering mineral wool and overlapping, a min 1/2 in. (13 mm) onto concrete. At point contact location between penetrant and periphery of the opening, a min 1/2 in. (13 mm) overlap of fill material shall be applied onto penetrant and concrete on both surfaces of the wall.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternative to Item B1, min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with both sides of wall. At point contact location between penetrant and the periphery of the opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/penetrant interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

+ Bearing the UL Listing Mark
Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A–A

1. **Wall Assembly –** Min 4-7/8 in. (124 mm) thick normal weight or lightweight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 18 in. (457 mm).

   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   - A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   - B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   - C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   - D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   - E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

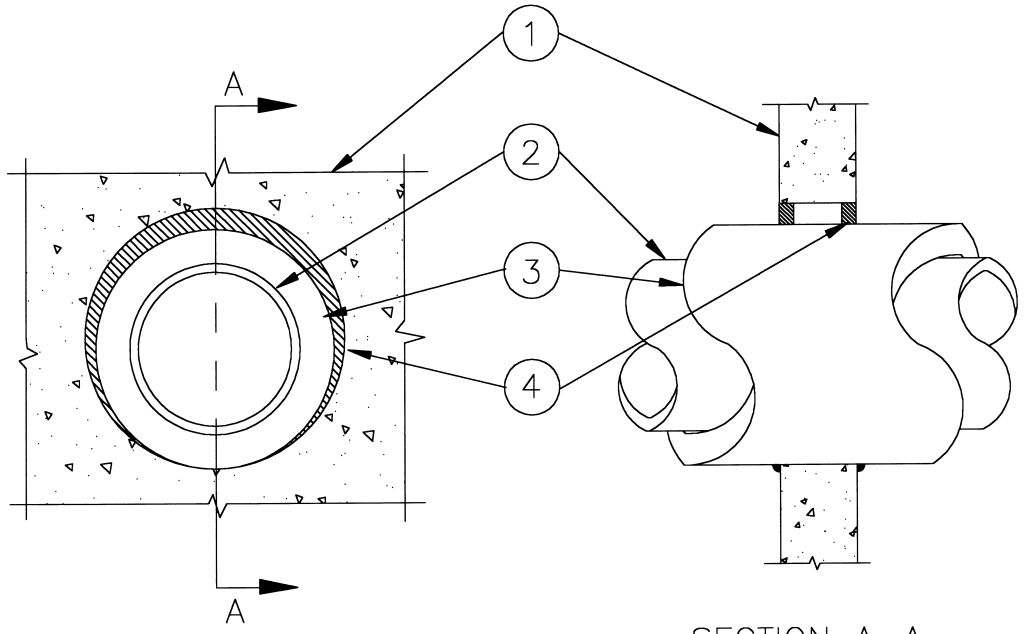
3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32mm)

   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant** Min 5/8 in (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wall, a min 3/8 in. (10mm) diam bead of fill material shall be applied at the wall/pipe covering interface on both surfaces of wall.
   Passive Fire Protection Partners– 3600EX, 4800DW,

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2, 3, and 4 Hr (See Item 1)	F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 1, 2 and 3 Hr (See Item 1)	FT Ratings — 1, 2 and 3 Hr (See Item 1)
	FH Ratings — 1, 2, 3 and 4 Hr (See Item 1)
	FTH Rating — 1, 2 and 3 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** Min 4-7/8 in. (124 mm), 6-1/8 in. (156 mm), 7-3/8 in. (187 mm) and 8-5/8 in. (219 mm) thick normal weight or lightweight (100-150 pcf or 1600-2400 kg/m^3) concrete for 1, 2, 3 and 4 hour rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 18 in. (457 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

   The hourly T Rating is 1 hr. for 1 hr. rated assemblies. The hourly T Rating is 2 hr for 2 and 3 hr. rated assemblies. The hourly T Rating is 3 hr. for 4 hr. rated assemblies.

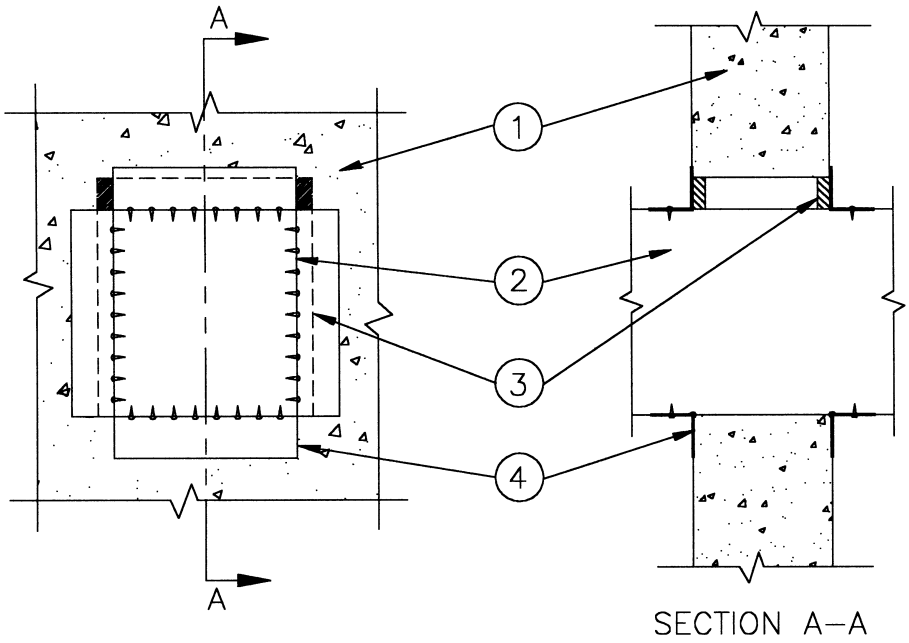
2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (101 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 64 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material for 1 hr rated wall assemblies and 1 in. (25 mm) thickness of fill material for 2, 3 and 4 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wall, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the concrete/pipe covering interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



SECTION A–A

1. **Wall Assembly –** Min 6 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max size of opening to be 957 sq. in. with a max dimension of 33 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
   The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

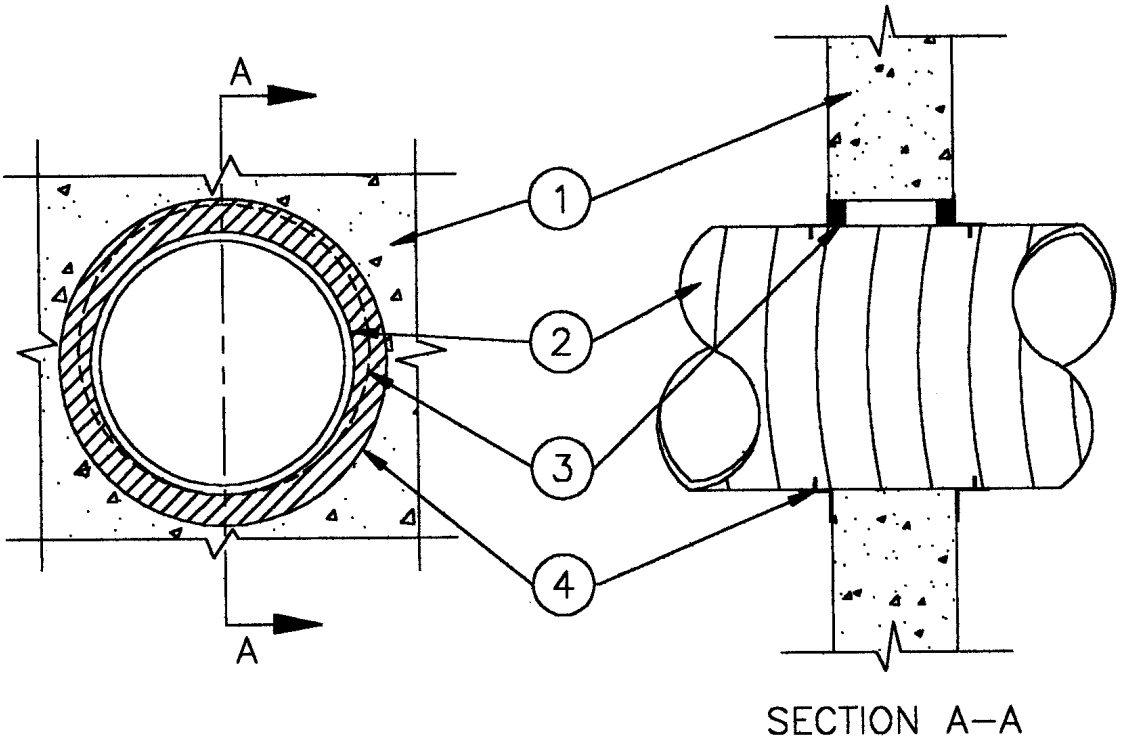
2. **Steel Duct –** Nom 26 in. by 30 (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1-1/2 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At the point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of sealant shall be applied at the duct/concrete interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

4. **Retaining Angles –** Min 16 gauge galv steel angles sized to lap duct a min of 2 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 1 in. from each end of duct and spaced a max of 6 in. OC.

Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



SECTION A–A

1. **Wall Assembly –** Min 6 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 17 in. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Duct –** Nom 16 in. diam (or smaller) No. 22 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At the point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of sealant shall be applied at the duct/concrete interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

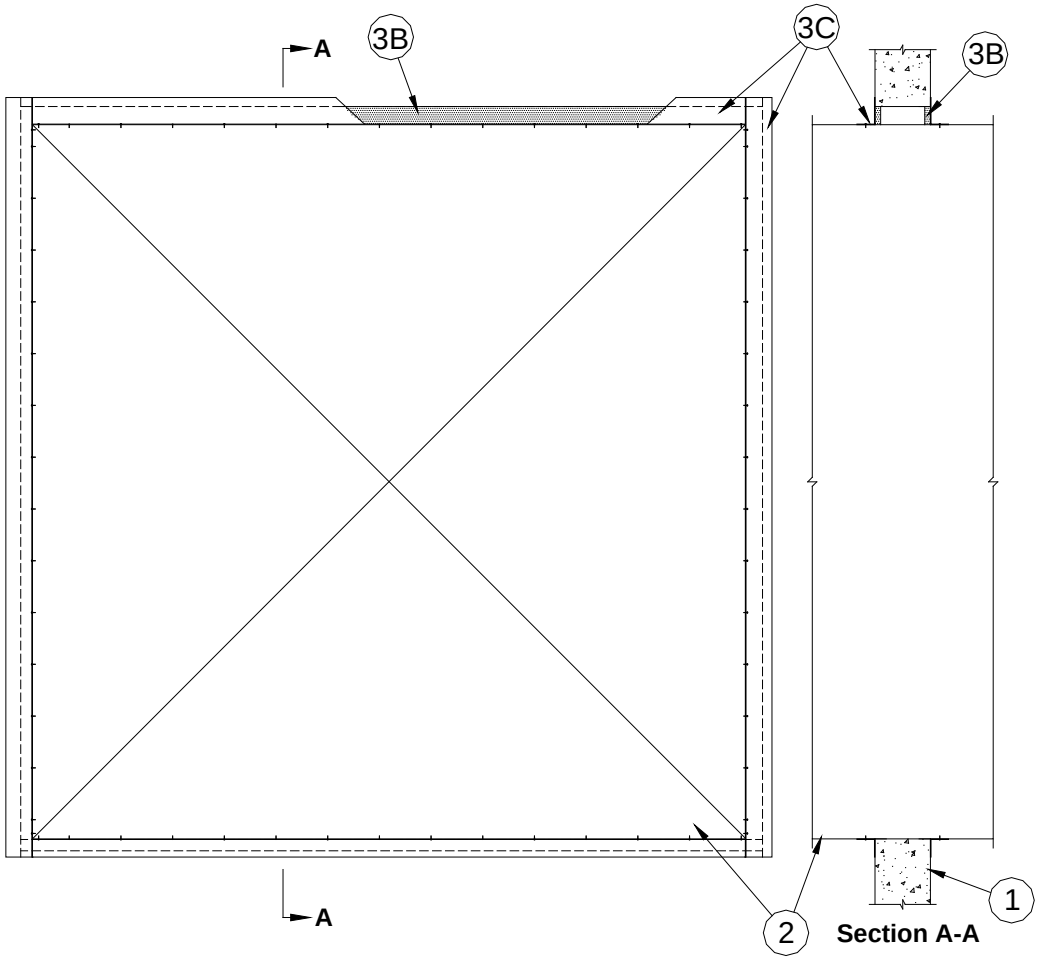
4. **Retaining Angles –** Min 16 gauge galv steel angles sized to lap duct a min of 1 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 6 in. OC.

*Bearing the UL Classification Marking

F Rating – 2 Hr
T Rating – 0 Hr

W-J-7126

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



Section A-A

1. **Wall Assembly —** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max area of opening is 103 sq ft (9.6 m^2) with max dimension of 122 in. (3.1 m).

See **Concrete Blocks** (CAZT) category in Fire Resistance Directory for names of manufacturers

2. **Steel Duct —** Max 118 by 118 in. (3 by 3 m) The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Duct to be installed either concentrically or eccentrically within the firestop system. The space between the steel duct and periphery or opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.

3. **Firestop System —** The firestop system shall consist of the following:
   A. **Packing Material —** (Optional, Not Shown) - Polyethylene backer rod, mineral wool batt insulation or fiberglass batt insulation friction fitted into annular space of opening. Packing material to be recessed from both surfaces of wall as required thickness of fill material.
   B. **Fill, Void or Cavity Material* — Sealant —** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between the steel duct and the concrete wall, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/steel duct interface on both surfaces of wall assembly.

      PASSIVE FIRE PROTECTION PARTNERS – 4800DW or 3600EX

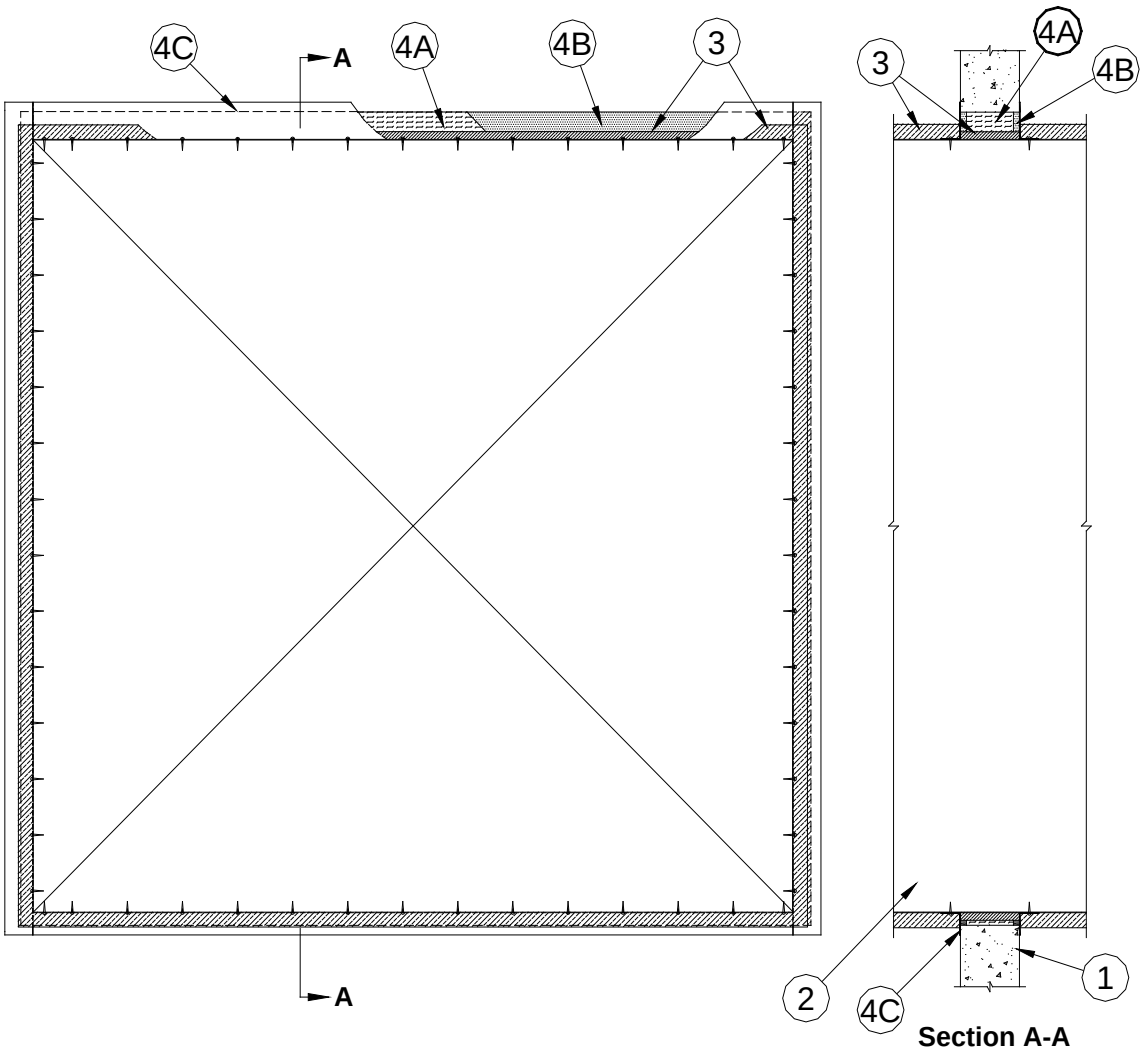
   C. **Steel Retaining Angles —** Min No. 16 gauge galv steel angles sized to lap steel duct a min of 2 in. (51 mm) and to lap wall surfaces a min of 1 in. (25 mm). Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of the steel duct and spaced a max of 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

F Rating – 2 Hr
T Rating – 0 Hr

W-J-7127

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



Section A-A

1. **Wall Assembly —** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max size of opening is 107 sq ft (9.9 m^2) with a max width of 124 in. (3.15 m).

See **Concrete Blocks** (CAZT) category in Fire Resistance Directory for names of manufacturers

2. **Steel Duct —** Max 118 by 118 in. (3 by 3 m) steel duct to be installed within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Batts and Blankets* —** Nom 1-1/2 or 2 in. (38 or 51 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m^3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm).

   See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.

3A. **Batts and Blankets* —** As an alternate to Item 3, single layer of nom 2 in. (51 mm) thick mineral fiber batt or blanket (nom 3 pcf or 48 kg/m^3) installed on duct and covered with max 0.8 mm thick aluminum facing. Longitudinal and transverse joints sealed and secured with pressure sensitive aluminum foil tape. Insulation is discontinuous at the steel retaining angles (Item 4C) at both sides of the wall assembly. During installation of the fill material (Item 4B), the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm). As an option, insulation may terminate flush against steel retaining angles (Item 4C) at both sides of wall.

   See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used

4. **Firestop System —** The firestop system shall consist of the following:
   A. **Packing Material —** Min 4-3/4 (121 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into annular space between wall opening and duct insulation as a permanent form. When Item 3A duct insulation terminates at steel retaining angles, packing material to be firmly packed into annular space between wall opening and steel duct. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.

   B. **Fill, Void or Cavity Material* — Sealant —** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall.

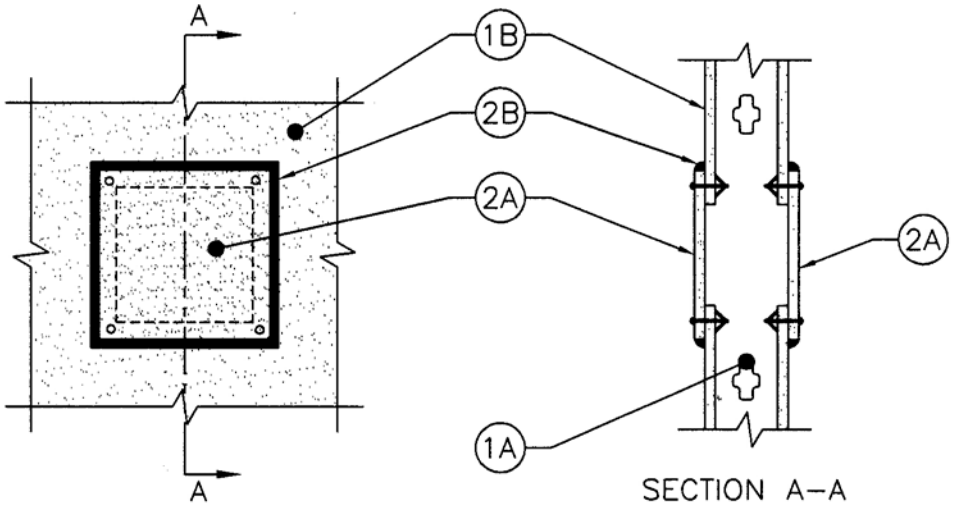
      PASSIVE FIRE PROTECTION PARTNERS – 4800DW or 3600EX

   C. **Steel Retaining Angles —** Min No. 16 gauge (0.059 in. (1.5 mm)) galv steel angles sized to lap steel duct a min of 1 in. (25 mm) and lap wall surfaces a min of 2 in. (51 mm). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

	F Rating – 1 Hr **FT Rating – 1 Hr** **FH Rating – 0 Hr** **FTH Rating – 0 Hr**	**W-L-0001-C**

CAN/ULC S115
F Rating — 1 Hr
FT Rating — 1 Hr
FH Rating — 0 Hr
FTH Rating — 0 Hr



1. **Wall Assembly –** The 1 Hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. The max area of opening is 144 in.^{2} (929 cm^2) with max dimension of 12 in. (305 mm).

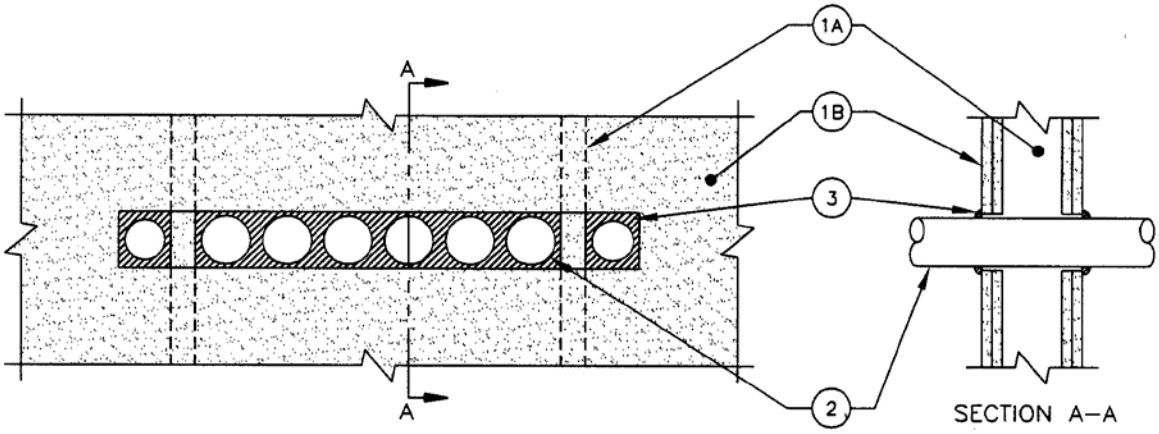
2. **Firestop System** – The firestop system shall consist of the following:
   A. **Gypsum Board Cover* –** One layer of nom 5/8 in. (16 mm) gypsum board sized to overlap opening a min of 2 in. (51 mm) on all sides. Gypsum board attached to both sides of wall with min four nom 3/16 in. (4.8 mm) (or larger) diam steel toggle bolts at each corner.
   B. **Fill, Void or Cavity Material* – Caulk** Min 5/8 in. (16 mm) diam bead of fill material applied around all edges of gypsum board cover on both sides of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

F Ratings – 1 and 2 Hr (See Item 1)
FT Rating – 1/4 Hr
FH Rating – 0 Hr
FTH Rating – 0 Hr

W-L-1010-C

CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)
FT Rating — 1/4 Hr
FH Rating — 0 Hr
FTH Rating — 0 Hr



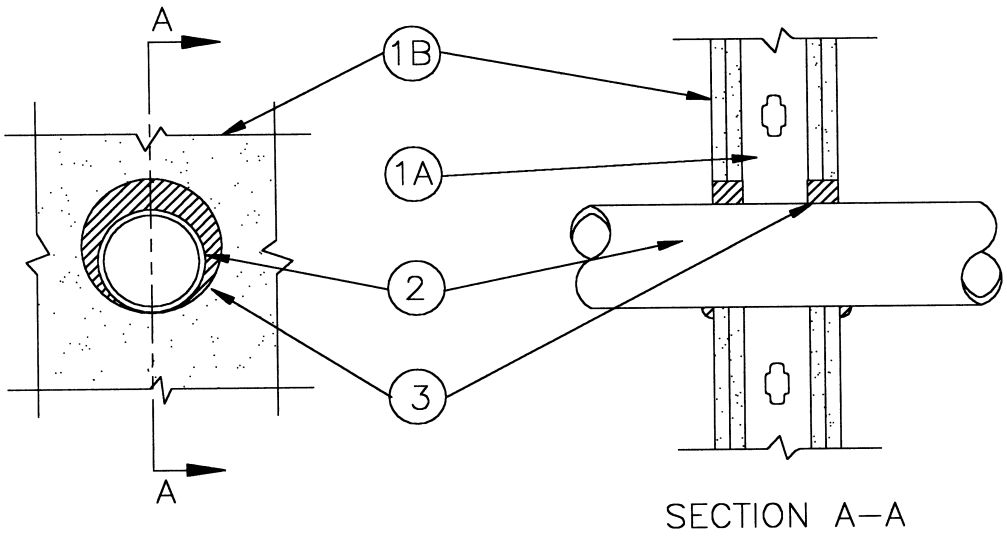
1. **Wall Assembly** – The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in the individual U400 Series design. Max height of opening is 3-1/2 in. (89 mm). Max width of opening is 36 in. (914 mm). When width of opening exceeds width of stud cavity, the studs and the gypsum board covering the studs shall not be removed.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants –** Max eight multiple sized pipes installed in single layer array within the firestop system. The annular space between the penetrants and between the penetrants and the edges of the opening shall be min 2/5 to max 1/2 in. (10 mm to max 13 mm). Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipe or conduit may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 3 in. (76 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular copper pipe.

3. **Fill Void or Cavity Materials* – Sealant –** Min 1/2 in. (16 mm) thickness of fill material installed to completely fill annular space between penetrants and gypsum board flush with each surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2, 3 and 4 Hr (See Item 1)	F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 0 and 1/4 Hr (See Item 2)	FT Ratings — 0 and 1/4 Hr (See Item 2)
	FH Ratings — 1, 2, 3 and 4 Hr (See Item 1)
	FTH Rating — 0 and 1/4 Hr (See Item 2)



SECTION A–A

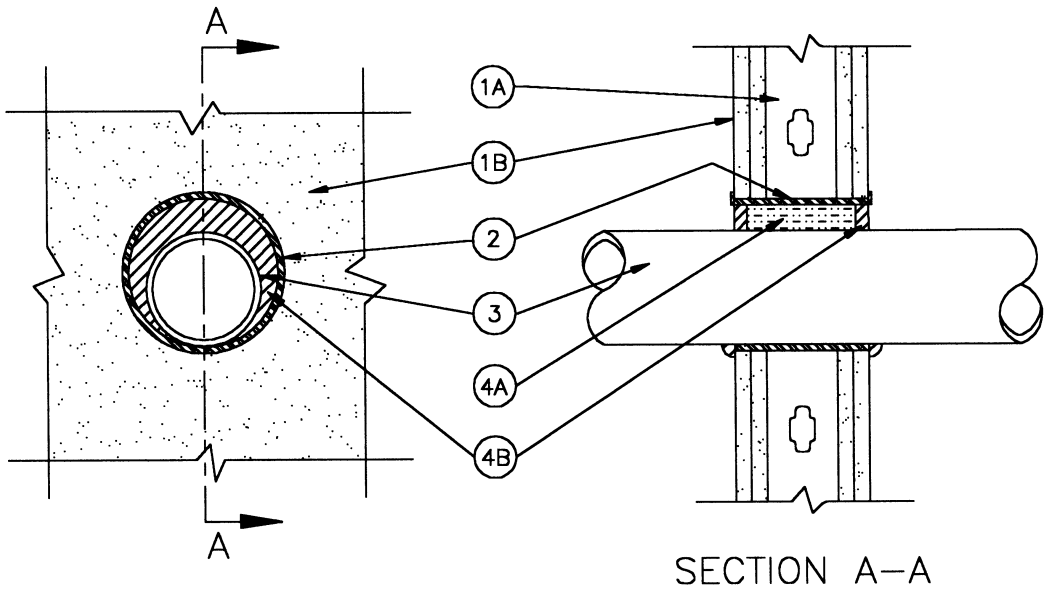
1. **Wall Assembly –** The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 24 in. (610 mm).
   The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (0 mm) (point contact) to max 1-1/4 in. (32 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe** - The following types and sizes of steel pipes may be used:
      A1. Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
      A2. Nom 24 in. (610 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
      When steel pipe is used T & FTH Ratings are 1/4 hr for nom 4 in. (102 mm) diam (or smaller) and 0 hr for steel pipes greater than nom 4 in. (102 mm) diam.
   B. **Iron Pipe** - Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe**. When iron pipe is used T & FTH Ratings are 1/4 hr.**
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or steel conduit. **When EMT or steel conduit is used T & FTH Ratings are 1/4 hr.**
   D. **Copper Tubing** – Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. **When copper tube is used T & FTH Ratings are 0 hr.**
   E. **Copper Pipe** – Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. **When copper pipe is used T & FTH Ratings are 0 hr.**
   F. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. **When stainless steel pipe is used T & FTH Ratings are 0 hr.**

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of sealant for 1 hr rated wall assembly, min 1-1/4 in. (32 mm) thickness of sealant for 2, 3 or 4 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and the wallboard, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the wallboard/penetrant interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1B)	F Ratings — 1 and 2 Hr (See Item 1B)
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Ratings — 1and 2 Hr (See Item 1B)
	FTH Rating — 1/4 Hr



SECTION A–A

1. **Wall Assembly –** The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 in. by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 8 in. (203 mm)

   The F and FH Ratings of the firestop system are equal to the hourly rating of the wall in which it is installed.

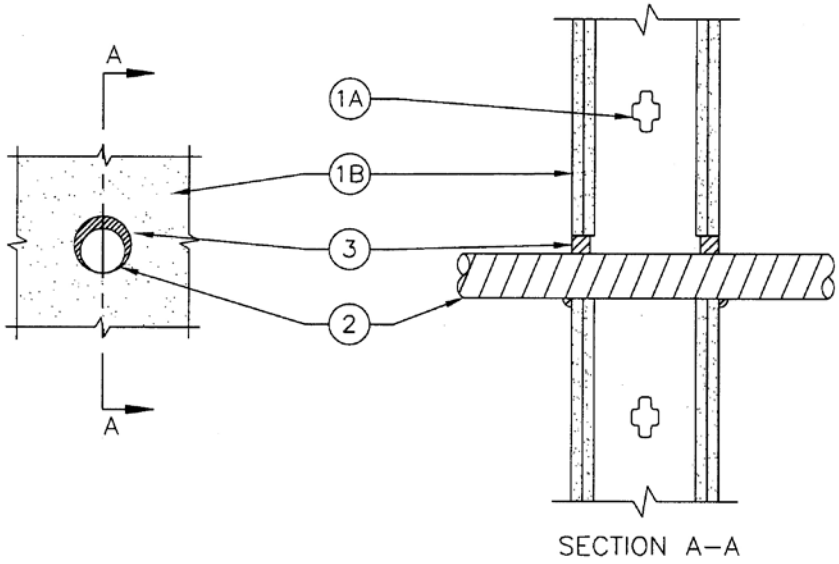
2. **Metallic Sleeve –** Outside diam of sleeve to be tightly fitted with inside diam of opening, flush with both surfaces of wall assembly. The following metallic sleeves may be used:
   A. **Sheet Metal Sleeve –** Nom 8-1/2 in. (216 mm) cylindrical sleeve fabricated from 24 gauge or heavier galv steel.
   B. **Steel Sleeve –** Nom 8 in. (203 mm) diam (or smaller) schedule 40 (or lighter) steel cast or ductile iron sleeve.

3. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of sleeve shall be min 0 in. (0 mm) (point contact) to max 4 in. (102 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or steel conduit.
   D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. (92 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation for 1 and 2 hour rated assemblies respectively, firmly packed into opening, with approximately 25 percent compression within the metallic sleeve. Packing material to be recessed from both surfaces of wall assembly to accommodate the required thickness of fill material (Item 4B).
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At point contact location between metallic sleeve and penetrant, a min 1/2 in (13 mm) diam bead of fill material shall be applied at the penetrant/metallic sleeve interface on both surfaces of wall. Min 1/16 in. (2 mm) thickness of fill material applied over edge of sleeve, overlapping wallboard surface a min 1/4 in. (6 mm).
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 1-1/4 Hr (See Item1)	FT Ratings — 3/4 and 1-1/4 Hr (See Item 1)
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Ratings — 3/4 and 1-1/4 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** - Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum*** - Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 3-1/2 in. (89 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating is 3/4 and 1-1/4 hr is for 1 and 2 hr rated assemblies, respectively.

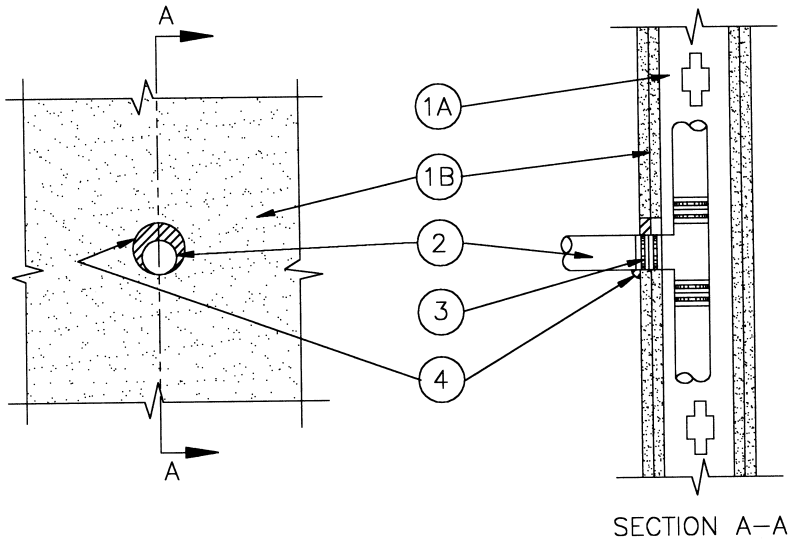
2. **Through Penetrating Products*** – **Flexible Metal Piping –** Nom. 2 in. (51 mm) diam (or smaller) steel flexible metallic piping. Max one flexible metal piping to be installed either concentrically or eccentrically within opening. The annular space between piping and periphery of opening shall be min 0 (point contact) in. to max 1 in. (25 mm). Piping to be rigidly supported on both sides of wall assembly. Plastic covering on piping may or may not be removed on both sides of wall assembly.
   Omegaflex Inc. – TracPipe Flexible Gas Piping

2A. **Stainless Steel Pipe –** (Not Shown) As an alternate to Item 2, Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe to be installed concentrically or eccentrically within opening. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 (16 mm) and 1-1/4 in. (32 mm) thickness of fill material for 1 and 2 hr fire-rated wall assemblies, respectively,, applied within the annulus, flush with both surfaces of wall. An additional 1/2 in. diam of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of wall.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of steel channel studs. Steel studs to be min 6 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 5-5/8 in.
   The F and T ratings are equal to the rating of the wall.

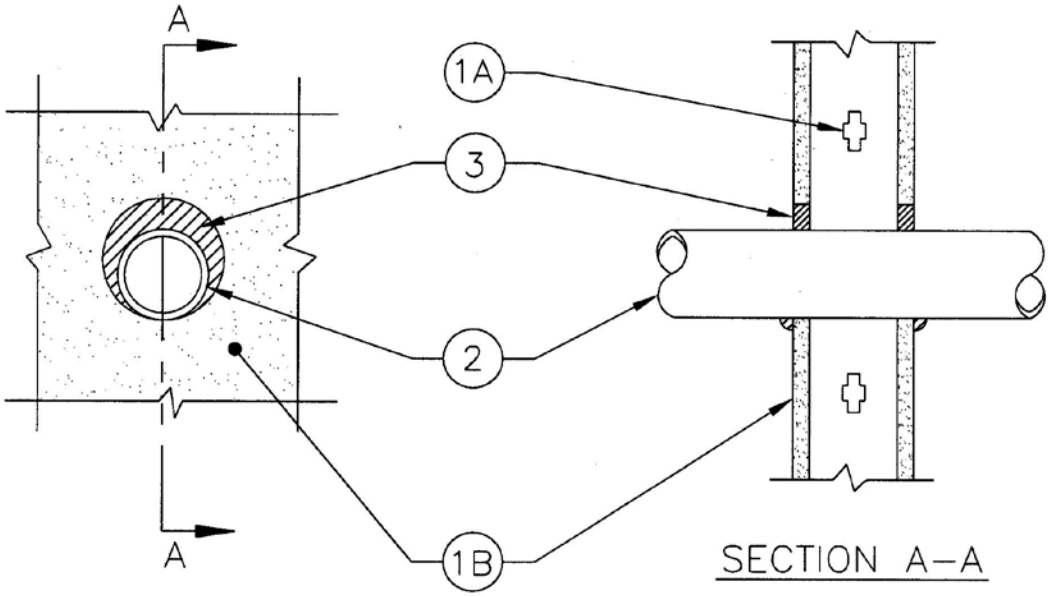
2. **Metallic Pipe –** Metallic pipe installed within stud cavity and connected to metallic tee with couplings (Item 3). Metallic pipe penetrating wall assembly on one side of wall to be installed either concentrically or eccentrically within the firestop system. Pipe, to be rigidly supported on penetrating side of wall assembly. The following types of and sizes of metallic pipes and tees may be used:
   A. **Steel Pipe –** Nom 4 in diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. diam (or smaller) cast or ductile iron pipe.
   C. **Steel Tee –** Nom 4 in diam (or smaller) Schedule 40 (or heavier) steel tee.
   D. **Iron Tee –** Nom 4 in. diam (or smaller) cast or ductile iron tee.

3. **Shielded Slip On Coupling –** Nom 4 in. diam (or smaller) 32 gauge (or heavier) corrugated stainless steel shielded rubber coupling, approved for installation in cast iron vented (drain, waste or vent) piping systems. Pipes to be secured together with slip on coupling. The annular space between coupling and periphery of opening shall be min 0 in. (point contact) to max 7/8 in.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At point contact location between wallboard and coupling, a min 1/2 in diam bead of fill material shall be applied at the wallboard/coupling interface on penetrating surface of wall.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/4 Hr



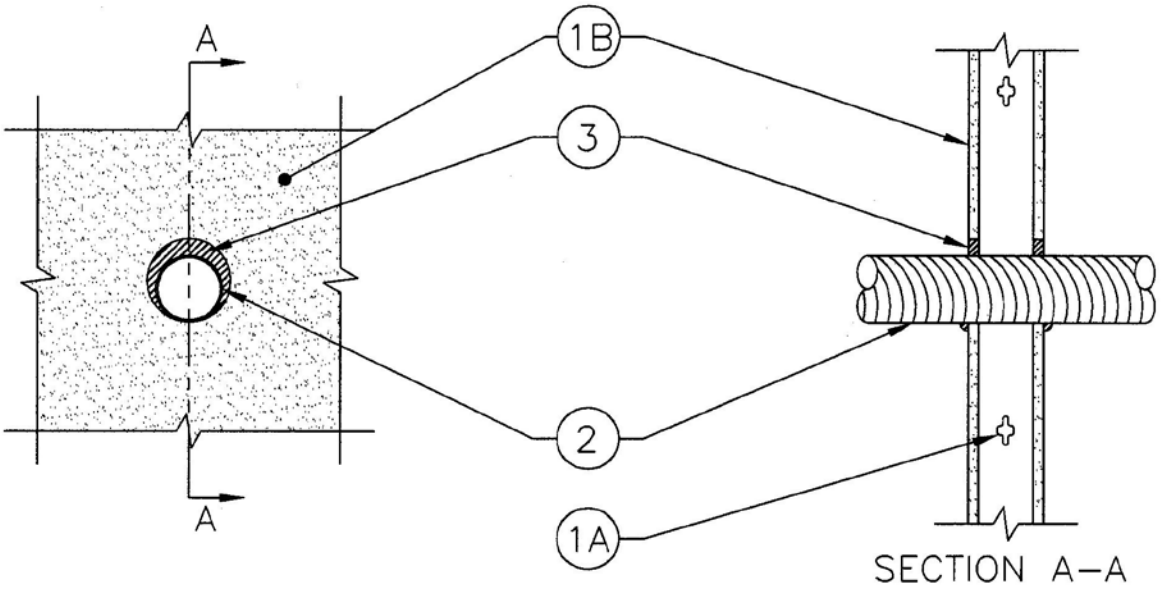
1. **Wall Assembly –** The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 10-1/8 in. (257 mm).

2. **Through Penetrants –** One metallic pipe or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe or tubing and periphery of opening shall be min 0 (point contact) in. to max 1-3/8 in. (35 mm). Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 8 in. (203 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
   F. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT).
   G. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. An additional 1/2 in. (13 mm) diam bead of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of the wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Ratings — 0 and 1/4 Hr (See Item1)	FT Ratings — 0 and 1/4 Hr (See Item 1)
	FH Rating — 1 Hr
	FTH Ratings — 0 and 1/4 Hr (See Item 1)



1. **Wall Assembly –** The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in theIndividual Wall and Partition Design. Max diam of opening is 6 in. (152 mm).

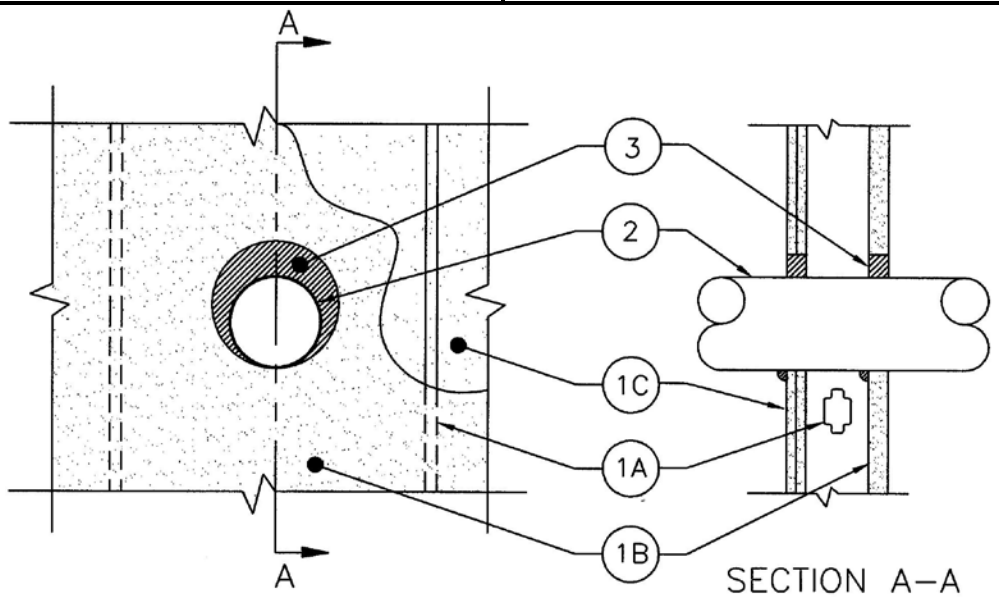
2. **Through Penetrants* –** Nom 4 in. (102 mm) diam (or smaller) aluminum or steel **Flexible Metal Conduit+**. Max one conduit per opening. The annular space between the conduit and the periphery of the opening shall be min 0 in. (0 mm) (point contact) to max 1-1/2 (38 mm) in. Flexible metal conduit to be rigidly supported on both sides of wall assembly.
   T Rating shall be 0 Hr for aluminum flexible conduit and 1/4 Hr for steel flexible conduit.

2A. **Through Penetrants* –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe. The annular space between the pipe and the periphery of the opening shall be min 0 in. (0 mm) (point contact) to max 1-1/2 (38 mm) in. Pipe to be rigidly supported on both sides of wall assembly.
T Rating shall be 0 Hr for stainless steel pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of the wall. An additional 1/2 in. (13 mm) diam bead of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of the wall.
Passive Fire Protection Partners – 3600EX, 4800DW

+Bearing the UL Listing Mark
*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 2 Hr
	FTH Rating — 0 Hr



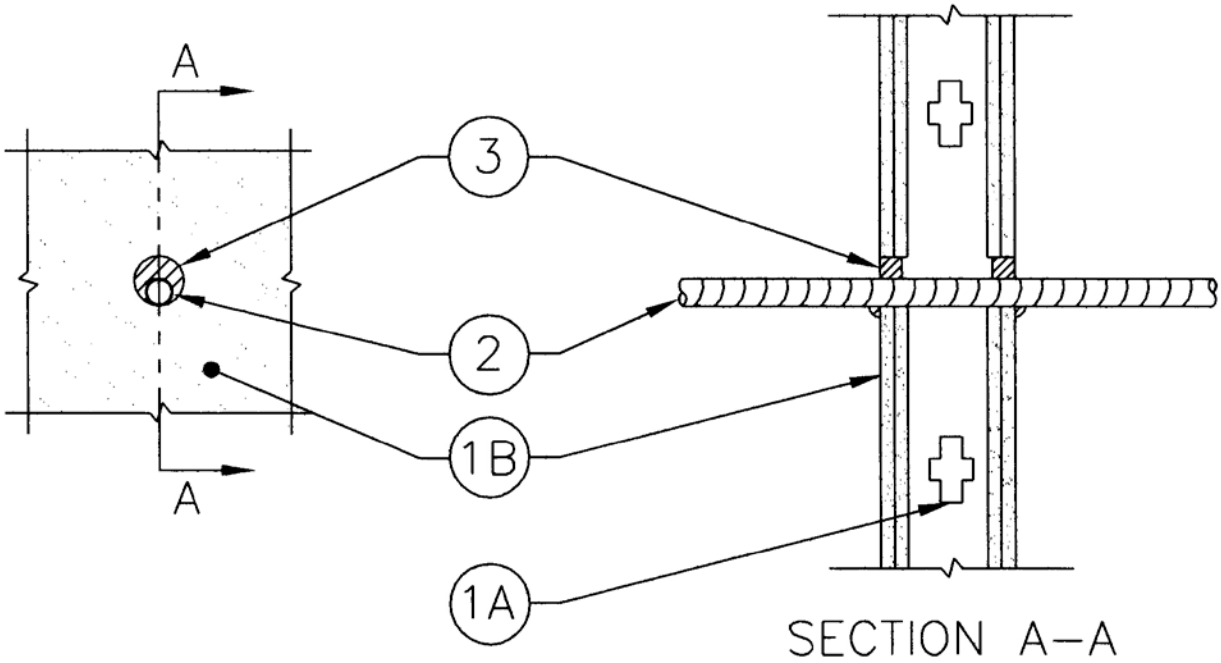
1. **Wall Assembly –** The 2 hr fire rated shaft wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400-Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Steel Studs** – C-H-shaped studs, 2-1/2 in. (64 mm) wide by min 1-1/2 in. (38 mm) deep, spaced 24 in. (610 mm) OC.
   - B. **Gypsum Board*** – 1 in. (25 mm) thick gypsum board liner panels, supplied in nom 24 in. (610 mm) widths as specified in the individual Wall and Partition Design. Max diam of opening is 10 in. (254 mm).
   - C. **Gypsum Board* –** Two layers of 1/2 in. (13 mm) thick gypsum board as specified in the individual Wall and Partition Design. Max diam of opening is 10 in. (254 mm).

2. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (point contact) to max 1-3/8 in. (35 mm) Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types of and sizes of metallic pipes, conduits or tubing may be used:
   - A. **Steel Pipe –** Nom 8 in. (203 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe
   - B. **Iron Pipe –** Nom 8 in. (203 mm) diam (or smaller) cast or ductile iron pipe
   - C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or nom 6 in. (152 mm) (or smaller) rigid steel conduit
   - D. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing
   - E. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe
   - F. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of sealant applied within the annulus, flush with both surfaces of wall. Min. 1/2 in. (13 mm) diam bead of fill material shall be applied at the gypsum board/penetrant interface at the point contact location on outer surface of wall on side using two layers of 1/2 in. (13 mm) gypsum board (Item 1C).
Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 2 Hr (See Item1)	FT Ratings — 3/4 and 2 Hr (See Item 1)
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Ratings — 3/4 and 1-1/4 Hr (See Item 1)



1. **Wall Assembly** – The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in.(93 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 2-1/2 in. (64 mm).
   The hourly F and FH Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T, FT and FTH Ratings 3/4 and 2 hr are for 1 and 2 hr rated assemblies, respectively.

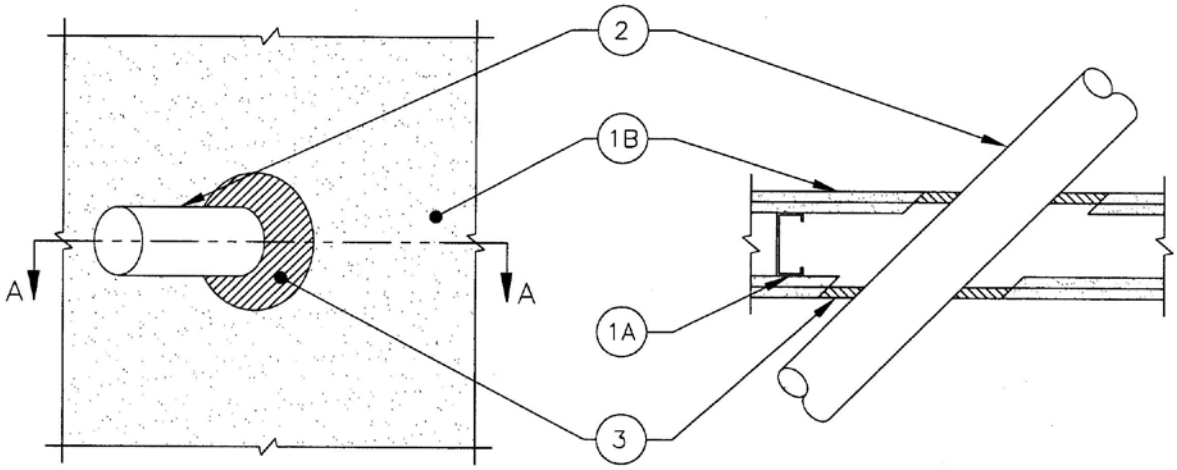
2. **Through Penetrating Product* – Flexible Metal Piping –** Nom 1-1/4 in. (32 mm) diam (or smaller) steel Flexible Metal Piping to be installed either concentrically or eccentrically within the firestop system. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of wall assembly.
   GASTITE, DIV OF TITEFLEX

2A. **Stainless Steel Pipe —** Nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between piping and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Piping to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material for 1 hr rated wall assemblies and 1 in. thickness of fill material for 2 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be installed at the wallboard/penetrant interface on both surfaces of wall.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



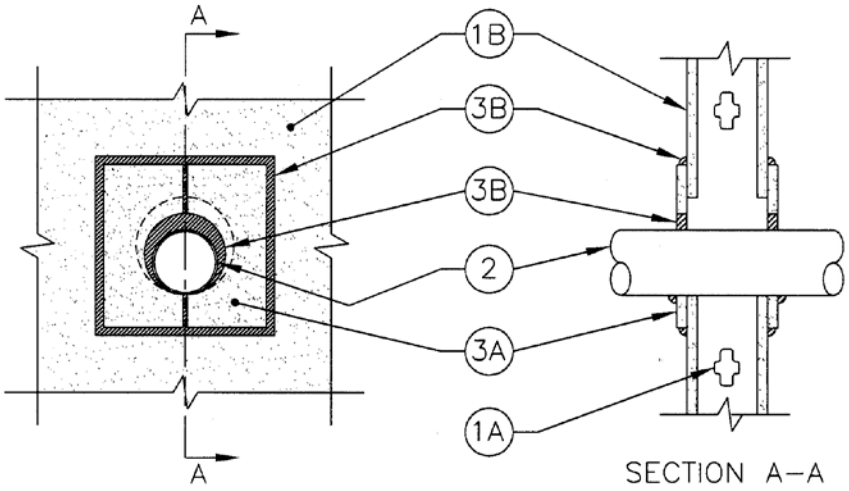
1. **Wall Assembly –** The 1 and 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 BY 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. (610 mm).
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 6-1/2 in. (165 mm).
   The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants –** One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). The Penetrant may be installed at an angle no greater than 45 degrees from perpendicular. Penetrant to be rigidly supported on both sides of wall assembly. The following types and sizes of penetrants may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or steel electrical metallic tubing (EMT).
   D. **Copper Tubing** – Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe** – Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of caulk applied within annulus, flush with both surfaces of wall assembly. Min 1/2 in. (13 mm) diam bead of caulk shall be applied at the penetrant/gypsum board interface at point contact location on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 1/4 Hr



1. **Wall Assembly** - The 1 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs**-Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board*** – One layer of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. Max diam of opening is 6 in. (152 mm).

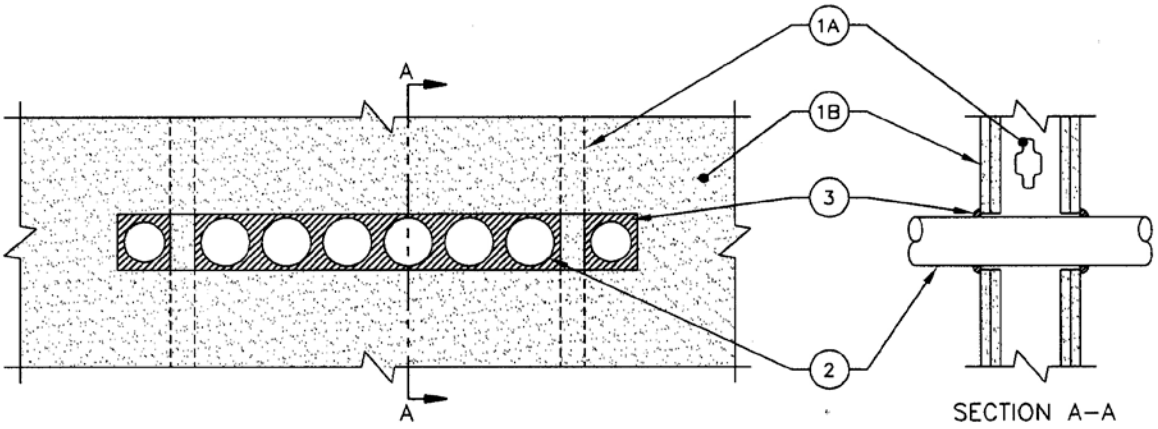
2. **Through Penetrants**-One metallic pipe, conduit or tubing installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). Penetrant to be rigidly supported on both sides of wall assembly. The following types and sizes of penetrants may be used:
   A. **Steel Pipe** – Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe** – Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit** – Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit or steel electrical metallic tubing (EMT).
   D. **Copper Tubing** – Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe** – Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Firestop System** – The firestop system shall consist of the following:
   A. **Gypsum Board*** – Two piece patch of min 5/8 in. (16 mm) thick gypsum board. Patch to be sized to overlap opening in Item 1B a min of 2 in. (51 mm) on all sides and cut into two halves such that a vertical seam traverses the center of the opening. Each half shall be tightly butted together and secured to gypsum board (Item 1B) with a min of five 1-1/4 in. (32 mm) long (or longer) bugle-head drywall screws located in each corner of patch and centered along the outside vertical edge. Max diam of opening is 1 in. (25 mm) larger than outside diam of penetrant.

   B. **Fill, Void or Cavity Materials* – Sealant** – Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of the gypsum board patch. An additional 5/8 in. (16 mm) bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface.
   Passive Fire Protection Partners – 3600EX,4100NS or 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 and 1/4 Hr (See Item1)	FT Ratings — 0 and 1/4 Hr (See Item 1)
	FH Ratings — 1and 2 Hr (See Item 1)
	FTH Ratings — 0 and 1/4 Hr (See Item 1)



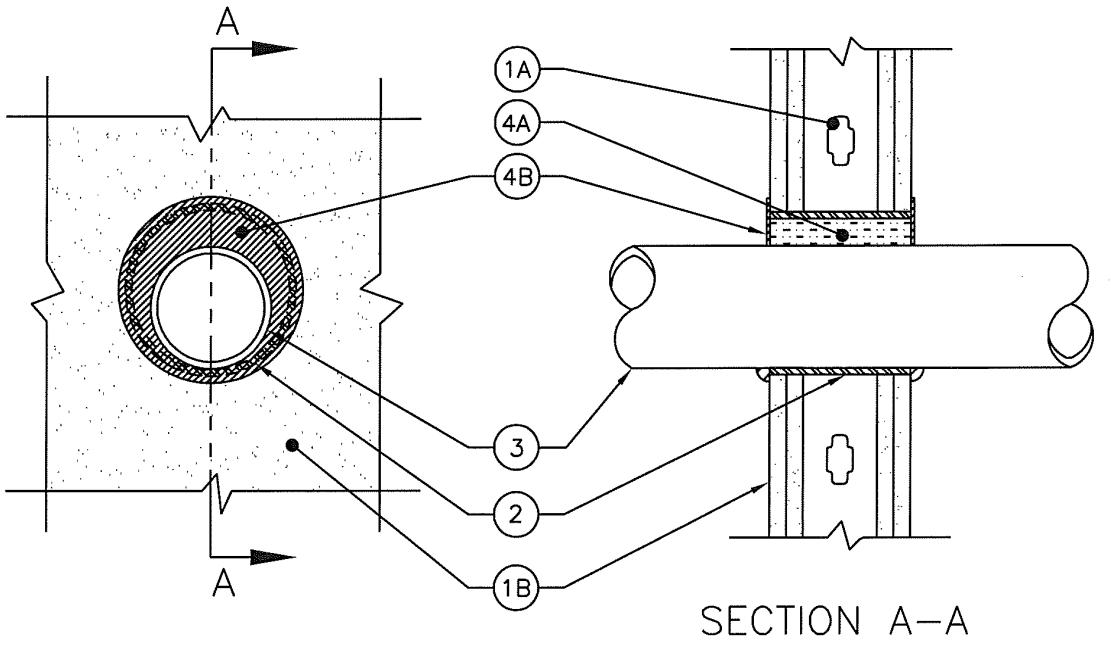
1. **Wall Assembly** – The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in the individual U400 Series design. Max height of opening is 3-1/2 in. (89 mm). Max width of opening is 32 in. (914 mm). When width of opening exceeds width of stud cavity, the studs and the gypsum board covering the studs shall not be removed.
   The hourly F an FH Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T, FT and FTH Ratings of the firestop system is 0 and 1/4 Hr for 1 and 2 Hr rated assemblies, respectively.

2. **Through Penetrants –** Max eight multiple sized pipes installed in single layer array within the firestop system. The annular space between the penetrants and between the penetrants and the edges of the opening shall be min 3/8 in. (10 mm) to max 3/4 in. (19 mm). Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipe or conduit may be used:
   A. **Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 3 in. (76 mm) diam (or smaller) steel electrical metallic tubing or rigid steel conduit.
   D. **Copper Tubing –** Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   E. **Copper Pipe –** Nom 3 in. (76 mm) diam (or smaller) Regular copper pipe.
   F. **Stainless Steel Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Fill Void or Cavity Materials* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed to completely fill annular space between penetrants and gypsum board flush with each surface of wall. **Passive Fire Protection Partners –** 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/4 Hr



1. **Wall Assembly –** The 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 13-7/8 in. (352 mm).

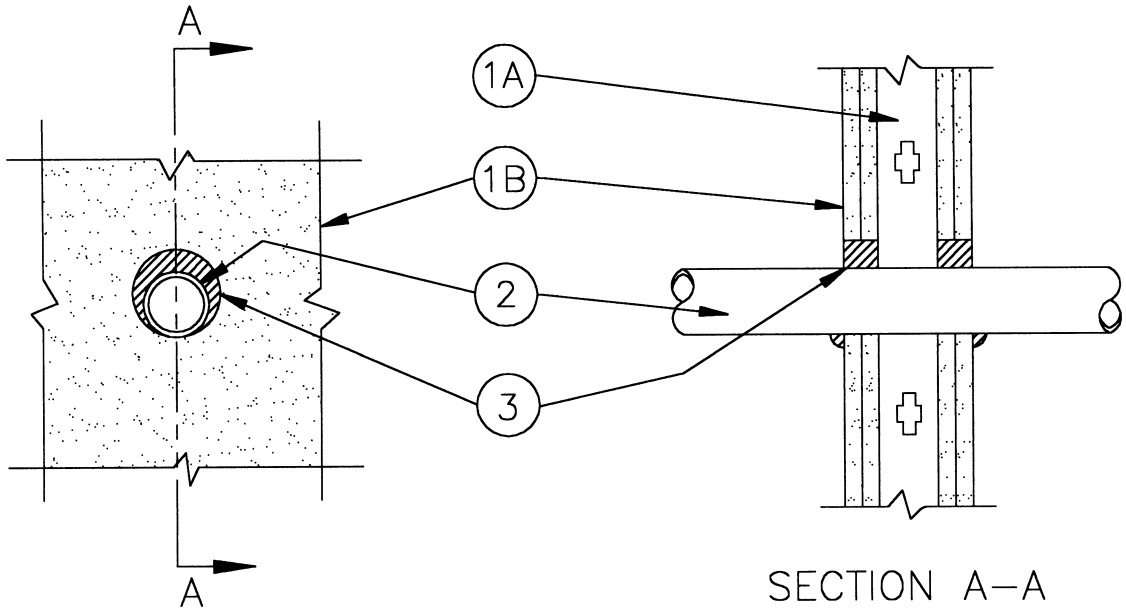
2. **Steel Sleeve –** Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel and having a min 1 in. (25 mm) overlap along the longitudinal seam. Sleeve friction-fitted into opening, flush with both surfaces of the wall.

3. **Through Penetrants –** One metallic pipe, tubing or conduit installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and the sleeve shall be min 0 (point contact) in. to max 1-7/8 in. (48 mm). Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduit may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Conduit –** Nom 6 in. (152 mm) diam (or smaller) electrical metallic tubing (EMT).
   F. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit.
   G. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Material** – Min 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into the opening as a permanent form, flush with both surfaces of the wall.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness of fill material applied to completely cover packing material on both surfaces of the wall and overlap onto gypsum board and penetrant a min 1/2 in. (13 mm).
      Passive Fire Protection Partners – 5100SP

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 1, 2, 3 and 4 Hr (See Item 1)



1. **Wall Assembly –** The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** The gypsum wallboard type, thickness, number of layers, fasteners and sheet orientation shall be as specified in the individual U300 or U400 Series Designs in the UL Fire Resistance Directory. Max diam of opening is 3-1/8 in.

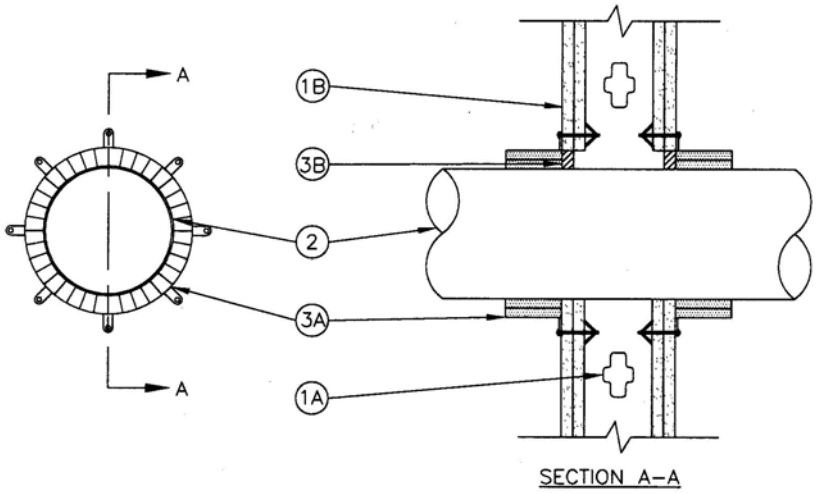
   The hourly F and T Ratings of the firestop system is equal to the hourly fire rating of the assembly in which it is installed.

2. **Through Penetrants –** One nonmetallic pipe or tubing installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or tubing may be used:
   A. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 11 CPVC pipe for use in closed (process or supply) piping systems. The annular space between pipe and periphery of opening shall be min 1/4 in. to max 1/2 in.
   B. **Crosslinked Polyethylene (PEX) Tubing –** Nom 1-1/2 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems. The annular space between tubing and periphery of opening shall be min 1/4 in. to max 3/8 in.
   C. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) piping systems. The annular space between pipe and periphery of opening shall be min 1/4 in. to max 1/2 in.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material for a 1 hr rated wall assembly, min 1 in. thickness of fill material for 2, 3 and 4 hr rated assemblies applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 2 Hr (See Item 1)



1. **Wall Assembly** – The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 7 in.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating is 3/4 and 2 hr for 1 and 2 hr rated assemblies, respectively.

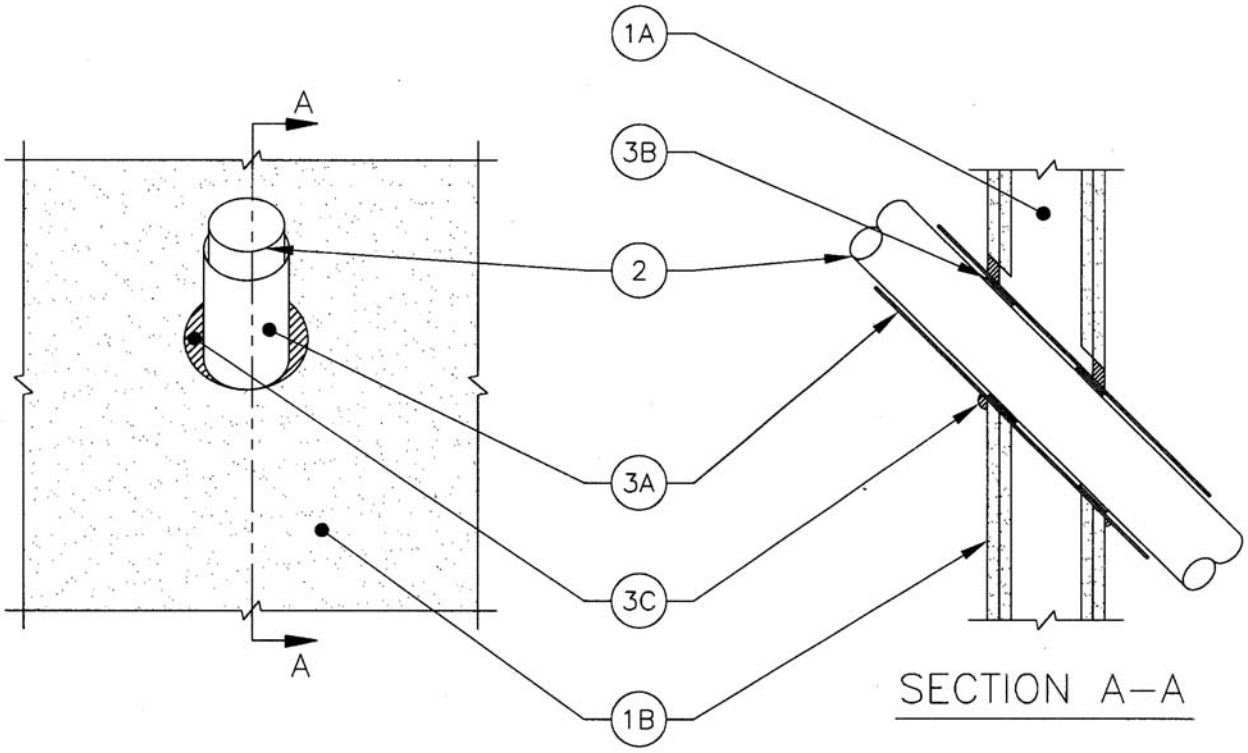
2. **Through Penetrants –** One non-metallic pipe to be installed concentrically or eccentrically within the opening. The annular space between pipe and periphery of opening to be min. 0 in. (point contact) to max 1/2 in. Pipe to be rigidly supported on both sides of floor assembly. The following types and sizes of non-metallic pipes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 6 in. diam (or smaller) Schedule 40 solid core or cellular core PVC pipe for use in closed (process and supply) or vented (drain, waste or vent) piping systems
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 6 in. diam (or smaller) SDR 17 CP' pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System** - The firestop system shall consist of the following:
   A. **Fill Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW
   B. **Firestop Device* - Collar** –Collar to be installed in accordance with the manufacturer's installation instructions. Collar to be installed and latched around pipe and secured to both sides of wall with min 3/16 in. diam steel toggle bolts in conjunction with steel nuts and min 1-1/4 in. diam steel washers. Min of two, three or four bolts for nom 2 in. diam (or smaller), nom 3 in. diam and nom 4 and 6 in. diam pipes, respectively.
   Passive Fire Protection Partners – Plastic pipe Collar (PPC) 1.5, 2, 3, 4 and 6

*Bearing the UL Classification Marking

****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 2 Hr (See Item 1)



1. **Wall Assembly –** The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide steel channel studs spaced max 24 in. OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 6-1/2 in.

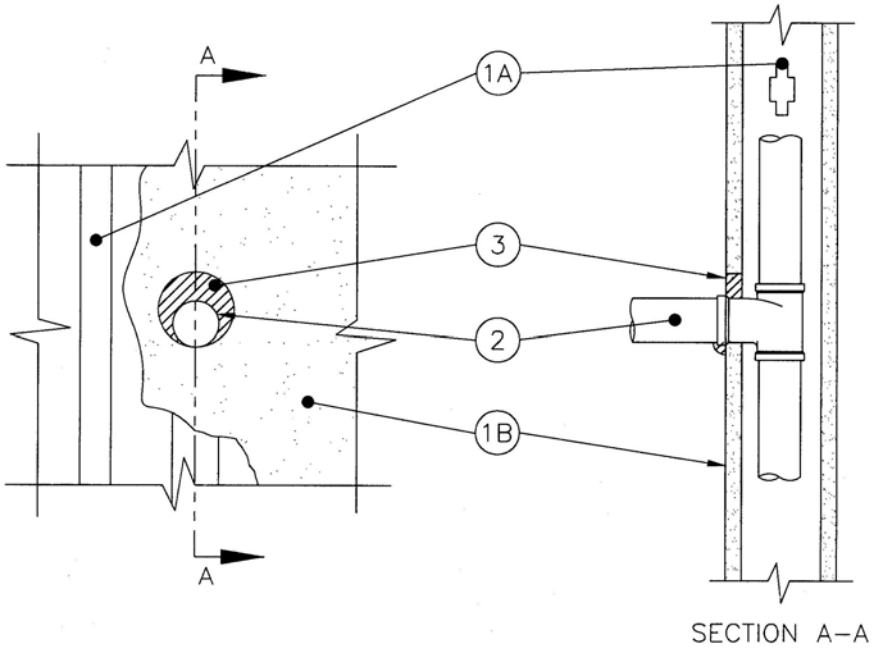
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which is installed. The hourly T Rating is 3/4 and 2 Hr for 1 and 2 Hr rated assemblies, respectively.

2. **Through Penetrants –** One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 1/4 in. to max 3/4 in. The penetrant may be installed at an angle not greater than 45 degrees from perpendicular. Penetrant to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 cellular core or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) pipe –** Nom 3 in. diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Non Metallic Conduit+** – Nom 3 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Metallic Sleeve –** Cylindrical sleeve fabricated from min 0.019 in. thick (26 gauge) galv sheet metal and having a min 1 in. lap along the longitudinal seam. Sleeve to extend a min. of 2 in. to a max 5-1/2 in. beyond both sides of the wall. The inside diam of the sleeve shall be 1/2 in. larger than outside diam of nonmetallic pipe or conduit such that an annular space will be present between the steel sleeve and the pipe around the entire circumference of the pipe to accommodate the layers of wrap strips (Item 3B). The annular space between the outside of the wrap strip layer(s) and the inside of the sleeve shall be 1/4 in. The annular space between the outside of the sleeve and the periphery of the opening shall be min 0 in. to max 1/2 in.
   B. **Fill, Void or Cavity Material* – Intumescent Strips –** Nom 1/8 in. thick intumescent material supplied in 2 in. wide strips. Two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into sleeve on both sides of wall such that the outer edges of wrap strips are recessed 1 in. from the outer edges of the sleeve. A min 1/2 in. wide stainless steel hose clamp shall be around the outside of sleeve over the center of the wrap strips on both ends of the sleeve.
      Passive Fire Protection Partners – Wrap Strip WS1
   C. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 and 1-1/4 in. thickness of caulk applied within annulus between metallic sleeve and periphery of the opening, flush with both surfaces of wall assembly for 1 and 2 Hr rated assemblies, respectively. Min 1/2 in. diam bead of caulk shall be applied at the sleeve/gypsum board interface at the point contact location on both surfaces of wall assemblyd.
      Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Rating — 1 Hr
T Rating — 1 Hr



SECTION A–A

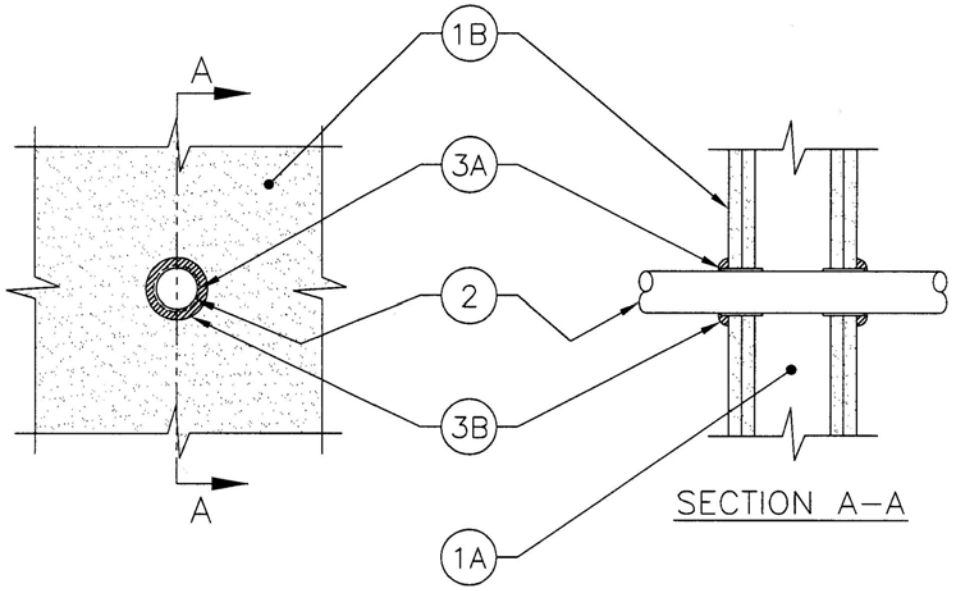
1. **Wall Assembly –** The 1 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide steel channel studs spaced max 24 in. OC.
   B. **Gypsum Board*** – Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 6 in.

2. **Nonmetallic Pipe** – Nonmetallic pipe, installed within stud cavity and connected to nonmetallic tee. Nonmetallic pipe penetrating wall assembly on one side of wall to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1-3/8 in. Pipe to be rigidly supported on penetrating side of wall assembly. The following types and sizes of nonmetallic pipes and tees may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 cellular core or solid core PVC pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. diam (or smaller) SDR 13.5 CPVC pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 cellular or solid core ABS pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with surface of wall. At point contact location between gypsum board and pipe, a min 1/2 in. diam bead of fill material shall be applied at the pipe/gypsum board interface.
Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1, 1-3/4 and 2 Hr (See Item 2)



1. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and partition Design. Max diam of opening is 1/2 in. larger than the outside diam of the nom 2-1/2 in and 3 in. diam penetrants. Diam of opening is 1/4 in. larger than the outside diam of penetrants less than nom 2-1/2 in. diam.
   The hourly F Rating of the firestop system is equal to the hourly rating of the wall assembly in which it is installed.

2. **Through Penetrant –** One non-metallic pipe or conduit to be centered within the opening. The annular space between the penetrant and the periphery of the opening shall be max 1/4 in for nom 2-1/2 in. and 3 in. dim penetrants. The annular space between penetrants and periphery of opening shall be 1/8 in. for penetrants less than nom 2-1/2 in. diam. Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of non-metallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent)** piping systems.
   B. **Chlorinated polyvinyl Chloride (CPVC) Pipe –** Nom 3 in. diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Non-Metallic Conduit+ –** Nom 3 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   D. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent)** piping systems.
   E. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 2 in. diam (or smaller) Schedule 40 cellular core or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent)** piping systems.

      The hourly T Rating is 1 Hr for 1 Hr rated assemblies.
      The hourly T Rating is 1-3/4 Hr for penetrants D and E in 2 Hr rated assemblies.
      The hourly T Rating is 2 Hr for all other penetrants in 2 Hr rated assemblies.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Intumescent Strips –** Nom 1/8 in. thick intumescent material supplied in 2 in. wide strips. Two layers of wrap strips are required for nom 2-1/2 in. and 3 in. diam penetrants and one layer of wrap strip is required for penetrants less than nom 2-1/2 in. diam. Wrap strips are individually wrapped tightly around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered of aligned. Layers of wrap strip to be recessed into opening on both sides of wall such that the outer edge of wrap strips extend approximately 1/2 in. beyond both surfaces pf wall.

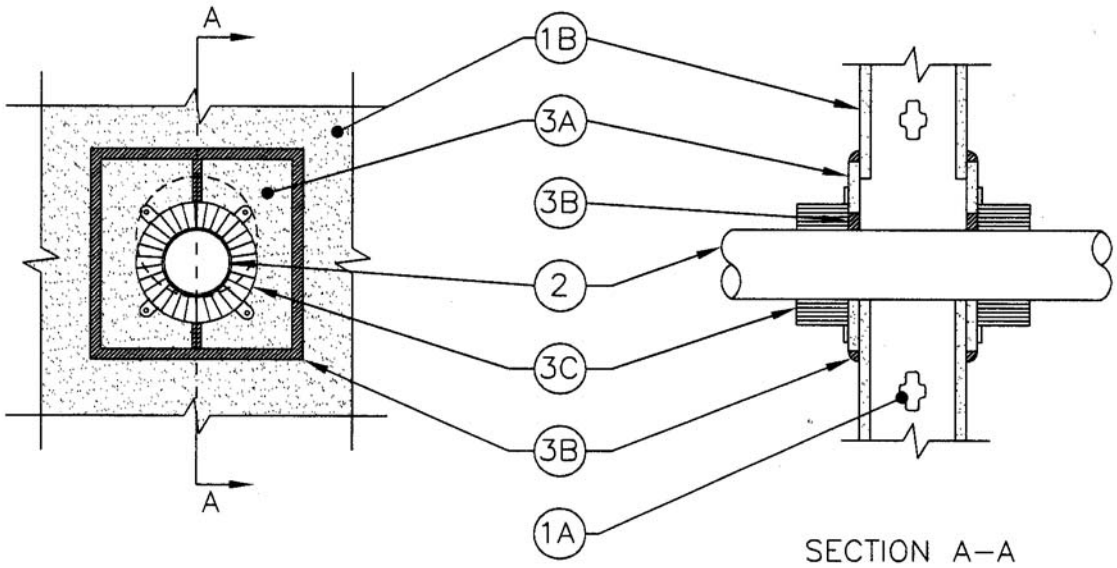
      Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. diam bead of caulk shall be applied at wrap strip/gypsum board interface on both surfaces of wall assembly.

      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

****Not tested to 50 Pa pressure differential as required by Canadian code for combustible DWV (Drain, Waste or Vent) piping systems.**

* Bearing the UL Classification Mark
\+ Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)
F Rating — 1 Hr
T Rating — 1 Hr



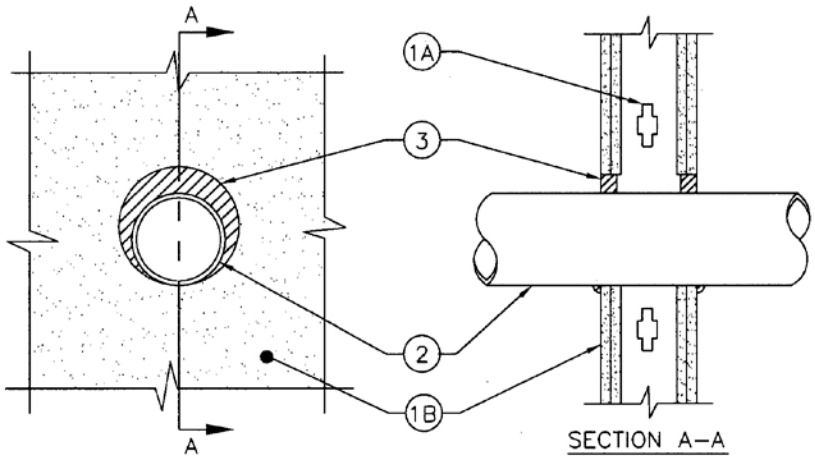
1. **Wall Assembly –** The 1 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board*** – One layer of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. Max diam of opening is 7 in. (178 mm).

2. **Through Penetrant** – Max one nonmetallic pipe or conduit to be installed concentrically or eccentrically within opening. The annular space between pipe and periphery of opening shall be min 0 in. (0 mm) (point contact) to max 2-1/2 in. (64 mm). Pipe to be rigidly supported on both sides of wall assembly.
   A. **Polyvinyl Chloride (PVC) Pipe** – Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping.
   B. **Rigid Non Metallic Conduit+ –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** – Nom 4 in. (102 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.

3. **Firestop System** – The firestop system shall consist of the following:
   - A. **Gypsum Board*** – Two piece patch of min 5/8 in. (16 mm) thick gypsum board. Patch to be sized to overlap opening in Item 1B a min of 2 in. (51 mm) on all sides and cut into two halves such that a vertical seam traverses the center of the opening. Each half shall be tightly butted together and secured to gypsum board (Item 1B) with a min of five 1-1/4 in. (32 mm) long (or longer) bugle-head drywall screws located in each corner of patch and centered along the outside vertical edge. Max diam of opening is 1/2 in. (13 mm) larger than outside diam of penetrant.
   - B. **Fill, Void or Cavity Materials* – Sealant** – Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of the gypsum board patch. An additional 5/8 in. (16 mm) bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface.
     Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW
   - C. **Firestop Device* – Collar** – Collar to be installed in accordance with the manufacturer's instructions. Collar to be installed and latched around pipes and secured to gypsum board patch on both sides of wall with min 3/16 in. (5 mm) diam steel toggle bolts in conjunction with steel nuts and 1-1/4 in. (32 mm) diam steel washers. Min of two, three and four bolts for nom 2 in. (51 mm) (and smaller), nom 3 in. (76 mm) and nom 4 in. (102 mm) diam pipes, respectively.
     Passive Fire Protection Partners – PPC 1.5, 2, 3 or 4

* Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 1/2 Hr



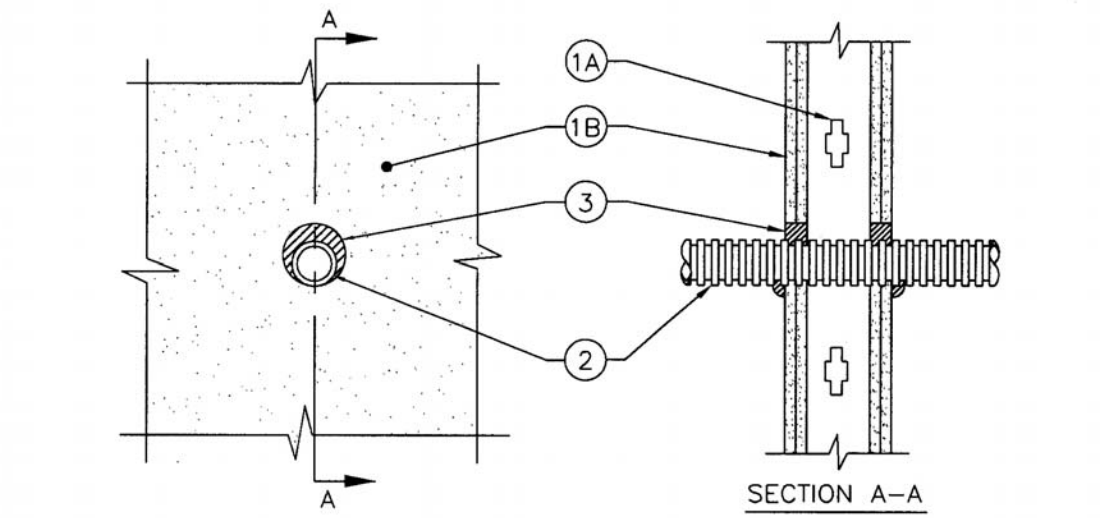
1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 7-1/2 in.

2. **Nonmetallic Pipe+ – Glass Pipe –** Nom 6 in. diam (or smaller) glass pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. One pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1 in. Pipe to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 or 1 in. thickness of fill material for 1 or 2 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the wallboard/pipe interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

*Bearing the UL Classification Marking
+Vented piping systems described in the UL Fire Resistance Directory are limited to closed piping systems based on the Canadian building code requirements.

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 2 Hr (See Item 1)



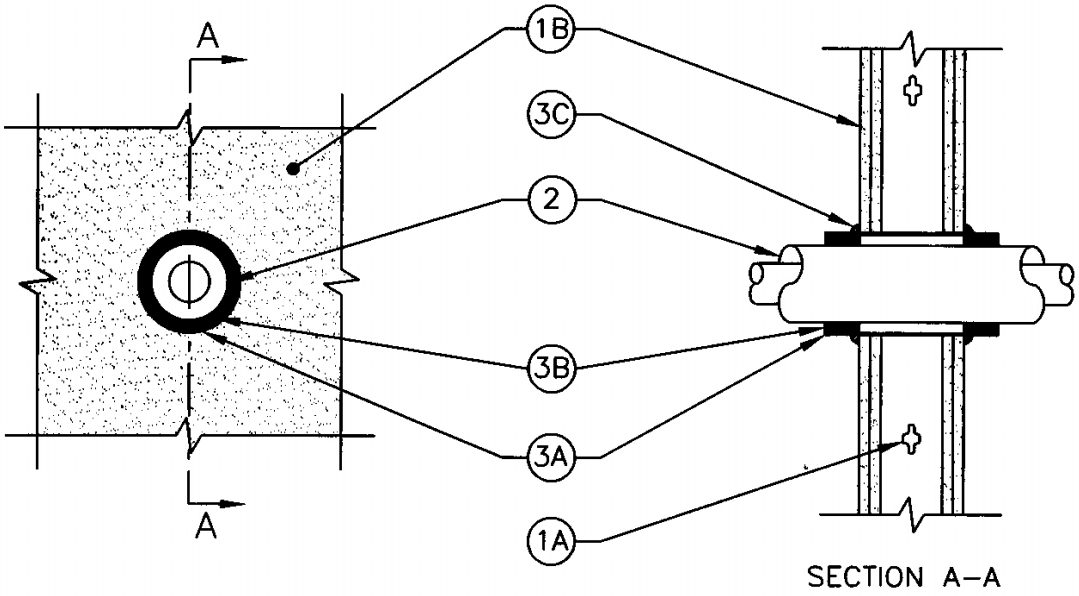
1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 3 in.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Electrical Nonmetallic Tubing (ENT)++ –** One nom 2 in. diam (or smaller) corrugated wall. ENT constructed of polyvinyl chloride (PVC). The annular space shall be min. 0 in. (point contact) to a max. 1 in. ENT to be rigidly supported on both sides of the wall.
   See **Electrical Nonmetallic Tubing** (FKHU) category in Electrical Construction Materials Directory for names of manufacturers.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 or 1 in. thickness of fill material for 1 or 2 hr rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At point contact location between penetrant and wallboard, a min 1/2 in. diam bead of fill material shall be applied at the penetrant/wallboard interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 and 1-3/4 Hr (See Item 1)



1. **Wall Assembly** – The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board*** – Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 6 in. (152 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating of the firestop system is 0 and 1-3/4 hr for 1 and 2 hr rated assemblies, respectively.

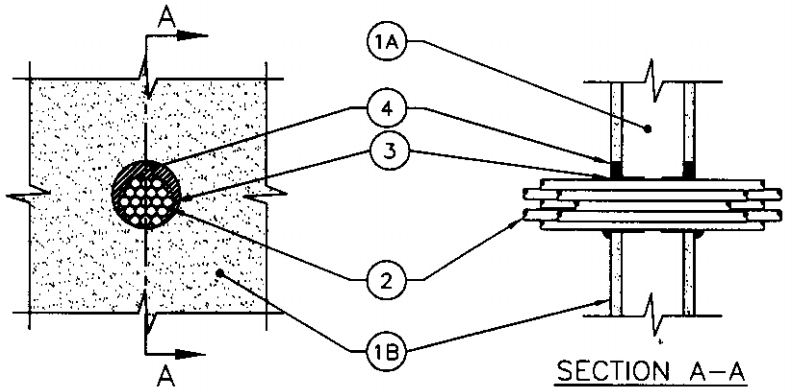
2. **Through Penetrants –** One nonmetallic pipe concentrically installed within a second nonmetallic pipe and centered within the firestop system. The space between the outer pipe and the sleeve shall be nom 1/2 in. (13 mm). Nonmetallic spacers shall be used to maintain the inner pipe within the center of the outer pipe at a distance no closer than 10 in. (254 mm) from both surfaces of the wall. Outer pipe to be rigidly supported on both sides of wall assembly. The following type and size of nonmetallic pipe described in Item A may be used for the outer pipe and the following type and size of nonmetallic pipe described in Items B may be used for the inner pipe.
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Metallic Sleeve –** Cylindrical sleeve fabricated from 20 gauge (or heavier) galv sheet steel. The ends of the sleeve shall extend 2 in. (51 mm) beyond each surface of the wall. After the installation of the wrap strip (Item 3B) within the sleeve, a 1/2 in (13 mm) wide stainless steel hose clap shall be tightly installed over the ends of the sleeve approx 1 in. from the ends on both sides of the wall. The annular space between the sleeve and the periphery of opening shall be min 0 in. (0 mm) to max 1/2 in. (13 mm).
   B. **Fill, Void or Cavity Material* – Wrap Strip –** Five layers of nom 0.1 in. (2.5 mm) thick by 2 in. (50 mm) wide intumescent wrap strip individually wrapped around the outer pipe with the ends butted and held in place with foil tape. Butted ends in successive layers may be aligned or offset. The layers of wrap strip to be slid into sleeve such that layers are flush with both ends of sleeve.
      Passive Fire Protection Partners – WS1
   C. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annular space, flush with both surfaces of wall. Min 1/2 in. (13 mm) diam bead of fill material applied at the point contact location at the gypsum board/sleeve interface on both surfaces of wall.
      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**

ANSI/UL1479 (ASTM E814)
F Rating — 1 Hr
T Rating — 1 Hr



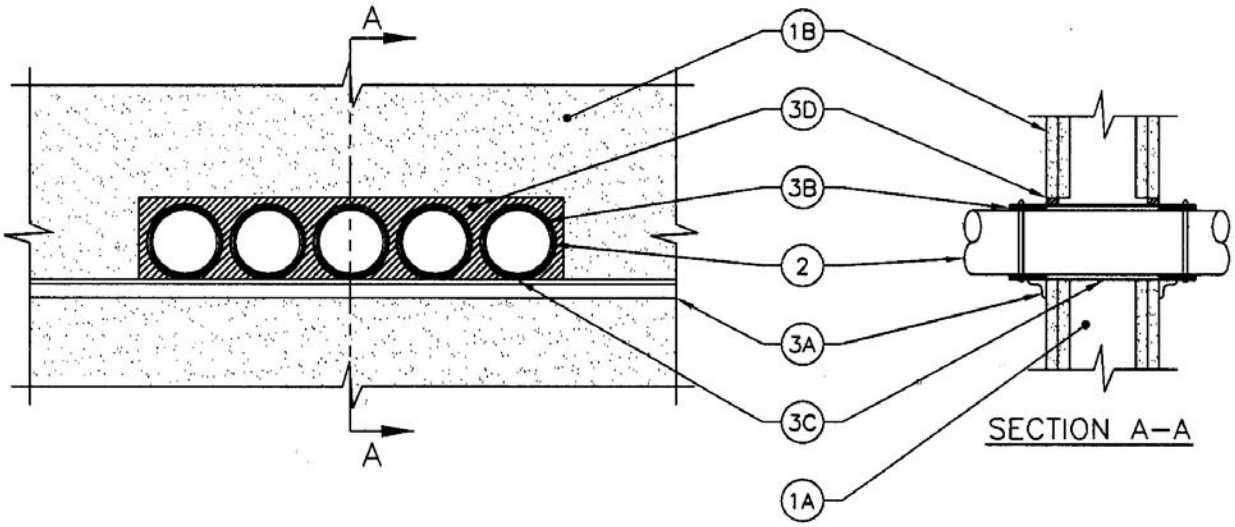
1. **Wall Assembly –** The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 2-3/4 in. (70 mm).

2. **Through Penetrant** – **Beverage Line –** Nom 2 in. (51 mm) diam beverage line for use in closed (process or supply) or vented (drain, waste or vent) piping systems, installed concentrically or eccentrically within the opening. The annular space between penetrant and periphery of opening shall be min 3/16 in. (5 mm) to a max 9/16 in. (14 mm). Penetrant to be rigidly supported on both sides of wall assembly. The beverage line shall consist of the following components:
   A. **Nonmetallic Tubing** – A max of ten tubes consisting of nom 3/8 in. (10 mm) diam and 1/2 in. (13 mm) diam polyethylene (PE) tubing tightly bundled.
   B. **Outer Jacket** – Polyvinyl chloride (PVC) jacket tightly wrapped over the tubes to completely cover the bundle.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Wrap Strip –** Two layers of nom 2.5 mm thick by 50 mm wide intumescent wrap strip individually wrapped around the outer circumference of the pipe and slid into the annular space such that wrap strip extends into opening and is flush with both surfaces of wall. Butted ends in successive layers shall be offset. Wrap strip secured with foil tape.
   Passive Fire Protection Partners – WS1
   B. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking
****Not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for Combustible Drain, Waste or Vent piping System.**

ANSI/UL1479 (ASTM E814)
F Ratings — 1and 2 Hr (See Item 1)
T Ratings — 0 and 1 Hr (See Item 1)



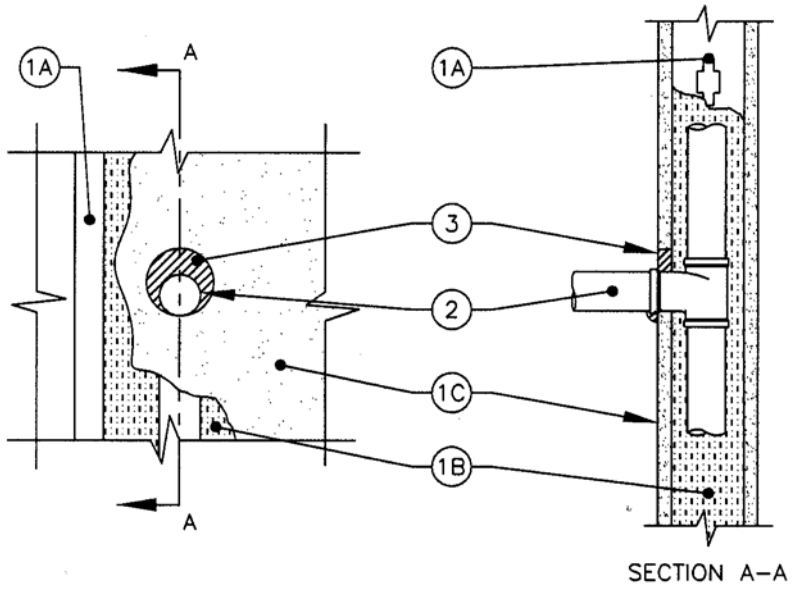
1. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in the individual Wall and Partition Design. Max height of opening is 4-1/2 in. (114 mm). Max width of opening is 22-3/4 in. (578 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating is 0 and 1 Hr for 1 and 2 Hr rated assemblies, respectively.

2. **Through Penetrant** – Max of five nonmetallic pipes or conduits to be installed concentrically or eccentrically within opening. The annular space between pipe and periphery of opening shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm). Penetrants to be rigidly supported on both sides of wall assembly. The following types and sizes of penetrants may be used:
   A. **Polyvinyl Chloride (PVC) Pipe** – Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping.
   B. **Rigid Non Metallic Conduit+ -** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).
   C. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** – Nom 3 in. (76 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.

3. **Firestop System –** The firestop system shall consist of the following:
   A. Min 1 by 1 by 1/4 in. (25 by 25 by 6 mm) steel secured steel studs with steel screws on both sides of the opening. Angles to be installed below the penetrants such that all penetrants and their steel sleeves (Item 3C) are fully supported on both sides of wall by the angles.
   B. **Fill, Void or Cavity Material* – Wrap Strip –** Two layers of nom 0.01 in. (2.5 mm) thick by 1.98 in. (50 mm) wide intumescent wrap strip individually wrapped around the outer circumference of each penetrant such that the wrap strip is flush with both surfaces of wall and extending outward. Butted ends in successive layers shall be offset. Wrap strip secured with foil tape.
   Passive Fire Protection Partners – WS1
   C. **Steel Sleeves** - Min 28 gauge galv steel sized to be 4 in. (102 mm) longer than the width of the wall.. Sleeves to be wrapped around each penetrant and extending 2 in. (51 mm) beyond both sides of wall and tightly secured around the wrap strip layers on each penetrant with 1/2 in. (13 mm) wide stainless steel hose clamps located approx 1/2 in. (13 mm) from each end of sleeve.
   D. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS or 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Rating — 1 Hr
T Rating — 1 Hr



SECTION A–A

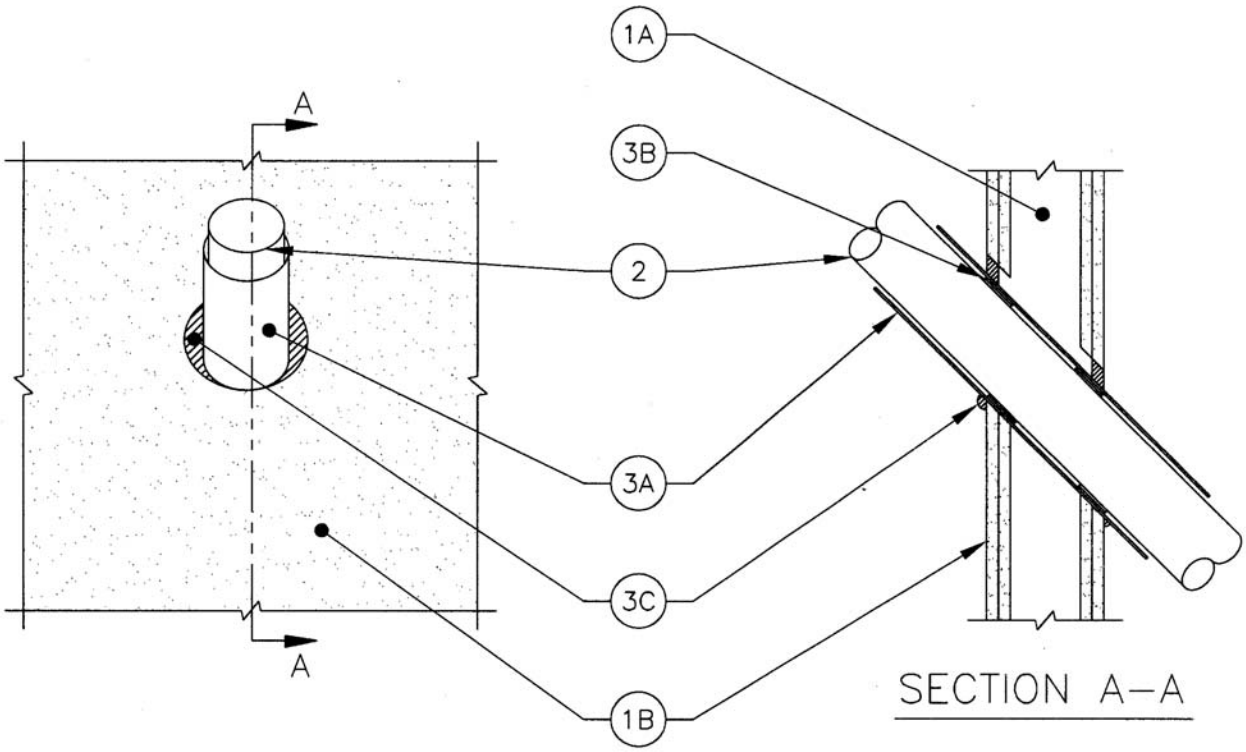
1. **Wall Assembly –** The fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Batts amd Blankets*** – Min R-13 glass fiber insulation or min 2.5 pcf (40 kg/m^3) mineral wool batt insulation installed to completely fill stud cavity containing nonmetallic pipe (Item 2).
   See **Batts and Blankets** (BZJZ) category in the Fire Resistance Directory for names of manufactures.
   C. **Gypsum Board*** – One layer of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 3-3/4 in. (95 mm).

2. **Nonmetallic Pipe** – Nonmetallic pipe, installed within stud cavity and connected to nonmetallic tee. Nonmetallic pipe penetrating wall assembly on one side of wall to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Pipe to be rigidly supported on penetrating side of wall assembly. The following types and sizes of nonmetallic pipes and tees may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 cellular core or solid core PVC pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe –** Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.
   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 cellular or solid core ABS pipe and tee for use in vented (drain, waste or vent) or closed (process or supply) piping systems.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with surface of wall. At point contact location between gypsum board and pipe, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/gypsum board interface.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Rating — 2 Hr
T Rating — 2 Hr



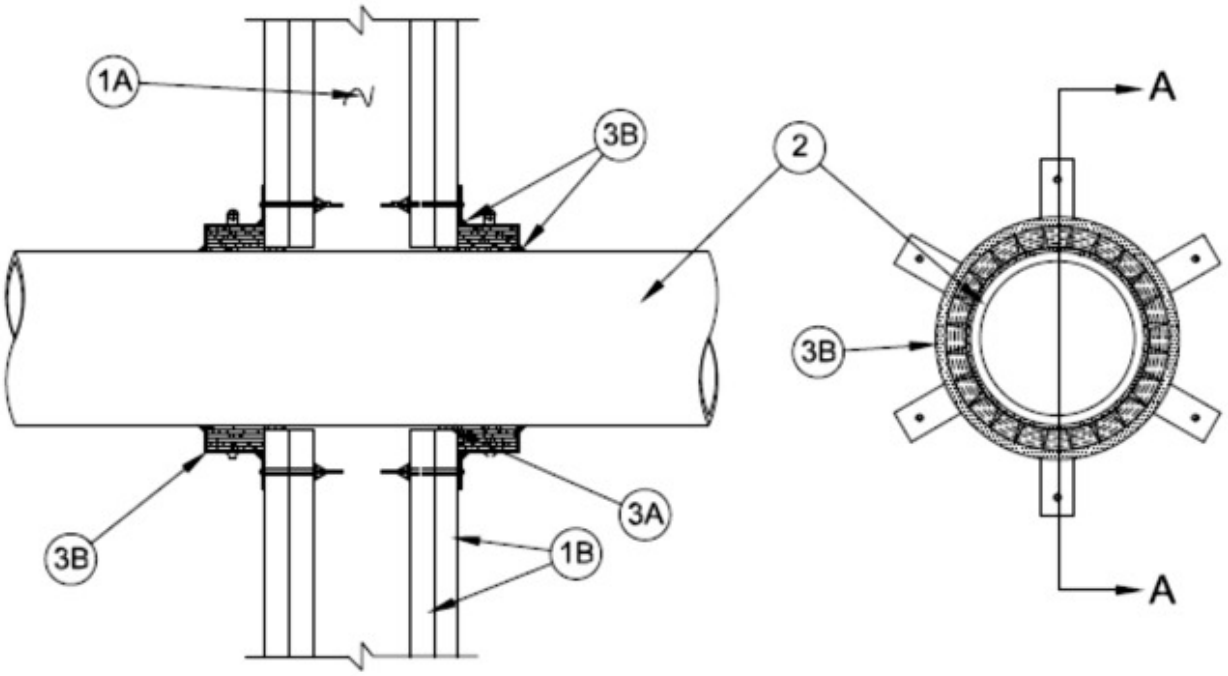
1. **Wall Assembly –** The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Two layers of 5/8 in. (16 mm) thick gypsum board as specified in the individual Wall and Partition Design. Diam of opening is max 1/2 in. (13 mm) larger thatn the outside diam of steel sleeve (Item 3A).

2. **Through Penetrants –** One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm). The penetrant may be installed at an angle not greater than 45 degrees from perpendicular. Penetrant to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. **Polyvinyl Chloride (PVC) Pipe –** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 cellular core or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) pipe –** Nom 3 in. (76 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Non Metallic Conduit+** – Nom 3 in. (76 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Metallic Sleeve –** Cylindrical sleeve fabricated from min 0.019 in. (0.48 mm) thick (26 gauge) galv sheet metal and having a min 1 in. (25 mm) lap along the longitudinal seam. Sleeve to extend a min. of 2 in. (51 mm) to a max 5-1/2 in. (140 mm) beyond both sides of the wall. The inside diam of the sleeve shall be 1/2 in. (13 mm) larger than outside diam of nonmetallic pipe or conduit such that an annular space will be present between the steel sleeve and the pipe around the entire circumference of the pipe to accommodate the layers of wrap strips (Item 3B). The annular space between the outside of the wrap strip layer(s) and the inside of the sleeve shall be 1/4 in. (6 mm). The annular space between the outside of the sleeve and the periphery of the opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm).
   B. **Fill, Void or Cavity Material* – Intumescent Strips –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Two layers of wrap strips are individually wrapped tightly around penetrant with the ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be recessed into sleeve on both sides of wall such that the outer edges of wrap strips are recessed 1 in. (25 mm) from the outer edges of the sleeve. A min 1/2 in. (13 mm) wide stainless steel hose clamp shall be secured around the outside of sleeve over the center of the wrap strips on both ends of the sleeve.
      Passive Fire Protection Partners – Wrap Strip WS1
   C. **Fill, Void or Cavity Material* – Sealant –** Min 1-1/4 in. (32 mm) thickness of caulk applied within annulus between metallic sleeve and periphery of the opening, flush with both surfaces of wall assembly. Min 1/2 in. (13 mm) diam bead of caulk shall be applied at the sleeve/gypsum board interface at the point contact location on both surfaces of wall assembly.
      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)
F Ratings — 1 or 2 Hr (See Item 1)
T Ratings — 0 or 1-1/2 Hr (See Item 3)
L Rating at Ambient — Less Than 1 CFM/sq ft (See Item 3)
L Rating at 400 F — Less Than 1 CFM/sq ft (See Item 3)



Section A-A

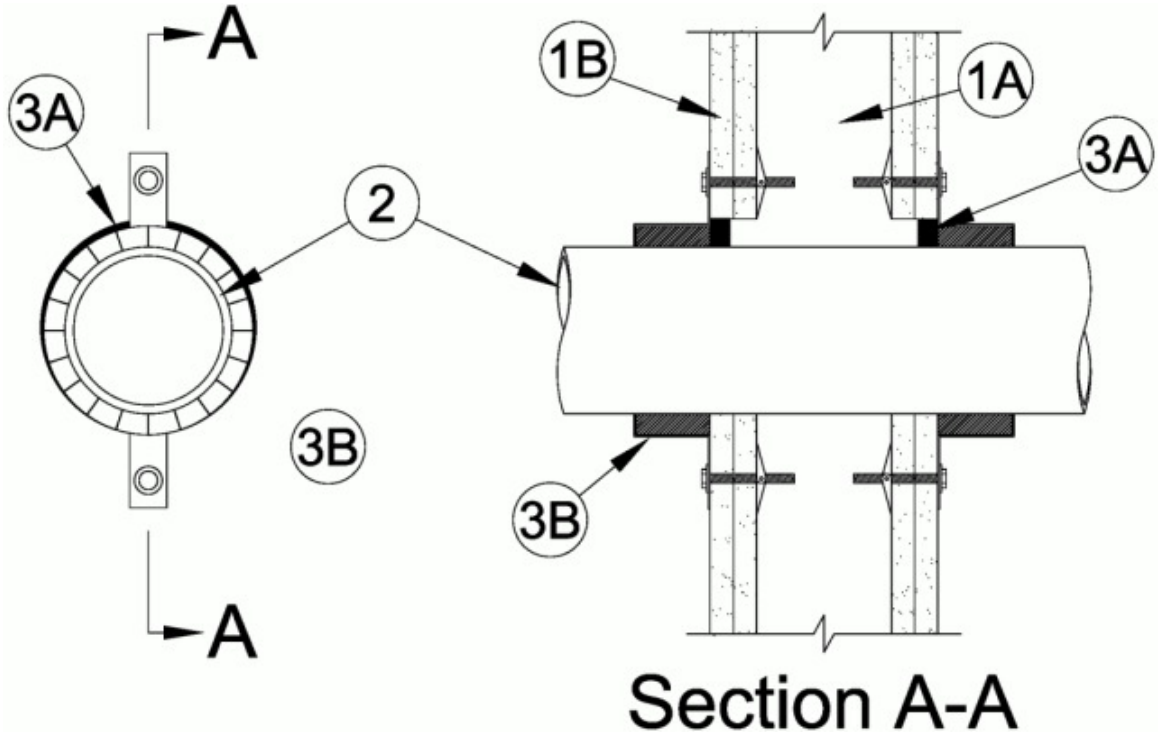
1. **Wall Assembly —** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs —** Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* —** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 5 in. (12 mm).

2. **Through Penetrants —** Nom 4in. (102 mm) diam (or smaller). Schedule 40 solid core PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of wall assembly.

3. **Firestop System —** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials * — Caulk —** (Optional, Required or air leakage) Min thickness of 1/2 in. (13 mm) of caulk applied within annulus, flush with both surfaces of wall assembly.
      PASSIVE FIRE PROTECTION PARTNERS — 3600EX
      Air leakage rating only applies when Item 3A is used.
      The T rating is 1-1/2 only when Item 3A is used.
   B. **Fill, Void or Cavity Material* — Wrap Strip —** Layers of nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide intumescent wrap strip individually wrapped around the outer circumference of the pipe such that wrap strip is flush with both surfaces of wall. Butted ends in successive layers shall be offset. Wrap strip secured with tape, wire or tie wire. Three layers are to be used for nom 4 in. (102 mm) diam pipe two layers for nom 3 in. (76 mm) diam Pipe and one layer for nom 2 in. (51 mm) diam pipe
      PASSIVE FIRE PROTECTION PARTNERS — WS2
   C. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (No. 28 gauge) galv steel available from fill material manufacturer. Collar shall be nom 2 in. (51 mm) deep with 1 in.(25 mm) wide by 1-1/2 in. (38 mm) long anchor tabs on 4 in. (102 mm) centers to secure to both surfaces of wall. In addition, collar contains retainer tabs, 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to both surfaces of wall at each anchor tab by means of 3/16 in. diam by 3 in. (5 by 76 mm) long steel hollow wall anchors in conjunction with 1/4 in. by 5/8 in. (6 by 16 mm) diam washers.

*Bearing the UL Classification Mark
++Bearing the UL Listing Mark

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1/2 and 1 Hr (See Item 2)



System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.

1. **Wall Assembly —** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Studs —** Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   - B. **Gypsum Board* —** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Wall opening to be max 5/8 in. (16 mm) larger than outside diam of nonmetallic pipe. Max diam of opening is 4 in. (102 mm).

The F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Nonmetallic Pipe —** One nom 3 in. (76 mm) diam (or smaller) nonmetallic pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipe may be used:
   A. **Polypropylene (PP) Pipe —** Nom 2 in. (51 mm) diam (or smaller) Aquatherm Greenpipe SDR 7.4 with Faser PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.
   B. **Polypropylene (PP) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Aquatherm Greenpipe SDR 11 PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.
   C. **Polypropylene (PP) Pipe —** Nom 3 in. (76 mm) diam (or smaller) Aquatherm Climatherm SDR 11 with Faser PP pipe for use in closed (process or supply) or vented (drain, waste and vent) piping systems.
   D. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 3 in. (76 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

When max 2 in. (51 mm) diam pipe is used, the T, FT and FTH Ratings of the firestop system are 1/2 Hr when installed in 1 Hr fire rated wall and 1 Hr when installed in 2 Hr fire rated wall. When max 3 in. (76 mm) diam pipe is used, the T, FT and FTH Ratings of the firestop system are 0 Hr when installed in 1 Hr fire rated wall and 1/2 Hr when installed in 2 Hr fire rated wall.

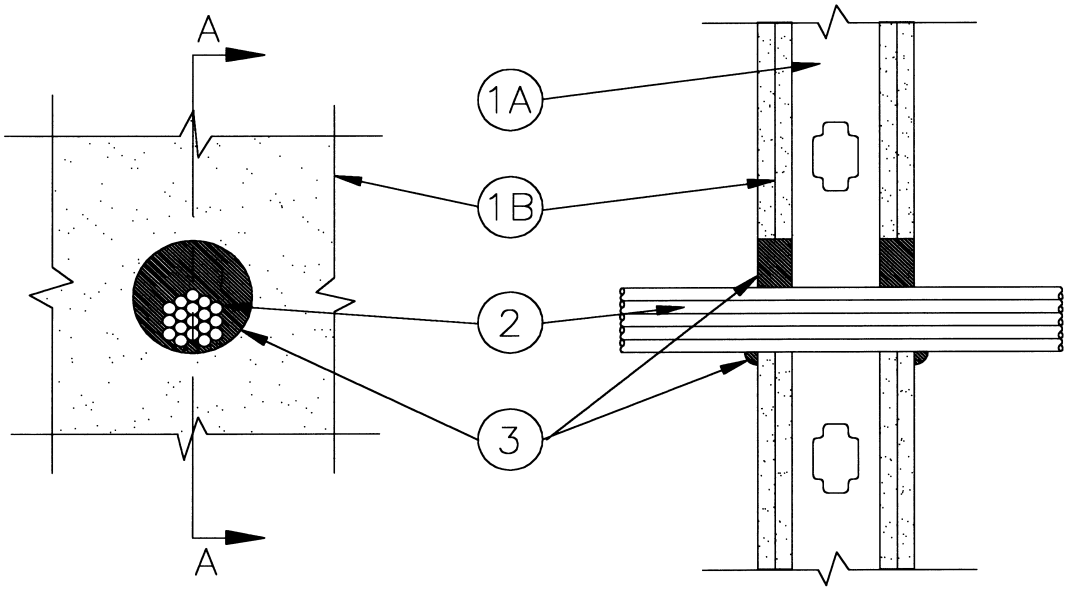
3. **Firestop System —** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Materials * - Caulk —** Min 1/2 in. (13 mm) thickness of caulk applied within annulus, flush with both surfaces of wall assembly. When the annular space between the pipe and the edge of the wall opening is less than 1/4 in. (6 mm), use of the caulk in the annulus is optional.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX
   B. **Fill, Void or Cavity Material* - Wrap Strip —** When max 2 in. (51 mm) diam pipe is used, single layer of nom 1/4 in. (6 mm) thick by 1 in. (25 mm) wide intumescent wrap strip wrapped around the outer circumference of the pipe on each side of the wall. When max 3 in. (51 mm) diam pipe is used, two layers of nom 1/4 in. (6 mm) thick by 1 in. (25 mm) wide intumescent wrap strip wrapped around the outer circumference of the pipe on each side of the wall. Wrap strip installed with butted seam and such that edge of wrap strip is flush with the surface of wall. Wrap strip temporarily secured with tape or tie wire.

      PASSIVE FIRE PROTECTION PARTNERS — WS2
   C. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. thick (0.41 mm) galv steel available from fill material manufacturer shall be installed to restrain wrap strip. Collar shall be nom 1 in. (25 mm) deep with 1 in. (25 mm) wide by 1-1/2 in. (38 mm) long anchor tabs for attachment to wall. In addition, collar provided with 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long retainer tabs opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. (25 mm). The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collars secured to wall at three anchor tabs with Type G laminating screws or 3/16 in. (5 mm) diam steel hollow wall anchors in conjunction with 1/4 by 5/8 in. (6 by 16 mm) diam steel washers.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2 and 3/4 Hr (See Item 1)	FT Ratings — 1/2 and 3/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2 and 3/4 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 3-1/8 in.

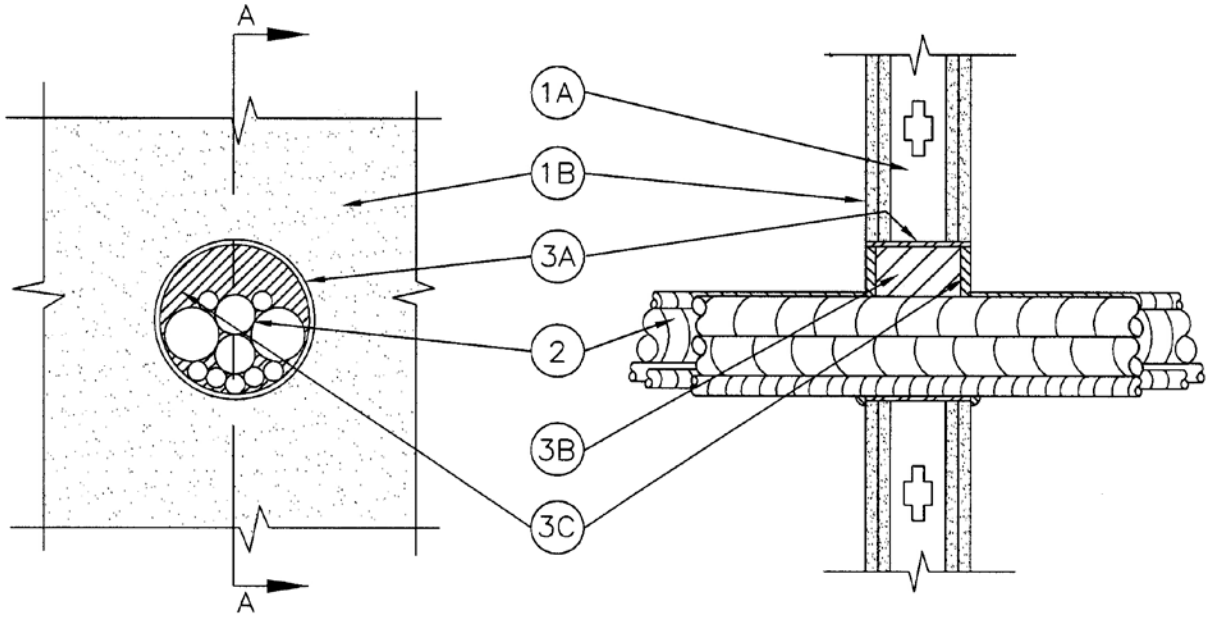
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The T rating is 1/2 hr for 1 hr rated and 3/4 hr for 2 hr rated assemblies.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 44 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. **Through Penetrating Product* –** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.
   ALFEX CORP
   D. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
   SOUTHWIRE CO – Type MC, Type AC

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 and 1-1/4 in. thickness of fill material for 1 or 2 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. Caulk to be forced into interstices of cable group to max extent possible. At the point contact location between cable(s) and wallboard, a min 1/2 in. diam bead of fill material shall be applied at the wallboard/cable interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

+Bearing the UL Listing Mark
*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1B)	F Ratings — 1 and 2 Hr (See Item 1B)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1B)
	FTH Rating — 0 Hr



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 in. by 4 in. lumber spaced max 24 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 8-1/2 in.

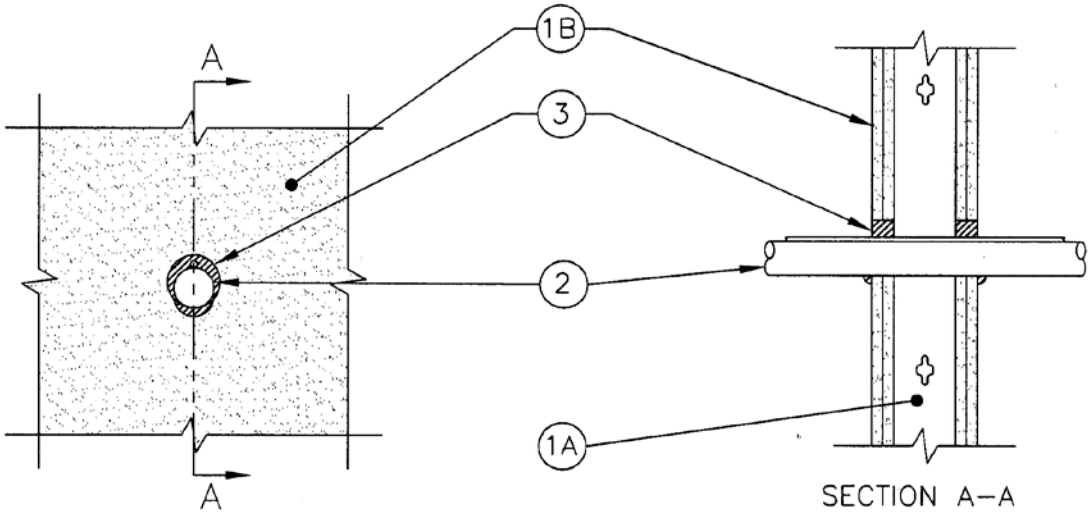
The F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Cables –** Aggregate cross sectional area of cables in opening to be max 27 percent of the cross sectional area of the opening. Cables installed either concentrically or eccentrically within the firestop system. The annular space between cables and periphery of sleeve shall be min 0 in. (point contact) to max 1-1/2 in. Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation, with or without PVC jacket.
   B. 3/C 3 50 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket
   C. 4/C No. 14 AWG (or smaller) copper conductor aluminum clad or steel clad TEK cable with XLPE insulation, with or without PVC jacket.
   D. Max 25 pair No. 20 AWG (and smaller) copper conductor cable with XLPE/PVC insulation, with or without PVC jacket.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation, with or without PVC jacket.
   F. 4/C No. 6 AWG (or smaller) copper conductor cable with XLPE insulation, with or without PVC jacket.
   G. **Through Penetrating Product* –** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.
      ALFEX CORP
   H. **Through Penetrating Product* –** Max four copper conductor No. 2/0 AWG (or smaller) aluminum or steel **Metal Clad Cable*** or max four copper conductor No. 1 AWG (or smaller) aluminum **Armored Cable*** or max 750 kcmil (or smaller) aluminum or copper Type THHN or XHHW conductors, jacketed of unjacketed aluminum or steel **Metal Clad Cable***.
      SOUTHWIRE CO – Type MC, Type AC

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Metallic Sleeve –** (Optional) – Outside diam of sleeve to be tightly fitted with inside diam of opening, flush with both surfaces of wall assembly. The following metallic sleeves may be used:
      1. **Sheet Metal Sleeve –** Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel.
      2. **Steel Sleeve –** Max 8 in. diam (or smaller) Schedule 40 steel sleeve.
   B. **Packing Material –** (Optional when sleeve is used) – Min 3-7/8 or 5-1/8 in. thickness of min 4 pcf mineral wool batt insulation for 1 and 2 hr rated assemblies, respectively, firmly packed into opening, approximately 25 percent larger than the area within the metallic sleeve cavity. Packing material to be recessed from both surfaces of wall assembly to accommodate the required thickness of fill material (Item 3C).
   C. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At point contact location between metallic sleeve and cable, a min 1/2 in. diam bead of fill material shall be applied at the metallic sleeve or wallboard/cable interface on both surfaces of wall. Min 1/16 in. thick layer of fill material applied over edge of sleeve overlapping wallboard surface min 1/4 in.
      Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2 and 2 Hr (See Item 1)	FT Ratings — 1/2 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2 and 2 Hr (See Item 1)



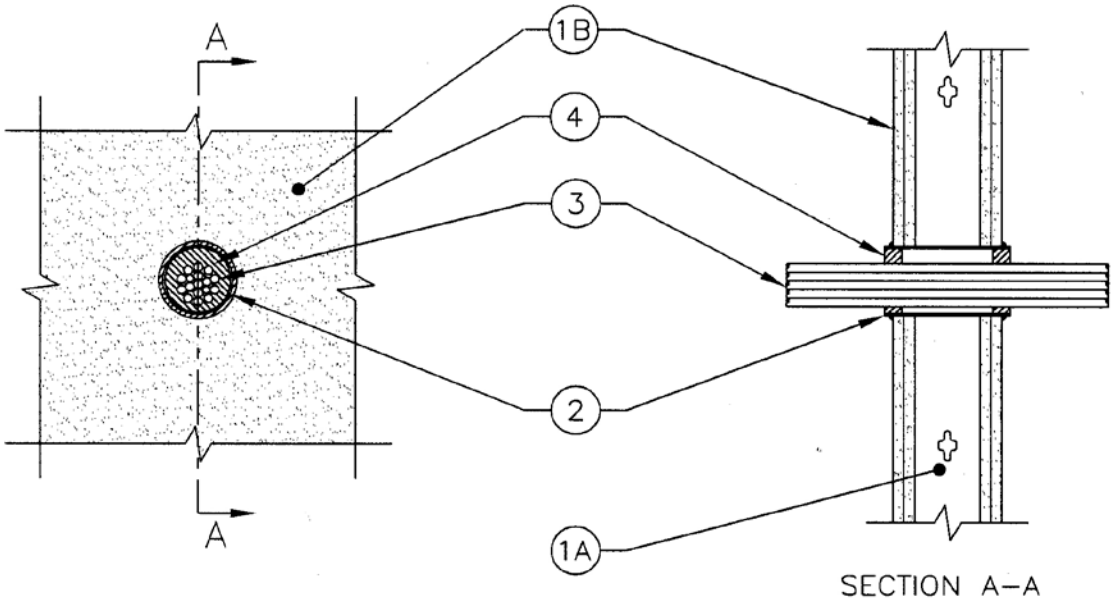
1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 2 in. (51 mm).
   The hourly F Rating of the firestop system is equal to the hourly rating of the wall assembly in which it is installed. The T Rating is 1/2 hr for 1 hr rated assemblies and 2 hr for 2 hr rated assemblies.

2. **Cables –** Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between cables and periphery shall be min 0 in. (0 mm) (point contact) to max 1 in. (25 mm). Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.
   D. 4/C No. 6 AWG (or smaller) copper conductor with ground, with PVC or XLPE insulation.
   E. **Through Penetrating Product* -** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.

3. **Fill, Void or Cavity Material* – Putty –** Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of putty for 1 and 2 hr rated wall assemblies, respectively, applied within the annulus, flush with both surfaces of wall. At the point contact location between cable(s) and gypsum board, a min 1/4 in. (13 mm) diam bead of putty shall be applied at the gypsum board/cable interface on both surfaces of wall.
   Passive Fire Protection Partners – 3300PS

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2 and 1 Hr (See Item 1)	FT Ratings — 1/2 and 1 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2 and 1 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 5 in. (127 mm).
   The hourly F Rating of the firestop system is equal to the hourly rating of the wall assembly in which it is installed. The T Rating is 1/2 hr for 1 hr rated assemblies and 1 hr for 2 hr rated assemblies.

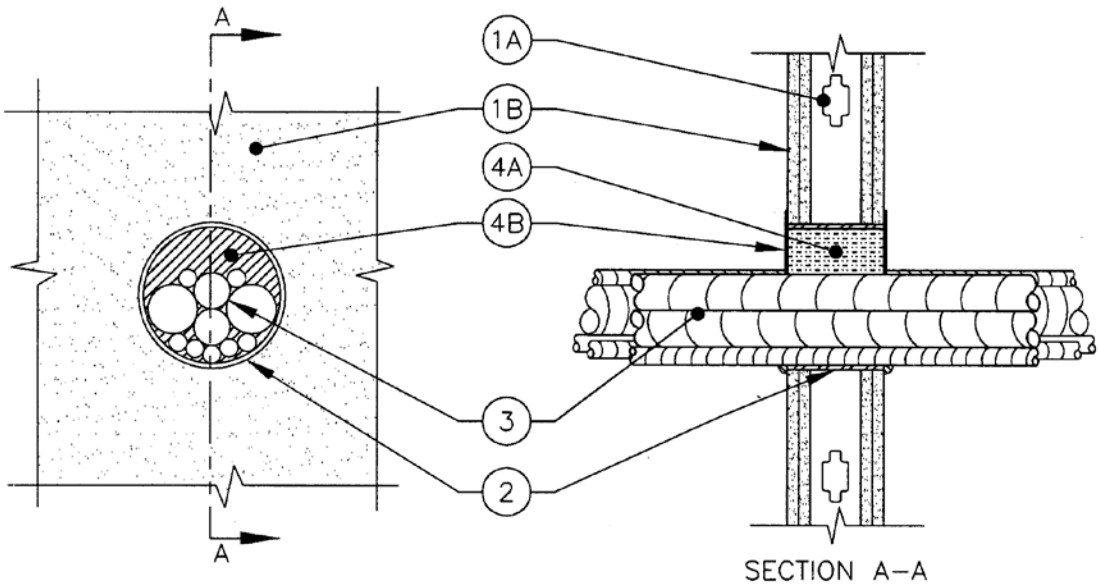
2. **Steel Sleeve –** Cylindrical sleeve fabricated from min 0.018 in. (0.046 mm) thick (No. 28 gauge) galv sheet steel and having a min 1 in. (25 mm) lap along the longitudinal seam. Length of sleeve to be 1/2 in. (13 mm) to 1 in. (25 mm) greater than the thickness of wall. Sleeve to be friction-fitted into opening with ends of sleeve extending 1/4 in. (6 mm) to 1/2 in. (13 mm) beyond each surface of wall.

3. **Cables –** Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between cables and sleeve shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm). Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.
   D. 4/C No. 6 AWG (or smaller) copper conductor with ground, with PVC or XLPE insulation.
   E. **Through Penetrating Product* -** Max 3/C No. 2 AWG (or smaller) aluminum or steel clad **Armored Cable*** or aluminum or steel clad **Metal Clad Cable*** with copper conductors.

4. **Fill, Void or Cavity Material* – Putty –** Min 1 in. (25 mm) thickness of putty applied within the annulus, flush with both ends of sleeve. An additional 1/4 in. (6 mm) bead of putty to be applied around entire perimeter of sleeve at the sleeve/gypsum board interface on both sides of wall.
   Passive Fire Protection Partners – 3300PS

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 12 in. (305 mm).
   The hourly F and T Ratings of the firestop system are equal to the hourly rating of the wall assembly in which it is installed.

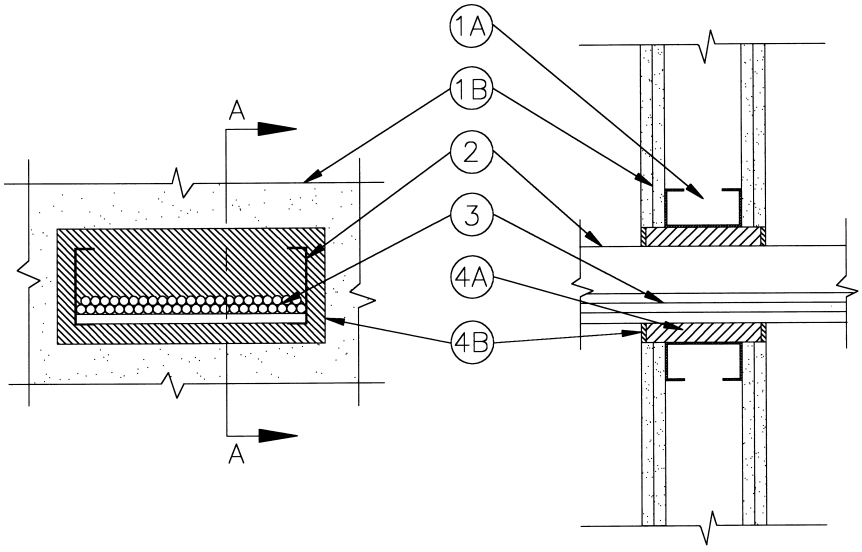
2. **Steel Sleeve –** Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel and having a min 1 in. (25 mm) overlap along the longitudinal seam. Sleeve friction-fitted into opening, flush with both surfaces of the wall.

3. **Cables –** Aggregate cross-sectional area of cable in opening to be max 39 percent of the cross-sectional area of the opening. The annular space between cables and sleeve shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm). Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of copper conductor cables may be used:
   A. 3/C No. 3/0 (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   B. 2/C No. 10 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.
   C. 3/C No. 4 AWG (or smaller) copper or aluminum conductor with ground, with PVC or XLPE insulation.
   D. 4/C No. 6 AWG (or smaller) copper conductor with ground, with PVC or XLPE insulation.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material** – Min 4-7/8 in. (124 mm) and 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for 1 hr and 2 hr rated assemblies, respectively, firmly packed into the opening as a permanent form, flush with both surfaces of the wall.
   B. **Fill, Void or Cavity Materials*** – **Sealant** – Min 1/8 in. (3.2 mm) thickness (dry) of fill material applied to completely cover packing material and to overlap a min 1/2 in. (13 mm) onto gypsum board and onto cables around entire opening on both sides of the wall.
      Passive Fire Protection Partners – 5100SP

*Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 and 3/4 Hr (See Item 1)	FT Ratings — 0 and 3/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 0 and 3/4 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be installed in stud cavity containing cable tray (Item2) to form a rectangular box around cable tray.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in the individual Wall and Partition Design. Max area of opening to be 87 sq. in. (561 cm^2) with max dimension of 14-1/2 (368 mm).
   The hourly F Rating of the firestop system is equal to the hourly F Rating of the wall assembly in which it is installed. The hourly T rating is 0 hr for 1 hr rated assemblies and 3/4 hr for 2 hr rated assemblies

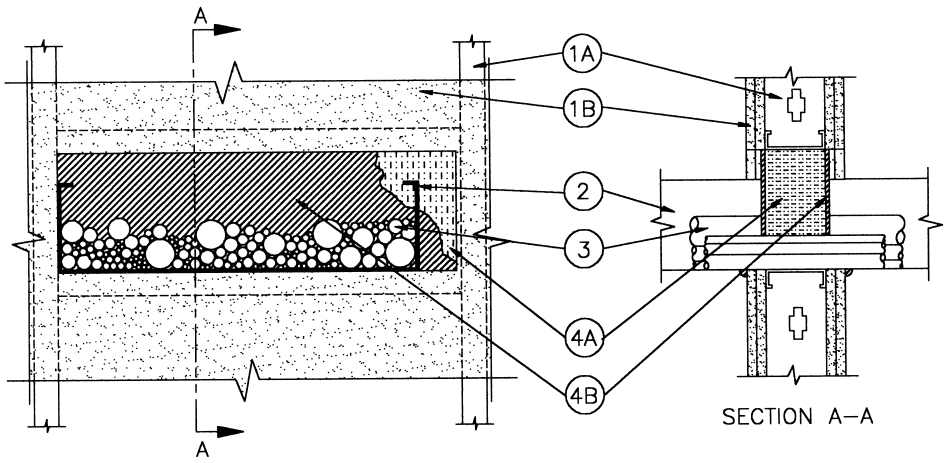
2. **Cable Tray+ –** Max 12 in. (305 mm) wide by max 4 in. (102 mm) deep open-ladder cable tray with channel shaped side rails formed of min 0.058 in. (1.5 mm) thick steel or aluminum with 1 in. (25 mm) wide by 1 in. (25 mm) deep rungs spaced 9 in. (229 mm) OC. One cable tray to be installed in the opening. The annular space between the cable tray and the periphery of the opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables –** Aggregate cross-sectional area of cables in cable tray to be max 45 percent of the cross-sectional area of the cable tray based on a max 3 in. (76 mm) cable loading depth within the cable tray. Any combination of the following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   D. Max 25 pair No. 20 AWG (or smaller) copper conductor PVC jacketed cabel with PVC insulation.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. (92 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation, firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material (Item B2).
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material sprayed or brushed on each side of wall assembly, completely covering mineral wool insulation, overlapping a min 1/2 in. (13 mm) onto gypsum board, cable tray and cables. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) overlap of fill material shall be applied at the gypsum board/cable tray interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternative to Item B1, min 1/4 in. (6 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. Sealant to be forced into interstices of cables to max extent possible. At point contact location between penetrant and periphery of opening, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the gypsum board/cable tray interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Listing Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 3/4 Hr



1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members may be installed in stud cavity containing cable tray (Item2) to form a rectangular box around cable tray.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners, as specified in the individual Wall and Partition Design. Max opening size to be 208 sq. in. (1342 cm^2) with max dimension of 26 in. (660 mm).
   The hourly F Rating of the firestop system is equal to the hourly F Rating of the wall assembly in which it is installed.

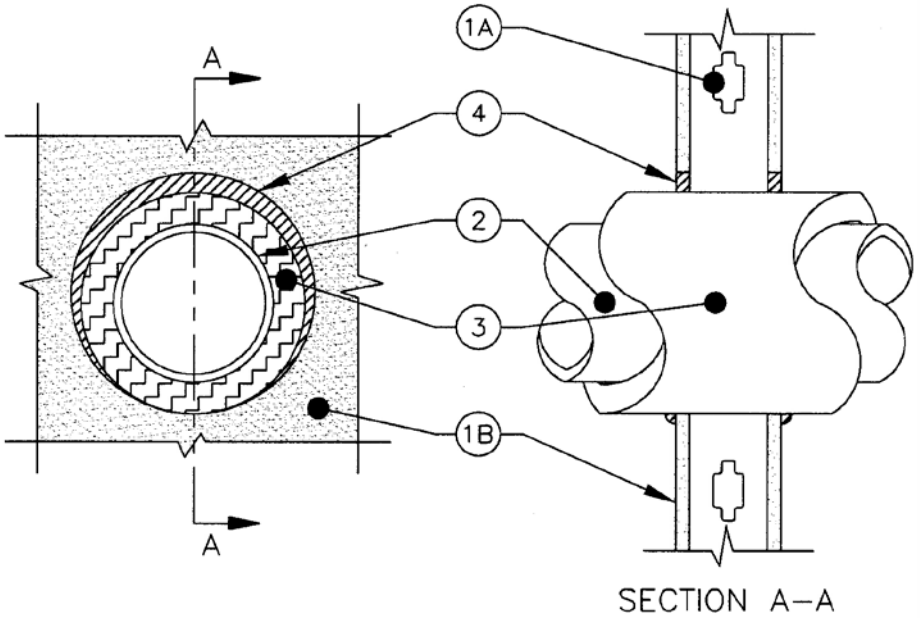
2. **Cable Tray+ –** Max 24 in. (610 mm) wide by max 6 in. (152 mm) deep 15 gauge (or heavier) aluminum or steel cable tray installed within the opening. The annular space between the cable tray and periphery of the opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables –** Aggregate cross-sectional area of cables in cable tray to be max 40 percent of the cross-sectional area of the opening. The annular space between cables and periphery of opening shall be min 0 in. (point contact) to max 5-3/4 in. Cables to be rigidly supported on both sides of wall assembly. Any combination of the following types and sizes of cables may be used:
   A. 1/C 750 kcmil (or smaller) copper conductor polyvinyl chloride (PVC) jacketed aluminum clad or steel clad TEK cable with cross-linked polyethylene (XLPE) insulation.
   B. 3/C 350 kcmil (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   C. 4/C No. 14 AWG (or smaller) copper conductor PVC jacketed aluminum clad or steel clad TEK cable with XLPE insulation.
   D. Max 25 pair No. 20 AWG (or smaller) copper conductor PVC jacketed cable with PVC insulation.
   E. 1/C 400 kcmil (or smaller) aluminum or copper conductor cable with XLPE insulation.
   F. 4/C No. 6 AWG (or smaller) copper conductor PVC jacketed cable with XLPE insulation.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. (92 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be flush with both sides of studs (Item 1A). Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material (Items B1 and B2).
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. thickness of fill material sprayed or brushed on each side of wall assembly, completely covering mineral wool insulation, overlapping a min 1/2 in. onto wallboard, cable tray and cables. At point contact location between penetrant and periphery of opening, a min 1/2 in. overlap of fill material shall be applied at the wallboard/cable tray interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternative to Item B1, min 1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall. Sealant to be forced into interstices of cables to max extent possible. At point contact location between penetrant and periphery of opening, a min 1/2 in. diam bead of fill material shall be applied at the wallboard/cable tray interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Listing Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A–A

1. **Wall Assembly –** The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum, as specified in the individual Wall and Partition Design. Max diam of opening is 18 in. (457 mm) for steel studs. Max diam of opening 12 in. (305 mm) for wood studs.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe** – Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

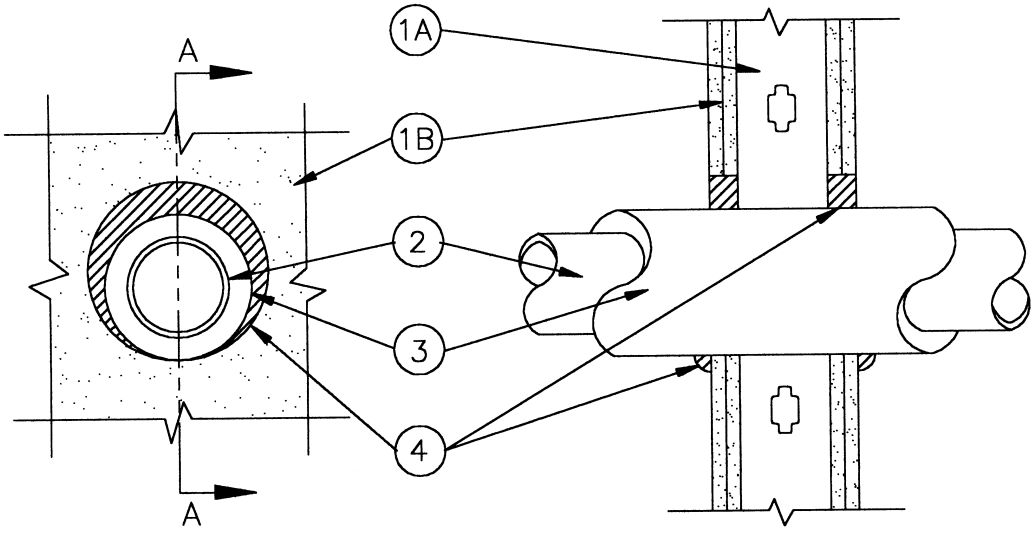
3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).

   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wallboard, a min 3/8 in. (10 mm) diam bead of fill material shall be applied at the gypsum board/pipe covering interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/2, 1 and 2 Hr (See Item 3)	FT Ratings — 1/2, 1 and 2 Hr (See Item 3)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/2, 1 and 2 Hr (See Item 3)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max size diam of opening is 7-1/2 in.
   The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants** – One metallic pipe or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Tube Insulation - Plastics+** - Max 1/2 or 3/4 in. (13 or 19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the tube insulation and the periphery of opening shall be min 0 in. (point contact) to max 1 in. (25 mm).
   See **Plastics+** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

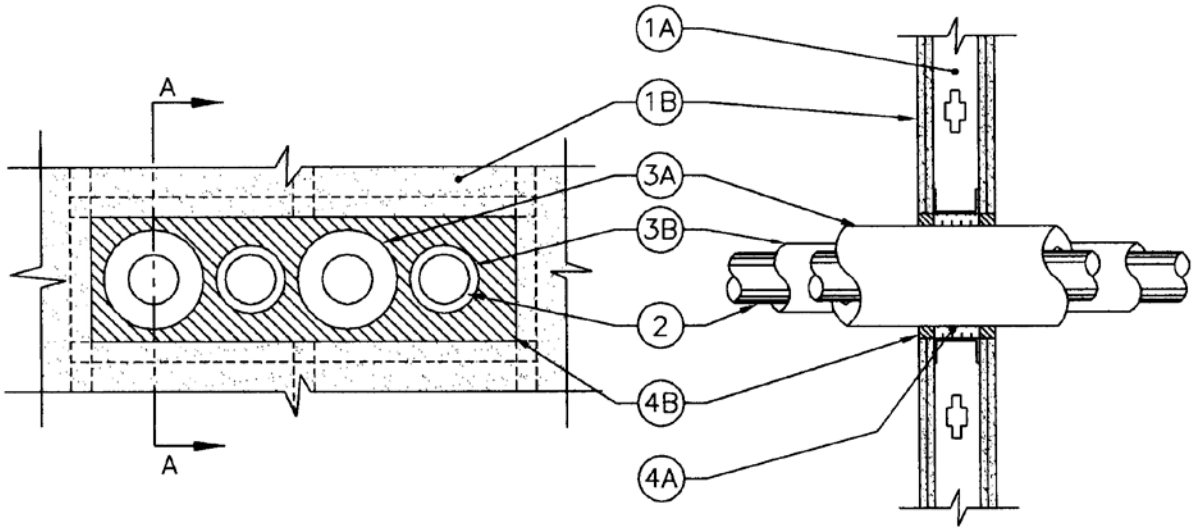
   The T Rating is dependent on the hourly F Rating, type of penetrant and thickness of insulation, as shown below.

F Rating	Penetrant	Insulation Thickness in. (mm)	T/FT/FTH Ratings
1 Hr	A and B	1/2 (13)	1/2 Hr
1 Hr	A and B	3/4 (19)	1 Hr
1 Hr	C and D	1/2 and 3/4 (13 and 19 mm)	1/2 Hr
2 Hr	A and B	1/2 (13 mm)	1/2 Hr
2 Hr	A and B	3/4 (19 mm)	2 Hr
2 Hr	C and D	1/2 and 3/4 (13 and 19 mm)	1/2 Hr

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall, for 1 and 2 hour rated assemblies, respectively. At the point contact location between insulation/wallboard interface, a min 1/2 in. (13 mm) diam bead of fill material shall be applied on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

+ Bearing the UL Listing Mark
* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 3/4 and 1-1/2 Hr (See Item 1)	FT Ratings — 3/4 and 1-1/2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 3/4 and 1-1/2 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly** – The 1 and 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U 300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum* -** Thickness, type, number of layers and fasteners as required for the individual Wall and Partition Design. Max size of opening is 335 sq. in. (2161 cm^2) with a max dimension of 33-1/2 in. (851 mm).
   The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T, FT and FTH Ratings are 3/4 hr. and 1-1/2 hr. for 1 and 2 hr. rated assemblies, respectively.

2. **Through Penetrants** – Max four pipes, conduits or tubings installed eccentrically or concentrically within opening. Pipes or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

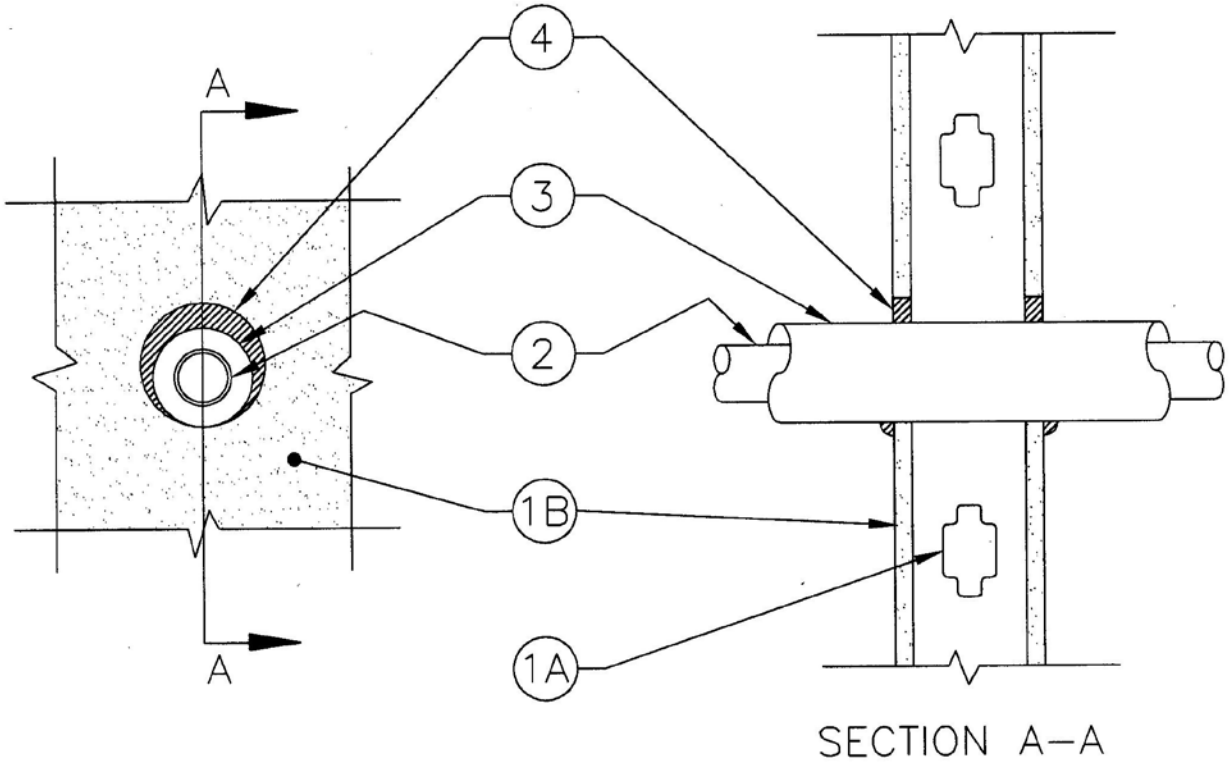
3. **Pipe Covering –** The following types of pipe coverings may be used.
   A. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 1/2 in. (13 mm) to max. 2 in. (51 mm). The annular space between insulated penetrants shall be min. 1/2 in. (13 mm) to max. 2 in. (51 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

   B. **Tube Insulation – Plastics**+ **–** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulated pipe and the edge of the through opening shall be min. 1/2 in. (13 mm) to max. 2 in. (51 mm). The annular space between insulated penetrants shall be min. 1/2 in. (13 mm) to max. 2 in. (51 mm).
   See **Plastics+** (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. (92 mm) or 4-1/8 in. (105 mm) thickness of min. 4 pcf (64 kg/m^3) mineral wool batt insulation for 1 and 2 hr. rated assemblies, respectively, firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in.(16 mm) or 1 in. (25 mm) thickness of fill material for 1 and 2 hr. rated assemblies, respectively, applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking
+Bearing the UL Recognized Component Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. **Wall Assembly –** The 1 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 series in Wall and Partition Design in the UL Fire resistance Directory and shall include the following construction features:
   - A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   - B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Designs. Max diam opening is 4-3/4 in. (121 mm).
   - C.

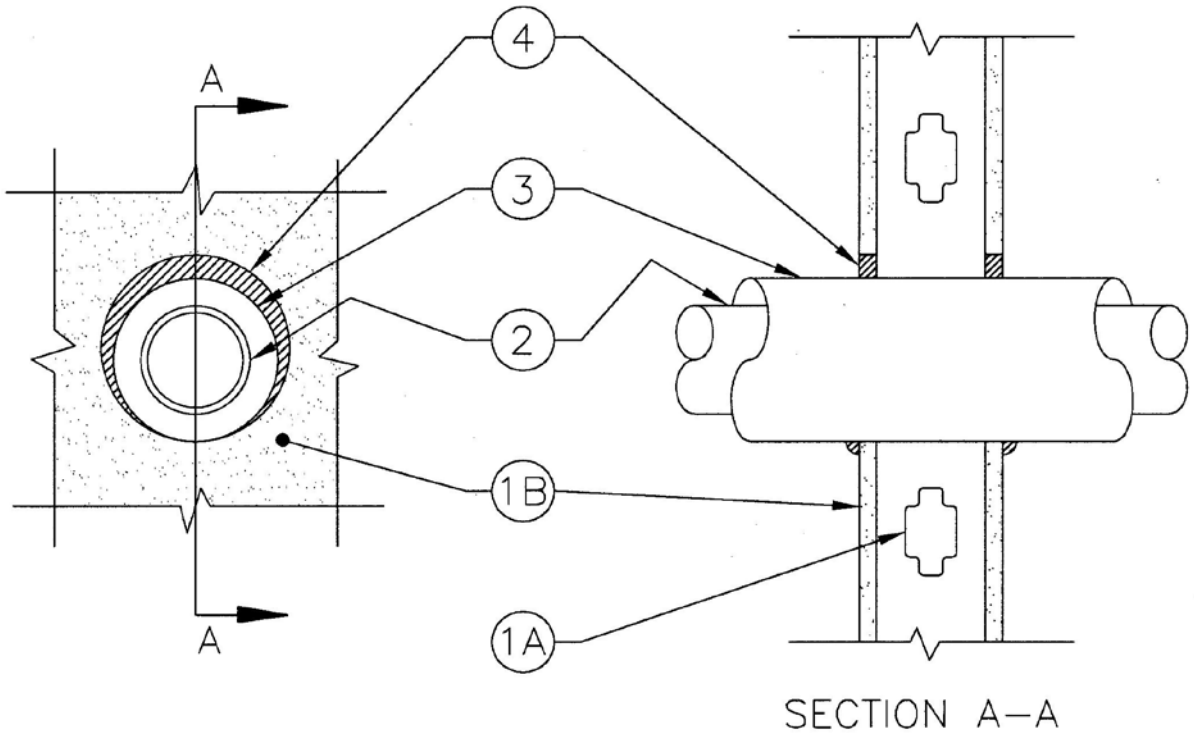
2. **Through Penetrants –** Max. one metallic pipe or tubing to be installed either concentrically of eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubes may be used:
   A. **Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 2 in. (51 mm) diam (or smaller) cast of ductile iron pipe.
   C. **Copper Tube –** Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper tube.
   E. **Stainless Steel Pipe —** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Tube Insulation-Plastic+ –** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between the insulation and the periphery of the opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm).
   See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufactures. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 95-5VA may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both sides of the wall. An additional 1/2 in. (13 mm) diam bead of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of the wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

***** Bearing the UL Classification Marking
+ Bearing the UL Recognized Component Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. **Wall Assembly –** The 1 hr fir rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs of steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam opening is 7-3/8 in. (187 mm).

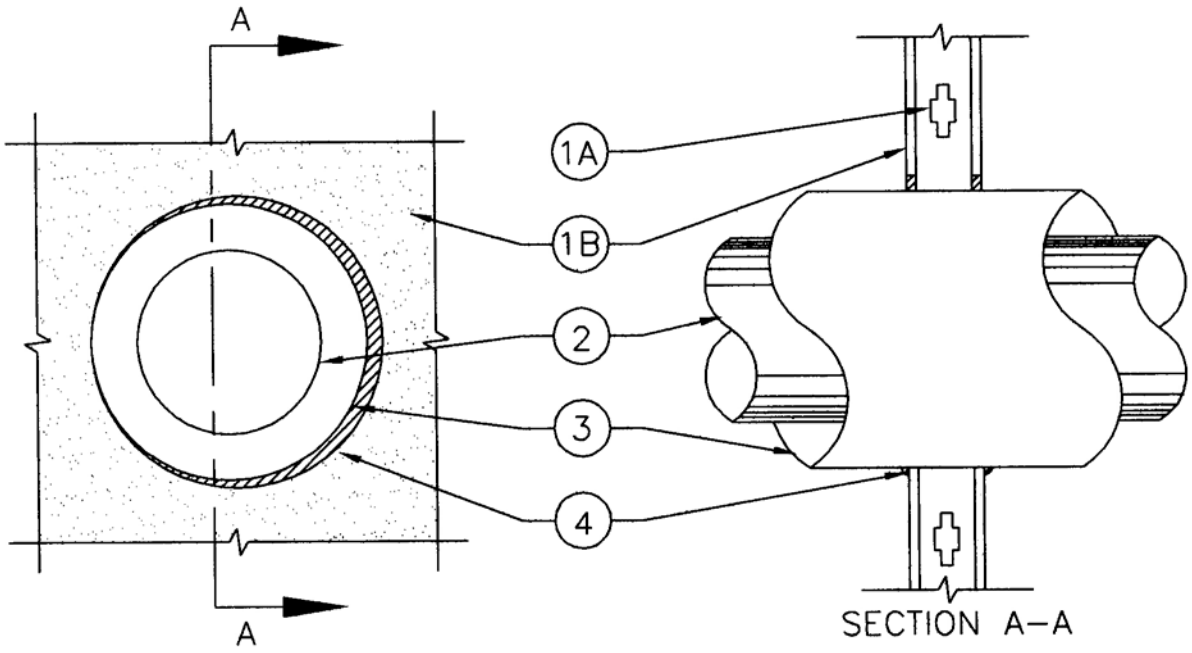
2. **Through Penetrants –** Max one metallic pipe of tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tube –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space shall be min 0 in. (point contact) to max 7/8 in.
   See **Pipe and Equipment Covering Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classified Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (19 mm) thickness of fill material applied within the annulus, flush with both surfaces of the wall. An additional 1/2 in. (13 mm) diam bead of fill material applied at gypsum board/penetrant interface at point contact location on both surfaces of the wall.
   Passive Fire Protection Partners – 3600EX, 4800DW

***** Bearing the UL Classified Marking
+ Bearing the UL Recognized Component Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. **Wall Assembly –** The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 104 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum wallboard, as specified in the individual Wall and Partition Design. Max diam of opening is 20-1/2 in. (521 mm) for steel studs. Max diam of opening 12 in. (305 mm) for wood studs.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe** – Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 2 in. (51 mm) diam (or smaller) pipe Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

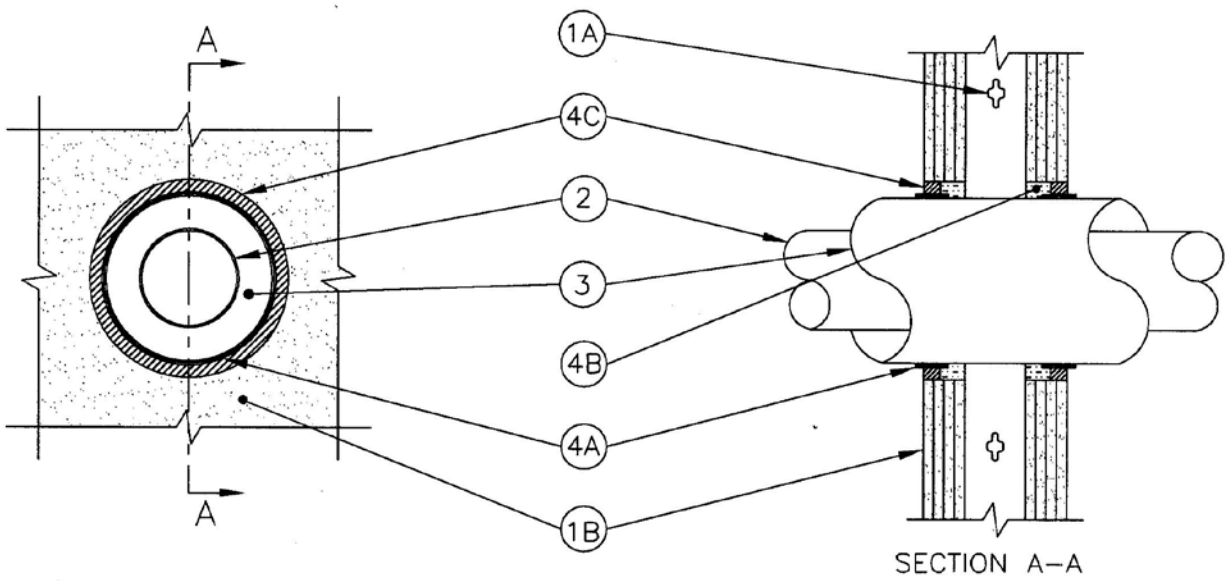
3. **Pipe Covering –** Max 3 in. (76 mm) thick hollow cylindrical Calcium Silicate pipe covering. Longitudinal joints sealed with metal fasteners or 8 AWG steel wire. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to a max 1-1/2 in. (38 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Mark with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wallboard, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the wallboard/pipe covering interface on both sides of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Mark

	F Rating – 4 Hr **T Rating – 3-1/4 Hr**	**W-L-5182**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 4 Hr	F Rating — 4 Hr
T Rating — 3-1/4 Hr	FT Rating — 3-1/4 Hr
	FH Rating — 4 Hr
	FTH Rating — 3-1/4 Hr



1. **Wall Assembly –** The 4 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400, V400 or W400 series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-5/8 in. (92 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum*** – Four layers 5/8 in. thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 12 in. (305 mm).

2. **Through Penetrants** – Max one metallic pipe or tubing to be installed either concentrically within the firestop system. Pipe or tubing to be rigidly support on both sides of the wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile pipe.
   C. **Copper Tubing –** Nom 6 in. (152 mm) dam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

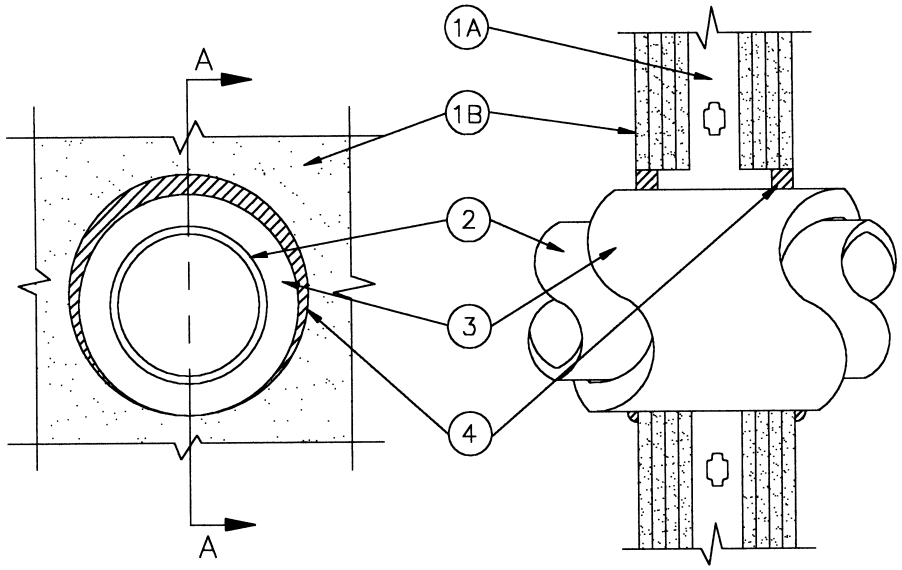
3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factor-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space shall be min 7/8 in. (22 mm) to max 1 in. (25 mm).

   See **Pipe and Equipment Covering Materials** (BRGU) category in the Building Materials Directory for names of manufactures. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Development Index of 50 or less may be used.

4. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Wrap Strip –** Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Two layers of wrap strips are individually wrapped tightly around insulated penetrant with the ends butted and held in place with aluminum foil tape. Butted ends to successive layers may be staggered or aligned. Wrap strip layers to be slid into annular space on both sides of wall such that 1/4 in. (6 mm) to 1/2 in. (13 mm) of wrap strip extends beyond both surfaces of the wall.
   Passive Fire Protection Partners – WS1
   B. **Packing Material –** Min 1-1/2 in. (38 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation firmly packed into annular space, with approximately 25 percent compression. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material (Item 4C).
   C. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) thickness of sealant applied within annular space, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2, 3 and 4 Hr (See Item 1)	F Ratings — 1, 2, 3 and 4 Hr (See Item 1)
T Ratings — 1, 2 and 3 Hr (See Item 1)	FT Ratings — 1, 2 and 3 Hr (See Item 1)
	FH Ratings — 1, 2, 3 and 4 Hr (See Item 1)
	FTH Ratings — 1, 2 and 3 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –**The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 18 in. (457 mm) for steel studs. Max diam of opening is 12 in. (305 mm) for wood studs.

   The hourly F and FH Ratings are equal to the hourly rating of the wall assembly.

   The hourly T, FT and FTH Ratings are 1 hr for 1 hr rated assemblies. The hourly T, FT and FTH Ratings are 2 hr for 2 and 3 hr rated assemblies. The hourly T, FT and FTH Ratings are 3 hr for 4 hr rated assemblies.

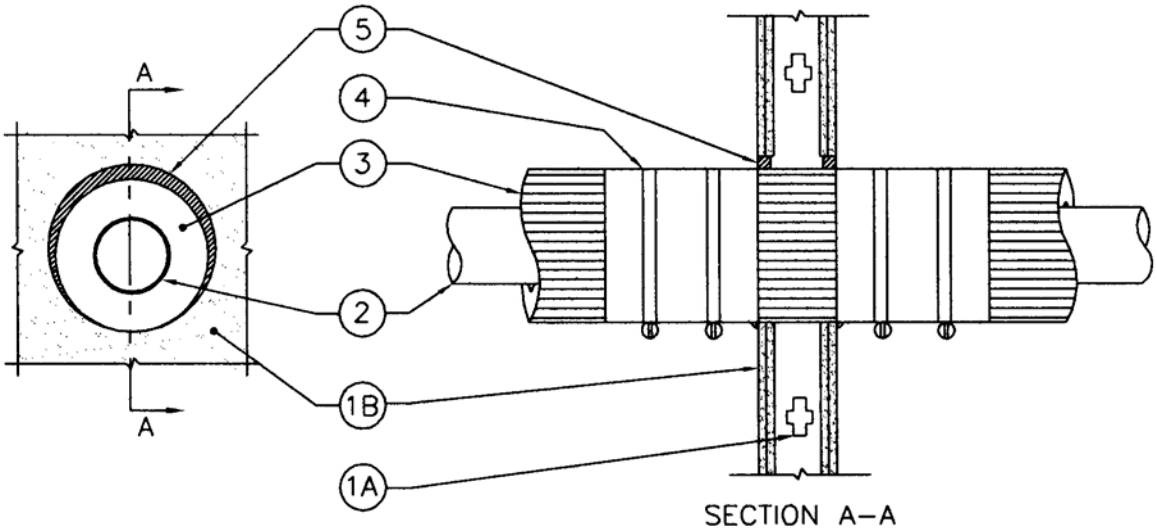
2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) in. diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 64 kg/m^3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See **Pipe and Equipment Covering – Materials** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material for 1 hr fire rated wall assemblies and min 1 in. (25 mm) thickness of fill material for 2, 3 or 4 hr fire rated wall assemblies, applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wallboard, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the gypsum board/pipe covering interface on both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners, as specified in the individual Wall and Partition Design. Max. diam of opening is 13-1/8 in. (333 mm).

   The hourly F, T, FH, FT and FTH Ratings of the firestop systems are equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrants –** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe
   C. **Copper Tubing –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* – Cellular Glass Insulation –** Max. 3 in. (76 mm) thick cellular glass units sized to the outside diam of the steel pipe and supplied in nom 24 in. (610 mm) long half sections or nom 18 in. (457 mm) long segments. The annular space shall be min 0 in. (point contact) to max 1 in. (25 mm). Pipe insulation installed on pipe in accordance with the manufacturer's instructions.

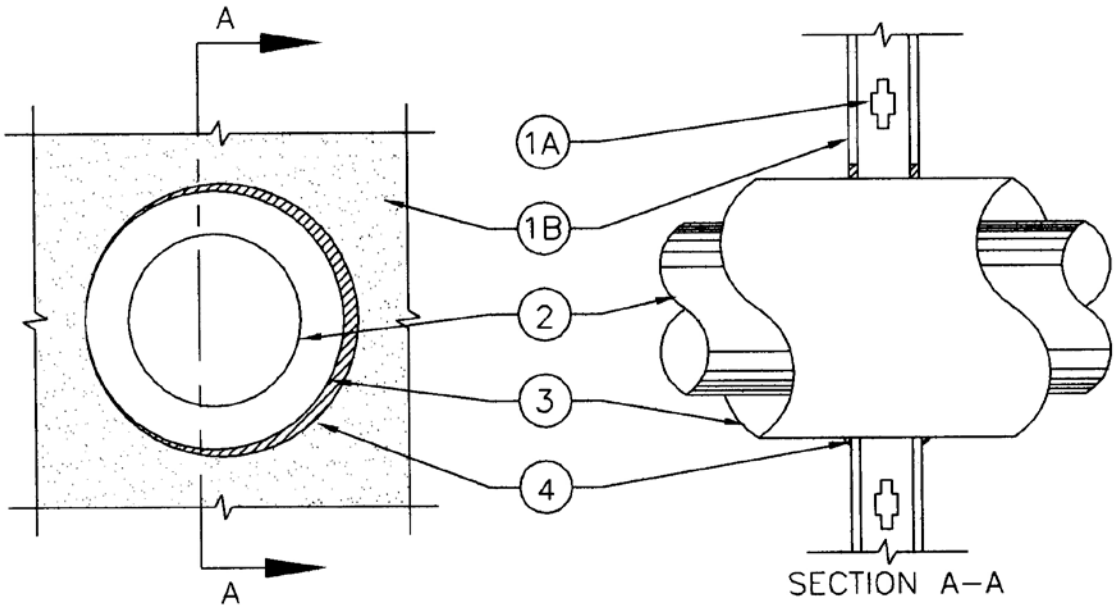
4. **Metal Jacket –** Min 12 in. (305 mm) long jacket formed of min 0.010 in. (.25 mm) thick steel or aluminum sheet cut to wrap tightly around the pipe insulation with a min. 2 in. (51 mm) lap. Jacket secured with min. 1/2 in. (13 mm) wide stainless steel hose clamps or bands located within 2 in. (51 mm) of each end of the jacket and spaced a max. of 10 in. (254 mm) O.C. Jacket to be installed with edges abutting surface of caulk fill material (Item 5) on both surfaces of wall. Metal jacket to be used in addition to any other jacketing material may be required or desired on the pipe insulation.

5. **Fill, Void or Cavity Materials* – Sealant –** Min 5/8 in. or 1 in. (16 or 25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall, for 1 or 2 hr. assemblies, respectively. At the point contact location between insulation/wallboard interface, a min. 1/2 in. (13 mm) bead of fill material shall be applied at the wallboard/pipe covering interface on both sides of wall.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

	F Rating – 1 Hr **T Rating – 1 Hr**	**W-L-5189**

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. **Wall Assembly** – The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** One layer of nom 5/8 in. (16 mm) thick gypsum wallboard, as specified in the individual Wall and Partition Design. Max diam of opening is 20-1/2 in. (333 mm) for steel studs. Max diam of opening is 12 in. (305 mm) for wood studs.

2. **Through Penetrants** – One metallic pipe or tubing to be installed either concentrically or eccentrically with firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule ST 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit –** Nom 4 in. (102 mm) diam (or smaller) steel metallic tubing or steel conduit.
   D. **Copper Tubing** – Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe –** Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   F. **Stainless Steel Pipe –** Nom 2 in. (51 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

3. **Pipe Covering* –** Max 3 in. (76 mm) thick hollow cylindrical Calcium Silicate pipe covering. Longitudinal joints sealed with metal fasteners or 8 AWG steel wire. The annular space between the insulated pipe and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/2 in. (38 mm).
   See **Pipe and Equipment Covering – Materials –** (BRGU) category in the Building MaterialsDirectory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Mark with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

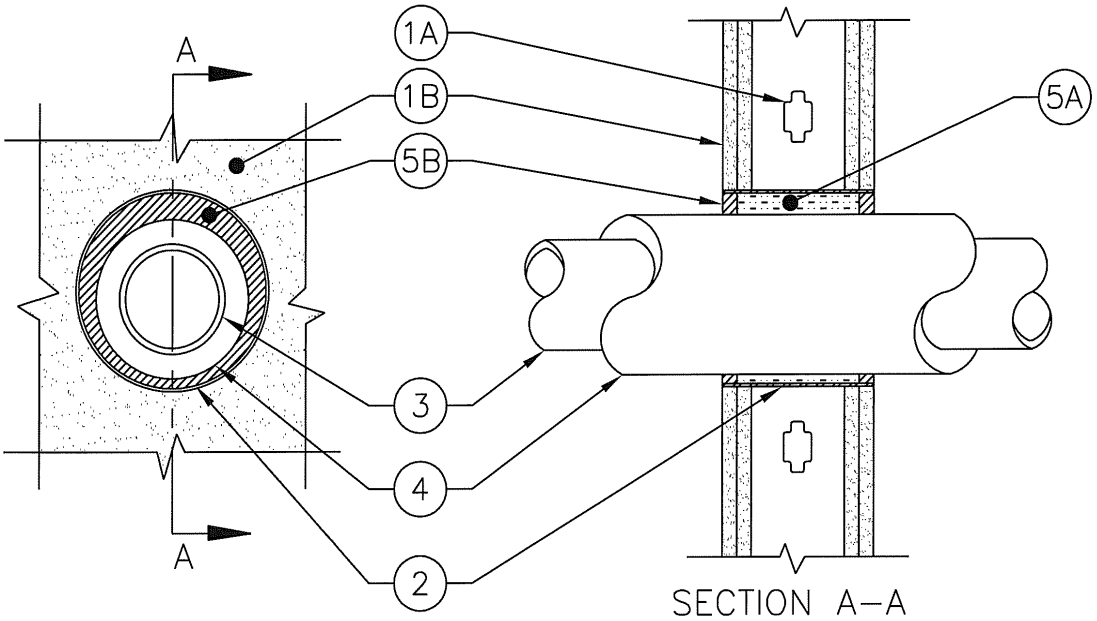
4. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and wallboard, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the wallboard/pipe covering interface on both sides of wall.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

F Rating – 2 Hr
T Rating – 1-3/4 Hr

W-L-5281

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1-3/4 Hr	FT Rating — 1-3/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1-3/4 Hr



1. **Wall Assembly** – The 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 16 in. (406 mm).

2. **Steel Sleeve** – Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel and having a min 1 in. (25 mm) overlap along the longitudinal seam. Sleeve friction-fitted into opening, flush with both surfaces of the wall.

3. **Through Penetrants** – Max one metallic pipe or tubing to be installed either concentrically or eccentrically with firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

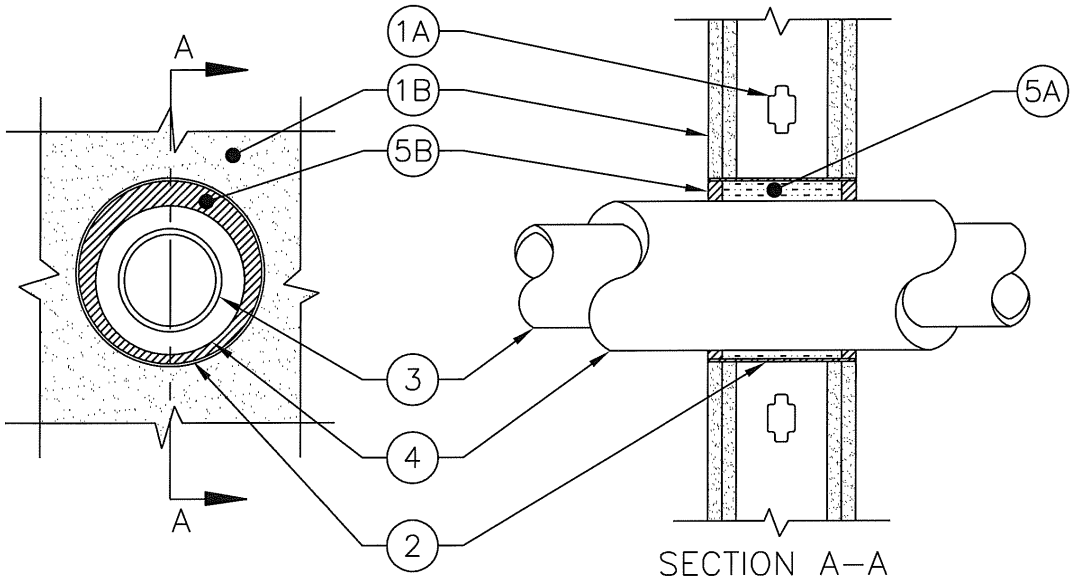
4. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory applied self-sealing tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between pipe covering and steel sleeve shall be min 1/2 in. (13 mm) to max 1-3/8 in. (35 mm).

   See **Pipe and Equipment Covering – Materials –** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System – The firestop system shall consist of the following:**
   A. **Packing Material** – Min 5-1/8 in. (130 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening as a permanent form. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



1. **Wall Assembly** – The 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 12 in. (305 mm).

2. **Steel Sleeve** – Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel and having a min 1 in. (25 mm) overlap along the longitudinal seam. Sleeve friction-fitted into opening, flush with both surfaces of the wall.

3. **Through Penetrants** – Max one metallic pipe or tubing to be installed either concentrically or eccentrically with firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 6 in. (152 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tube –** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
   D. **Copper Pipe –** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 6 in. (152 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

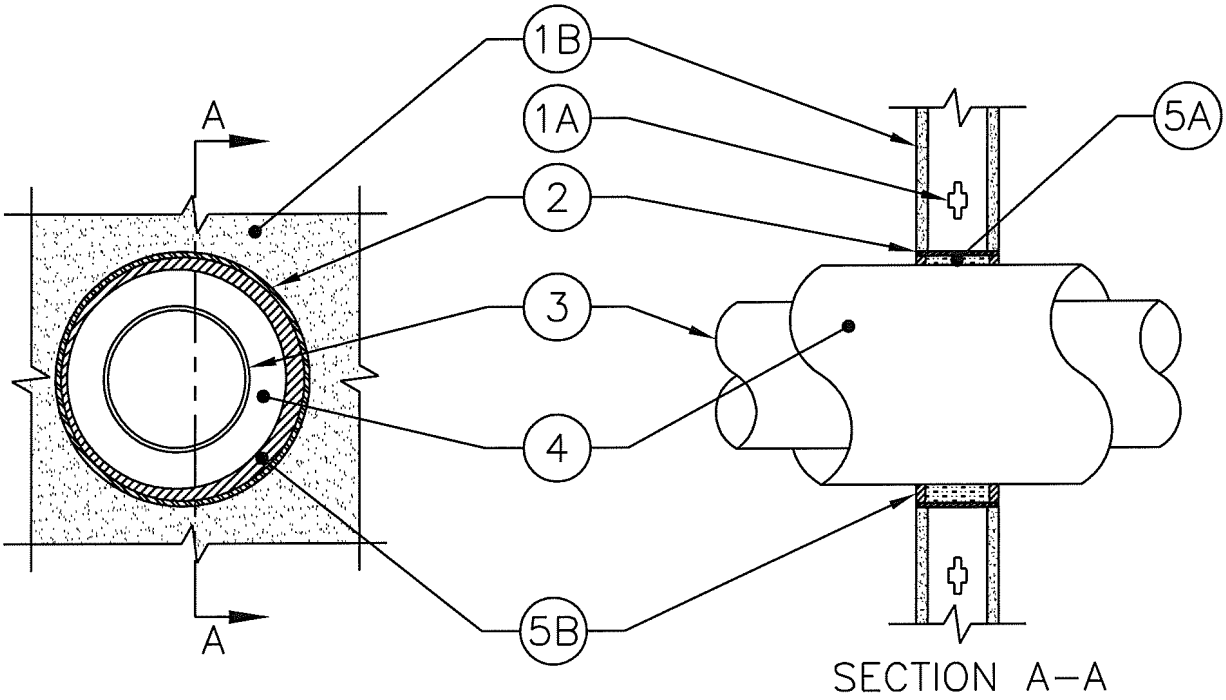
4. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory applied self-sealing tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between pipe covering and steel sleeve shall be min 1/2 in. (13 mm) to max 1-3/8 in. (35 mm).

   See **Pipe and Equipment Covering – Materials –** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System – The firestop system shall consist of the following:**
   A. **Packing Material** – Min 5-1/8 in. (130 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening as a permanent form. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX

Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Ratings — 0 and 3/4 Hr (See Item 4)	FT Ratings — 0 and 3/4 Hr (See Item 4)
	FH Rating — 1 Hr
	FTH Ratings — 0 and 3/4 Hr (See Item 4)



1. **Wall Assembly** – The 1 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Diam of opening to be 3/4 in. (19 mm) to 1-1/4 in. (32 mm) larger than outside diam of pipe insulation (Item 4). Max diam of opening is 18 in. (457 mm).

2. **Steel Sleeve** – Cylindrical sleeve fabricated from 24 gauge (or heavier) galv steel and having a min 1 in. (25 mm) overlap along the longitudinal seam. Outside diam of sleeve to be tightly fitted with inside diam of opening, flush with both surfaces of the wall.

3. **Through Penetrants** – Max one metallic pipe or tubing to be installed either concentrically or eccentrically with firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe –** Nom 12 in. (305 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. **Iron Pipe –** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tube –** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.
   D. **Copper Pipe –** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
   E. **Stainless Steel Pipe –** Nom 4 in. (102 mm) diam (or smaller) Schedule 5 (or heavier) stainless steel pipe.

4. **Pipe Covering* –** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m^3) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory applied self-sealing tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space shall be min 0 in. (point contact) to max 7/8 in. (22 mm).

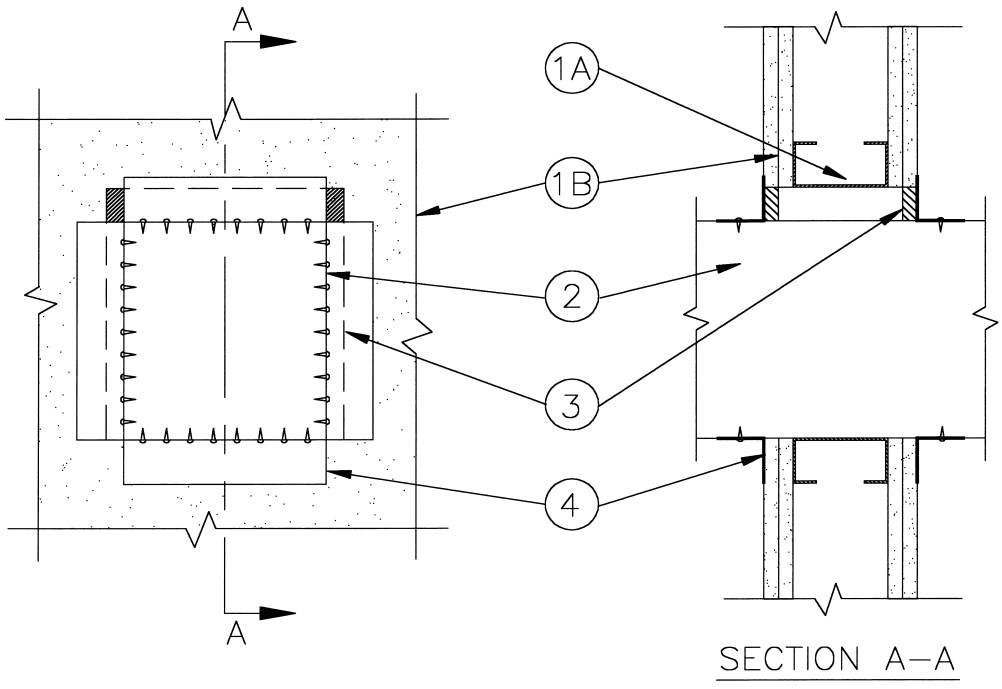
   T Rating is 3/4 Hr for nom 2 in. (51 mm) thick pipe covering. T Rating is 0 Hr for pipe coverings less than nom 2 in. (51 mm) thick.

   See **Pipe and Equipment Covering – Materials –** (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

5. **Firestop System – The firestop system shall consist of the following:**
   A. **Packing Material** – Min 3-7/8 in. (98 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into the opening and recessed from both surfaces of wall assembly to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Min 1/2 in. (13 mm) dai bead of fill material applied at pipe insulation/gypsum board interface at point contact locations.
      Passive Fire Protection Partners – 3600EX

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr	F Ratings — 1 and 2 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr
	FTH Rating — 0 Hr



SECTION A–A

1. **Wall Assembly –** The 1 and 2 hr fire rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of steel channel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. Additional 3-5/8 in. wide steel studs shall be used to completely frame opening.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max size of opening to be 957 sq in. with a max dimension of 33 in.

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

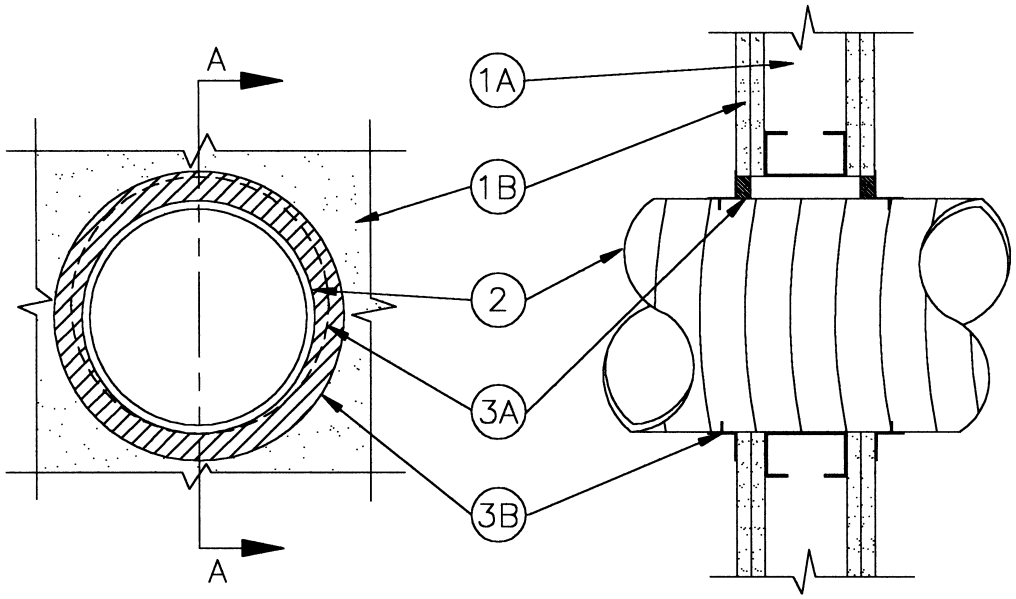
2. **Through-Penetrant –** Nom 26 in. by 30 (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1-1/2 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At the point contact location between duct and wallboard, a min 1/2 in. diam bead of sealant shall be applied at the wallboard/duct interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

4. **Retaining Angles –** Min 16 gauge galv steel angles sized to lap duct a min of 2 in. and lap wall surfaces of a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 1 in. from each end of duct and spaced a max of 6 in. OC.

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



SECTION A–A

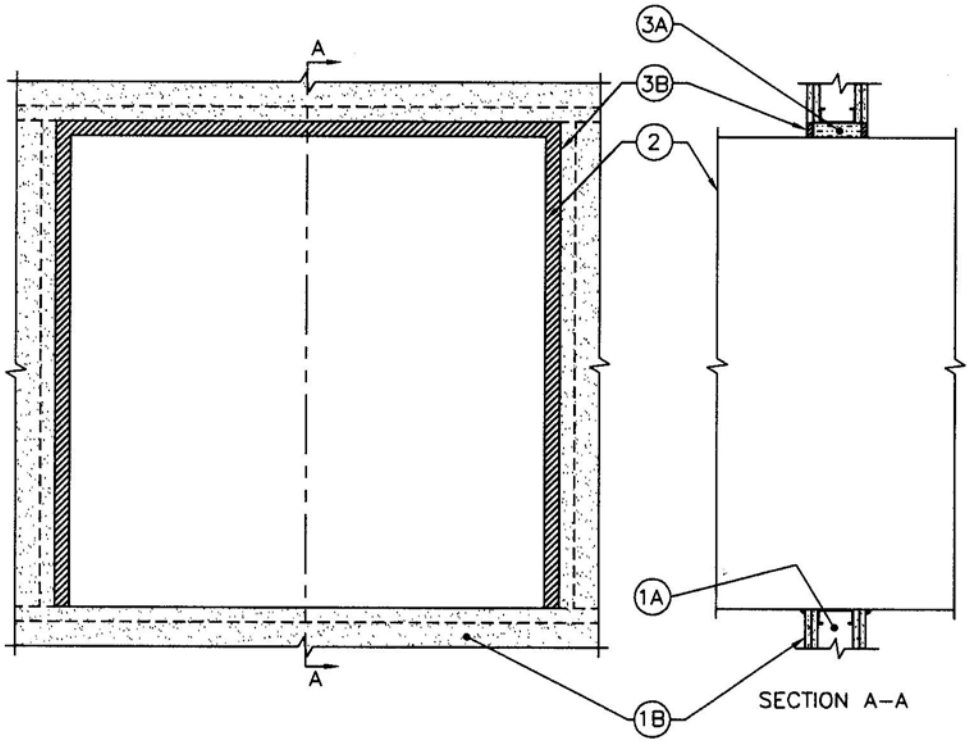
1. **Wall Assembly –** The 1 or 2 hr fire rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC. Additional studs shall be used to completely frame opening.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as required in the individual Wall and Partition Design. Max diam of opening is 17 in.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Steel Duct –** Nom 16 in. (or smaller) No. 22 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min 0 in. (point contact) to max 1 in. Duct to be rigidly supported on both sides of wall assembly.

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. or 1-1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall for 1 and 2 hr walls, respectively. At the point contact location between duct and gypsum board, a min 1/4 in. diam bead of sealant shall be applied at the gypsum board/duct interface on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW
   B. **Retaining Angles –** Min 16 gauge galv steel angles roll-formed and sized to lap duct a min of 1 in. and lap wall surfaces a min of 1 in. Angles attached to duct on both sides of wall with min 1/2 in. long, No. 10 (or larger) sheet metal screws spaced a max of 6 in. OC.

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1-1/4 Hr	FT Rating — 1-1/4 Hr
	FH Rating — 2 Hr
	FTH Rating — 1=1/4 Hr



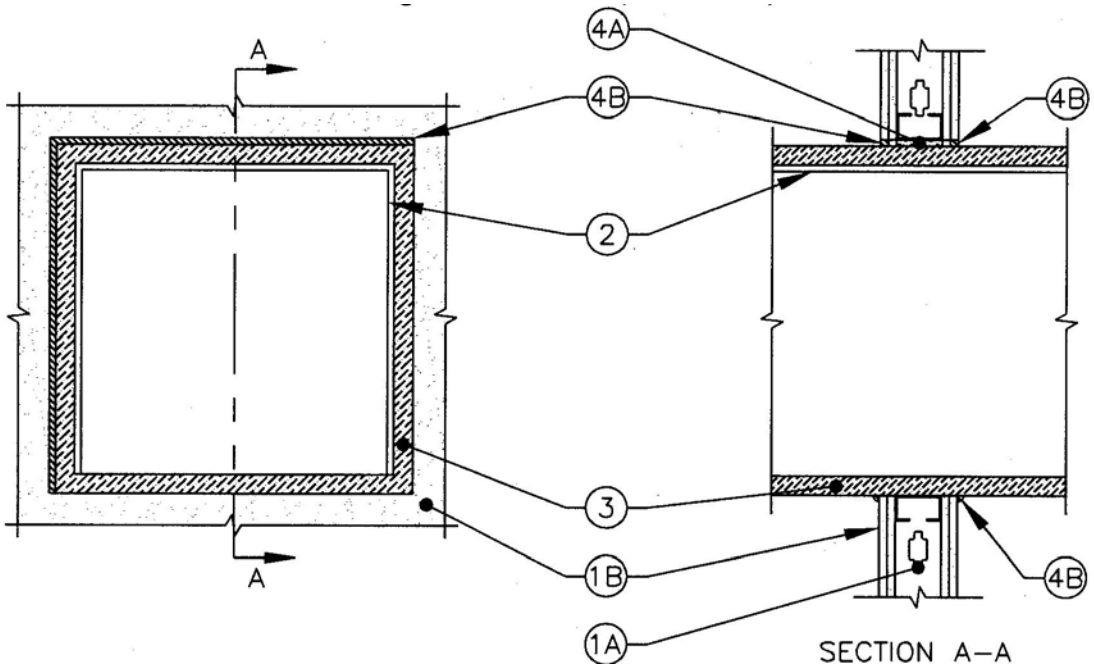
1. **Wall Assembly –** The 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs** - Wall framing shall consist of min. 3-5/8 in. wide steel channel studs and spaced max 24 in. OC. Additional 3-5/8 in. wide steel studs shall be used to completely frame opening.
   B. **Gypsum Board*** – Two layers of 5/8 in. thick gypsum wallboard as specified in the individual Wall and Partition Design. Max size of opening to be 688.5 sq. in. with a max dimension of 27 in.

2. **Steel Duct** – Nom. 24 in. by 24 in. (or smaller) No. 24 gauge (or heavier) galv. steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 0 in. (point contact) to max 1-1/2 in. is required within the firestop system. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Material –** Min 5-1/8 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. thickness of sealant applied within annulus, flush with both surfaces of wall assembly. Min 1/2 in. diam bead of sealant shall be applied at the duct/gypsum board interface at point contact location on both surfaces of wall assembly.
   Passive Fire Protection Partners – 3600EX, 4800DW

* Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1 and 2 Hr (See Item 1)



1. **Wall Assembly** – The 1 and 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of steel channel studs to be min 3-5/8 in. wide and spaced max 24 in. OC. Additional framing members required to completely frame opening.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max size of opening is 31-1/2 in. by 31-1/2 in.
   The hourly F and T Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

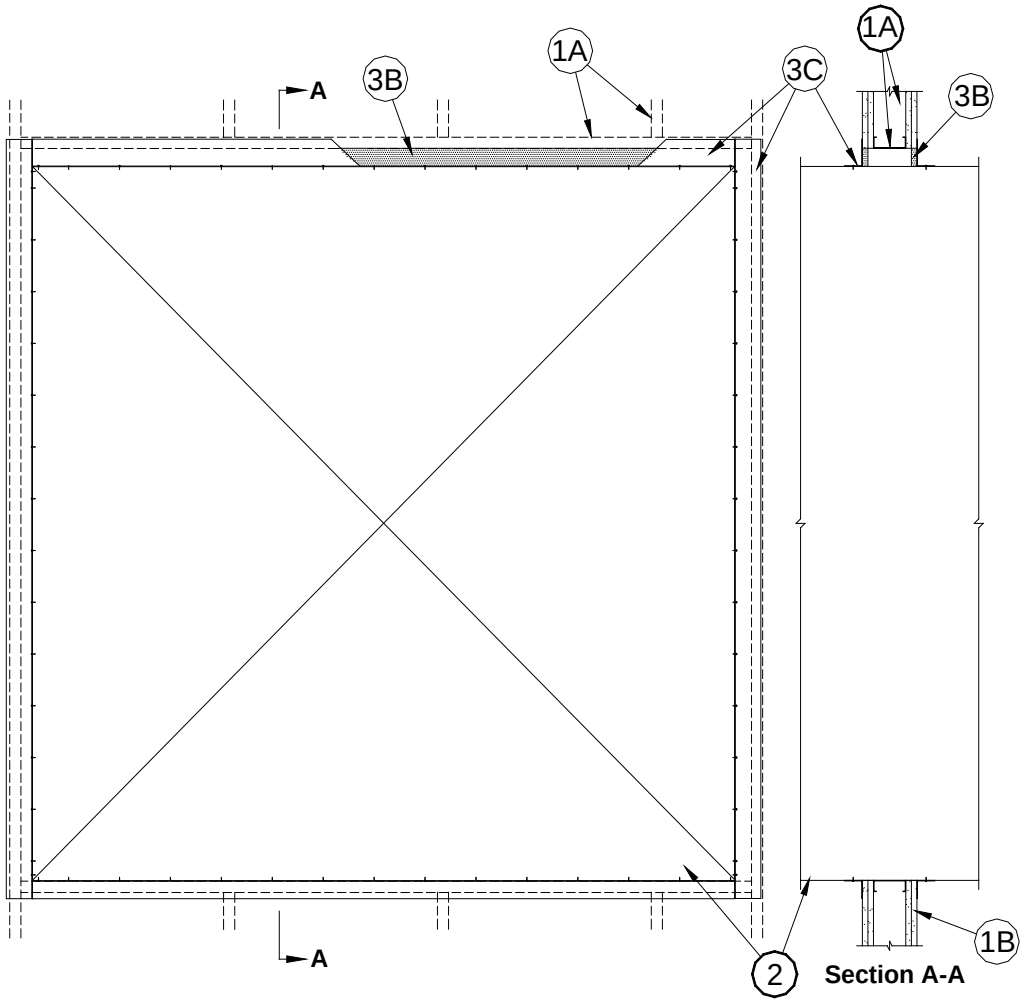
2. **Steel Grease Duct –** Nom 24 in. by 24 in. (or smaller) No. 16 (or heavier) galv steel duct to be installed either concentrically or eccentrically within the firestop system. Duct to be rigidly supported on both sides of wall assembly.

3. **Duct Wrap Materials* –** Min two layers of 1-1/2 in. thick duct wrap installed in accordance with the manufacturer's installation instructions. The annular space between the insulated duct and periphery of opening shall be min 0 in. (point contact) to max 1-1/2 in.
   UNIFRAX CORP – FyreWrap Duct 1.5 Insulation

4. **Firestop System** The firestop system shall consist of the following:
   A. **Packing Material –** Min 3-5/8 in. thickness of min 4 pcf mineral wool batt insulation or thermal insulation from Duct Wrap firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of the wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall assembly. At the point contact location between insulated duct and wallboard, a min 1/2 in. diam bead of fill material shall be applied at the wallboard/insulated duct interface on both sides of wall.
      Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



1. **Wall Assembly —** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. **Studs —** Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC. Additional steel studs shall be used to completely frame the opening.

B. **Gypsum Board* —** Min 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers and orientation shall be as specified in the individual U400. V400 or W400 Wall and Partition Design. Max area of opening is 103 sq ft (9.6 m^2) with a max dimension of 122 in. (3.1 m).

The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall in which it is installed.

2. **Steel Duct —** Max 118 in. by 118 in. (3 by 3 m) The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Duct to be installed either concentrically or eccentrically within the firestop system. The space between the steel duct and periphery or opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.

3. **Firestop System —** The firestop system shall consist of the following:

A. **Packing Material —** Optional, Not Shown) — Polyethylene backer rod, mineral wool batt insulation or fiberglass batt insulation friction fitted into annular space. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.

B. **Fill, Void or Cavity Material* — Sealant —** Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Min 1/4 in. (6 mm) diam bead of fill material shall be applied at the point contact location between the steel duct and the gypsum board.

PASSIVE FIRE PROTECTION PARTNERS – 4800DW or 3600EX

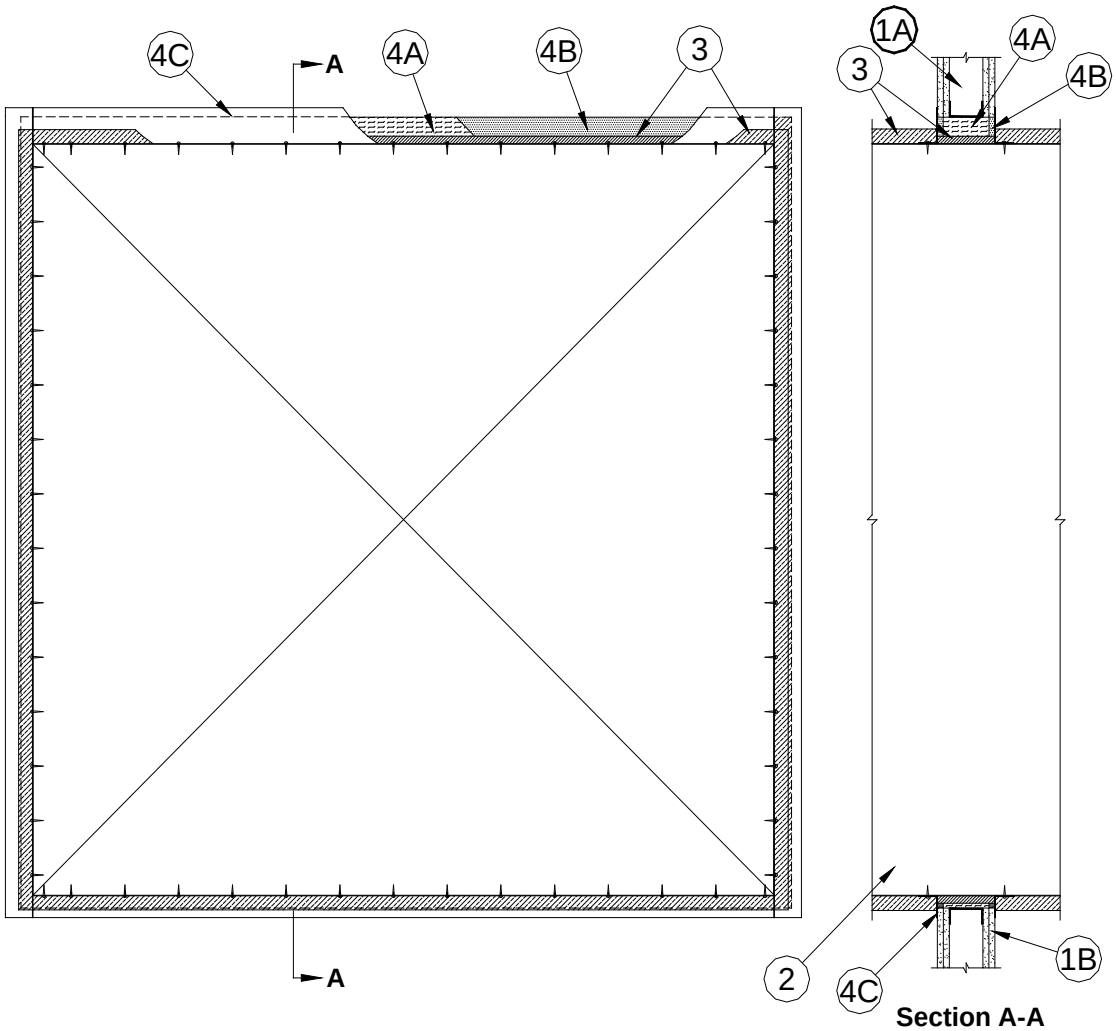
C. **Steel Retaining Angles —** Min No. 16 gauge (0.059 in. or 15 mm) galv steel angles sized to lap steel duct a min of 2 in. (51 mm) and to lap wall surfaces a min of 1 in. (25 mm). Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

F Ratings – 1 and 2 Hr
T Rating – 0 Hr

W-L-7218

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



Section A-A

1. **Wall Assembly —** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. **Studs —** Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.

B. **Gypsum Board* —** Min 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers and orientation shall be as specified in the individual U300, U400. V400 or W400 Wall and Partition Design. Max size of opening is 210 sq in. (1355 cm^2) with a max width of 14-1/2 in. (368 mm) for wood studs. Max size of opening is 107 sq ft. (9.9 m^2) with a max width of 124 in. (3.15 m) for steel studs.

The hourly F and FH Ratings of the firestop system is equal to the hourly fire rating of the wall in which it is installed.

2. **Steel Duct —** Max 118 by 118 in. (3 by 3 m) steel duct to be installed within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Batts and Blankets* —** Nom 1-1/2 or 2 in. (38 or 51 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m^3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm).

   See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.

3A. **Batts and Blankets* —** As an alternate to Item 3, single layer of nom 2 in. (51 mm) thick mineral fiber batt or blanket (nom 3 pcf or 48 kg/m^3) installed on duct and covered with max 0.8 mm thick aluminum facing. Longitudinal and transverse joints sealed and secured with pressure sensitive aluminum foil tape. Insulation is discontinuous at the steel retaining angles (Item 4C) at both sides of the wall assembly. During installation of the fill material (Item 4B), the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm). As an option, insulation may terminate flush against steel retaining angles (Item 4C) at both sides of wall.

   See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used

4. **Firestop System —** The firestop system shall consist of the following:
   A. **Packing Material —** Min 3-5/8 (92 mm) or 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 or 2 hr fire-rated walls, respectively. When Item 3A duct insulation terminates at steel retaining angles, packing material to be firmly packed into annular space between wall opening and steel duct. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.

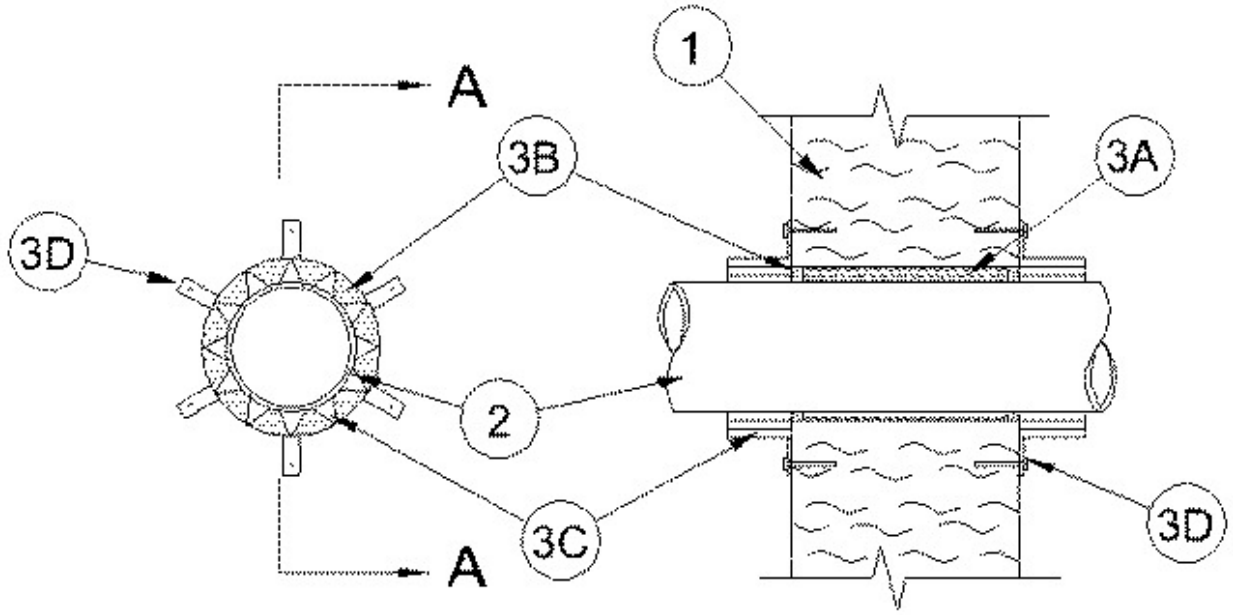
   B. **Fill, Void or Cavity Material* — Sealant —** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall.

      PASSIVE FIRE PROTECTION PARTNERS – 4800DW or 3600EX

   C. **Steel Retaining Angles —** Min No. 16 gauge (0.059 in. (1.5 mm)) galv steel angles sized to lap steel duct a min of 1 in. (25 mm) and lap wall surfaces a min of 2 in. (51 mm). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)
F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)



Section A-A

1. **Wall Assembly —** The 1 or 2 hr fire rated composite wall assembly shall be constructed of nom 4 in. (102 mm) or 7 in. (178 mm) thick, respectively, galvanized steel or painted galvanized steel faced **Partition Panel Units*** (CJMR) installed in the manner specified in Wall and Partition Design No. U050 in the Fire Resistance Directory. Max diam of opening is 7-5/8 in. (194 mm). Opening can be located on or off panel unit joints.

The F and T Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

METL-SPAN, A DIVISION OF NCI GROUP, INC. — ThermalSafe Partition Units

2. **Through-Penetrants —** One nonmetallic pipe or tube to be installed eccentrically or concentrically within the opening. The annular space between the penetrant and the periphery of the opening shall be min 1/4 in. (6 mm) to max 1/2 in. (13 mm). Pipe or tube to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes or tubing may be used:

   A. **Polyvinyl Chloride (PVC) Pipe —** Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core PVC for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe —** Nom 6 in. (152 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.

   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe —** Nom 6 in. (152 mm) diam Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   D. **Flame Retardant Polypropylene (FRPP) Pipe —** Nom 4 in. (102 mm) diam Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

3. **Firestop System —** The firestop system shall consist of the following:

   A. **Packing Material —** Min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Min 3-1/4 in. (83 mm) and min 6-1/4 in. (159 mm) thickness required for 1 hr and 2 hr fire rated walls, respectively. Packing material may be recessed from one or both surfaces of wall to accommodate the thickness of the optional fill material (Item 3B).

   B. **Fill, Void or Cavity Material* — Sealant —** (Optional) - Nom 3/8 in. (10 mm) thickness of fill material applied within the annulus, flush with one or both wall surfaces.

      PASSIVE FIRE PROTECTION PARTNERS — 3600EX

   C. **Fill, Void or Cavity Material* — Wrap Strip —** Nom 1/4 in. (6 mm) thick by 2 in. (51 mm) wide intumescent wrap strip. Layers of wrap strip are individually or continuously wrapped around the through-penetrant. Ends of individual layers are butted and held in place with masking tape, and butted ends in successive layer shall be offset. Wrap strip butted tightly against both surfaces of wall. See Table below for number of layers of wrap strip required.

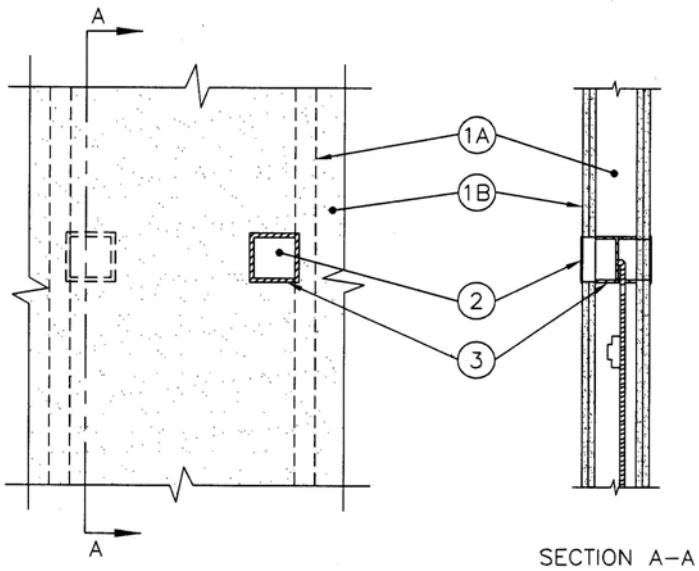
      PASSIVE FIRE PROTECTION PARTNERS — WS2

Max Pipe Diam, In. (mm)	No. of Layers of Wrap Strip Required
6 (152)	4
4 (102)	3
2 (51)	2

D. **Steel Collar —** Collar fabricated from coils of precut min 0.016 in. (0.41 mm) thick (No. 28 gauge) galv steel available from wrap strip manufacturer or field assembled. Collar shall be nom 2 in. (51 mm) deep with 1 in. (25 mm) wide by 1-1/2 in. (38 mm) long anchor tabs on 4 in. (102 mm) centers for securement to both surfaces of wall. In addition, collars contain retainer tabs 1/2 in. (13 mm) wide by 3/4 in. (19 mm) long, located opposite the anchor tabs. Collar shall be wrapped over the wrap strip, overlapping min 1 in. (25 mm) and secured with a nom 1/2 in. (13 mm) wide stainless steel hose clamp. The retainer tabs are folded 90 deg towards the pipe to maintain the annular space around the pipe and to retain the wrap strip. Collar secured to both surfaces of wall at each anchor tab by means of min No. 12 sheet metal screws in conjunction with 1-1/4 in. (32 mm) diam fender washers.

*Bearing the UL Classification Mark

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hrs	F Ratings — 1 & 2 Hrs
T Ratings — 1 & 2 Hrs	FT Ratings — 1 & 2 Hrs
	FH Ratings — 1 & 2 Hrs
	FTH Ratings — 1 & 2 Hrs



SECTION A–A

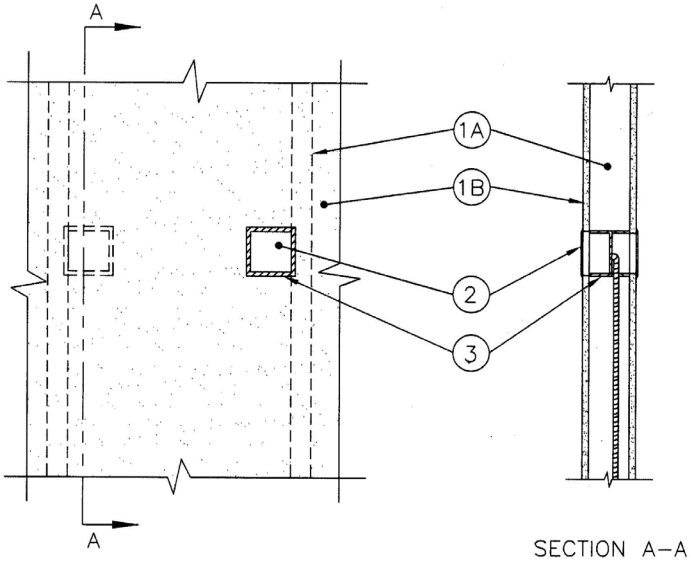
1. **Wall Assembly –** The 1 or 2 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-5/8 in. (92 mm) steel studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max size of opening is 25 in. sq. (161.3 mm).

2. **Partial Penetrants –** Max 4 by 4 by 2-1/8 in. (102 by 102 by 54 mm) flush device UL Listed Metallic Outlet Boxes installed with steel cover plates installed either concentrically or eccentrically within the wall opening. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm).

3. **Fill, Void or Cavity Material* – Sealant –** A min 3/16 in. (5 mm) thickness of sealant to be installed to completely cover the exterior surfaces of the box within the stud cavity with a min 3/16 in. (5 mm) thickness of sealant used to plug the end of each electrical metallic tube or conduit at its connection to the box. Min 1/4 in. (6 mm) thickness of fill material to be installed between electrical receptacle outlet box and wallboard. When the sealant material is used as directed, the horizontal separation between outlet boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the outlet boxes are not installed back to back.
   Passive Fire Protection Partners – 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A–A

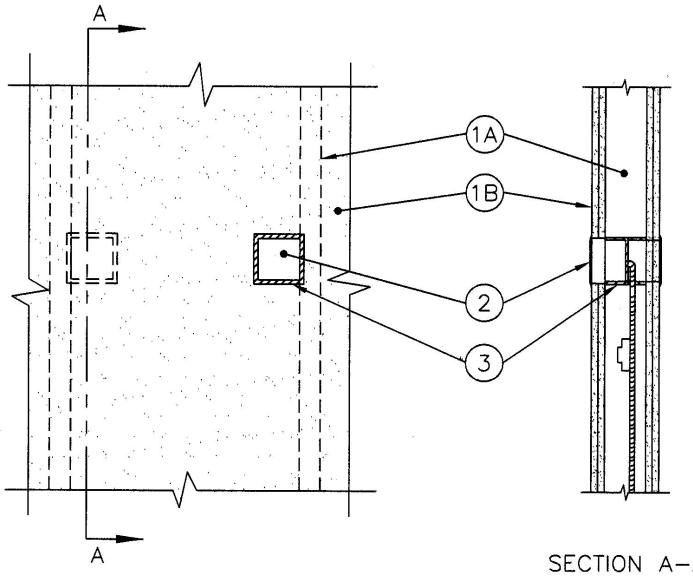
1. **Wall Assembly –** The 1 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing to consist of min 3-5/8 in. (92 mm) steel studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max size of opening is 25 in. sq. (161.3 mm).

2. **Partial Penetrants –** Max 4 by 3-11/16 by 3 in. (102 by 94 by 76 mm) deep UL Listed Nonmetallic Outlet Boxes manufactured by Thomas & Betts Corp., made from polycarbonate and bearing a 2 hr rating under the "Outlet Boxes and Fittings Classified for Fire Resistance" category in the UL Fire Resistance Directory, installed either concentrically or eccentrically within the wall opening. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm).

3. **Fill, Void or Cavity Material* – Sealant –** A min 3/16 in. (5 mm) thickness of sealant to be installed to completely cover the exterior surfaces of the box within the stud cavity with a min 3/16 in. (5 mm) thickness of sealant used to plug the end of each electrical metallic tube or conduit at its connection to the box. Min 1/4 in. (6 mm) bead of fill material to be installed between edge of electrical receptacle outlet box and wallboard. When the sealant material is used as directed, the horizontal separation between outlet boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the outlet boxes are not installed back to back.
   Passive Fire Protection Partners – 4800DW

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hrs	F Ratings — 1 & 2 Hrs
T Ratings — 1 & 2 Hrs	FT Ratings — 1 & 2 Hrs
	FH Ratings — 1 & 2 Hrs
	FTH Ratings — 1 & 2 Hrs



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-5/8 in. (92 mm) steel studs spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

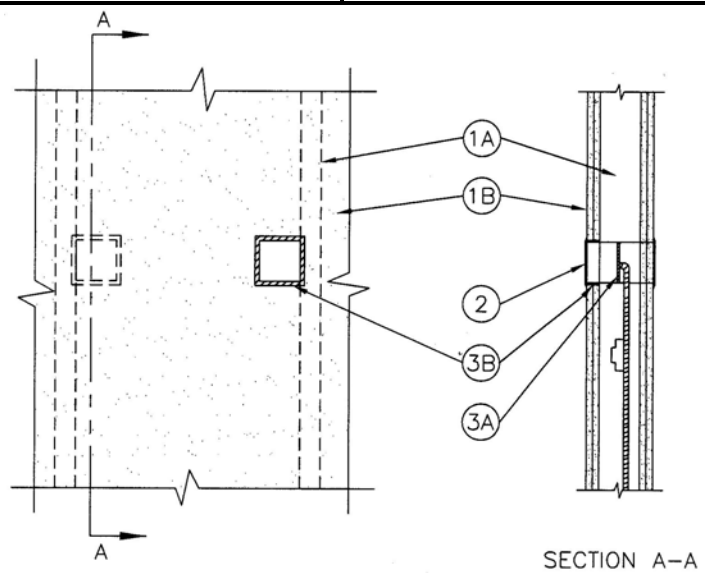
2. **Partial Penetrants** – Max 4 by 4 by 2-1/8 in. (102 by 102 by 54 mm) UL listed metallic outlet box, with steel cover, installed either concentrically or eccentrically within the wall opening, on opposing studs spaced max 24 in. (610 mm) OC. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/8 in. (3 mm).

3. **Fill, Void or Cavity Material* – Putty Pad** – Min 1/8 in. (3 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box (except for the side of the outlet box against the stud) and completely seal against the stud within the stud cavity. An additional 3/4 in. (19 mm) ball of putty pad material used to plug the end of each electrical metallic tube or conduit at its connection to the box. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.

   Passive Fire Protection Partners – MP1 – Putty Pads

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hrs	F Ratings — 1 & 2 Hrs
T Ratings — 1 & 2 Hrs	FT Ratings — 1 & 2 Hrs
	FH Ratings — 1 & 2 Hrs
	FTH Ratings — 1 & 2 Hrs



SECTION A–A

1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing to consist of min 3-5/8 in. (92 mm) steel studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max size of opening is 16 in. sq. (103 cm^2).

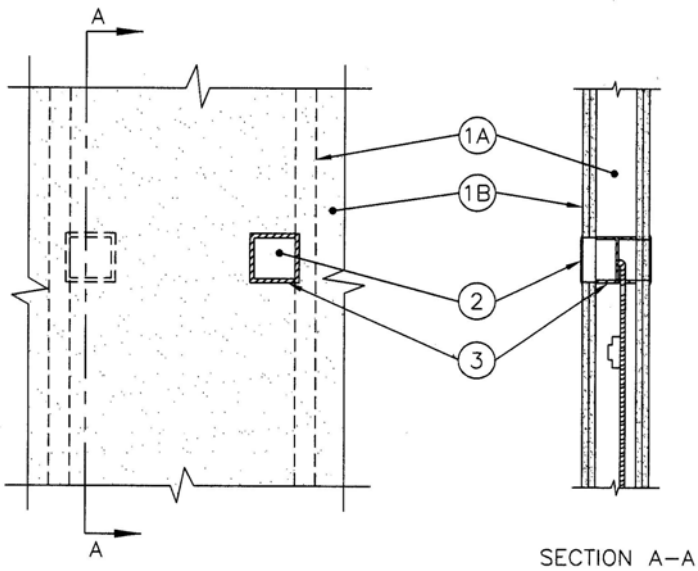
2. **Partial Penetrants –** Max 4 by 4 by 2-1/8 in. (102 by 102 by 54 mm) deep and 2-1/8 by 4 by 2-1/8 in. (54 by 102 by 54 mm) deep electrical receptacle outlet boxes with 1 or 2 hr fire rating, installed either concentrically or eccentrically within the wall opening. The outlet boxes are to be flush device UL Listed Metallic Outlet Boxes without internal clamps installed with steel cover plates in 1 and 2 hr fire rated gypsum board wall assemblies framed with min 3-5/8 in. (92 mm) deep steel studs and constructed of the materials and in the manner specified in the individual U400 and V400 Series Wall and Partition Designs in the UL Fire Resistance Directory. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/4 in. (6 mm).

3. **Firestop System –** The firestop system shall consist of the following:
   A. **Box Electrical Outlet Box Inserts –** One insert sized, 3-3/4 by 3-3/4 in. (95 by 95 mm) and 1-13/16 by 3-3/4 in. (47 by 95 mm) for use with max 4 by 4 by 2-1/8 in. (102 by 102 by 54 mm) deep and 2-1/8 by 4 by 2-1/8 in. (54 by 102 by 54 mm) deep outlet boxes, respectively. One 1/4 in. (6 mm) thick pad insert adhered to the interior back wall of the outlet box in accordance the instructions supplied with the product. Installation to comply with Article 370-16 of the National Electrical Code (NFPA 70).
   Passive Fire Protection Partners – EBI-60
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied between gypsum board and outside perimeter of outlet box. When protective material is used within outlet boxes on both sides of the wall as directed, the horizontal separation between outlet boxes on opposite sides of the wall as directed, the horizontal separation between outlet boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

	Classified Wall Opening Protective Material Metal Boxes Installed In Noncombustible & Combustible Construction Assembly Rating – 1 & 2 Hr	R18335 (5)

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hrs	F Ratings — 1 & 2 Hrs
T Ratings — 1 & 2 Hrs	FT Ratings — 1 & 2 Hrs
	FH Ratings — 1 & 2 Hrs
	FTH Ratings — 1 & 2 Hrs



SECTION A–A

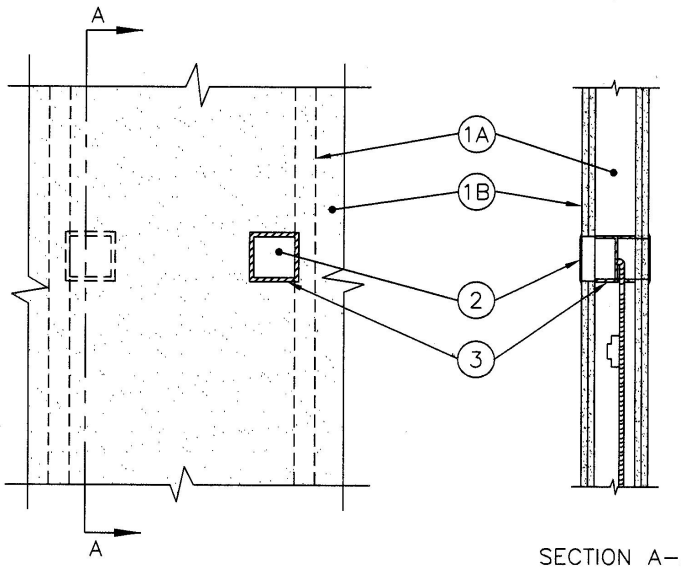
1. **Wall Assembly –** The 1 or 2 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-1/2 in. (89 mm) deep wood or steel studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

2. **Partial Penetrants** – Max 4 by 4 by 2-1/8 in. (102 by 102 by 54 mm) UL listed metallic outlet box, with steel cover plates, installed either concentrically or eccentrically within the wall opening, on opposing studs spaced max 24 in. (610 mm) OC. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/8 in. (3 mm).

3. **Fill, Void or Cavity Material* – Putty Pad** – Min 1/8 in. (3 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box (except for the side of the outlet box against the stud) and completely seal against the stud within the stud cavity. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.
   Passive Fire Protection Partners – MP1 – Putty Pads

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 2 Hr	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr



SECTION A–A

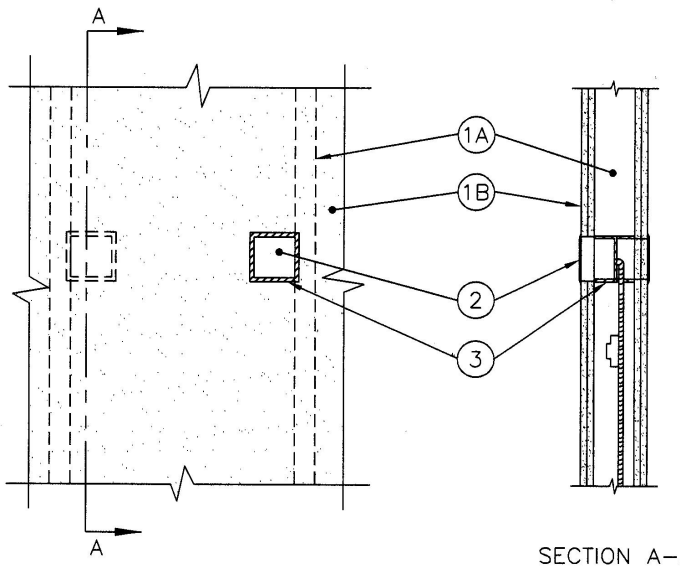
1. **Wall Assembly –** The 2 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-1/2 in. (89 mm) deep wood or steel studs.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

2. **Partial Penetrants** – Max 2-3/16 by 3-3/4 by 2-11/32 in. (56 by 95 by 60 mm) deep UL listed Nonmetallic Outlet Boxes manufactured by Pass & Seymour Inc. under the trade name Slater, made from polyvinyl chloride and bearing a 2 hour rating under the "Outlet Boxes and Fittings Classified for Fire Resistance" category in the Fire Resistance Directory. Outlet box secured to studs by means of mounting tab supplied with the outlet box. Outlet boxes installed with steel or plastic cover plates. The annular space between outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/8 in. (3 mm).

3. **Fill, Void or Cavity Material* – Putty Pad** – Min 1/8 in. (3 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box including the side of the outlet box against the stud. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.
   Passive Fire Protection Partners – MP1 – Putty Pads

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 & 2 Hrs	F Ratings — 1 & 2 Hrs
T Ratings — 1 & 2 Hrs	FT Ratings — 1 & 2 Hrs
	FH Ratings — 1 & 2 Hrs
	FTH Ratings — 1 & 2 Hrs



SECTION A–A

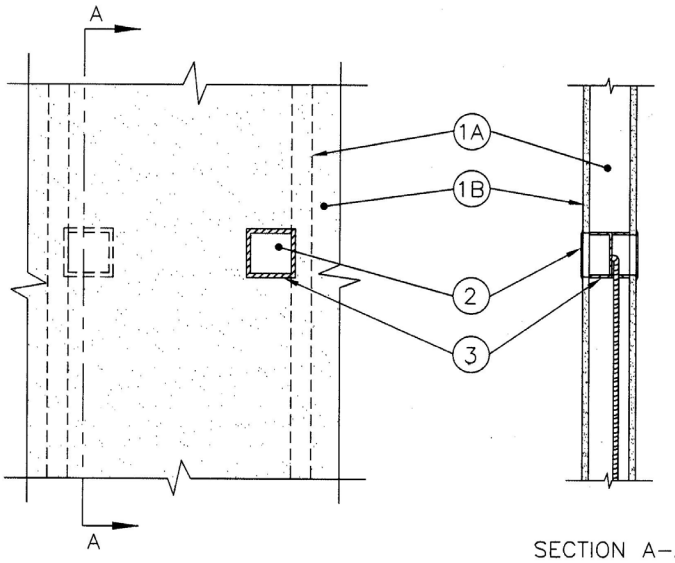
1. **Wall Assembly –** The 1 & 2 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min 3-1/2 in. (89 mm) deep wood studs.
   B. **Wallboard, Gypsum* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

2. **Partial Penetrants** – Max 4 by 3-3/4 by 3 in. (102 by 95 by 76 mm) deep UL listed Nonmetallic Outlet Boxes manufactured by Carlon Electrical Products, made from polyvinyl chloride and bearing a 2 hour rating under the "Outlet Boxes and Fittings Classified for Fire Resistance" category in the Fire Resistance Directory. Outlet box secured to wood stud by means of two nailing tabs in conjunction with nails supplied with the outlet box. Outlet boxes installed with steel or plastic cover plates. The annular space between outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/8 in. (3 mm).

3. **Fill, Void or Cavity Material* – Putty Pad** – Min 1/8 in. (3 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box (except for the side of the outlet box against the stud) including the nailing tab and completely seal against the stud within the stud cavity. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.
   Passive Fire Protection Partners – MP1 – Putty Pads

*Bearing the UL Classification Marking

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A–A

1. **Wall Assembly –** The 1 hour fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Wall framing to consist of min 3-5/8 in. (92 mm) wood studs.
   B. **Gypsum Board* –** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design.

2. **Partial Penetrants –** Max 4 by 3-11/16 by 3 in. (102 by 94 by 76 mm) deep UL Listed Nonmetallic Outlet Boxes manufactured by Thomas & Betts Corp., made from polycarbonate and bearing a 2 hr rating under the "Outlet Boxes and Fittings Classified for Fire Resistance" category in the UL Fire Resistance Directory. Outlet box secured to wood stud by means of two nailing tabs in conjunction with nails supplied with the outlet box. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (point contact) to max 1/8 in. (3 mm).

3. **Fill, Void or Cavity Material* – Putty Pad** – Min 1/8 in. (3 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box (except for the side of the outlet box against the stud) including nailing tab and completely seal against the stud within the stud cavity. Outlet box installed with steel or plastic cover plates. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on both sides of wall as directed, the horizontal distance separation between outlet boxes on opposite sides of the wall may be less than 24 in. (610 mm) provided that the boxes are not installed back to back.
   Passive Fire Protection Partners – MP1 – Putty Pads

*Bearing the UL Classification Marking

Understanding a Underwriters Laboratories (UL) Joint Firestop Listing (XHBN & XHDG Systems).

UL uses an Alpha-alphanumeric identification system can be used to help identify the correct joint firestop system to select.

The Alpha component is used to identify the assembly type being penetrated, as the Numerical component is used to identify the penetration type.

First Two Alpha Characters Identify Joint Type

BW	=	signifies bottom-of-wall
CG	=	signifies wall-to-wall joints intended for use as corner guards
CW	=	signifies perimeter fire containment (curtain wall)
HW	=	signifies head-of-wall
FF	=	signifies floor-to-floor
FW	=	signifies floor-to-wall
WW	=	signifies wall-to-wall

Third Alpha Characters Identify Joint Movement Capabilities

S	=	signifies static joint - no movement
D	=	signifies dynamic joint - movement

Numeric Component Identifies Joint Width

0000-0999	=	Less than or equal to 2 in.
1000-1999	=	Greater than 2 in. and less than or equal to 6 in.
2000-2999	=	Greater than 6 in. and less than or equal to 12 in.
3000-3999	=	Greater than 12 in. and less than or equal to 24 in.
4000-4999	=	Greater than 24 in.

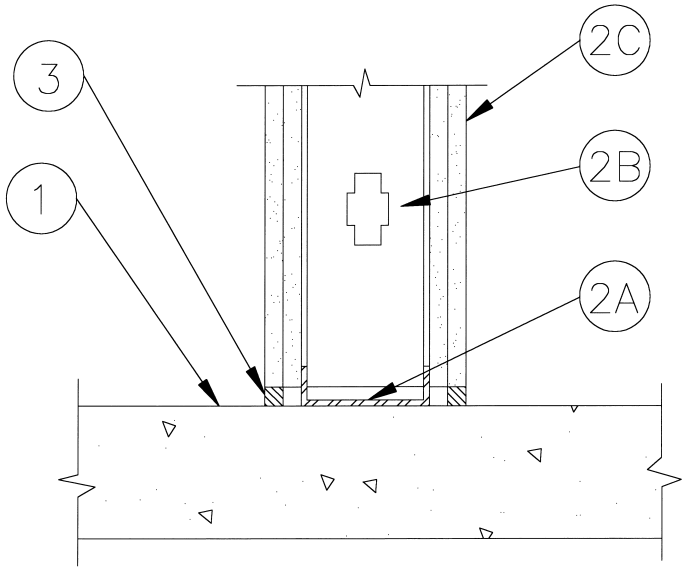
1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.	FT Ratings — 1 and 2 Hr (See Item 2)
	FH Ratings — 1 and 2 Hr (See Item 2)
	FTH Ratings — 1 and 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in.



1. **Floor Assembly** – Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Floor may also be constructed of any 6 in. thick UL Classified hollow-core **Precast Concrete Units***.
   See **Precast Concrete Units** category in the Fire Resistance Directory for names of manufactures.

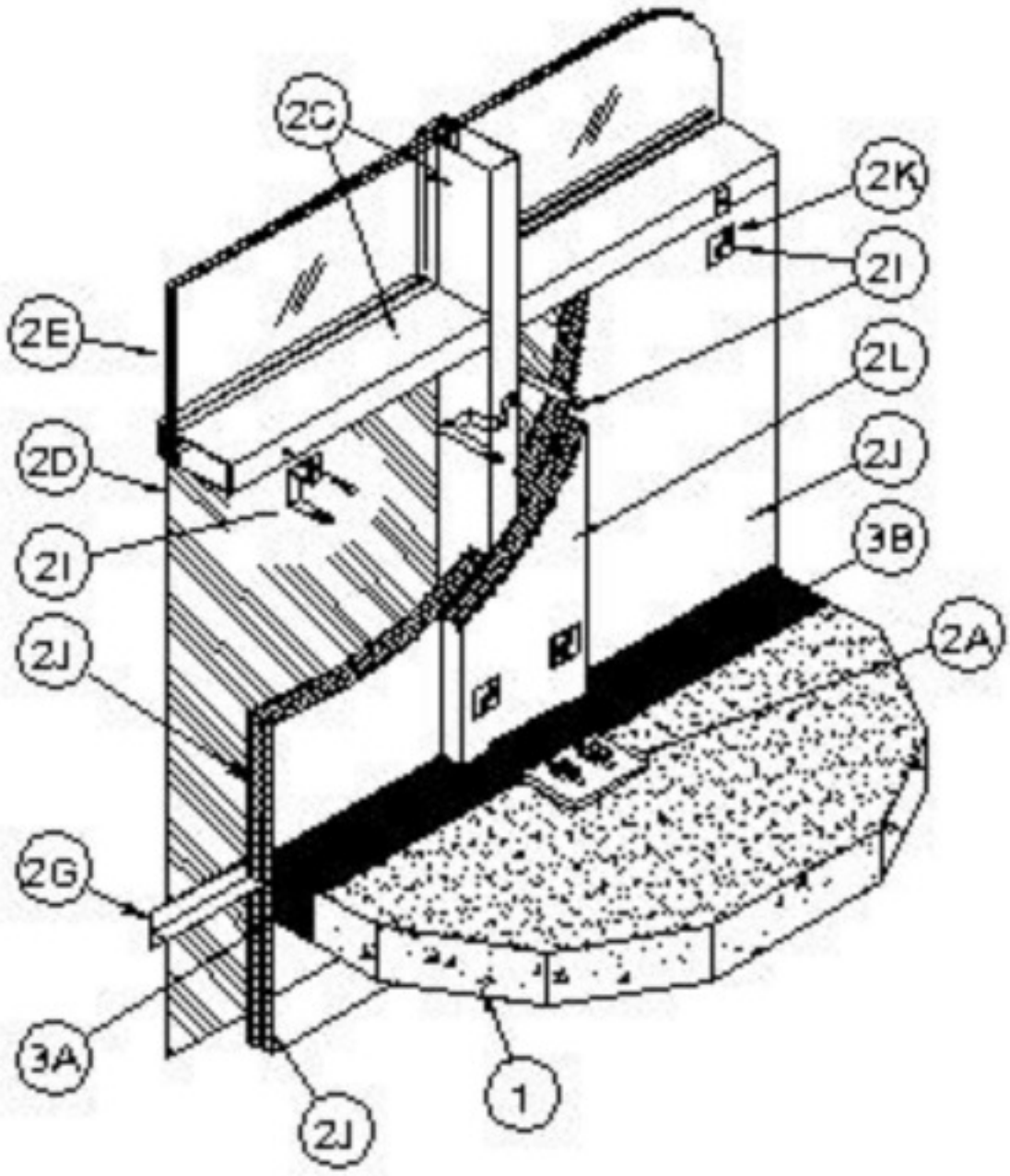
2. **Wall Assembly –** The 1 or 2 h fire-rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory. In addition, the wall may incorporate a head-of-wall joint system constructed as specified in the HW Series Joint Systems in the UL Fire Resistance Directory. The wall shall include the following construction features:
   A. **Steel Floor Runner –** Floor runners of wall assembly shall consist of min No. 25 gauge galv steel channels sized to accommodate steel studs (Item 2B). Floor runners to be provided with min 1-1/4 in. flanges. Runners secured with steel fasteners spaced 12 in. OC.
   B. **Studs –** Steel studs to be min 2-1/2 in. wide. Studs cut 1/2 to 3/4 in. less in length than assembly height with bottom nesting in, resting on and fastened to floor runner with sheet metal screws. Stud spacing not to exceed 24 in. OC.

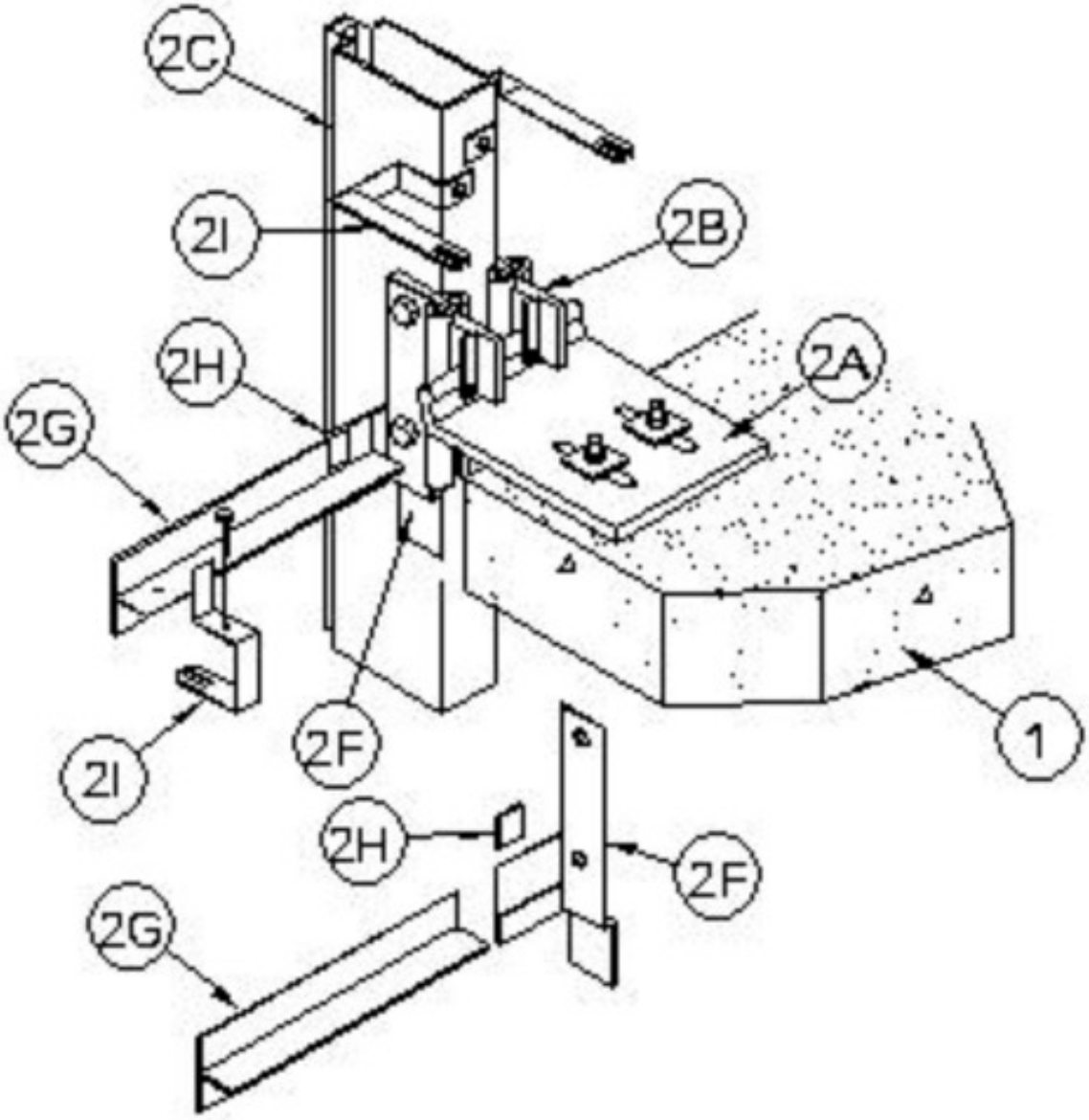
C. **Gypsum Board* –** Gypsum board installed to a min total thickness of 5/8 or 1-1/4 in. on each side of wall for a 1 or 2 hr rated wall, receptively. Wall to be constructed as specified in the individual U400 or V400 Series Design in the UL Fire Resistance Directory, except that a max 3/4 in. gap shall be maintained between the bottom of gypsum board and top of concrete floor.
The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Fill, Void or Cavity Material* – Sealant – Max separation between top of floor and bottom of gypsum board is 3/4 in.** Min 5/8 in. thickness of fill material installed on each side of the wall between the bottom of the gypsum board and the top of the concrete floor, flush with each surface of the wall.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Mark

	F Rating – 2 Hr **T Rating – 1/4 Hr** **Integrity Rating – 2 Hr** **Insulation Rating – 1/4 Hr** **Linear Opening Width – 4 In. Max** **Class II Movement Capabilities – 5% Vertical Shear (See Item3)**	**CW-D-1005**





1. **Floor Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete.

2. **Curtain Wall Assembly –** The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Anchor Plates –** Nom 7 in. wide by 9-1/4 in. long by 5/8 in. thick extruded aluminum plates with a nominal 1-3/4 in. high raised lip along one end to engage hooked ends of mullion mounting clips (Item 2B). Plates anchored to top surface of floor at each mullion location with steel wedge anchor bolts in conjunction with extruded aluminum washers.
   B. **Mullion Mounting Clips –** Nominal 3 in. wide by 7 in. high extruded aluminum anchor slides with tapped holes and with separate extruded aluminum hooks designed to engage the raised lip of the anchor plate (Item 2A). Anchor slides bolted to each side of mullion at each floor with 1/2 in. diam stainless steel screws with locking washers. Anchor hooks secured to anchor slides with steel jacking screws and secured to raised lip of anchor plate with steel set screw.
   C. **Framing –** The one-piece or split rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. wide by 6 in. deep and shall be formed from min 0.125 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mullion anchor plates (Item 2A) with mounting clips (Item 2B) at each floor level. Interior face of mullions to be max 4 in. from edge of floor assembly. Transoms to be spaced min 69 in. OC. The minimum height from the top of the floor to the bottom of the vision panel sill is 33 in.
   D. **Spandrel Panels –** The spandrel panels shall consist of one of the following types:
      a. **Glass Panels –** Nom 1/4 in. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels –** Nom 1/8 in. (3 mm) thick aluminum panels with 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. **Stone Panels –** Nom 1-3/16 in. (46 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   E. **Vision Panels –** Nom 1 in. thick insulated glass units with two layers of nom 1/4 in. thick transparent heat-strengthened glass separated by a 1/2 in. air space. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   F. **Light Gauge Framing* – T-Bar Support Brackets –** Nom 2 in. wide brackets formed from galv steel and designed to bridge extruded aluminum anchor slides of mullion mounting clips (Item 2B). Each T-Bar support bracket provided with nominal 3 in. wide by 5 in. high leg with a nominal 3/4 in. hemmed edge to receive the bottom edge of the T-Bar (Item 2G). T-Bar support bracket secured to each side of mullion using the same bolts used to attach the anchor slides of the mullion mounting clips. The hemmed edge of the T Bar support bracket is to be located 4-1/2 in. below the top surface of the floor slab such that, when installed, the stem of the T-Bar (Item 2G) will be located 2 in. below the top plane of the floor slab. Angle of T Bar support bracket to be recessed from interior face of framing as necessary to accommodate the thickness of the curtain wall insulation (Item 2J).
      THERMAFIBER INC

G. **Light Gauge Framing* – T-Bar –** Nom 5 in. wide by 1-1/2 in. high tee section formed from galv steel. T Bar installed between mullions at each floor level to restrain curtain wall insulation (Item 2J) against outward movement when forming material (Item 3A) is installed and to support edge of safing joint cover (Item 3C). The T Bar shall be installed with a clearance of 1/2 to 3/4 in. at each end. The bottom edge of the T Bar shall rest in and be supported by the hemmed edge of the T Bar support bracket (Item 2F) at each end. The top edge of the T Bar shall be locked in place with a T Bar locking clip (Item 2H) at one end and by a min No. 10 by 1/2 in. long self-drilling, self-tapping steel screw at the opposite end. Each T Bar shall be located with its stem at an elevation 2 in. below the top plane of the floor.
THERMAFIBER INC

H. **Light Gauge Framing* – T Bar Locking Clip –** Nom 1 by 2 in. clip formed from galv steel and designed to lock top of T Bar (Item 2G) to T Bar support bracket (Item 2F).
THERMAFIBER INC

I. **Light Gauge Framing* – Vertical and Horizontal Hangers –** Vertical and horizontal hangers formed from 1 in. wide galv steel strips, supplied in two configurations with length as needed to accommodate thickness of curtain wall insulation (Item 2J) and mullion cover (Item 2L). Vertical hangers (with 90 deg twist) screw-attached to interior face of mullions with No. 10 by min 1/2 in. long self-drilling, self-tapping steel screws. Vertical hangers on mullions to be located near each corner of each piece of curtain wall insulation except for the nominal 7 to 9 in. high piece of curtain wall insulation located immediately beneath the stem of the T Bar. The 7 to 9 in. high piece of curtain wall insulation immediately beneath the stem of the T Bar requires only one vertical hanger near its midheight at each end. Horizontal hangers (without twist) screw-attached to T-Bar (Item 2G) and to transom at top of spandrel panel (sill of vision panel) with No. 10 by min 1/2 in. long self-drilling, self-tapping steel screws. Horizontal hangers on T Bar to be located within 6 in. of mullion at each end and spaced max 16 in. OC. Horizontal hanger on transom at top of spandrel panel to be located at center of transom. No hangers are to be used on the transom at the bottom of spandrel panel (lintel of vision panel).
THERMAFIBER INC

J. **Curtain Wall Insulation* –** Min 2 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 in. wide batts. Insulation batts to be installed with no vertical seams. A horizontal seam is to be located 7 to 9 in. below the stem of the T Bar in each spandrel area and is to be sealed with aluminum foil tape. In the spandrel area beneath the stem of the T Bar, insulation panels tightly-fitted between vertical mullions and between the stem of the T Bar (Item 2G) and the transom, flush with the interior surface of framing. Insulation panels impaled on vertical and horizontal hangers (Item 2I) and secured in place with nom 2 by 2 in. steel locking washers (Item 2K). In the spandrel area above the safing joint cover (Item 3C), insulation panels tightly-fitted between vertical mullions and between the safing material and the transom, flush with the interior surface of framing.
THERMAFIBER INC – Firespan 90

K. **Light Gauge Framing* – Locking Washers –** Nom 2 by 2 in. clips formed from galv steel and designed to secure curtain wall insulation and mullion covers on vertical and horizontal hangers (Item 2I).
THERMAFIBER INC

L. **Mullion Covers – Curtain Wall Insulation* –** Nom 2 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 in. boards. Nom 12 in. wide strips to be centered over mullions and impaled on the same vertical hangers used to secure the spandrel panel insulation and secured in place with nom 2 by 2 in. locking washers (Item 2K). Mullion covers to abut the safing system (Items 3A and 3C) above and below the floor.
THERMAFIBER INC – Firespan 90

M. **Light Gauge Framing* – Spiral Anchor –** (Not Shown) – As an alternate to the vertical hangers (Item 2I), galv steel wire spiral anchors may be used to secure the framing covers (Item 2L) to the curtain wall insulation (Item 2J) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 in. OC.
THERMAFIBER INC

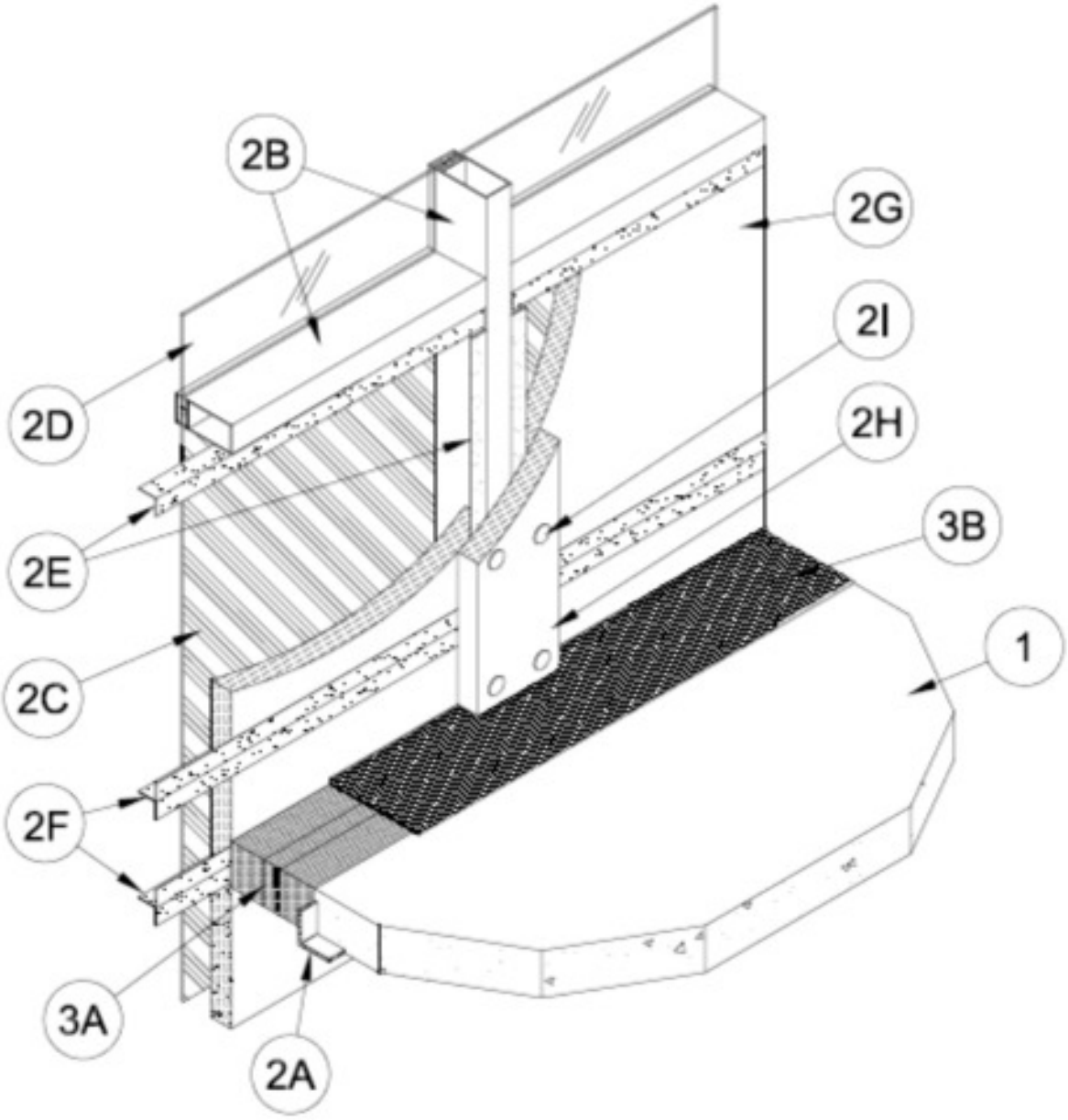
3. **Safing System –** Max separation between the edge of the floor and the face of the framing members (at time of installation) is 4 in. The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width. The safing system shall incorporate the following construction features:

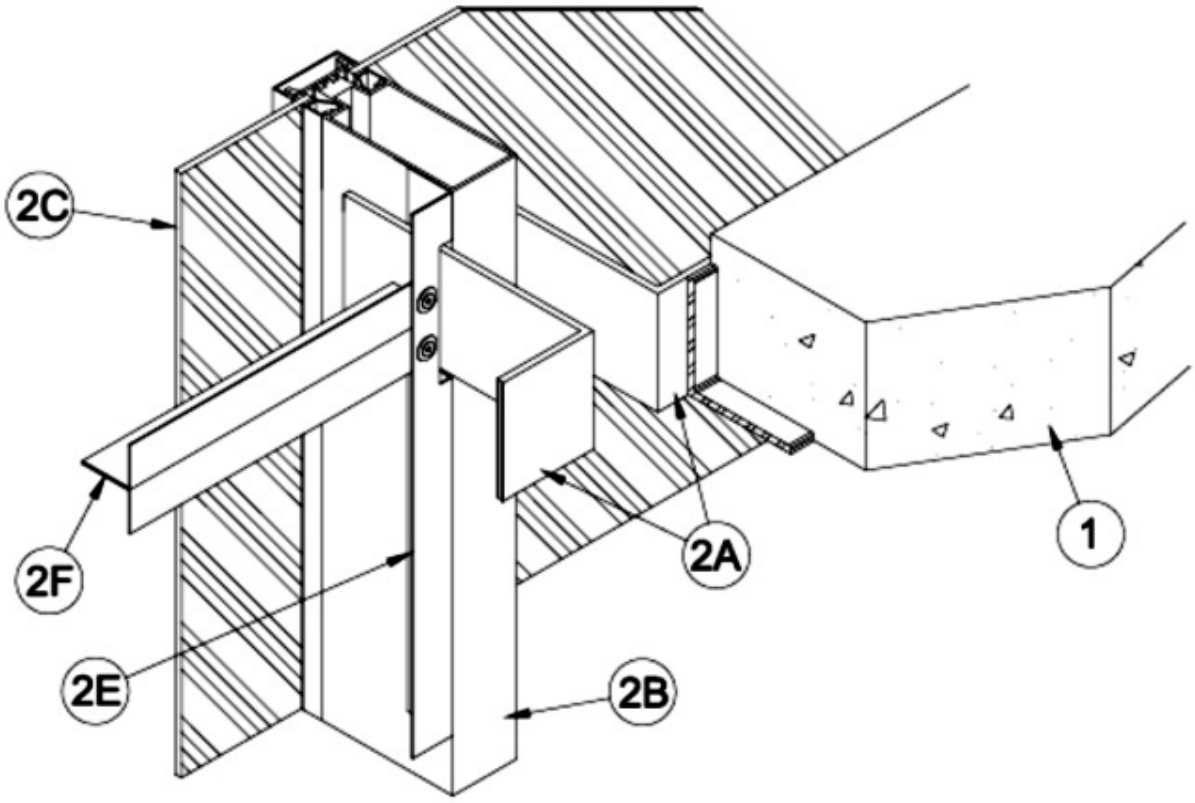
A. **Forming Material* –** Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a min 4-1/2 in. width and stacked to a thickness which is min 25 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab to attain a min 20 percent compression in the thickness direction. The forming material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. Forming material to extend completely beneath mullion mounting plate (Item 2A). A max of two tightly-butted seams are permitted in the forming material between mullions.
THERMAFIBER INC – Type SAF

B. **Fill, Void or Cavity Material* –** Min 1/8 in. wet thickness (min 1/16 in. dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. onto the top surface of the floor and onto the curtain wall insulation, mullion anchor plate (Item 2A) and framing covers.
Passive Fire Protection Partners – 5100SP

*Bearing the UL Classification Mark

	F Rating – 2 Hr **T Rating – 1/4 Hr** **Linear Opening Width – 8 in. (203 mm) Max** **L Rating at Ambient – Less than 1 CFM/Lin Ft** **L Rating at 400º F – Less than 1 CFM/Lin Ft** **Class II Movement Capabilities – 5% Vertical Shear (See Item3)**	**CW-D-2059**





1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).

2. **Curtain Wall Assembly –** The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips —** Min 4 in. (102 mm) long angles with one nom 4 in. (102 mm) leg for attachment to edge of floor assembly and with one leg approx 4 in. (102 mm) longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. (6 mm) thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Each clip to be provided with elongated holes to accommodate the designed amount of vertical movement. Top edge of each clip to be recessed min 1/2 in. (13 mm) below top surface of floor.
   B. **Framing —** The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. (64 mm) wide by 5 in. (127 mm) deep and shall be formed from min 0.085 in. (2.2 mm) thick aluminum. Mullions spaced max 60 in. (1.52 m) OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8 in. (10 mm) diam by 4 in. (102 mm) long hex head steel bolts in conjunction with steel nuts and washers . Interior face of mullions to be max 8 in. (203 mm) from edge of floor assembly. Transoms to be spaced min 60 in. (1.52 m) OC. Transom forming sill of vision panel (Item 2D) to be located such that its bottom surface is at a min height of 24 in. (610 mm) above the top surface of the floor.

C. **Spandrel Panels –** The spandrel panels shall consist of one of the following types:
   a. **Glass Panels –** Nom 1/4 in. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   b. **Aluminum Panels –** Nom 1/8 in. (3 mm) thick aluminum panels with 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   c. **Stone Panels –** Nom 1-3/16 in. (30 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.

D. **Vision Panels –** Nom 1/4 in. (6 mm) thick transparent heat-strengthened glass or nom 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick transparent heat-strengthened glass separated by a 1/2 in. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.

E. **Spandrel Panel Perimeter Angles –** Nom 1-1/2 by 1-1/2 in. (38 by 38 mm) No. 20 gauge (min 0.034 in. or 0.86 mm thick) galv steel angles installed around entire perimeter of each spandrel panel, flush with inside face of mullions and transoms. Angles notched at mullion mounting clips (Item 2A). Angles screw-attached to mullions and transom along sides and top of each spandrel panel with No. 8 by 1 in. (25 mm) long self-drilling, self-tapping steel screws spaced max 12 in. (305 mm) OC. Angle along bottom of each spandrel panel to be screw-attached to leg of angle on mullion at each end without any direct attachment to transom.

F. **Stiffener Tee –** Two nom 1-1/2 by 1-1/2 in. (38 by 38 mm) No. 20 gauge (min 0.034 in. or 0.86 mm thick) galv steel angles secured together, back-to-back, to form stiffener tee for installation in each horizontal seam of the curtain wall insulation (Item 2G). The angle legs forming the stem of the tee shall be secured together using No. 8 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screws spaced max 8 in. (203 mm) OC. The tee shall be installed with a clearance of 1/8 to 1/4 in. (3 to 6 mm) at each end and shall be screw-attached to the spandrel panel perimeter angles (Item 2E) with No. 10 by 3/4 in. (19 mm) long self-drilling, self-tapping steel screws, with steel washers, through two predrilled 1/4 in. (6 mm) diam holes at each end. One stiffener tee shall be located with its stem at an elevation 2 in. (51 mm) below the top plane of the floor at each floor level. Additional stiffener tee located with its stem a min of 6 in. (152 mm) above the top surface of the floor.

G. **Curtain Wall Insulation* –** Min 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 in. (0.91 m) wide batts. Insulation panels to be installed with no vertical seams. Insulation panels tightly-fitted between vertical mullions and between the stems of the stiffener tees (Item 2F) and the transoms. Insulation panels secured to spandrel panel perimeter angles and to each stiffener tee with cup head weld pins (Item 2I) spaced max 12 in. (305 mm) OC. The horizontal seams between insulation panels shall be located 2 in. (51 mm) below the top plane of the floor at each floor level and a min of 6 in. (152 mm) above the top surface of the floor.
THERMAFIBER INC – FIRESPAN 90

H. **Framing Covers –** Curtain Wall Insulation* – Min 8 in. (203 mm) wide strips cut from the same min 2 in. (51 mm) thick mineral wool batt insulation used for the curtain wall insulation (Item 2G). Framing covers to be centered over mullions and secured to the spandrel panel perimeter angles with cup head weld pins (Item 2I) spaced max 12 in. (305 mm) OC. Where more than one spandrel panel occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 in. (203 mm) wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.
THERMAFIBER INC – FIRESPAN 90

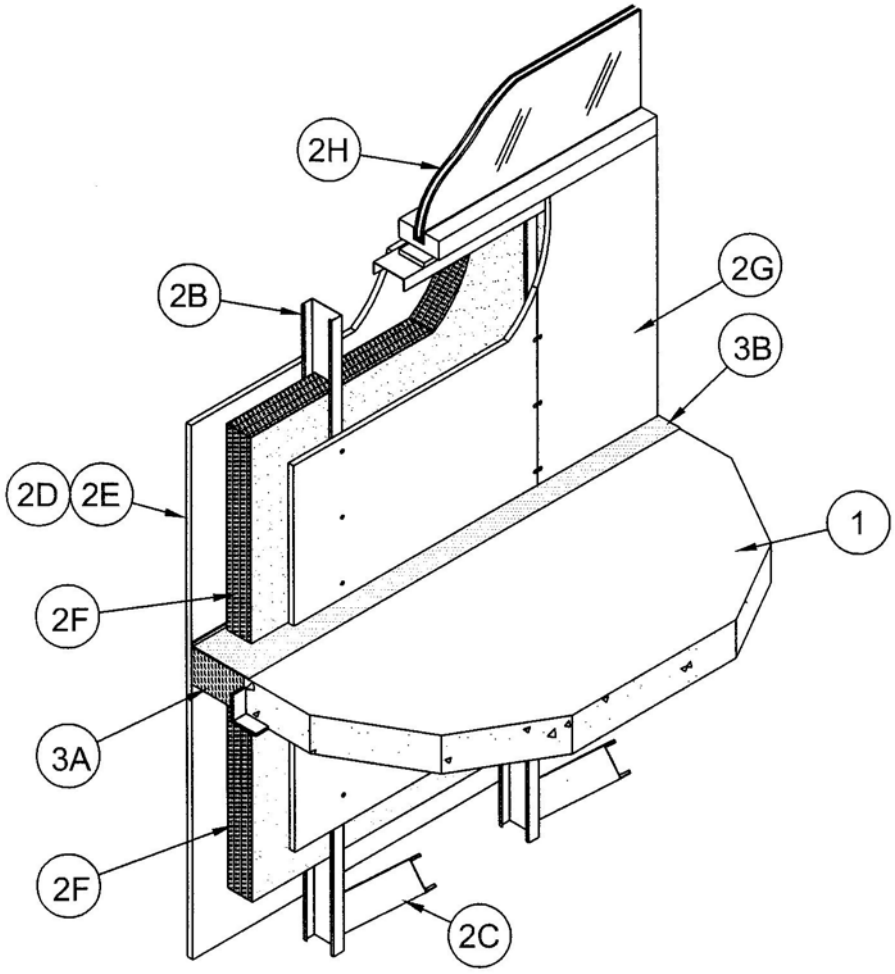
I. **Weld Pin –** No. 12 gauge galv steel weld pin with nom 1-3/16 in. (30 mm) diam galv steel cup head. Length of Cup head weld pins to be equal to thickness of curtain wall insulation (Item 2G) and framing cover (Item 2H). Cup head weld pin inserted through curtain wall insulation or framing cover and welded to spandrel panel perimeter angles and to stiffener tees max 12 in. (305 mm) OC.

J. **Light Gauge Framing* – Spiral Anchor –** (Not Shown) – As an alternate to the weld pins (Item 2I), galv steel wire spiral anchors may be used to secure the framing covers (Item 2H) to the curtain wall insulation (Item 2G) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 in. OC.
THERMAFIBER INC

3. **Safing System –** Max separation between edge of floor assembly and face of framing members (at time of installation) is 8 in. (203 mm). The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width. The safing system shall incorporate the following construction features:

A. **Forming Material* –** Nom 4 pcf (64 kg/m^3) density mineral wool batt insulation. Batt sections cut to a min 4 in. (102 mm) width and stacked to a thickness which is min 20 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between mullions. Additional pieces of forming material to be friction-fit into spaces between mullion mounting clips at each mullion location.
THERMAFIBER INC — SAF

B. **Fill, Void or Cavity Material* –** Min 1/8 in. (3 mm) wet thickness (min 1/16 in. or 1.5 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the curtain wall insulation and framing covers.
Passive Fire Protection Partners – 5100SP



1. **Floor Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3by 3 by 1/4 in. thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).

2. **Curtain Wall Assembly –** The curtain wall assembly shall incorporate the following construction features:
   A. **Mounting Angles –** (Not Shown) – Min 3 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 2-1/2 to 3 in. longer than distance to interior face of steel studs. Angles to be formed of min 1/8 in. thick steel. Angles welded to cast-in-place structural steel angle at edge of floor assembly (Item 1) on one side of each steel stud (Item 2B) at each floor level. Top edge of each mounting angle to be recessed 1 to 1-1/2 in. below top surface of floor.
   B. **Steel Studs –** C-shaped studs formed from min 0.034 in. thick (20 ga) galv steel. The steel studs shall be -1/2 in. to 6 in. wide by 1-1/4 in. deep with 5/16 in. wide stiffening flanges and shall be assembled using runner channels formed from min 0.034 in. thick galv steel. Studs spaced max 24 in. OC and welded, bolted or screwed to mounting angles (Item 2A) at each floor level. When cementitious backer units (Item 2E) are used for exterior sheathing, max stud spacing is 16 in. OC. Interior face of studs to be max 2-1/2 in. from edge of floor assembly.

C. **Steel Struts –** Short lengths of steel stud (Item 2B) used to brace each steel stud against lateral movement. One end of strut bolted, screwed or welded to steel stud beneath plane of floor assembly. Opposite end of strut anchored to underside of floor.

D. **Gypsum Board* –** One layer of nom 5/8 in. thick, 48 in. wide gypsum sheathing installed to cover entire exterior surface of wall. Sheathing applied with joints centered over studs and secured to steel studs with min 1 in. long bugle head steel screws spaced max 8 in. OC along the edges and max 12 in. OC in the field of each sheet.

E. **Cementitious Backer Units* –** As an alternate to the gypsum sheathing (Item 2D), nom 1/2 in. or 5/8 in. thick square-edge boards attached to studs with 1-1/4 in. long corrosion resistant self-tapping wafer-head steel screws spaced 6 in OC. Joints covered with glass fiber mesh tape.
UNITED STATES GYPSUM CO – Durock Exterior Cement Board, Durock Cement Board or Durock WMB

F. **Batts and Blankets* –** Any glass fiber insulation bearing the UL Classification Marking as to fire resistance or surface burning characteristics, of a thickness to completely fill stud cavity. Insulation batts friction fit to completely fill all stud cavities of curtain wall above the top of the fill material (Item 3B) and below the forming material (Item 3A).
See **Batts and Blankets (BZJZ)** category for names of manufacturers.

G. **Gypsum Board* –** One layer of nom 5/8 in. thick, 48 in. wide gypsum board applied with joints centered over studs. Gypsum board secured to steel studs on interior surface of curtain wall with min 1 in. long bugle head steel screws spaced max 8 in. OC along the edges and max 12 in. OC in the field of each sheet. Gypsum board installed to cover interior surface of wall above the top of the fill material (Item 3C) and below the forming material (Item 3B).

H. **Framed Window –** Metal-framed window with nom 1/4 in. thick heat-strengthened glass. Sill of window to be min 34 in. above top of floor slab. Top of window to be min 33 in. below bottom of floor slab.

I. **Siding, Brick or Stucco –** (Not Shown) – Aluminum siding, steel siding, brick veneer or stucco installed over gypsum sheathing or cementitious backer units and meeting the requirements of local code agencies. Brick veneer wall attached to studs with corrugated metal wall ties attached to each stud with steel screws.

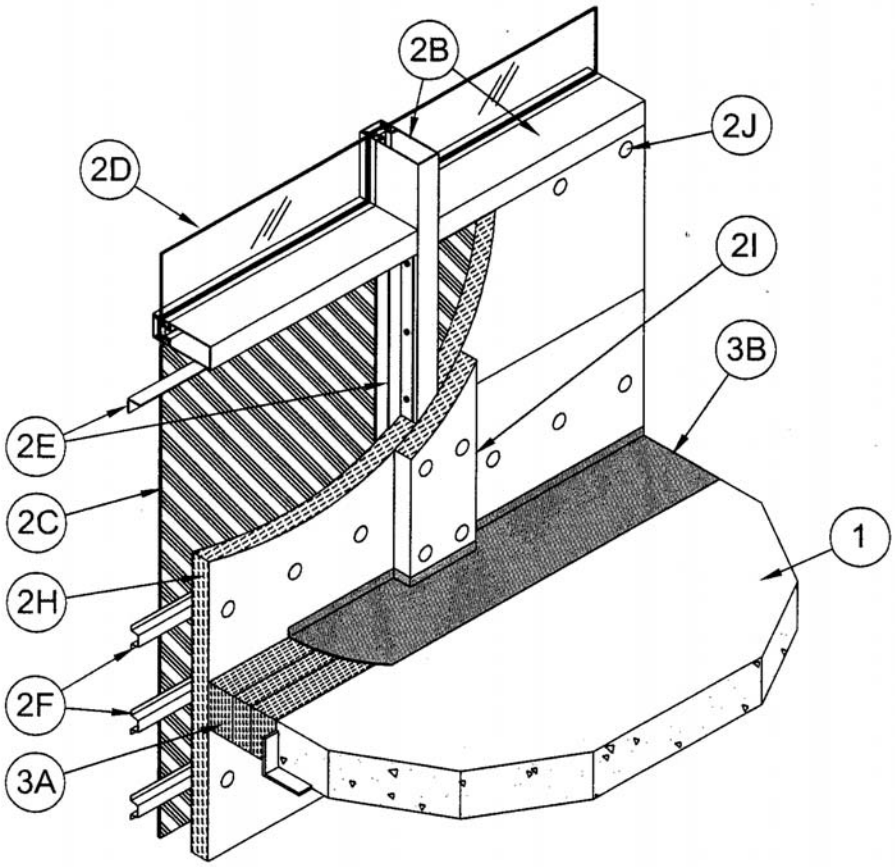
3. **Safing System –** The safing system shall incorporate the following construction features:

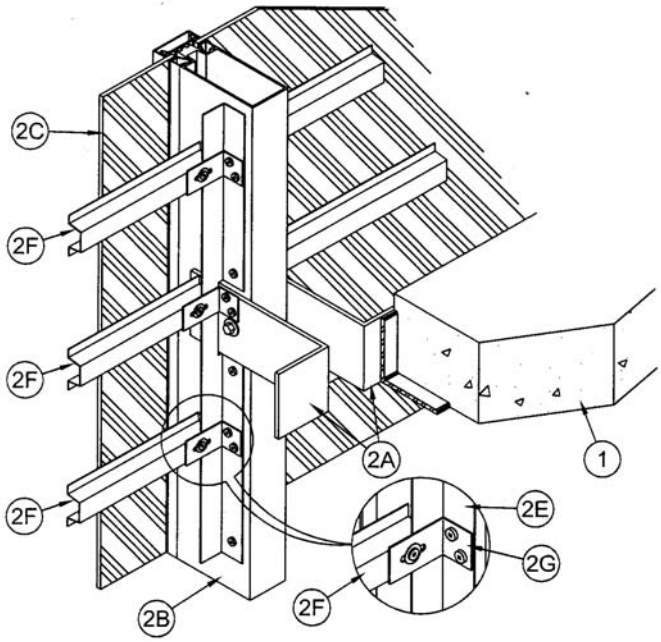
A. **Forming Material* –** Nom 4 pcf density mineral wool batt insulation. Batt sections to be cut to a min width of 4 in. and stacked to a thickness which is 20 percent greater than the width of linear gap between the gypsum sheathing and the edge of the concrete floor. The forming material is compressed and inserted cut-edge-first into linear gap between edge of floor slab and sheathing material such that its top surface is flush with the top surface of the floor assembly. Length of batt to be equal to on-center spacing of steel studs such that it is friction-fitted between studs and mounting angles without seams. Additional pieces of mineral wool batt to be stuffed inside the channel of each steel stud throughout the thickness of the forming material.
ROXUL INC – SAFE

B. **Fill, Void or Cavity Material* –** Min 1/16 in. thickness (dry) of fill material spray-applied over top of forming material and lapping min 1/2 in. onto the top surface of the floor and onto the gypsum sheathing and steel studs.
Passive Fire Protection Partners – 5100SP

*Bearing the UL Classification Mark

	Integrity Rating – 2 Hr **Insulation Rating – 1/4 Hr** **Linear Opening Width – 8 In. Max**	**CW-S-2037**





1. **Floor Assembly –** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 4 by 4 by 1/4 in. thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).

2. **Curtain Wall Assembly –** The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips –** Min 4 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Top edge of each mounting angle to be recessed min 1/2 in. below top surface of floor.
   B. **Framing –** The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be minimum 2-1/2in. wide by 5 in. deep and shall be formed from min 0.100 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mullion mounting clips (Item 2A) at each floor level with two 1/2 in. diam by 4 in. long hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be max 8 in. from edge of floor assembly. Transoms framing top and bottom edges of spandrel panels (Item 2C) to be spaced min 72 in. OC. Transom forming sill of vision panel (Item 2D) to be located such that its bottom surface is at height of 33 in. above the top surface of the floor (Item 1).
   C. **Spandrel Panels** – Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws. The following types of spandrel panels may be used:
      1. Nom 1/4 in. thick opaque heat-strengthened or tempered glass.
      2. Nom 1-3/16 in. thick polished granite spandrel panels with 1 in. thick gauged edges.
      3. Nom 1/8 in. thick aluminum panels with 1/4 in. thick edges.
   D. **Vision Panels –** Nom 1/4 in. thick transparent heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   E. **Spandrel Panel Perimeter Angles –** Nom 1-1/2 by 1-1/2 in. No. 22 gauge galvanized steel angles installed around entire perimeter of each spandrel panel. Angles recessed from interior face of framing as necessary to accommodate thickness of curtain wall insulation (Item 2H). Angles notched as necessary to be continuous over mullion mounting clips (Item 2A). Angles screw-attached to mullions and transom along sides and top of each spandrel panel with No. 10 by 1/2 in. long self-drilling, self-tapping steel screws spaced max 12 in. OC. Angle along bottom of each spandrel panel to be screw-attached to leg of angle on mullion at each end without any direct attachment to transom.
   F. **Stiff Back Channel –** Nom 2-1/2 in. wide by 7/8 in. deep hat-shaped channel formed of 22 gauge galv steel to be installed to stiffen curtain wall insulation between mullions above and below and at elevation of safing joint. One stiff back channel to be located with its centerline approx 6 in. below floor and one stiff back channel to be located with its centerline approx 6 in. above floor. A third stiff back channel is to be located near the midheight of the safing joint. A clearance of 1/4 to 1/2 in. shall be maintained between the ends of the stiff back channels and the mullions. Stiff back channel secured to mullion at each end with channel attachment clip (Item 2G) in conjunction with a No. 8 by 1/2 in. long self-drilling, self-tapping wafer head steel screw or a 3/16 in. diam steel bolt with nut and washer.

G. **Channel Attachment Clip –** Nom 1-1/2 by 2-1/2 by 1-1/2 in. long angle formed of 16 gauge galv steel. The 2-1/2 in. leg is provided with a 1/4 in. wide by 1-1/2 in. long slot along its centerline for attachment of the stiff back channel. Clips secured to mullions mounting clips (Item 2A) and mullions, through perimeter angles, with two No. 10 by 1/2 in. long self-drilling, self-tapping steel screws. Channel clips installed with 2-1/2 in. leg recessed from interior face of mullion to accommodate thickness of curtain wall insulation (Item 2H).

H. **Curtain Wall Insulation* –** Min 2 in. thick mineral wool board insulation, unfaced or faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 in. wide boards. Insulation boards to be installed with no vertical seams and with horizontal seams spaced min 24 in. OC. A full-width board shall be centered at the midheight of floor and tightly-fitted between vertical mullions, flush with interior surface of framing. The centered board shall be secured to the stiff back channels (Item 2F) located approx 6 in. above and below the floor with cup head weld pins (Item 2J) spaced max 10 in. OC along each channel. The remainder of the spandrel panel framing above and below the centered full-width board shall be filled in with additional lengths of board cut to fit tightly between mullions and with the horizontal seams between board sections tightly butted. The boards shall be secured to the spandrel panel perimeter angles with cup head weld pins at each corner of each board and spaced max 10 in. OC. When faced boards are used, butted seams to be covered with min 4 in. wide aluminum foil tape.
ROXUL INC – RHT-80

I. **Framing Covers – Curtain Wall Insulation* –** Min 8 in. wide strips cut from the same min 2 in. thick mineral wool batt insulation used for the curtain wall insulation (Item 2H). Framing covers to be centered over mullions and secured to the spandrel panel perimeter angles (Item 2E) with cup head weld pins (Item 2J) spaced max 12 in. OC. Where more than one spandrel panel occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 in. wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.
ROXUL INC – RHT-80

J. **Weld Pin –** No. 12 gauge galv steel weld pin with nom 1-3/16 in. diam galv steel cup head. Cup head weld pins provided in two lengths. One length to be equal to thickness of curtain wall insulation (Item 2H) and second length to be equal to thickness of curtain wall insulation plus thickness of framing cover (Item 2I). Cup head weld pins inserted through curtain wall insulation and mullion covers and welded to spandrel panel perimeter angles at max OC spacings referenced in Items 2H and 2I.

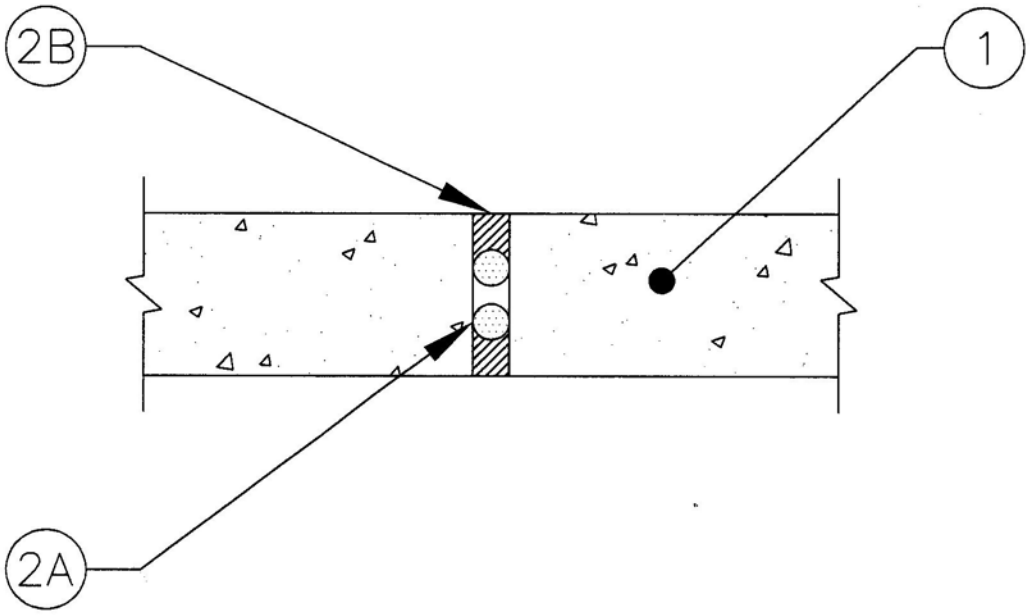
3. **Perimeter Fire Containment System –** The perimeter fire containment system shall incorporate the following construction features:

A. **Forming Material* –** Nom 4 in. thick, mineral wool batt safing material to be installed in continuous pieces between mullion clips. Safing material to be cut to a 4-1/2 in. width and stacked to a thickness which is at least 25 percent greater than the width of the linear gap between the curtain wall and the edge of the concrete floor slab. The safing material is compressed and inserted cut-edge-first into the linear gap and recessed from top surface of floor to accommodate the required thickness of fill material. Additional pieces of safing material to be friction-fit into space between mullion mounting clips at each mullion location with top edges of mullion clips covered with a min 1/2 in. thickness of compressed safing material.
ROXUL INC – SAFE

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. thickness (dry) of fill material applied within the joint, flush with top surface of floor.
Passive Fire Protection Partners – 5100SP

*Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in.
	Class II Movement Capabilities — 25% Compression or Extension

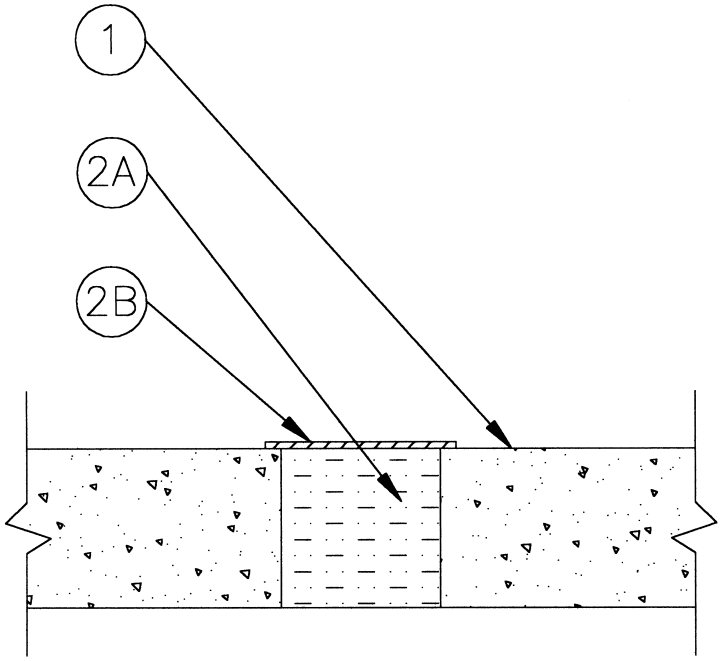


1. **Floor Assembly –** Min 4-1/2 in. (114mm) thick steel-reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m³)) structural concrete.

2. **Joint System – Max width of joint (at time of installation of joint system) is 1 in. (25mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Packing Material – Backer Rod –** Nom 1-1/4 in. (32mm) diam polyethylene backer rod compressed and firmly packed into joint opening and recessed from both sides of floor to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25mm) thickness of fill material applied within the joint, flush with both surfaces of floor.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr (See Item 2)	F Rating — 2 Hr (See Item 2)
Nominal Joint Width — 4 in.(102 mm) (See Item 2)	FT Rating — 2 Hr (See Item 2)
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 2 Hr (See Item 2)
	FTH Rating — 2 Hr (See Item 2)
	Nominal Joint Width — 4 in. (102 mm) (See Item 2)
	Class II Movement Capabilities — 12.5% Compression or Extension

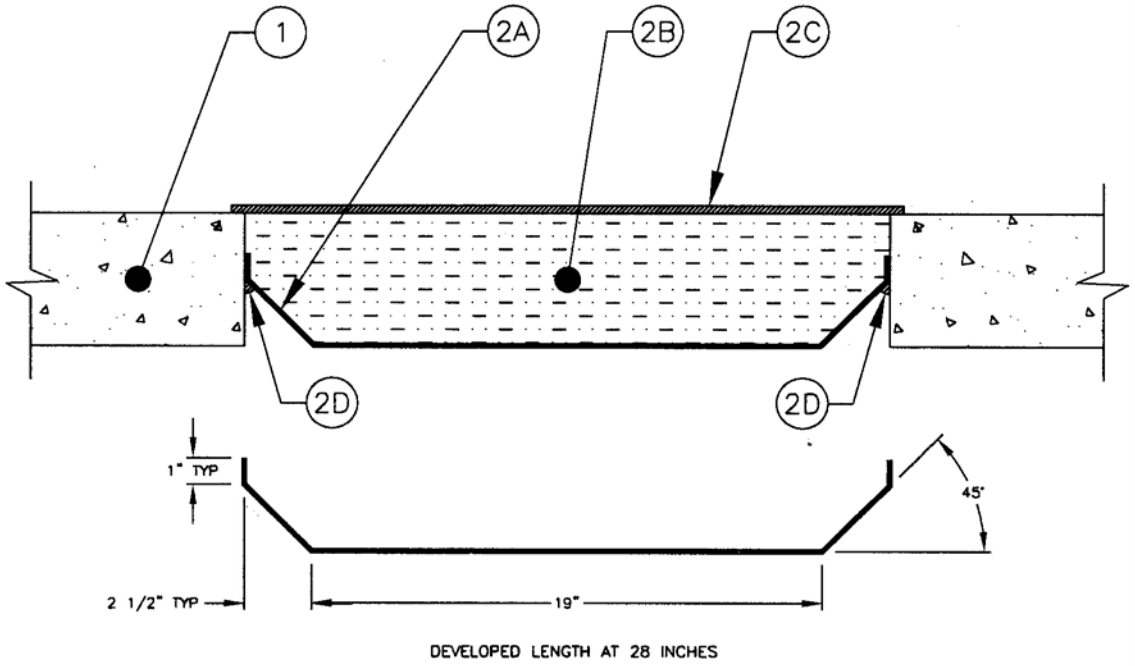


1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

2. **Joint System –** Max width of joint (at time of installation of joint system) is 4 in. (102 mm). The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width. The joint system shall consist of the following:
   A. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation installed into joint opening as a permanent form. Batt cut to min width of 4-1/2 in. (114 mm) and installed edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 33 percent in thickness and such that the compressed batt sections are flush with the top surface of floor.
   IIG Minwool LLC – MinWool-1200 Safing
   Rock wool Manufacturing Company – Delta Safing Board
   ROXUL ASIA SDN BHD – Type SAF
   Roxul Inc. – Type SAF
   Thermafiber LLC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on top surface of floor to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto concrete floor.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr (See Item 2)	F Rating — 2 Hr (See Item 2)
Nominal Joint Width — 24 in.(See Item 2)	FT Rating — 2 Hr (See Item 2)
Class I Movement Capabilities — 4.2% Compression or Extension	FH Rating — 2 Hr (See Item 2)
	FTH Rating — 2 Hr (See Item 2)
	Nominal Joint Width — 24 in. (See Item 2)
	Class I Movement Capabilities — 4.2% Compression or Extension



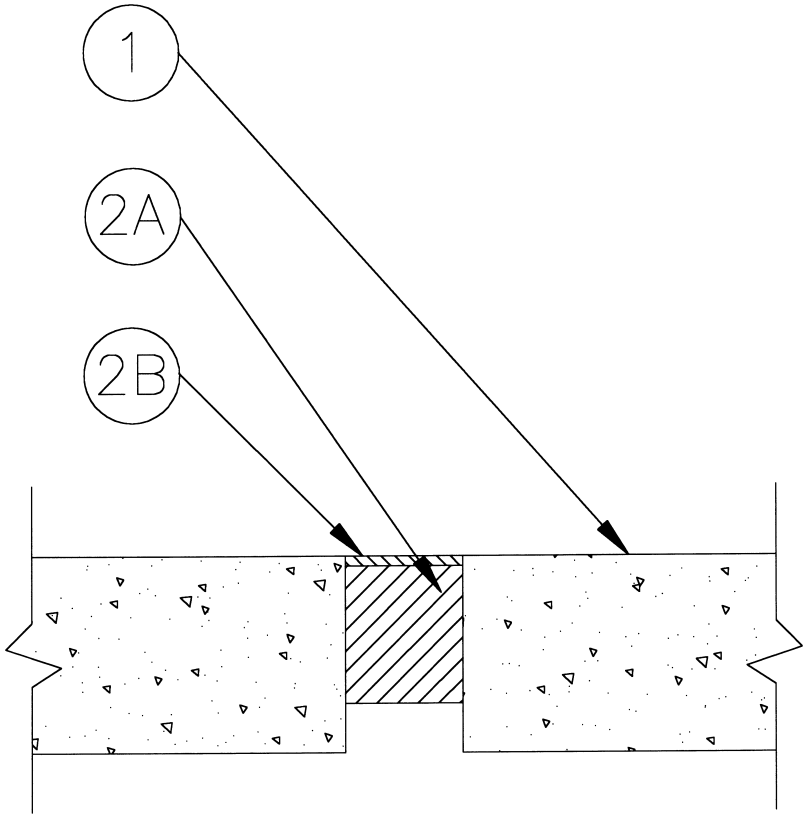
DEVELOPED LENGTH AT 28 INCHES

1. **Floor Assembly –** Min 5-1/2 in. thick steel-reinforced lightweight or normal weight (100-150 pcf) structural concrete.

2. **Joint System –** Max width of joint (at time of installation of joint system) is 24 in. The joint system is designed to accommodate a max 4.2 percent compression or extension from its installed width. The joint system shall consist of the following:
   A. **Steel Plate –** Formed of 24 gauge (or heavier) galv steel with 1 in. high legs bent for attachment to the sides within the opening. The overall width of the formed plate to be 1in. wider than nom joint width. Adjoining lengths of plates to be overlapped a min of 1in. Plates to be installed flush with bottom surface of floor and secured to sides of concrete slabs within joint opening on each side of opening with min 1/4 in. diam by min 1 in. long steel masonry anchors spaced a max of 6 in. on center.
   B. **Forming Material* –** Min 4.0 pcf mineral wool batt insulation installed in joint opening as a permanent form. Batt cut to min width 5-1/2 in. and installed edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 25 percent in thickness and such that the compressed batt sections are flush with the top surface of floor. Adjoining lengths of batt to be tightly-butted with butted seams spaced min 48 in. apart along the length of the joint.
      Owens Corning – Paroc Safing Insulation
      Rock Wool Manufacturing CO – Delta Safing Board
      Thermafiber INC – Type SAF
   C. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. dry thickness of fill material sprayed or brushed on top surface of floor to completely cover mineral wool and overlap a min 1 in. onto concrete floor.
      Passive Fire Protection Partners – 3500SI, 5100SP
   D. **Fill, Void or Cavity Material* – Sealant –** Min 1/2 in. diam bead of fill material applied at the steel plate/concrete interface on bottom side of floor.
      Passive Fire Protection Partners – 3600EX, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Joint Width — 3 in. Max	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Joint Width — 3 in. Max

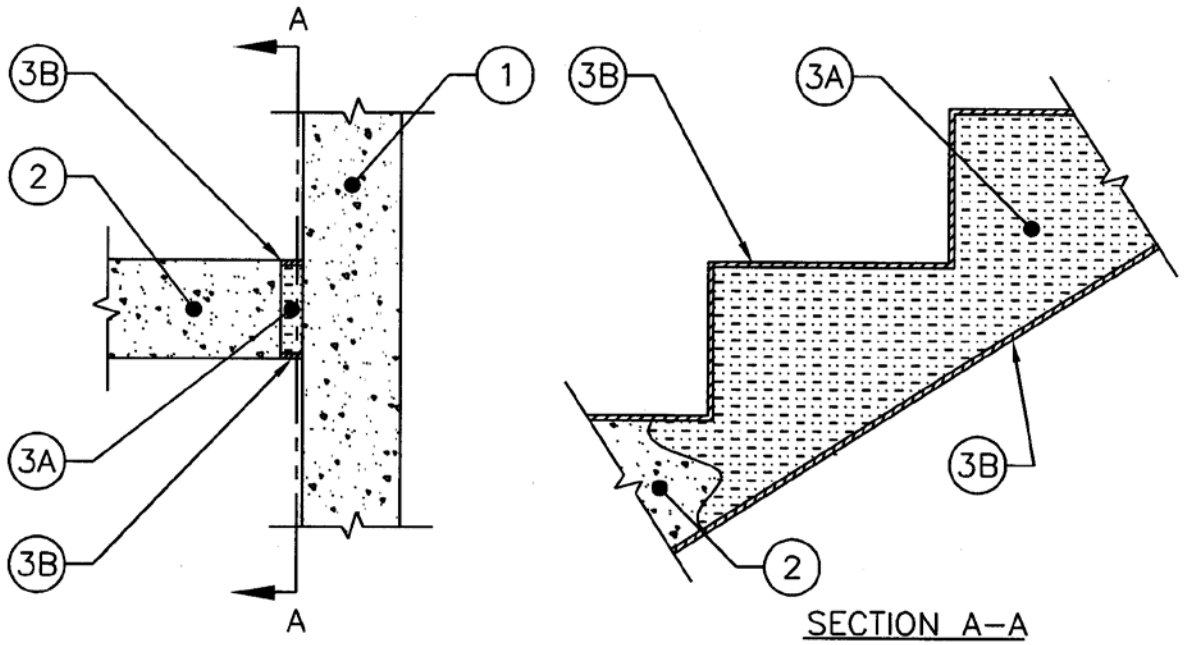


1. **Floor Assembly –** Min 5 in. (127 mm) thick reinforced normal weight (140 – 150 pcf or 2200 – 2400 kg/m^3) structural concrete.

2. **Joint System –** Max width of joint is 3 in. (76 mm) The joint system shall consist of the following:
   - A**.** **Packing Material –** Min 3-1/2 in. (89 mm) thickneddss of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor as required to accommodate the required thickness of fill material.
   - B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material applied within the joint, flush with top surface of floor.
     Passive Fire Protection Partners – 3500SI, 5100SP
   - B2. **Fill, Void or Cavity Material* – Sealant –** As an alternate to the above, min 1/4 in. (6 mm) (thickness of fill material applied within the joint, flush with top surface of floor.
     Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



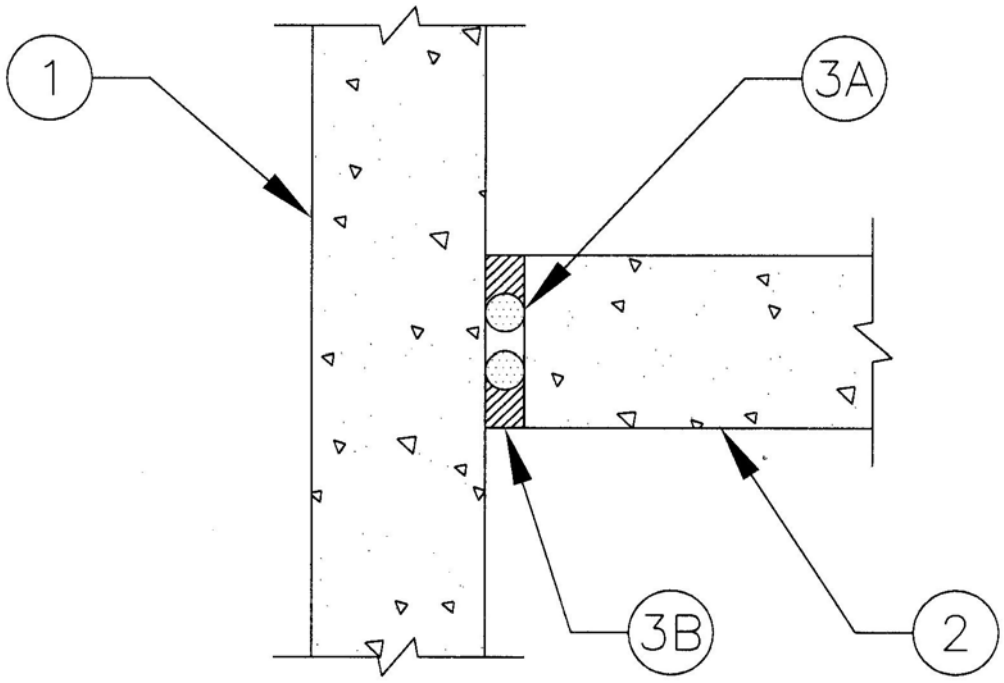
1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Stair Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

3. **Joint System – Max separation between edge of stair assembly and face of wall (at time of installation of joint system) is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent horizontal compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Forming Material* –** Min 4 pcf or (64 kg/m^3) mineral wool batt insulation installed in joint opening as a permanent form. Pieces of batt cut to min width of 3-3/4 in. (95 mm) and installed edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 25 percent in thickness and such that the compressed batt sections are recessed from top and bottom surface of the stair assembly as required to accommodate the required thickness of fill material. Adjoining lengths of batt to be tightly butted with butted seams spaced min 24 in. (610 mm) apart along the length of the joint.
   Fibrex Insulation Inc. – FBX Safing Insulation
   IIG Minwool LLC – MinWool-1200 Safing
   Rock Wool Manufacturing Company – Safing Board
   Roxul Asia SDN BHD – SAFE Mineral Wool
   Roxul Inc. – SAFE Mineral Wool
   Thermafiber LLC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6.4 mm) dry thickness of fill material applied within the joint, flush with top and bottom surfaces of stair assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



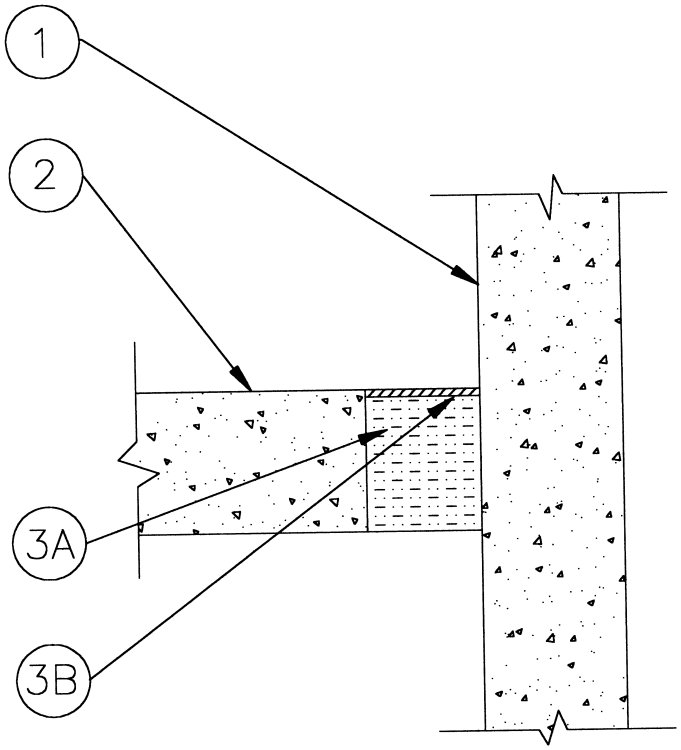
1. **Wall Assembly –** Min 4-1/2 in. (114mm) thick steel-reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m³)) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.***
   See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

2. **Floor Assembly –** Min 4-1/2 in. (114mm) thick steel-reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m³)) structural concrete.

3. **Joint System – Max width of joint (at time of installation of joint system) is 1 in. (25mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Packing Material – Backer Rod –** Nom 1-1/4 in. (32mm) diam polyethylene backer rod compressed and firmly packed into joint opening and recessed from both sides of floor to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25mm) thickness of fill material applied within the joint, flush with both surfaces of floor.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 4 in.(102 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 4 in. (102 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



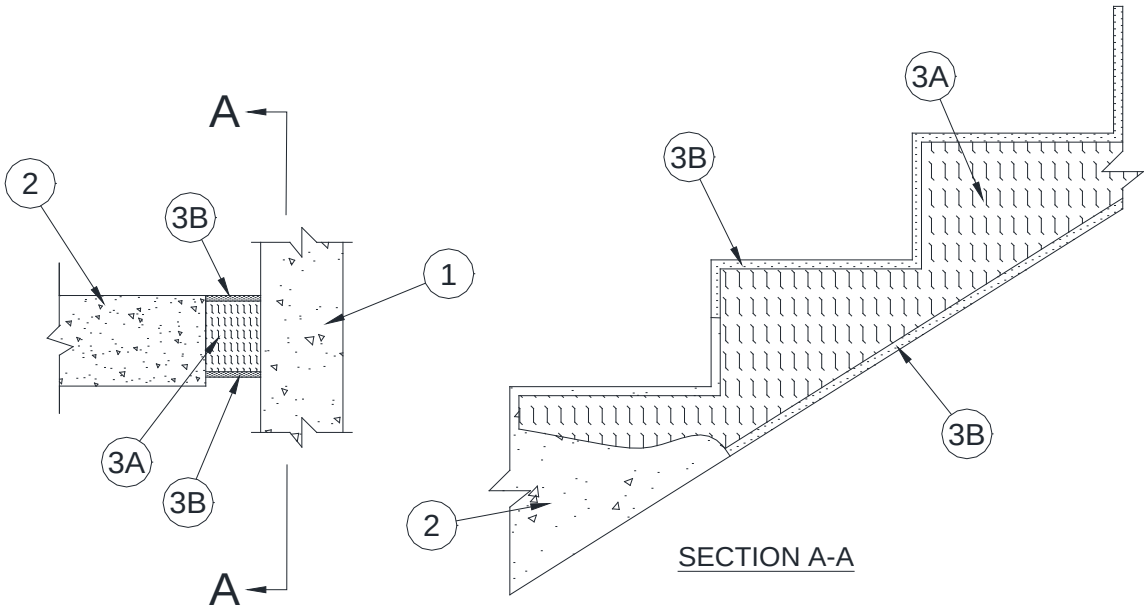
1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

3. **Joint System –** Max width of joint (at time of installation of joint system) is 4 in. (102 mm) The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width. The joint system shall consist of the following:
   A. **Forming Material* –** Min 4 pcf or (64 kg/m^3) mineral wool batt insulation installed in joint opening as a permanent form. Batt cut to min width of 4-1/2 in. (114 mm) and installed edge first into joint opening, parallel with joint direction, such that batt sections are compressed min 33 percent in thickness and such that the compressed batt sections are flush with the top surface of floor.
   Fibrex Insulation Inc. – FBX Safing Insulation
   IIG Minwool LLC – MinWool-1200 Safing
   Rock Wool Manufacturing Company – Delta Safing Board
   Thermafiber LLC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on top surface of floor to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto concrete floor.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3 in.(76 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 7% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3 in. (76 mm)
	Class II Movement Capabilities — 7% Compression or Extension



1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Stair Assembly –** Min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

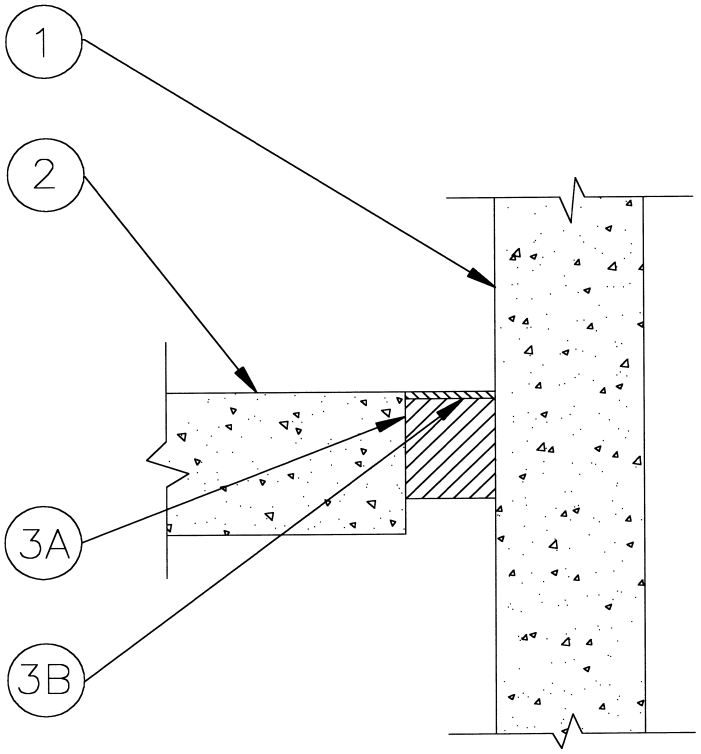
3. **Joint System – Max separation between edge of stair assembly and face of wall (at time of installation of joint system) is 3 in. (76 mm). The joint system is designed to accommodate a max 7 percent horizontal compression or extension from its installed width.** The joint system shall consist of the following:

   A. **Forming Material* –** Min 4 pcf or (64 kg/m^3) mineral wool batt insulation installed in joint opening as a permanent form. Pieces of batt cut to min width of 4 in. (102 mm) and installed edge-first into joint opening, parallel with the joint direction, such that batt sections are compressed min 33 percent in thickness and such that the compressed batt sections are recessed from top and bottom surface of the stair assembly as required to accommodate the required thickness of fill material. Adjoining lengths of batt to be tightly butted with butted seams spaced min 24 in. (610 mm) apart along the length of the joint.
   IIG Minwool LLC – MinWool-1200 Safing
   Rock Wool Manufacturing Company – Safing Board
   Roxul Malaysia SDN BHD – SAFE Mineral Wool
   Roxul Inc. – SAFE Mineral Wool
   Thermafiber LLC – Type SAF

   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/4 in. (6 mm) thickness of fill material applied within the joint over the forming material, flush with top and at bottom surfaces of stair assembly.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Joint Width — 3 in. Max	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Joint Width — 3 in. Max



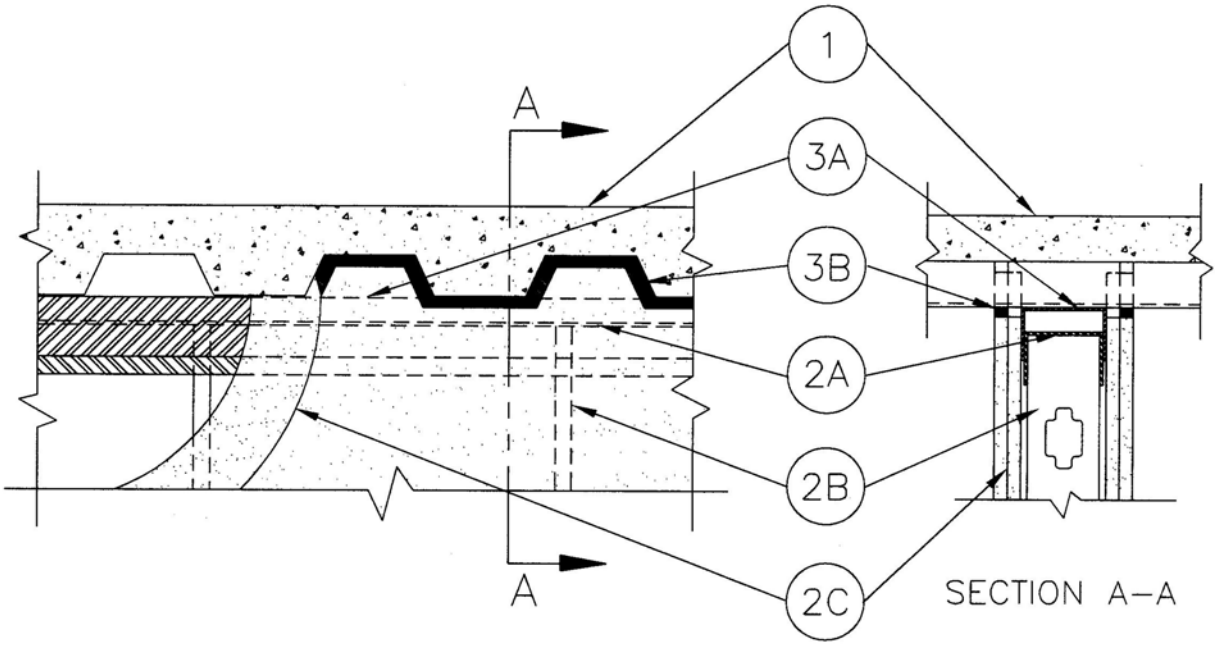
1. **Wall Assembly –** Min 5 in. (127 mm) thick reinforced normal weight (140 – 150 pcf or 2200 – 2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Floor Assembly –** Min 5 in. (127 mm) thick steel-reinforced normal weight (140 – 150 pcf or 2200 – 2400 kg/m^3) structural concrete.

3. **Joint System –** Max width of joint is 3 in. (76 mm). The joint system shall consist of the following:
   A. **Packing Material -** Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor as required to accommodate the required thickness of fill material.
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material applied within the joint, flush with top surface of floor.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternate to the above, min 1/4 in. (6 mm) thickness of fill material applied within the joint, flush with top surface of floor.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4100SL, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in. (19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top
   C. Concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (64 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulated

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

BRADY CONSTRUCTION INNOVATIONS INC.,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
CLARKWESTERN BUILDING SYSTEMS INC. – Type SLT, SLT-H
MARINO/WARE, DIV OF WARE INDUSTRIES INC – Type SLT
METAL-LITE INC. – The System
RAM SALES LLC – Ram Slotted Track
SCAFCO STEEL STUD MANUFACTURERS CO.
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.

OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner is used (Item 2A1), steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board*** – Gypsum board to be installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated wall, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that the gypsum board is cut to fit the contour of the steel floor units with a nom 3/4 in. (19 mm) gap. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.

The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

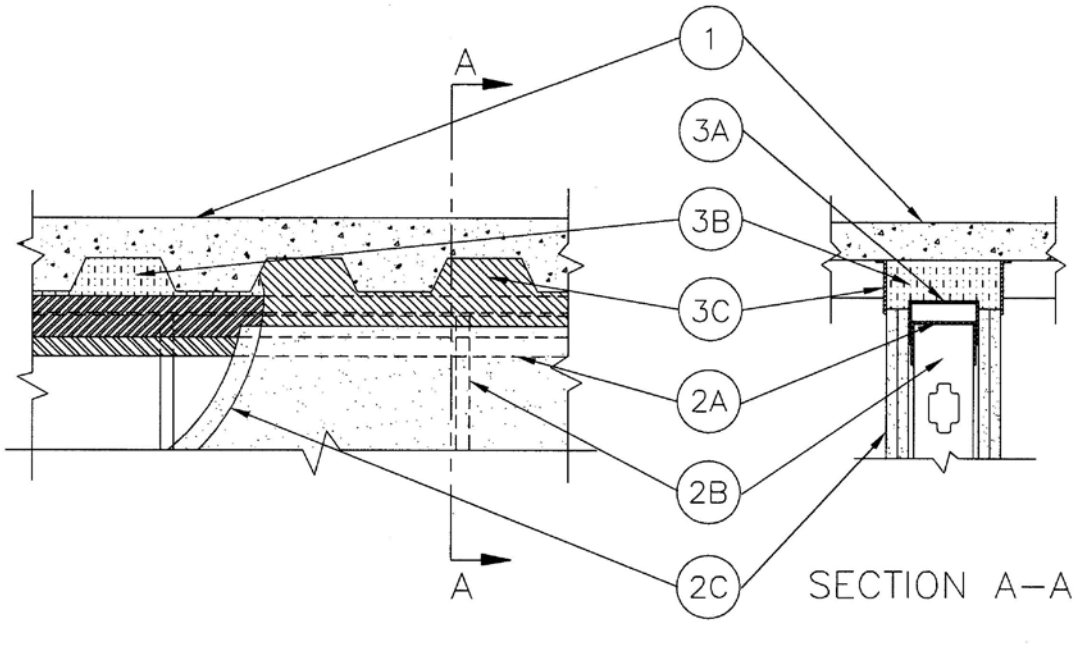
3. **Joint System - Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel and a fill material, as follows:

A. **Deflection Channel** – (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Fill Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and all surfaces of the steel floor units, flush with each surface of gypsum board.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
L Rating At Ambient – Less Than 1 CFM/Lin FT	FTH Ratings — 1 & 2 Hr (See Item 2)
L Rating At 400°F – Less Than 1 CFM/Lin FT	L Rating At Ambient – Less Than 1 CFM/Lin FT
	L Rating At 400°F – Less Than 1 CFM/Lin FT
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (64 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering –** Hot-mopped or cold-application materials compatible with insulated concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

BRADY CONSTRUCTION INNOVATIONS INC., DBA SLIPTRACK SYSTEMS, INC – SLP-TRK

CLARKWESTERN BUILDING SYSTEMS INC. – Type SLT, SLT-H

SCAFCO STEEL STUD MANUFACTURERS CO.

TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.

OLMAR SUPPLY INC – Type SCR

B. **Studs** – Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runners. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board*** – Gypsum board sheets installed to a min total thickness of 5/8 and 1-1/4 in. (16 and 32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.

The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel, forming material and a fill material, as follows:

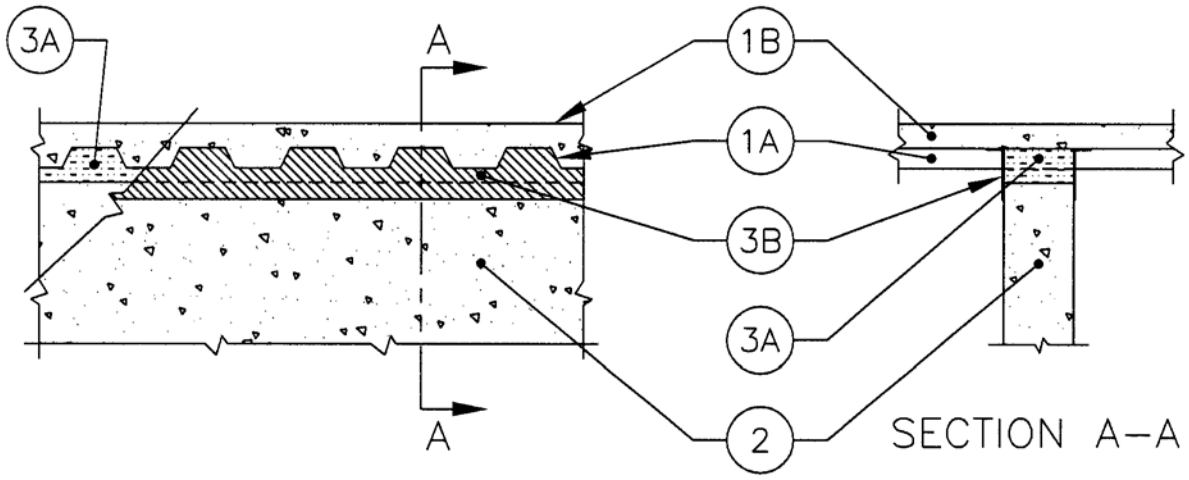
A. **Deflection Channel (Optional) –** A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 gauge steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Forming Material* –** Min 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 25 percent larger than the areas of the flutes and compressed into flutes of the steel floor units between the top of the deflection channel and the steel deck, flush with both sides of wall. Additional pieces of min 5/8 in. (16 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation are to be cut into strips and compressed approximately 25 percent to fill the 3/4 in. (19 mm) gap between the top of the gypsum board and bottom of the steel floor units, flush with both sides of wall.
THERMAFIBER Inc. – Type SAF

C. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1, 2, 3 & 4 Hr (See Item 2)	F Ratings — 1, 2, 3 & 4 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1, 2, 3 & 4 Hr (See Item 2)r
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1, 2, 3 & 4 Hr (See Item 2)
	FTH Ratings — 1, 2, 3 & 4 Hr (See Item 2)r
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the floor assembly shall be equal to or greater than hourly rating of the wall assembly and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulated concrete.

2. **Wall Assembly –** Min 4-7/8, 6-1/8, 7-3/8 and 8-5/8 in. (124, 156, 187 and 219 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete for 1, 2, 3 and 4 Hr rated assemblies, respectively. Wall may also be constructed of any UL Classified **Concrete Blocks***.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a forming material and a fill material, as follows:

A. **Forming Material –** Min 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes with additional min 4-7/8 in. (124 mm) thick by 1 in. (25 mm) high sections at the bottom of the shapes to completely fill the 3/4 in. (19 mm) gap between the top of the wall and bottom of the steel floor units. Mineral wool to be compressed and firmly packed into the flutes and the gap between the top of the wall and bottom of the steel floor units, flush with both sides of wall.

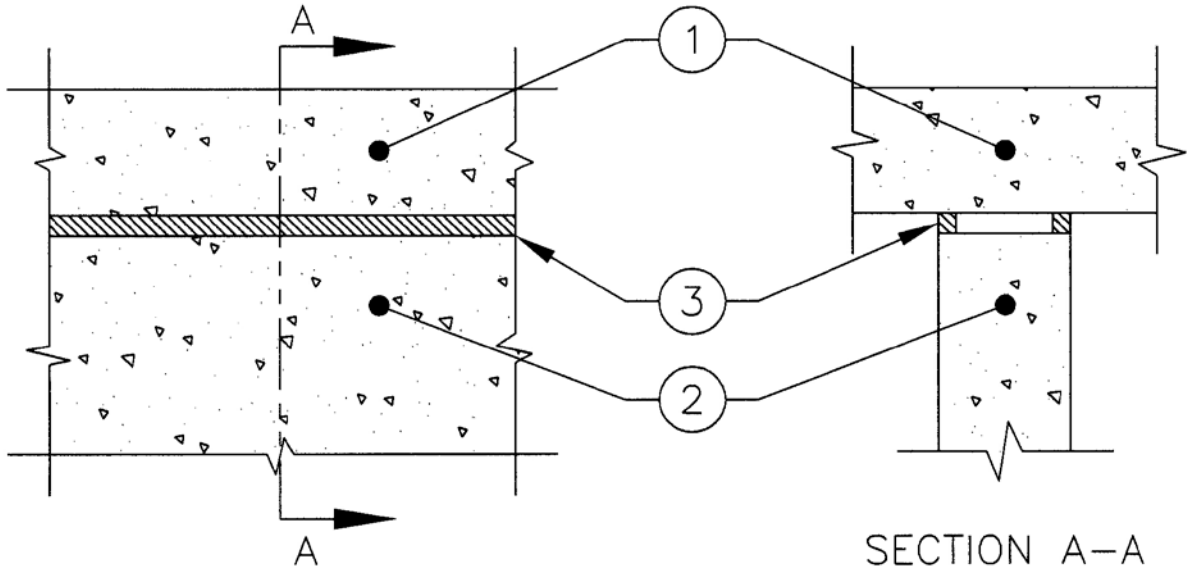
Industrial Insulation Group LLC – MinWool-1200 Safing
Rock Wool Manufacturing Co. – Delta Board
Roxul Inc. – Safe
Thermafiber Inc.– Type SAF

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the wall and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto wall and steel deck on both sides of wall.

Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3/4 in.(19 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 33% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



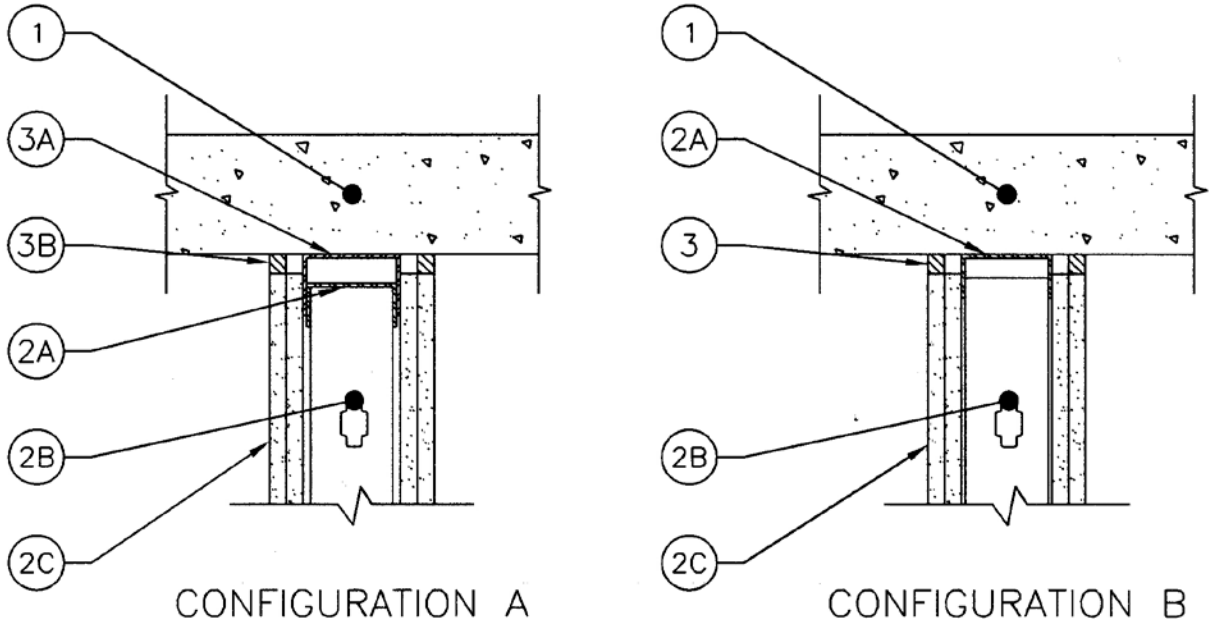
1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Floor may also be constructed from any UL Classified hollow-core **Precast Concrete Units***.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Wall Assembly –** Min 4-7/8 in. (124 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

3. **Fill, Void or Cavity Material* – Sealant** – Min 5/8 in. (16 mm) thickness of fill material applied on each side of the wall between the top of the wall and the bottom of the floor, flush with each surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in. (19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow core **Precast Concrete Units***.
   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.

CONFIGURATION A

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 of V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and Ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be installed within the deflection channel such that a 1 in. (25 mm) gap is maintained between the top of ceiling runner and top of deflection channel. Deflection channel is secured to floor with steel masonry anchors spaced a max of 24 in. (610 mm) OC.
   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel. Stud spacing not to exceed 24 in. (610 mm) OC.
   C. **Gypsum Board* –** Gypsum board sheets to be installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1in. (25 mm) below the bottom of the U-shaped deflection channel (Item 3A).
   The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel and a fill material, as follows:
   A. **Deflection Channel –** A nom 3-5/8 in. (92 mm) wide by min 2 in. (52 mm) deep min 24 gauge (or heavier) steel U-shaped channel. Deflection channel secured to floor assembly with steel fasteners, spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.
   B. **Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and the bottom of floor, flush with each surface of gypsum board.
      Passive Fire Protection Partners –** 3600EX, 4100NS, 4800DW

CONFIGURATION B

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and Ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner is secured to concrete floor slab with steel masonry anchors spaced a max of 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner is secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC.
BRADY CONSTRUCTION INNOVATIONS INC,
SLIPTRACK SYSTEMS, INC – SLP-TRK
CALIFORNIA EXPANDED METAL PRODUCTS – CST
CLARKDIETRICH BUILDING SYSTEMS INC – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO.
STEELER INC – Steeler Slotted Ceiling Runner
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC.
THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC – Type SCR

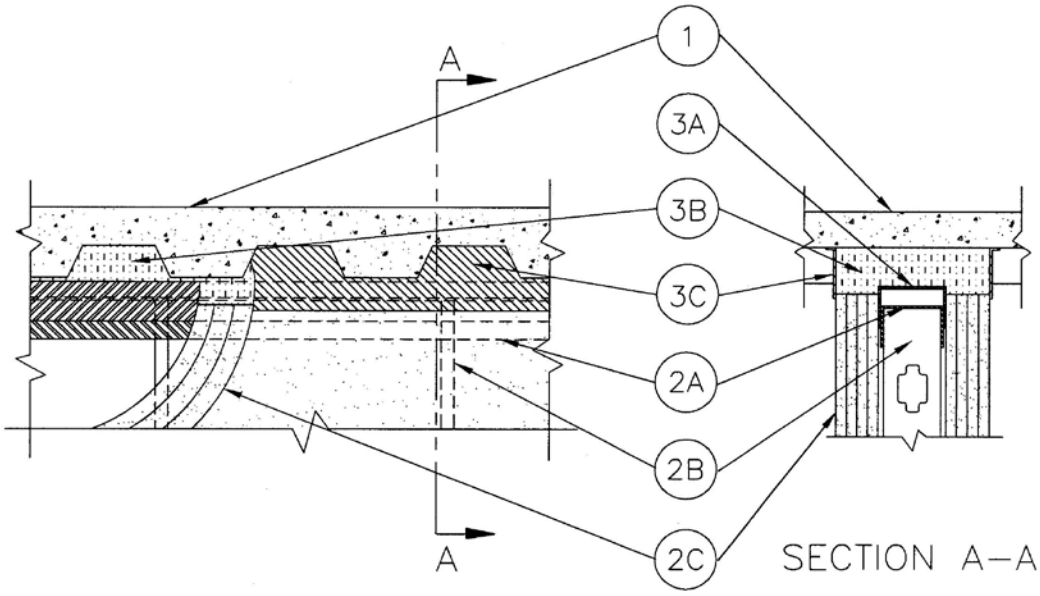
B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Steel studs shall not be secured to ceiling runner. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at mid-height of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at mid-height of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets to be installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Fill, Void or Cavity Material* – Sealant – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and the bottom of floor, flush with each surface of gypsum board.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1, 2, 3 & 4 Hr (See Item 2)	F Ratings — 1, 2, 3 & 4 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1, 2, 3 & 4 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1, 2, 3 & 4 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/Lin Ft.	FTH Ratings — 1, 2, 3 & 4 Hr (See Item 2)
L Rating At 400°F — Less Than 1 CFM/Lin Ft.	L Rating At Ambient — Less Than 1 CFM/Lin Ft.
	L Rating At 400°F — Less Than 1 CFM/Lin Ft.
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulated concrete.

2. **Wall Assembly –** The 1, 2, 3 or 4 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel fasteners or by welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

BRADY CONSTRUCTION INNOVATIONS INC.,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURERS CO.
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed perpendicular to fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.

OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runners. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8, 1-1/4, 1-7/8 or 2-1/2 in. (16, 32, 48 or 64 mm) on each side of wall for 1, 2, 3 or 4 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel, forming material and a fill material, as follows:

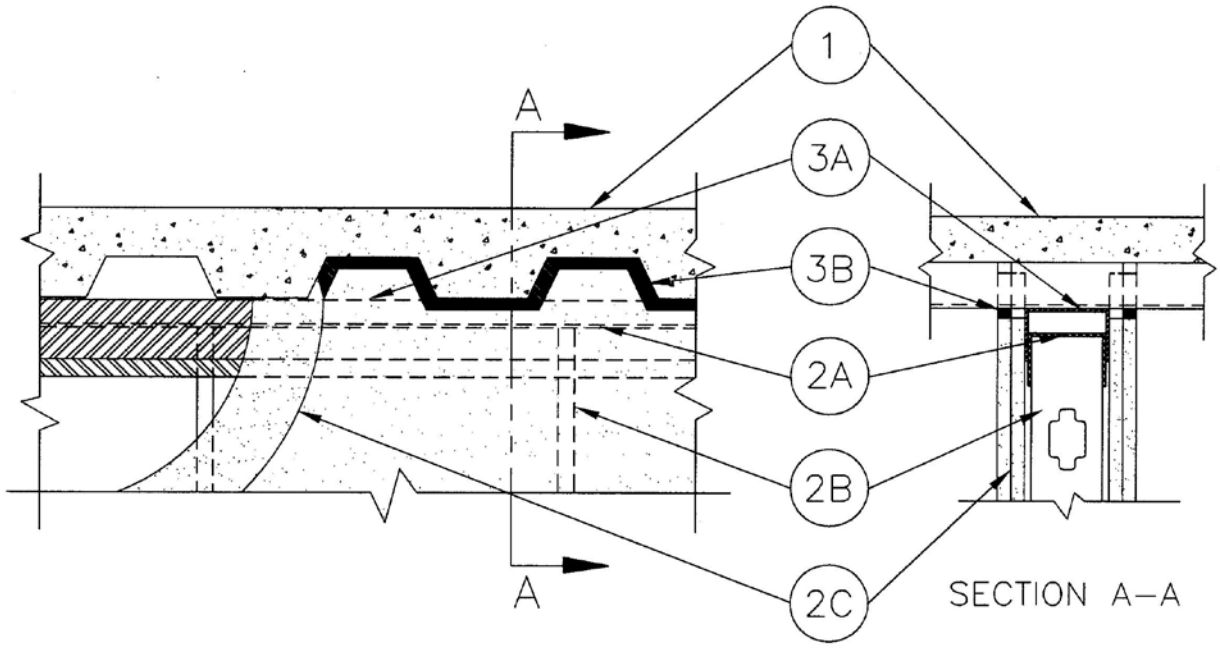
A. **Deflection Channel –** A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 gauge steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Forming Material* –** Min 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for 1 and 2 hr rated assemblies, min 7-3/8 in. (187 mm) and 8-5/8 in. (219 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for 3 and 4 hr rated assemblies, respectively, cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the deflection channel and the steel deck, flush with both sides of wall. Additional pieces of min 5/8 in. (16 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for 1 and 2 hr rated assemblies, min 1-7/8 in. (48 mm) and min 2-1/2 in. (64 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for 3 and 4 hr rated assemblies, respectively, are to be cut into strips and compressed approximately 25 percent to fill the 3/4 in. (19 mm) gap between the top of the gypsum board and bottom of the steel floor units, flush with both sides of wall.
INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO. – Delta Safing Board
THERMAFIBER L L C — Type SAF

C. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulated concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V 400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. gap maintained between the top of ceiling runner and top of deflection plate. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

A1. **Light Gauge Framing* - Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.

OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner is used (Item 2A1), steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum board* –** Gypsum board sheets to be installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated wall, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that the gypsum board is cut to fit the contour of the steel floor units with a nom 3/4 in. (19 mm) gap. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

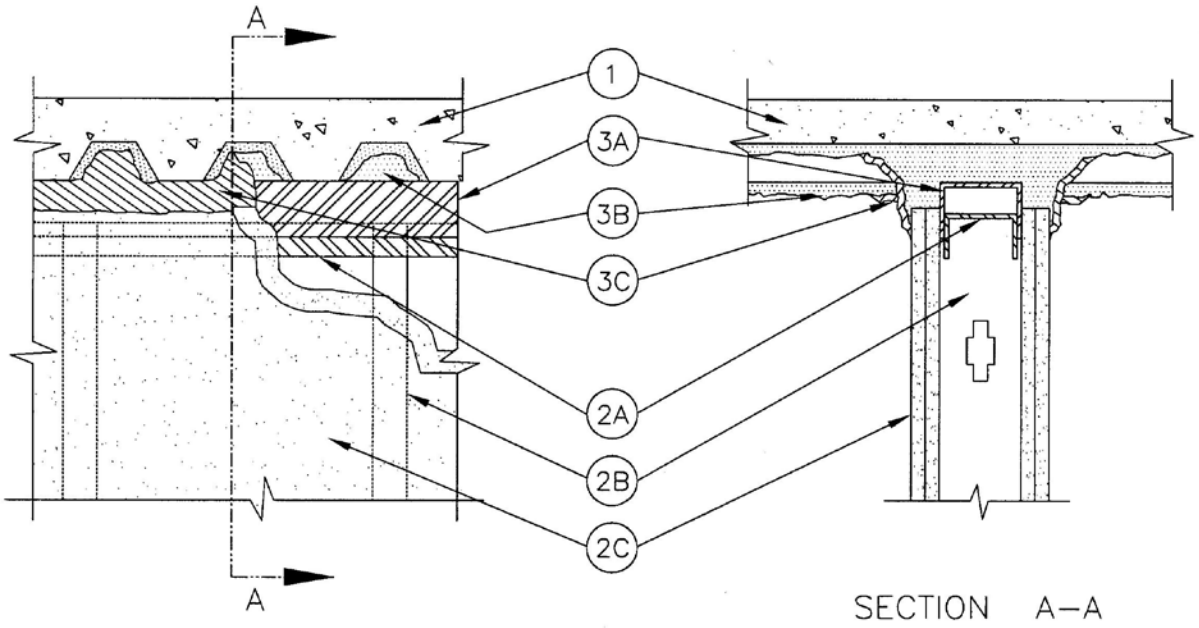
3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel and a fill material, as follows:

A. **Deflection Channel –** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured to valleys with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Fill Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and all surfaces of the steel floor units, flush with each surface of gypsum board.
Passive Fire Protection Partners – 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/Lin Ft.	FTH Ratings — 1 & 2 Hr (See Item 2)
L Rating At 400°F — Less Than 1 CFM/Lin Ft.	L Rating At Ambient — Less Than 1 CFM/Lin Ft.
	L Rating At 400°F — Less Than 1 CFM/Lin Ft.
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D900 Series Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor And Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner (Item 2A) with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel (Item 3A), when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner is used, studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel, is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel, forming material and a fill material, as follows:

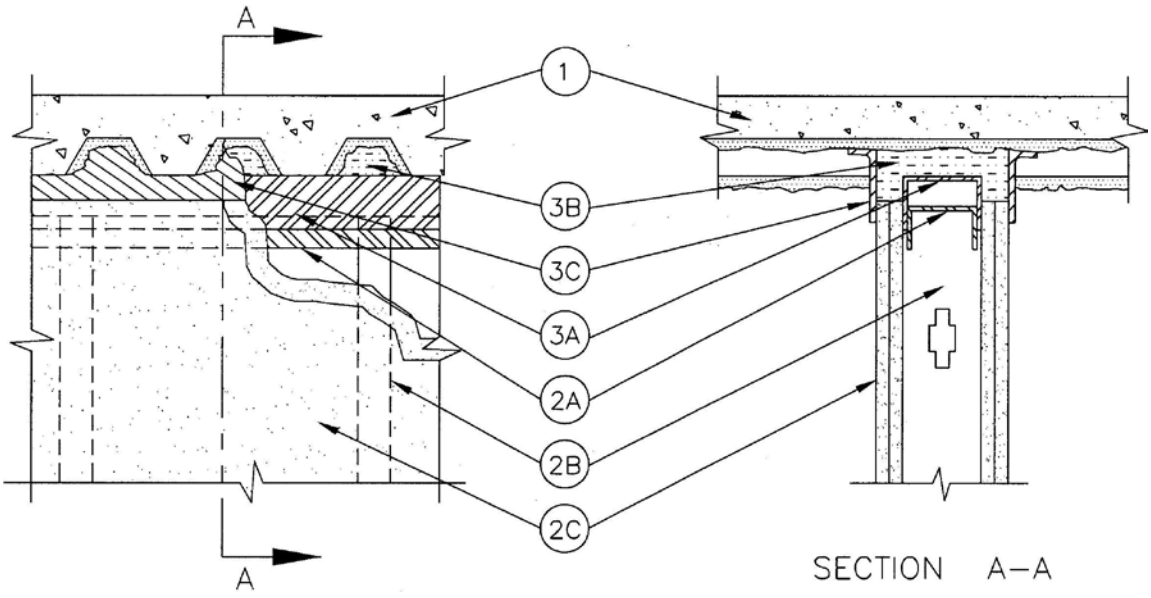
A. **Deflection Channel** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Spray-Applied Fire Resistive Materials* –** Min 5/16 (8 mm) to max 11/16 in. (17 mm) thickness of spray-applied fire resistive materials applied to all surfaces of steel floor units (Item 1A), within the entire joint system, overlapping onto gypsum a min 1 in. (25 mm). Spray-applied fire resistive material to form a radius of 3 in. (76 mm) from steel floor units to joint system.
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY

C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the joint system, completely covering radius formed from spray-applied fire resistive materials of the joint system and overlapping a min of 1 in. (25 mm) onto gypsum board (Item 2C) and steel deck on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/Lin Ft.	FTH Ratings — 1 & 2 Hr (See Item 2)
L Rating At 400°F — Less Than 1 CFM/Lin Ft.	L Rating At Ambient — Less Than 1 CFM/Lin Ft.
	L Rating At 400°F — Less Than 1 CFM/Lin Ft.
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D800 Series Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Spray-Applied Fire Resistive Materials* –** Min 5/16 in. (8 mm) to max 11/16 in. (17 mm) thickness of spray-applied fire resistive materials applied to all surfaces of steel floor units. Prior to securing ceiling runner (Item 2A) spray applied fire resistive materials to be removed from valleys of steel floor units flush with both surfaces of wall assembly.
   GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY
   C1. **Spray-Applied Fire Resistive Materials* –** As an alternate to the above min 3/8 in. (10 mm) to max 15/16 in. (24 mm) thickness of spray-applied fire resistive materials applied to all surfaces of steel floor units. Spray applied fire resistive materials may or may not be removed from valleys of steel floor units flush with both surfaces of wall assembly, prior to securing ceiling runner (Item 2A).
   ISOLATEK INTERNATIONAL – Type 300

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

   A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.
   B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulated concrete, as measured from the top plane of the floor units.
   C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulating concrete.
   D. **Spray-Applied Fire Resistive Materials* –** Prior to the installation of the steel ceiling runners, the roof assembly shall be sprayed with the thickness of fire resistive material indicated in the individual P700 Series Design.
   GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY
   ISOLATEK INTERNATIONAL – Type 300

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory. The wall assembly shall include the following construction features:

   A. **Steel Floor And Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry fasteners or welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Items 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry fasteners spaced max 24 in. (610 mm) OC. When slotted runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternative to the ceiling runner in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening to steel studs. Vertical deflection ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC.– VertiTrack VTD362, VTD400, VTD600 and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternative to the ceiling runner in Items 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notch ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC.– Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner (Item 2A) with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel (Item 3A), when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted ceiling vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board*** – Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the spray–applied fire resistive material on the steel floor or roof deck. The screws attaching the gypsum board to studs at the top of wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of a deflection channel, forming material and fill material, as following:

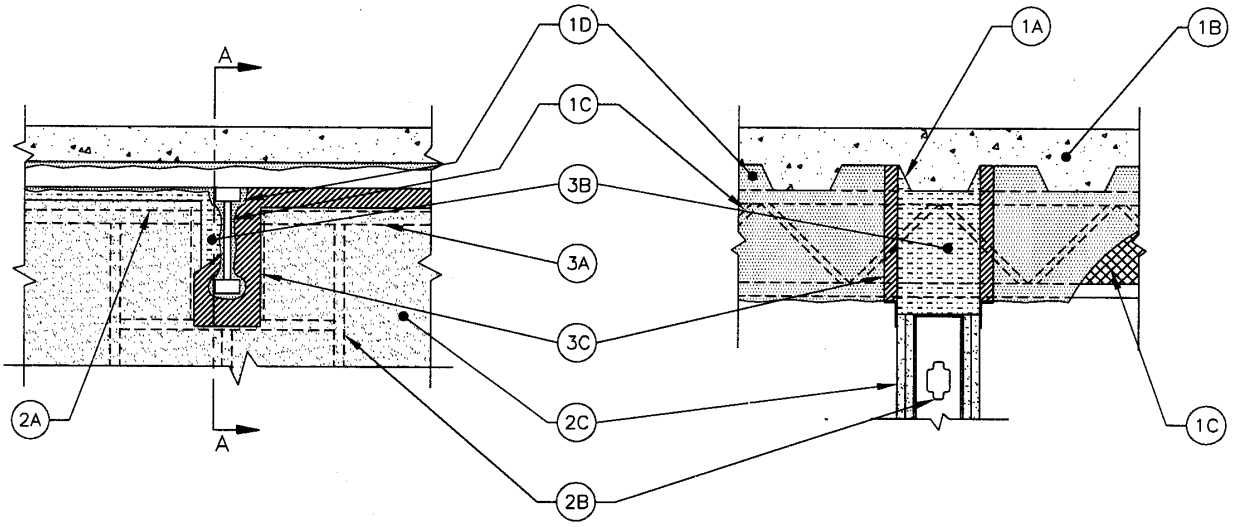
A. **Deflection Channel** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Forming Material* –** Min 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg//m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes and compressed into flutes of the steel floor units (Item 1A) between the top of the deflection channel (Item 3A) and the steel deck, flush with both sides of wall. Additional pieces of min 5/8 in. (16 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation are to be cut into strips and compressed approximately 25 percent in width to fill the 3/4 in. (19 mm) gap between the top of the gypsum board and the spray-applied fire resistive material on the bottom of the steel floor units, flush with both sides of wall.
INDUSTRIAL INSULATION GROUP LLC – MinWool 1200 Safing
THERMAFIBER LLC – Type SAF

C. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness (1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units (Item 1A) and between the top of the gypsum board (Item 2C) and the bottom of the steel units to completely cover mineral wool (Item 3B) and overlap a min of 1 in. (25 mm) onto gypsum board and spray-applied fire resistance materials (Item 1C) of steel deck on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1 in.(25 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 Series Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.

   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

   C. **Structural Steel Support –** (Optional) – Steel beam or open-web steel joist, as specified in the individual D700 Series Floor-Ceiling Design, used to support steel floor units. Structural steel support oriented perpendicular to wall assembly. Where open-web steel joists pass through the fire rated wall, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^3) shall be secured to one side of each joist with steel tie wire and the lath shall be fully covered with spray-applied fire resistive material with no min thickness requirement.

D. **Spray-Applied Fire Resistive Materials* –** After installation of the ceiling runner (Item 2A) or deflection channel (Item 3A, if used), steel floor units and structural steel supports to be sprayed in accordance with the specifications in the individual D700 Series Design.
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor And Ceiling Runners** – Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with min 1-1/4 in. (32 mm) to max 3 in. (76 mm) flanges. When U-shaped deflection channel (Item 3A) is used, the ceiling runner is to nest within the deflection channel with a 1/2 in. to 1 in. (13 to 25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner to be provided with 3 in. (76 mm) flanges and secured to steel floor units (Item 1A) prior to the application of the sprayed-applied fire resistive material with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC. Ceiling runner to be centered beneath and parallel with valley of steel floor units. A clearance of 1 to 1-1/4 in. (25 to 32 mm) shall be maintained between the end of the ceiling runner or deflection channel and the spray applied fire resistive material on the structural steel support members.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, prior to the application of the sprayed-applied fire resistive material and secured with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, 2A1 or 2A2, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, prior to the application of the sprayed-applied fire resistive material and secured with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC. – VertiTrack VTD362, VTD400, VTD600, and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A through 2A3, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, prior to the application of the sprayed-applied fire resistive material and secured with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and secured to floor runner. When deflection channel (Item 3A) is used, steel studs attached to ceiling runner (Item 2A) with sheet metal screws located 1/2 in. (13 mm) below bottom of the deflection channel (Item 3A). When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A3) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. A framed opening shall be constructed around each structural steel support member. A min clearance of 1 in. (25 mm) to a max clearance of 3 in. (76 mm) shall be maintained between the framing and spray applied fire resistive material on the two sides of the structural support member. The clearance between the framing and the spray applied fire resistive material on the bottom of the structural steel support member shall be min 1/2 in. (13 mm) to max 1 in. (25 mm).

C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual U400 Series Wall and Partition Design in the UL Fire Resistance Directory, except that a max 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the spray applied fire resistive material on the steel floor units and min 1/2 in. (13 mm) to max 1 in. (25 mm) gap shall be maintained between the top edge of the gypsum board and the spray applied fire resistive material on the structural steel support member. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located in 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of the spray applied fire resistive material on the steel floor units and top of gypsum board (at time of installation of joint system) is 1 in. (25 mm). Max separation between spray applied fire resistive material on bottom of structural support member and framed opening in top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from it's installed width as measured between the spray applied fire resistive material on the steel floor units and the top of the gypsum board.** The joint system consists of forming and fill materials, with or without deflection channel (Item 3A), as follows:

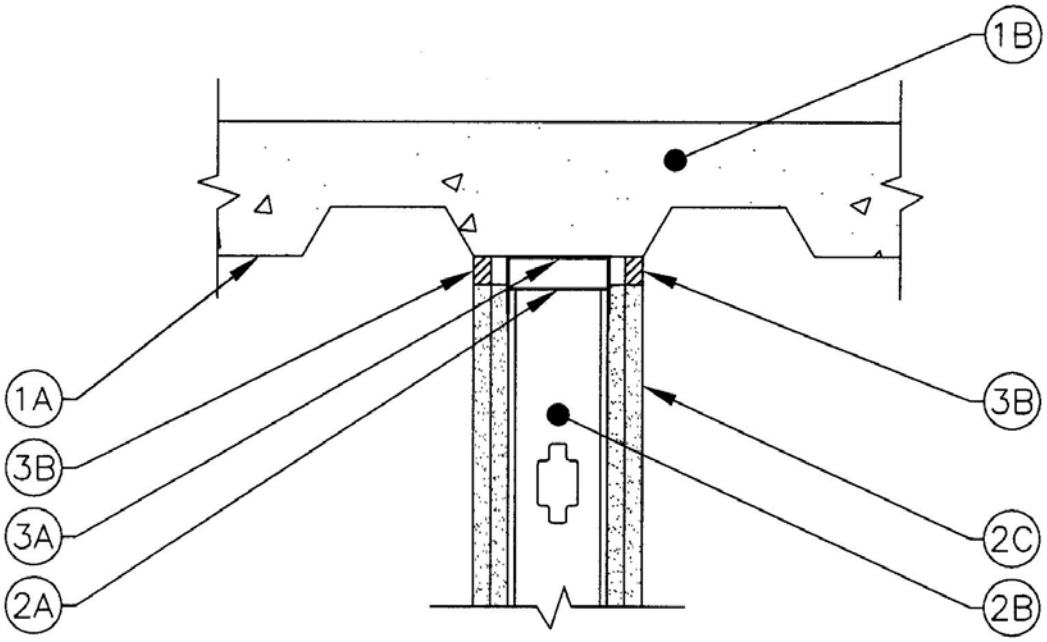
   A. **Deflection Channel** (Optional – Not Shown) – Min 24 gauge galv steel channel, 3 in. (76 mm) deep, sized to accommodate ceiling runner (Item 2A). Deflection channel installed parallel to direction of fluted steel deck, centered beneath valley, prior to the application of the sprayed-applied fire resistive material and secured with steel masonry anchors or welds spaced max 24 in. (610 mm). The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1/2 in. to 1 in. (13 to 25 mm) gap between the top of the ceiling runner and the top of the deflection channel. A clearance of 1 to 1-1/4 in. (25 to 32 mm) shall be maintained between the end of the deflection channel and the spray applied fire resistive material on the structural steel support members. The ceiling runner nests inside the deflection channel without attachment.

   B. **Forming Material* –** Nom 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to a length approximately the same as the overall thickness of wall and inserted cut edge first into the spaces between the spray-applied fire resistive material on the structural steel member and the framed notch at the top of the wall, flush with the gypsum board surface on both sides of the wall. The thickness of forming material shall be sufficient to attain a min compression of 33 percent between the sides of the framed notch and the protected structural steel member and between the bottom of the framed notch and bottom of the protected structural steel member. Additional sections of mineral wool batt insulation are compressed 33 percent in thickness and are installed cut edge first to completely fill the gap above the top of the gypsum board, flush with both surfaces of wall.
   INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO. – Delta Board
   ROCKWOOL MALAYSIA SDN BHD – Type Safe
   ROXUL – Type Safe
   THERMAFIBER, LLC – Type SAF

   C. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) wet thickness (1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed over the forming material on each side of the wall. Fill material to overlap a min of 1 in. (25 mm) onto the gypsum board and a min 2 in. (51 mm) onto the spray applied fire resistive material (Item 1D) on the steel floor unit and on the structural steel support member on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II and III Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II and III Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fire rated fluted steel floor unit/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly** – (Not Shown) – As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly and shall include the following construction features:
   A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation** – Min 2-1/4 in (57 mm) thick poured insulating concrete, as measured from the top plane of the floor units.

C. **Roof Covering** – Hot-moped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly** – The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be parallel to and centered valleys of steel floor or roof and constructed of the materials and in the manner described in the individual U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection plate. When deflection channel is not used, ceiling runner installed parallel to valleys with steel fasteners or by welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner –** As an alternative to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv. steel channels with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed parallel to direction of fluted steel floor units and secured to valleys with steel fasteners spaced max 24 in. OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed parallel to the direction of the fluted steel deck, centered beneath valley and secured with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC. – VertiTrack VTD358, VTD400, VTD600 and VTD800

A3. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Item 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley and secured with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and nesting on the floor runner and with the top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. OC.

C. **Board, Gypsum* –** Installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a max 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when the deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.

The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall

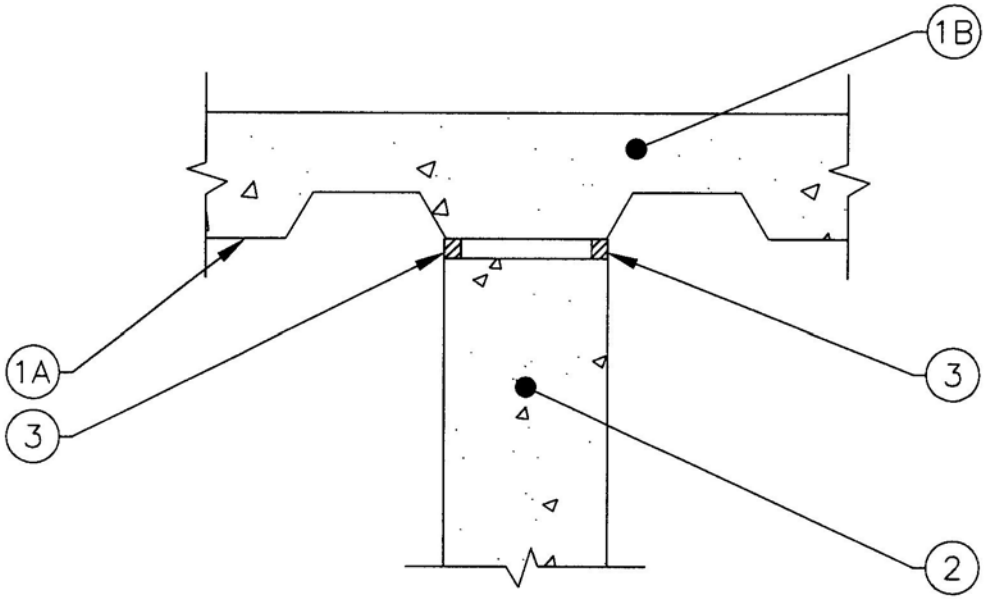
3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system consists of the following:

A. **Deflection Channel –** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep, min 24 gauge steel U-shaped channel. Deflection channel installed parallel to direction of fluted steel deck, centered beneath valley and secured with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC. The ceiling runner is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Fill, Void or Cavity Material*** – **Sealant –** Min 5/8 in. (16 mm) thickness of fill material to be installed on each side of wall between the top of the gypsum board and the bottom of the floor, flush with surface of gypsum board.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3/4 in.(19 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 33% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fire rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly** – (Not Shown) – As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Concrete** - Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the roof units.

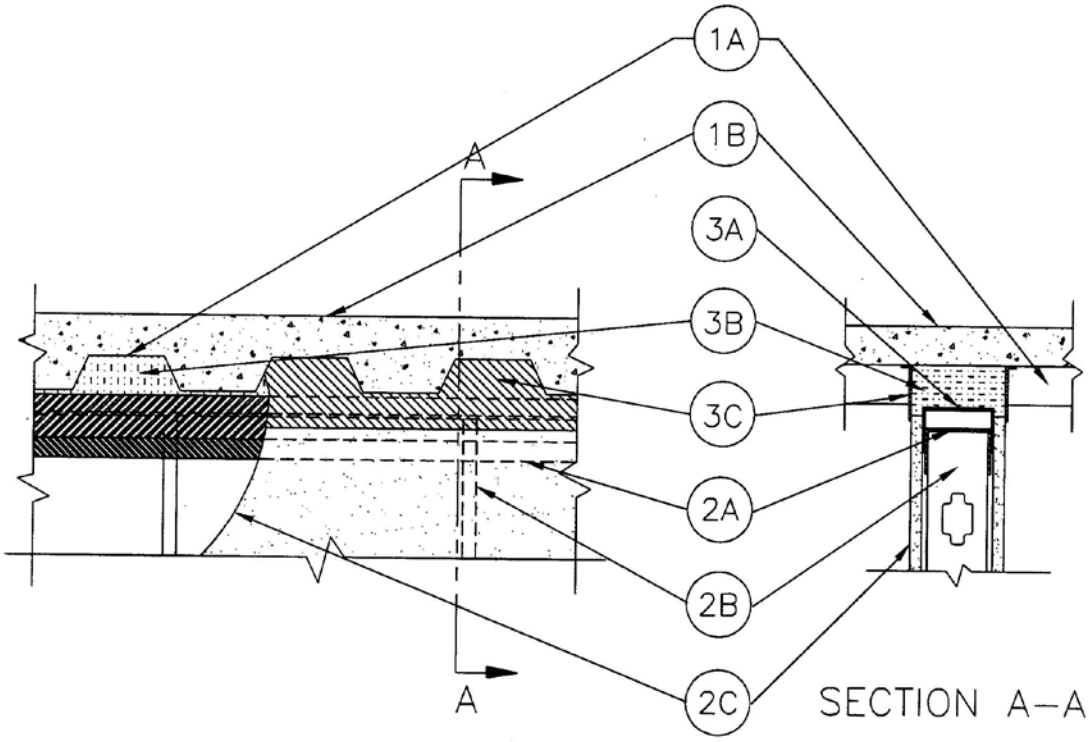
C. **Roof Covering*** – Hot-mopped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly –** Min 6-1/8 in. (156 mm) thick steel reinforced lightweight or normal weight (100–150 pcf or 1600-2400 kg/m^3) concrete. Wall to be parallel to and centered under valleys of steel floor or roof. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System – Max separation between bottom of floor and top of wall is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width. Fill, Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material applied on each side of the wall between the top of the wall and all surfaces of the steel floor units, flush with the surface of the wall.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1 in.(25 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II and III Movement Capabilities — 25% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II and III Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly** – The fire rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units*** – Max 3 in. (76 mm) deep galv steel fluted units.
   B. **Concrete** – Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Ceiling Runners** – Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys of steel floor units (Item 1A) with steel masonry anchors or by welds spaced max 24 in. (610 mm) OC.

   A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
   BRADY CONSTRUCTION INNOVATIONS INC,
   DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
   CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
   SCAFCO STEEL STUD MANUFACTURING CO
   TELLING INDUSTRIES LLC – True-Action Deflection Track

   A2. **Light Gauge Framing* — Clipped Ceiling Runner —** As an alternate to the ceiling runner in Items 2A and 2A1, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 2-1/2 in. (64 mm). Clipped ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.
   TOTAL STEEL SOLUTIONS L L C — Snap Trak

   A3. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical defection clips mechanically fastened within runner. Slotted clips provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
   THE STEEL NETWORK INC. – VeriTrack VTD250, VTD362, VTD400, VTD600 and VTD800

   A4. **Light Gauge Framing* – Notched Ceiling Runner** – As an alternate to the ceiling runners in Items 2A, 2A1 or 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
   OLMAR SUPPLY INC – Type SCR

B. **Studs –** Steel studs to be min 2-1/2 in. (64 mm) wide. Studs cut 5/8 in. (16 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A3) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the bottom of the steel floor units. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when the deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the tops of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max width of joint (at time of installation of joint) is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of the following:

A. **Deflection Channel – (Optional) –** A nom 2-1/2 in. (64 mm) wide by min 2 in. (51 mm) deep min 24 gauge steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel floor units and secured to valleys units with steel masonry anchors of by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

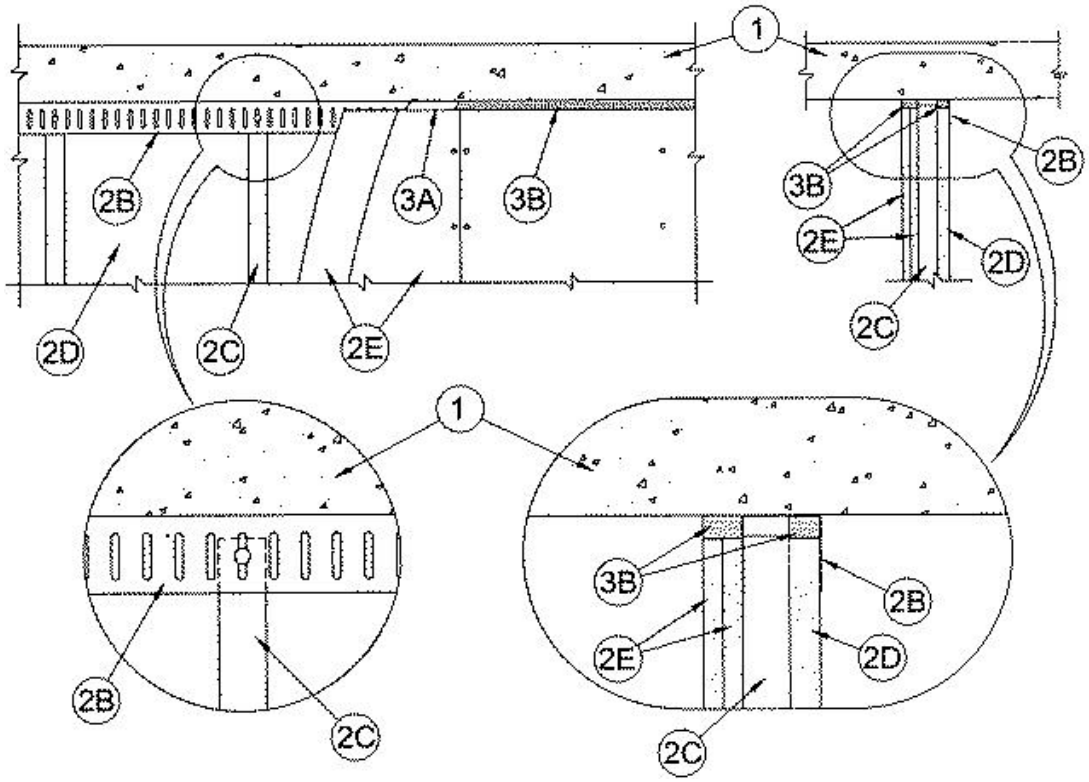
B. **Forming Material* –** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 20 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the ceiling runner and the steel deck and compressed in width to be flush with vertical leg of ceiling runner on both sides. Additional pieces of min 4 pcf (64 kg/m^3) mineral wool batt insulation are to be cut to the contour of the flutes with an additional 1-3/8 in. (35 mm) high section at the bottom of the shapes to fill the 1 in. gap between the top of the gypsum board and bottom of the steel deck. The additional pieces of mineral wool are to be cut to min 3/4 in. and 1-1/2 in. (19 and 38 mm) thick for 1 and 2 hr rated assemblies, respectively, and compressed and firmly packed into the flutes and the gap between the top of the gypsum board and bottom of the steel deck on both sides of the wall and compressed in thickness to be recessed from each surface of the wall to accommodate the required thickness of fill material.
FIBEREX INSULATIONS, INC. – FBX Safing Insulation
IIG MINWOOL LLC – MinWool 1200 Safing
ROCK WOOL MANUFACTURING CO. – Delta Safing Board
THERMAFIBER INC – Type SAF

C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the wall in the flutes of the steel deck and between the top of the gypsum board and the bottom of the steel deck to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall.

Passive Fire Protection Partners – 3500SI, 5100SP

Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

2. **Shaft Wall Assembly –** With the exception of the ceiling runner, the 2 hr fire rated shaft wall assembly shall be constructed of the materials and in the manner described in System B of Design No. U415 in the UL Fire Resistance Directory. The wall shall include the following construction features:

A. **Floor and Wall Runners –** (Not Shown) – "J"-shaped runner, min 2-1/2 in. (64 mm) wide with unequal legs of 1 in. (25 mm) and 2 in. (51 mm), fabricated from min 24 MSG galv steel. Runners positioned with short leg toward finished side of wall. Runners attached to walls and floor with steel fasteners spaced max 24 in. (610 mm) OC. As an alternate to the "J"-shaped runner, a min 2-1/2 in. (64 mm) wide by 1 or 1-1/4 in. (25 to 32 mm) deep channel formed from min 24 MSG galv steel may be used for the floor runner.

B. **Light Gauge Framing*** – **Slotted Ceiling Track** – Slotted ceiling track shall consist of galv steel channels with slotted flanges. Slotted ceiling track sized to accommodate steel "C-H" studs (Items 2C). Attached to concrete at ceiling with steel fasteners spaced max 12 in. (305 mm) OC.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK

C. **Steel Studs** – "C-H"-shaped steel studs to be min 2-1/2 in. (64 mm) wide and formed of min 24 MSG galv steel. As an alternate, nom 6 in. (152 mm) wide "E"-shaped steel studs installed back-to-back and secured together with steel screws spaced max 12 in. (305 mm) OC may be used. "E"-shaped studs to be formed of min 24 MSG galv steel. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in slotted ceiling track. Studs spaced 24 in. (610 mm) OC. After installation of gypsum board liner panels (Item 2D), studs secured to flange of floor runner on finished side of wall only with No. 6 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screws. Studs secured to flange of slotted ceiling track on finished side of wall only with No. 8 by 1/2 in. (13 mm) long self-drilling, self-tapping wafer head steel screws at slot midheight.

D. **Gypsum Board*** – 1 in. (25 mm) thick by 24 in. (610 mm) wide gypsum board liner panels as specified in Design No. U415. Panels cut 1 in. (25 mm) less in length than floor to ceiling height. Vertical edges inserted in "H"-shaped section of "C-H" studs. Free edge of end panels attached to long leg of "J" runner (Item 2A) with 1-5/8 in. (41 mm) long Type S steel screws spaced max 12 in. (305 mm) OC.

E. **Gypsum Board*** – Gypsum board sheets, 1/2 or 5/8 in. (13 or 15 mm) thick, applied vertically or horizontally in two layers on finished side of wall as specified in System B of Design No. U415. A max 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the bottom surface of the concrete floor. The screws attaching the gypsum board layers to the C-H studs shall be located 1 in. (25 mm) below the bottom of the slotted ceiling track (Item 2C). No gypsum board attachment screws are to penetrate the slotted ceiling track.

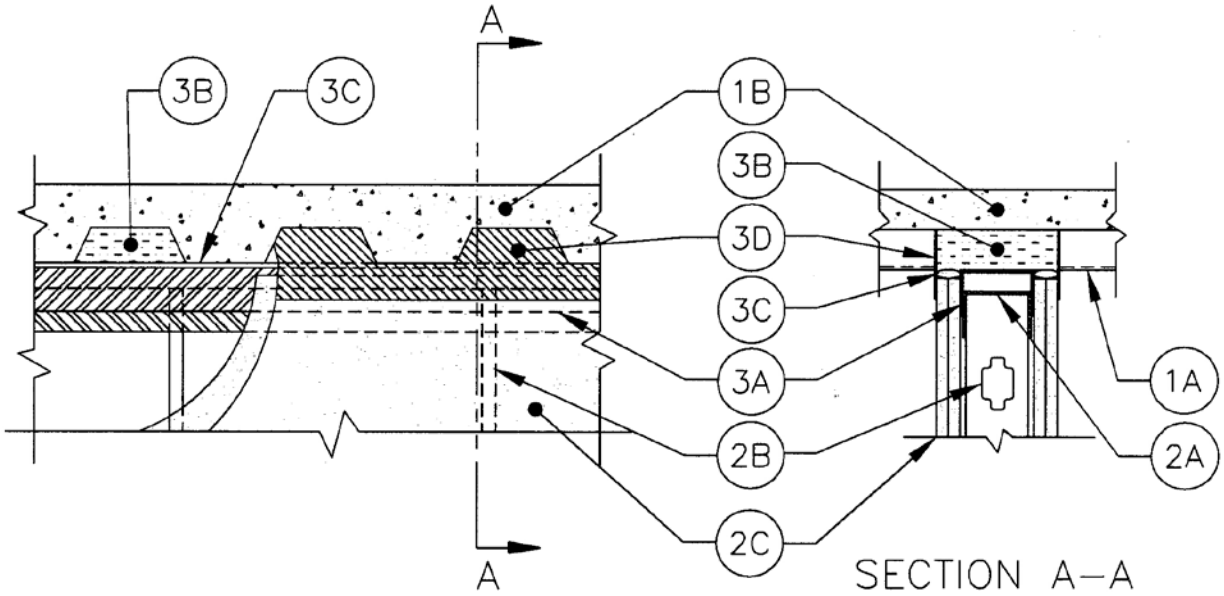
3. **Joint System** – Max separation between bottom of floor and top of liner panel (Item 2D) and between bottom of floor and top of gypsum board sheets (Item 2E) at time of installation of joint system is 1 in. (25 mm). The joint system is designed to accommodate a maximum 25 percent compression or extension from its installed width. The joint system consists of bond breaker tape and sealant, as follows:

A. **Bond Breaker Tape –** Polyethylene tape supplied in rolls. Tape applied to flanges of slotted ceiling track (Item 2D) to prevent bonding of the sealant at points other than the top and bottom of the linear gap.

B. **Fill, Void or Cavity Material* – Sealant –** Min 1 in. (25 mm) depth of sealant to be installed to fill linear gap between top of gypsum board liner panel (Item 2D) and top inside surface of slotted ceiling track (Item 2B) prior to installation of gypsum board sheets on finished side of wall. Min 1 in. (25 mm) depth of sealant to be installed to fill linear gap between top of gypsum board sheets (Item 2E) and bottom of concrete floor.
Passive Fire Protection Partners — 3600EX, 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II and III Movement Capabilities — 33% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II and III Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fire rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly a fire-rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly and shall include the following construction features:
   A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv. steel fluted roof deck.
   B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the floor units.
   C. **Roof Covering* –** Hot-mopped or cold application materials compatible with insulating concrete.

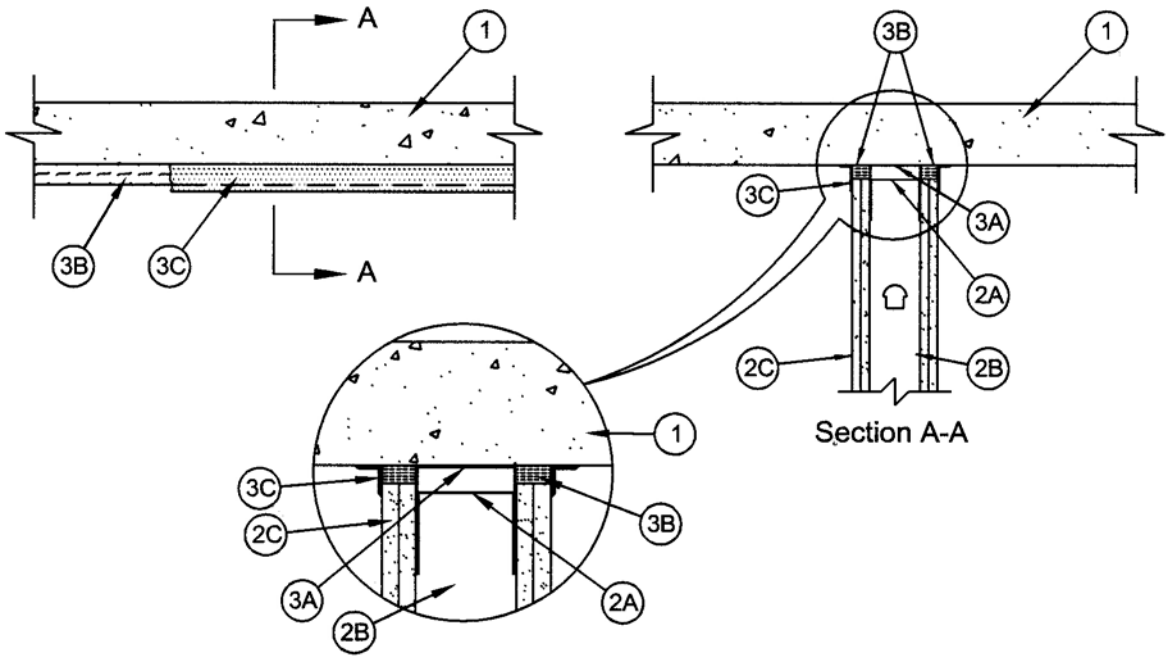
2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs. When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of the ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to valleys of steel floor units with steel fasteners or by welds spaced max 24 in. (610 mm) OC.
   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 5/8 in. (16 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. Stud spacing not to exceed 24 in. (610 mm).
   C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) on each side of wall. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between the top of the gypsum board and the bottom of the steel floor units and the top row of screws shall be installed into the studs 1 in. (25 mm) below the bottom of the ceiling runner or deflection channel, when used.

   The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max width of joint (at time of installation of joint system) is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Deflection Channel – (Optional) –** Min 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 gauge steel U-shaped channel. Deflection channel secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.
   B. **Forming Material* –** Min 4-7/8 in. (124 mm) and 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation for 1 and 2 hr rated assemblies, respectively, cut to the shape of the fluted deck, approx 20 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the ceiling runner and the steel deck, flush with the surface of the wall on both sides.
      INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING CO – Delta Safing Board
      THERMAFIBER INC – Type SAF
   C. **Backer Rod –** Nom 1 in. (25 mm) diam polyethylene backer rod compressed and firmly packed into the nom 3/4 in. (19 mm) gap between the top of the gypsum board and the bottom of the steel deck and the bottom of the forming material in area of flutes. Backer rod compressed to be flush with both surfaces of the wall.
   D. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and backer rod and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall.
      Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Ratings — 1 & 2 Hr (See Item 2)
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1-1/2 in.(38 mm)	FTH Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1-1/2 in. (38 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor And Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with 3 in. (76 mm) flanges. When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner –** As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* — Clipped Ceiling Runner** — As an alternate to the ceiling runner in Items 2A and 2A1, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 2-1/2 in. (64 mm) Clipped ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.
TOTAL STEEL SOLUTIONS L L C — Snap Trak

A3. **Light Gauge Framing* – Vertical Deflection Ceiling Runner –** As an alternate to the ceiling runner in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC – VertiTrack VTD362, VTD400, VTD600 and VTD800

A4. **Light Gauge Framing* – Notched Ceiling Runner –** As an alternate to the ceiling runner in Items 2A, 2A1 or 2A2, notched ceiling runner to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.
OLMAR SUPPLY INC – Type SCR

B. **Studs Steel –** Studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 16 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1-1/2 in. (38 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.

The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System –** Max separation between bottom of floor and top of wall is 1-1/2 in. (38 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width. The joint system consists of a deflection channel, forming material and a fill material, as follows:

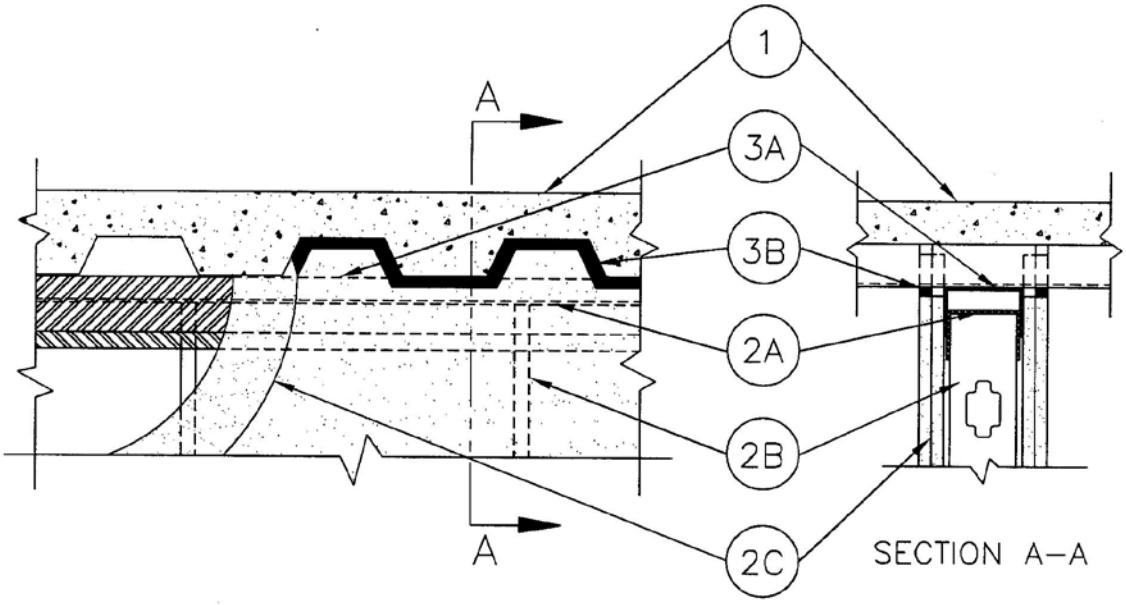
A. **Deflection Channel –** (Optional) – A nom 3-5/8 in. (92 mm) wide by 3 in. (76 mm) deep min 24 ga steel U-shaped channel. Deflection channel secured to concrete floor slab with steel masonry anchors spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

B. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation cut into 5/8 in. (16 mm) and 1-1/4 in. (32 mm) wide strips for 1 and 2 Hr rated assemblies, respectively. Mineral wool to be compressed 50 percent in thickness and installed edge first into gap between top of gypsum board and bottom of floor, flush with both sides of wall.
FIBREX INSULATIONS INC – FBX Safing Insulation
IIG MINWOOL LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO – Delta Board or Delta -8
ROCKWOOL MALAYSIA SDN BHD – Type Safe
ROXUL INC – Type Safe
THERMAFIBER LLC – Type SAF

C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on each side of the wall between the top of the gypsum board and the bottom of the floor to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto gypsum board and floor on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Ratings — 1 & 2 Hr (See Item 2)
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1 in.(25 mm)	FTH Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression and 13% Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression and 13% Extension



1. **Floor Assembly -** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulated concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 - Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

METAL-LITE INC – The System
SCAFCO STEEL STUD MANUFACTURING CO
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner –** As an alternate to the ceiling runner in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips provided with step bushings for permanent fastening of steel studs. Flanges sized to accommodate steel studs (Item 2B). Vertical deflection ceiling runner installed perpendicular to direction of fluted steel floor or roof deck and secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

THE STEEL NETWORK, INC. – VertiTrack VTD362, VTD400, VTD600 AND VTD800

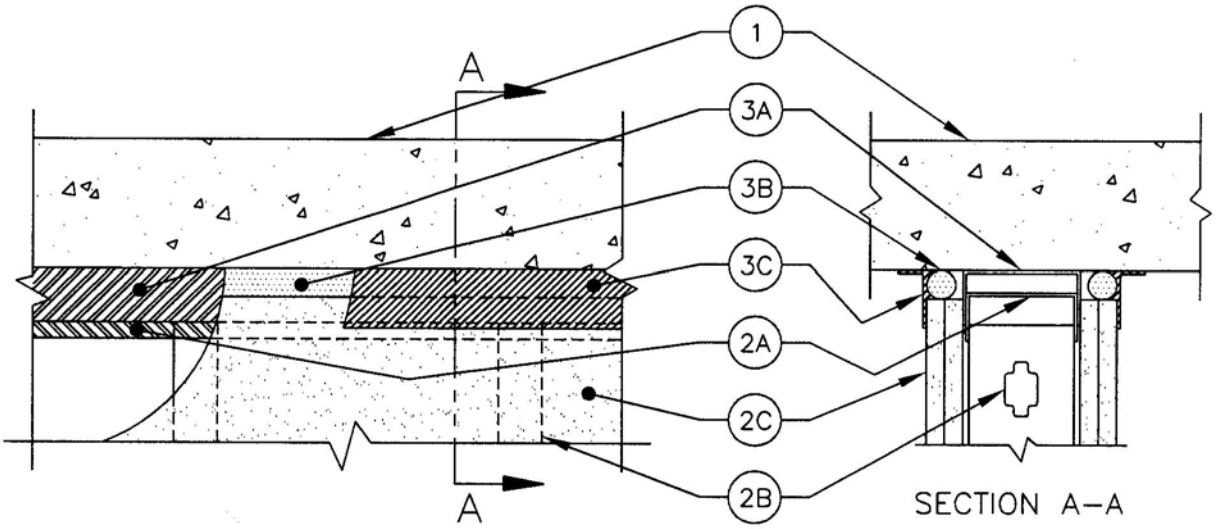
B. **Studs** - Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner is used (Item 2A), steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A3) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight or each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets to be installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated wall, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that the gypsum board is cut to fit the contour of the steel floor units with a nom 1 in. (25 mm) gap. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel, when deflection channel is used. When deflection channel is not used, the screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner.
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 1 in. The joint system is designed to accommodate a max 12.5 percent extension and max 25 percent compression from its installed width.** The joint system consists of a deflection channel and a fill material, as follows:
   A. **Deflection Channel** (optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.
   B. **Fill Void or Cavity Material* – Sealant –** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and all surfaces of the steel floor units, flush with each surface of gypsum board.
   Passive Fire Protection Partners – 4100NS, 4800DW

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Rating — 2 Hr
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FTH Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.

2. **Wall Assembly** – The 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner is secured to floor assembly (Item 1) with steel masonry anchors spaced max 24 in.(610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed with steel fasteners spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
CLARKDIETRICH BUILDING SYSTEMS INC. – Type SLT, SLT-H
SCAFCO STEEL STUD MANUFACTURING CO
TELLING INDUSTRIES LLC – True-Action Deflection Track

A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternative to the ceiling runner in Item 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips provided with step bushings for permanent fastening ceiling runner installed with steel fasteners spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.
THE STEEL NETWORK INC – VertiTrack VTD362, VTD400, VTD600 and VTD800

A3. **Light Gauge Framing* — Clipped Ceiling Runner** — As an alternate to the ceiling runner in Items 2A, 2A1 and 2A2, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 3-1/4 in. (83 mm). Clipped ceiling runner installed with steel fasteners spaced max 24 in. (610 mm) OC. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.
TOTAL STEEL SOLUTIONS L L C — Snap Trak

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Studs attached to ceiling runner with sheet metal screws a min of 1/2 in. (13 mm) below bottom of deflection channel, when deflection channel is used. When deflection channel is not used, studs shall not be secured to ceiling runner. When slotted ceiling runner is used (Item 2A1), steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets to be installed to a min total thickness of 1-1/4 in. (32 mm) on each side of the wall for a 2 hr fire rated wall. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner or deflection channel.

3. **Joint System – Max separation between bottom of floor and top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed joint width.** The joint system consists of the following:

A. **Deflection Channel** (optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep min 24 ga. steel U-shaped channel. Deflection channel secured to floor with steel masonry anchors spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.

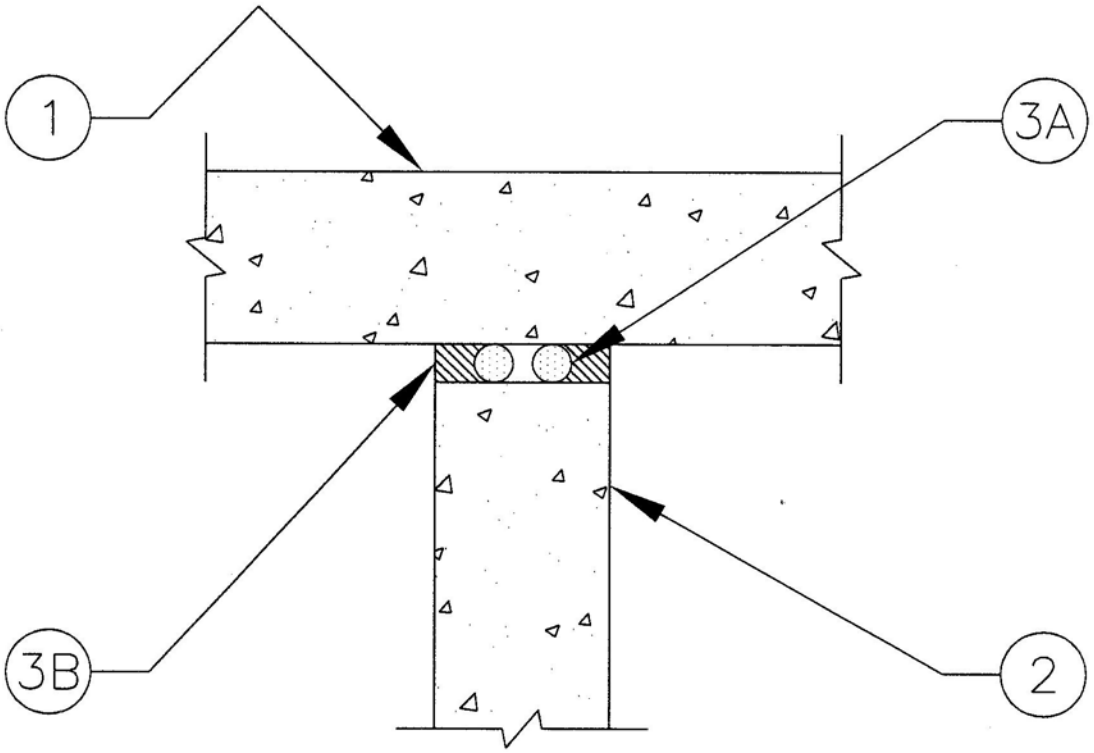
B. **Backer Rod –** Nom 1-1/4 in. (32 mm) diam polyethylene backer rod compressed and firmly packed into the 1 in. (25 mm) gap between the top of the gypsum board and lower surface of the floor assembly. Backer rod to be flush with both surfaces of wall.

C. **Fill Void or Cavity Material* – Sealant** – Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed over joint, completely covering backer rod and overlapping min 1 in. (25 mm) onto gypsum board and underside of floor assembly.

Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



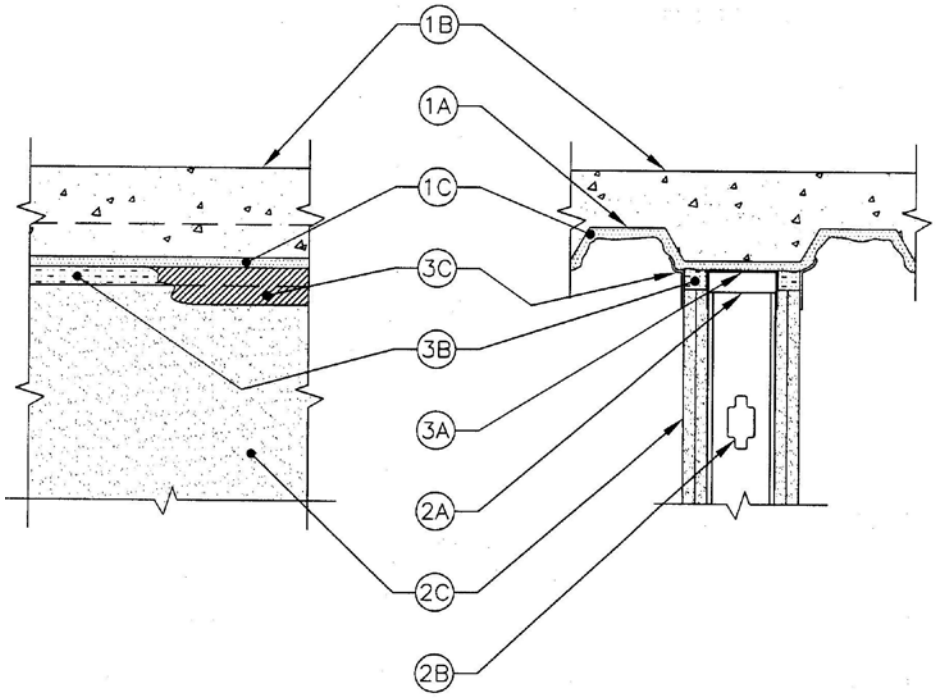
1. **Floor Assembly –** Min 4-1/2 in. (114mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) structural concrete.

2. **Wall Assembly –** Min 4-1/2 in. (114mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.***
See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System – Max width of joint (at time of installation of joint system) is 1 in. (25mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Packing Material – Backer Rod –** Nom 1-1/4 in. (32mm) diam polyethylene backer rod compressed and firmly packed into joint opening and recessed from both sides of wall to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material – Sealant –** Min 1 in. (25mm) thickness of fill material applied within the joint, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1 in.(25 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II and III Movement Capabilities — 25% Compression or Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II and III Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** The fluted steel floor unit/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Spray-Applied Fire Resistive Material* –** Prior to the installation of the deflection channel, forming material and fill material (Items 3A, 3B & 3C), the steel floor units shall be sprayed with min 5/16 in. (8 mm) to max 1-3/4 in. (44 mm) thickness of fire resistance material in accordance with the specifications in the individual D700 Series Design.
   GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory. The wall assembly shall include the following construction features:

   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with 1 in. (25 mm) flanges. Ceiling runner installed within the U-shaped deflection channel (Item 3A) with a 1 in. (25 mm) gap maintained between the top of the ceiling runner and top of deflection channel.

   A1. **Light Gauge Framing* – Slotted Ceiling Runner –** As an alternative to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv. steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, and secured through spray-applied fire resistive material with steel masonry anchors spced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

   BRADY CONSTRUCTION INNOVATIONS INC,
   DBA SLIPTRACK SYSTEMS, INC – SLP-TRK
   CLARKWESTERN BUILDING SYSTEMS INC. – Type SLT, SLT-H
   SCAFCO STEEL STUD MANUFACTURING CO
   TELLING INDUSTRIES LLC – True-Action Deflection Track

   A2. **Light Gauge Framing* – Vertical Deflection Ceiling Runner –** As an alternate to the ceiling runner in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips provided with step bushings for permanent fastening of steel studs. Flanges sized to accommodate steel studs (Item 2B). Vertical deflection ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, and secured through spray-applied fire resistive material with steel masonry anchors, spaced max 24 in. (610 mm) OC. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

   THE STEEL NETWORK, INC. – VertiTrack VTD362, VTD400, VTD600 AND VTD800

   A3. **Light Gauge Framing* – Clipped Ceiling Runner** – As an alternate to the ceiling runner in Items 2A, 2A1 and 2A2, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 3-1/4 in. (83 mm) Clipped ceiling runner installed parallel to direction of fluted steel deck, centered beneath valley, and secured through spray-applied fire resistive material with steel masonry anchors spaced max 24 in. (610 mm) OC. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.

   TOTAL STEEL SOLUTIONS L L C — Snap Trak

   A4. **Light Gauge Framing* – Notched Ceiling Runner –** As an alternate to the ceiling runner in Items 2A, 2A1 and 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed parallel to direction of fluted steel, centered beneath valley, and secured through spray-applied fire resistive material with steel masonry anchors spaced max 24 in. (610 mm) OC. When notched ceiling runner is used, deflection channel (Item 3A) shall not be used.

   OLMAR INC – Type SCR

B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and resting on the floor runner and with the top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Studs spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board*** – Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) and 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs (Item 2B) at the top of the wall shall be located 1 in. (25 mm) below the bottom of the deflection channel (Item 3A) ceiling runner (Item 2A, 2A1, 2A2, 2A3 or 2A4).

The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall

3. **Joint System – Max separation between bottom of floor and top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system consists of a deflection channel, forming material and a fill material, as following:

A. **Deflection Channel –** A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep, min 24 gauge steel U-shaped channel. Deflection channel installed parallel to direction of fluted steel deck, centered beneath valley, and secured through spray-applied fire resistive material with steel masonry anchors spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel. Deflection channel shall not be used when light gauge framing components (Item 2A1, 2A2, or 2A3) are used.

B. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation cut into strips to fill gap between top of gypsum board and bottom of protected steel floor units. The width of the strips shall be equal to the total thickness of the gypsum board. The strips are to be compressed a min of 50 percent in thickness and firmly packed into the gap between the top of the gypsum board and bottom of the fire resistive material, flush with both surfaces of wall.

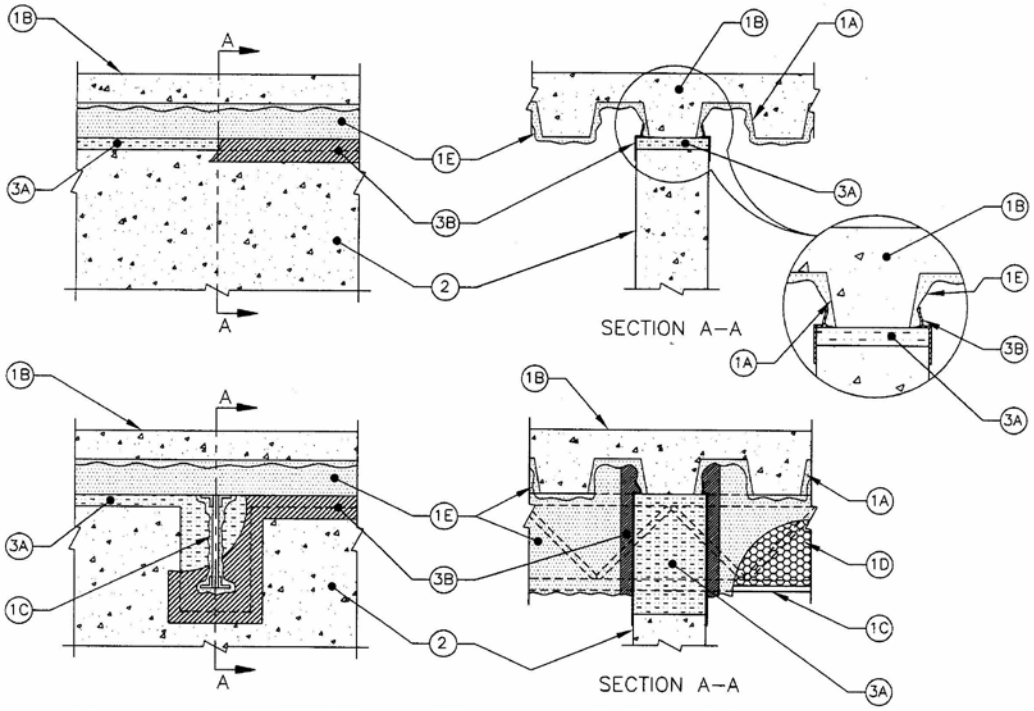
INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO – Delta Board or Delta 8
ROCKWOOL MALAYSIA SDN BHD – Type Safe
ROXUL INC. – Type Safe
THERMAFIBER INC. – Type SAF

C. **Fill, Void or Cavity Material*** – **Sealant** – Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed of brushed on each side of the joint system, completely covering forming material and overlapping a min of 1 in. (25 mm) onto gypsum board (Item 2C) and spray-applied fire resistive material on steel deck on both sides of wall.

Passive Fire Protection Partners – 3500SI, 5100SP

***** Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Rating — 2 Hr
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FTH Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 Series Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete** - Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Structural Steel Support –** (Optional) – Steel beam or open-web steel joist, as specified in the individual D700 Series Floor-Ceiling Design, used to support steel floor units. Structural steel support oriented perpendicular to wall assembly.

D. **Steel Lath –** Where open-web steel joists pass through the fire rated wall, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^2) shall be secured to one side of each joist with steel tie wire and the lath shall be fully covered with spray-applied fire resistive material with no min thickness requirement.

E. **Spray-Applied Fire Resistive Materials* –** Prior to installation of the forming material (Item 3A) and sealant (Item 3B), steel floor units and structural steel supports to be sprayed with the thickness of material specified in the individual D700 Series Design. Material is to be excluded from the steel deck in the area immediately above the wall. The spray applied fire resistive material is mixed with water in accordance with the mixing instructions on the bag. The min average density of the spray applied fire resistive material shall be 15 pcf (240 kg/m^3) with a min individual density of 14 pcf (224 kg/m^3). Dee Design Information Section in Volume 1 of the Fire Resistance Directory for method of density determination.
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY.

2. **Wall Assembly** – Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Block***. Wall assembly to be centered beneath and parallel with valley of steel floor unit.
See **Concrete Block** (CAZT) category in Fire Resistance Directory for names of manufacturers.

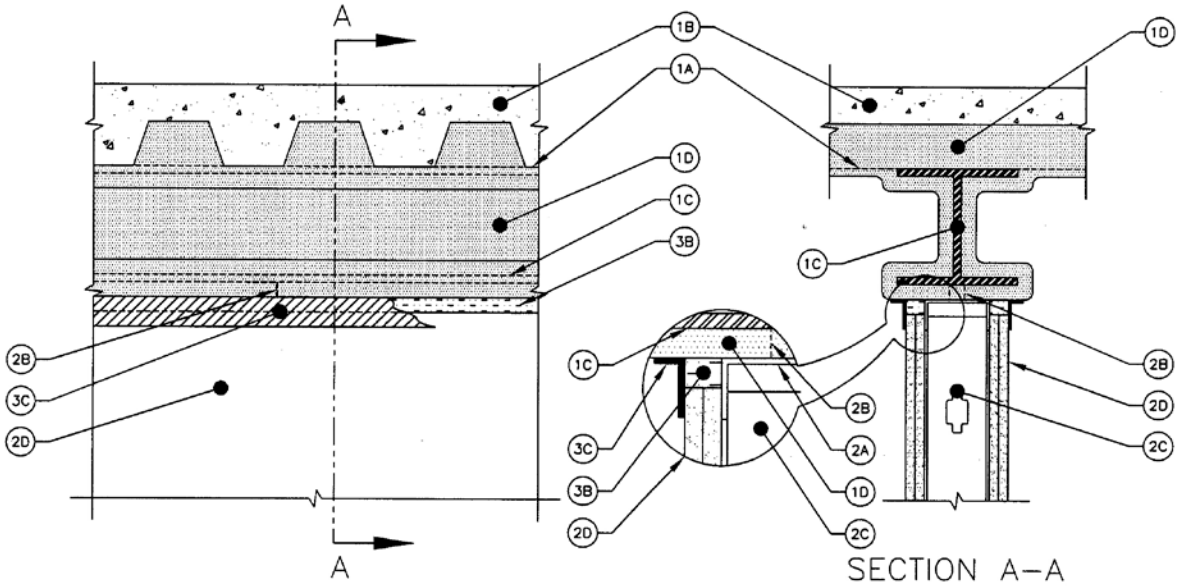
3. **Joint System – Max separation between bottom plane of steel floor unit and top of concrete wall (at time of installation of joint system) is 1 in. (25 mm). Max separation between spray-applied fire resistive material on bottom of structural support member and notched opening in top of wall is 1 in. (25 mm). Max clearance between spray-applied fire resistive material on sides of structural steel member and notched opening in top of wall in 3 in. (76 mm). The joint system is designed to accommodate a max 25 percent compression or extension from it's installed width as measured between bottom plane of steel floor units and top of concrete wall.** The joint system shall consists of forming and fill materials, as follows:

A. **Forming Material* –** Nom 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to a length approximately 1 in. (25 mm) longer than overall thickness of wall and inserted cut edge first into the spaces between the spray-applied fire resistive material on the structural steel member and the notched opening at the top of the wall. The thickness of forming material shall be sufficient to attain a min compression of 20 percent between the sides of the notched opening and the protected structural steel member and a min compression of 33 percent between the bottom of the notched opening and the bottom of the protected structural steel member. The mineral wool batt insulation is to be additionally compressed in the length direction such that it is flush with both surfaces of the wall. Additional min 8 in. (203 mm) wide sections of mineral wool batt insulation are compressed 50 percent in thickness and are installed cut edge first to completely fill the gap above the top of the wall. The forming material shall be flush with both surfaces of wall.
INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO. – Delta Board or Delta-8
ROCKWOOL MALAYSIA SDN BHD – Type Safe
ROXUL – Type Safe
THERMAFIBER INC. – Type SAF

B. **Fill, Void or Cavity Material* –** Min 1/8 in. (3.2 mm) dry thickness of fill material sprayed or brushed over the forming material on each side of the wall. Fill material to overlap a min of 1/2 in. (13 mm) onto the concrete wall and a min 2 in. (51 mm) onto the spray-applied fire resistive material (Item 1E) on the steel floor unit and on the structural steel support member on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Items 1 and 2)	F Ratings — 1 and 2 Hr (See Items 1 and 2)
Nominal Joint Width — 1 in. (25 mm).	FT Ratings — 1 and 2 Hr (See Items 1 and 2)
Class II Movement Capabilities — 19% Compression or Extension	FH Ratings — 1 and 2 Hr (See Items 1 and 2)
	FTH Ratings — 1 and 2 Hr (See Items 1 and 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 19% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Structural Steel Support –** Steel beam, as specified in the individual D700 Series Floor-Ceiling Design, used to support steel floor units. Steel beam centered over and parallel with wall assembly.

D. **Spray-Applied Fire Resistive Material* –** After installation of the steel attachment clips (Item 2B), steel floor units and structural steel support to be sprayed with the min thickness of material specified in the individual D700 Series Design. The flutes of the steel floor units are to be filled with material across the entire top flange of the steel beam. Additional material shall be applied to the web of the steel beam on each side of the wall. **For a 1 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 13/16 in. (21 mm). For a 2 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-3/8 in. (35 mm).**
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY

D1. **Spray-Applied Fire Resistive Material* –** After installation of the steel attachment clips (Item 2B), steel floor units and structural steel support to be sprayed with the min thickness of material specified in the individual D700 Series Design. The flutes of the steel floor units are to be filled with material across the entire top flange of the steel beam. Additional material shall be applied to the web of the steel beam on each side of the wall. **For a 1 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 11/16 in. (17 mm). For a 2 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-1/2 in. (38 mm).**
ISOLATEK INTERNATIONAL — Type 300

2. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with min 1-1/4 in. (32 mm) to max 2 in. (51 mm) flanges. When deflection channel (Item 3A) is used, flange height of ceiling runner is to be equal to or greater than flange height of deflection channel and the ceiling runner is to nest within the deflection channel with a 1/2 in. to 3/4 in. (13 to 19 mm) gap maintained between the top of the ceiling runner and the top of the deflection channel. When deflection channel is not used, ceiling runner is secured to steel beam (Item 1A) with steel attachment clips (Item 2B) spaced max 24 in. (610 mm) OC. Ceiling runner or deflection channel to be centered beneath and parallel with bottom flange of steel beam. A clearance equal to the required thickness of spray-applied fireproofing material (Item 1D) shall be maintained between the top of the ceiling runner or deflection channel and the bottom flange of the steel beam.

B. **Steel Attachment Clips –** Z-shaped clips formed from 1 in. (25 mm) wide strips of min 20 ga galv steel. Clips to be sized to extend through the thickness of the spray-applied fire-resistive material on the bottom flange of the steel beam with 2 in. (51 mm) long upper and lower legs. Legs of clips fastened to bottom of beam (prior to application of spray-applied fire-resistive materials) and top of ceiling runner (or deflection channel) with steel fasteners or welds. Clips spaced max 16 in. (406 mm) OC.

C. **Studs –** Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1/2 in. to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and secured to floor runner. When deflection channel (Item 3A) is used, steel studs attached to ceiling runner (Item 2A) with sheet metal screws located 1/2 in. (13 mm) below the bottom of the deflection channel. When deflection channel is not used, studs to nest in ceiling runner without attachment.

D. **Gypsum Board* –** Gypsum board sheets installed to a min total 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness on each side of wall for 1 and 2 hr fire rated assemblies, respectively. Wall to be constructed in accordance with the individual U400 or V400 Series Design in the UL Fire Resistance Directory, except that a max 1 in. (25 mm) high gap shall be maintained between the top of the gypsum board and the bottom plane of the spray applied fire resistive material on the structural steel support member. The screws attaching the gypsum board to the studs along the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner. No gypsum board attachment screws shall be driven into the ceiling runner or into the optional deflection channel.

The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max separation between spray applied fire resistive material on bottom of structural support member and top of gypsum board (at time of installation of joint system) is 1 in. (25 mm). The joint system is designed to accommodate a max 19 percent compression or extension from it's installed width as measured between bottom plane of the protective material on the steel beam and the top of the gypsum board.** The joint system shall consist of forming and fill materials, with or without a deflection channel (Item 3A), as follows:

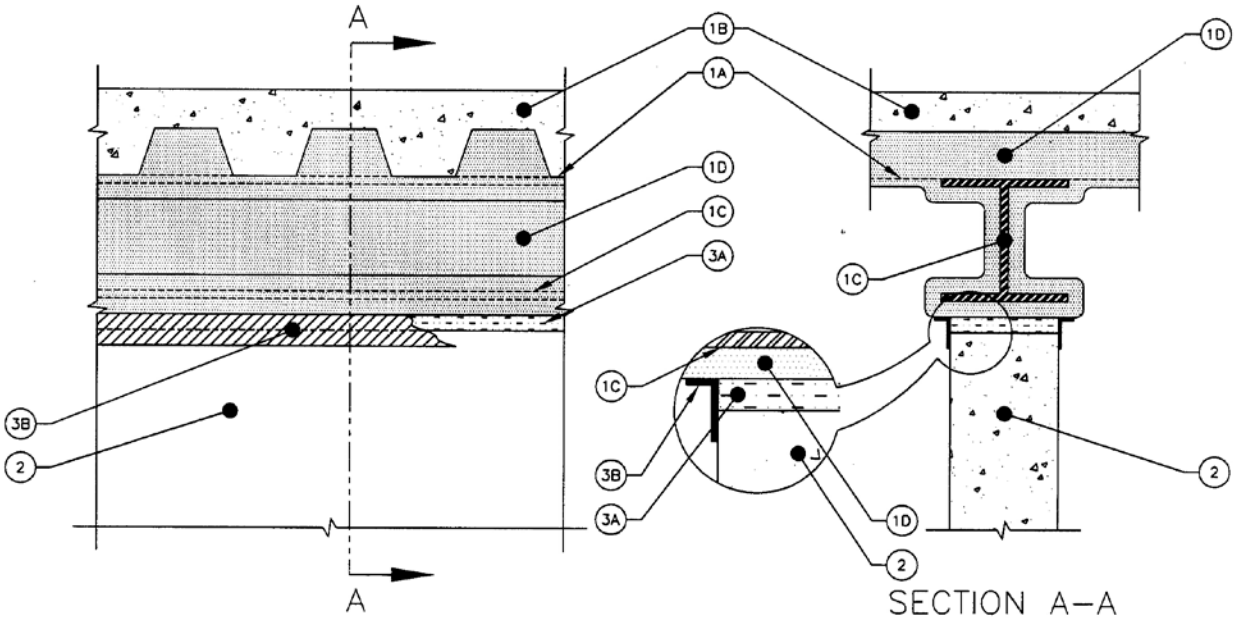
A. **Deflection Channel –** (Optional, Not Shown) – Max 2 in. (51 mm) deep min 24 gauge galv steel channel sized to accommodated ceiling runner (Item 2A). Deflection channel installed parallel with and centered beneath bottom flange of steel beam (Item 1C) and secured to steel beam with steel clips (Item 2B) spaced max 16 in. (406 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1/2 in. to 3/4 in. (13 to 19 mm) gap between the top of the ceiling runner and the top of the deflection channel. A clearance equal to the required thickness of spray-applied fireproofing material (Item 1D) shall be maintained between the top of the ceiling runner or deflection channel and the bottom flange of the steel beam. The ceiling runner nests inside the deflection channel without attachment.

B. **Forming Material –** Sections of nom 6 pcf (96 kg/m^3) mineral wool batt insulation to be compressed 50 percent in thickness and installed cut edge first to completely fill the gap above the top of the gypsum board. The forming material shall be installed flush with both surfaces of wall.
OWENS CORNING – Paroc Safing Insulation
ROCK WOOL MANUFACTURING CO – Delta Safing Insulation
THERMAFIBER LLC – Type SAF

C. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3 mm) wet thickness of fill material spray applied over the forming material on each side of the wall. Fill material to overlap min 1/2 in. (13 mm) onto gypsum board and min 2 in. (51 mm) onto the spray applied material (Item 1D) on the steel beam on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 2 and 3 Hr (See Item 1)	F Ratings — 2 and 3 Hr (See Item 1)
Nominal Joint Width — 1 in. (25 mm).	FT Ratings — 2 and 3 Hr (See Item 1)
Class II Movement Capabilities — 19% Compression or Extension	FH Ratings — 2 and 3 Hr (See Item 1)
	FTH Ratings — 2 and 3 Hr (See Item 1)
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 19% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Structural Steel Support –** Steel beam, as specified in the individual D700 Series Floor-Ceiling Design, used to support steel floor units. Steel beam centered over and parallel with wall assembly.

D. **Spray-Applied Fire Resistive Material –** Steel floor units and structural steel support to be sprayed with the thickness of material specified in the individual D700 Series Design. The flutes of the steel floor units are to be filled with material across the entire top flange of the steel beam. Additional material shall be applied to the web of the steel beam on each side of the wall. **For a 2 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-3/8 in. (35 mm). For a 3 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-9/16 in. (40 mm).**
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY

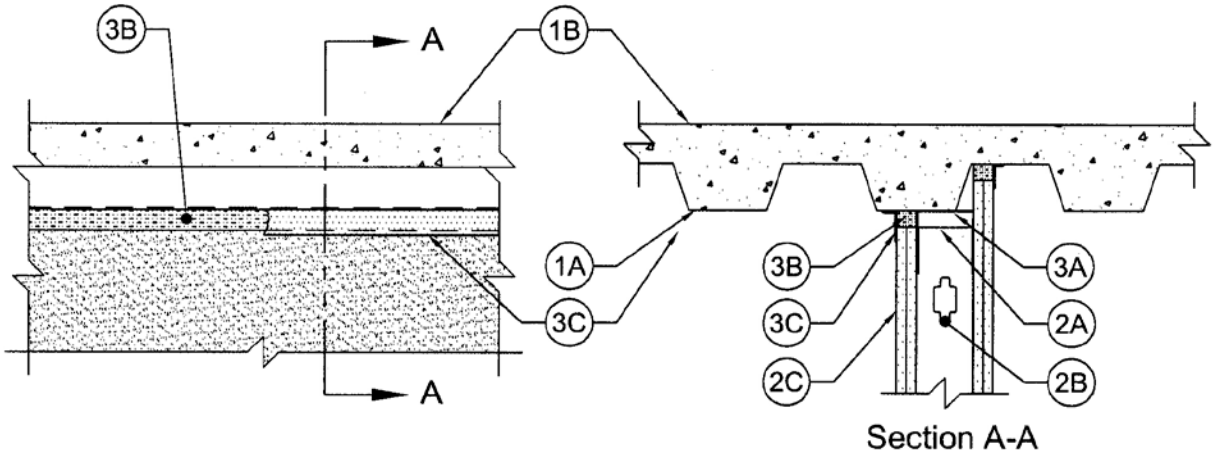
D1. **Spray-Applied Fire Resistive Material –** Steel floor units and structural steel support to be sprayed with the thickness of material specified in the individual D700 Series Design. The flutes of the steel floor units are to be filled with material across the entire top flange of the steel beam. Additional material shall be applied to the web of the steel beam on each side of the wall. **For a 2 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-1/2 in. (38 mm). For a 3 hr Assembly Rating, the thickness of material applied to each side of the steel beam web shall be 1-1/2 in. (38 mm).**
ISOLATEK INTERNATIONAL – Type 300

2. **Wall Assembly –** Min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Block***. Concrete wall to be centered beneath and parallel with bottom flange of steel beam.
See **Concrete Block** (CAZT) category in Fire Resistance Directory for names of manufactures.

3. **Joint System – Max separation between spray applied fire resistive material on bottom of structural support member and top of concrete wall (at time of installation of joint system) is 1 in. (25 mm). The joint system is designed to accommodate a max 19 percent compression or extension from it's installed width as measured between bottom plane of the protective material on the steel beam and the top of concrete wall.** The joint system shall consist of forming and fill materials as follows:
D. **Forming Material* –** Min 8 in. (203 mm) wide section on nom 6 pcf (96 kg/m^3) mineral wool batt insulation to be compressed 50 percent in thickness and installed cut edge first to completely fill the gap above the top of the concrete wall. The forming material shall be installed flush with both surfaces of wall.
OWENS CORNING — Paroc Safing Insulation
ROCK WOOL MANUFACTURING CO — Delta Safing Insulation
THERMAFIBER INC. — Type SAF
E. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3 mm) wet thickness of fill material spray applied over the forming material on each side of the wall. Fill material to overlap min 1/2 in. (13 mm) onto concrete and min 2 in. (51 mm) onto the spray applied material (Item 1D) on the steel beam on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width — 1 in. (25 mm).	FT Ratings — 1 and 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression or Extension	FH Ratings — 1 and 2 Hr (See Item 2)
	FTH Ratings — 1 and 2 Hr (See Item 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



Section A-A

1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units having a min valley width of 4-3/4 in. (121 mm).
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:
   A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck having a min valley width of 4-3/4 in.
   B. **Roof Insulation –** Min 2-1/4 in. (64 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.
   C. **Roof Covering* –** Hot mopped or cold-application materials compatible with insulating concrete

2. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs. Ceiling runner to be provided with min 1-1/4 in. (32 mm) to max 3 in. (76 mm) flanges. When deflection channel (Item 3A) is used, flange height of ceiling runner is to be equal to or greater than flange height of deflection channel and the ceiling runner is to nest within the deflection channel with a 1/2 to 1 in. (13 to 25 mm) gap maintained between the top of the ceiling runner and the top of the deflection channel. When deflection channel is not used, ceiling runner installed parallel with direction of fluted steel floor units or roof deck and secured to valley with steel fasteners or welds spaced max 24 in. (610 mm) OC. Ceiling runner not to cantilever more than 1-1/2 in. (38 mm) beyond edge of valley.

   A1. **Light Gauge Framing* – Slotted Ceiling Runner –** As an alternate to the ceiling runner in Item 2A, slotted ceiling runner consisting of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Ceiling runner installed parallel with direction of fluted steel floor or roof deck and secured to valley with steel fasteners or welds spaced max 24 in. (610 mm) OC. Slotted ceiling runner not to cantilever more than 1-1/2 in. (38 mm) beyond edge of valley. When slotted ceiling runner is used, deflection channel (Item 3A) shall not be used.

   BRADY CONSTRUCTION INNOVATIONS INC
   SLIPTRACK SYSTEMS INC – SLP-TRK

   A2. Light Gauge Framing* - Clipped Ceiling Runner — As an alternate to the ceiling runner in Items 2A and 2A1, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 3-1/4 in. (83 mm). Clipped ceiling runner installed parallel with direction of fluted steel floor units or roof deck and secured to valley with steel fasteners spaced max 24 in. (610 mm) OC. Clipped ceiling runner not to cantilever more than 1-1/2 in. (38 mm) beyond edge of valley. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.

   TOTAL STEEL SOLUTIONS L L C — Snap Trak

   A3. **Light Gauge Framing* – Vertical Deflection Ceiling Runner –** As an alternate to the ceiling runner in Items 2A, 2A1 and 2A2, vertical deflection ceiling runner consisting of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips, provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner installed parallel with direction of fluted steel floor or roof deck and secured to valley with steel fasteners or welds spaced max 24 in. (610 mm) OC. Vertical deflection ceiling runner not to cantilever more than 1-1/2 in. (38 mm) beyond edge of valley. When vertical deflection ceiling runner is used, deflection channel (Item 3A) shall not be used.

   THE STEEL NETWORK INC – VertiTrack VTD358, VTD400, VTD600 and VTD800

   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and secured to floor runner. When deflection channel (Item 3A) is used, steel studs attached to ceiling runner (Item 2A) with sheet metal screws located 3/4 in. (19 mm) below the bottom to the deflection channel. When deflection channel is not used, studs to nest in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets installed to a min total 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual U400 or V400 Series Design in the UL Fire Resistance Directory, except that a max 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the underside of the steel floor or roof deck. The screws attaching the gypsum board to the studs along the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner. No gypsum board attachment screws shall be driven into the ceiling runner or into the optional deflection channel.

The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max separation between floor or roof deck and top of gypsum board (at time of installation of joint system) is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of forming and fill materials, with or without a deflection channel (Item 3A), as follows:

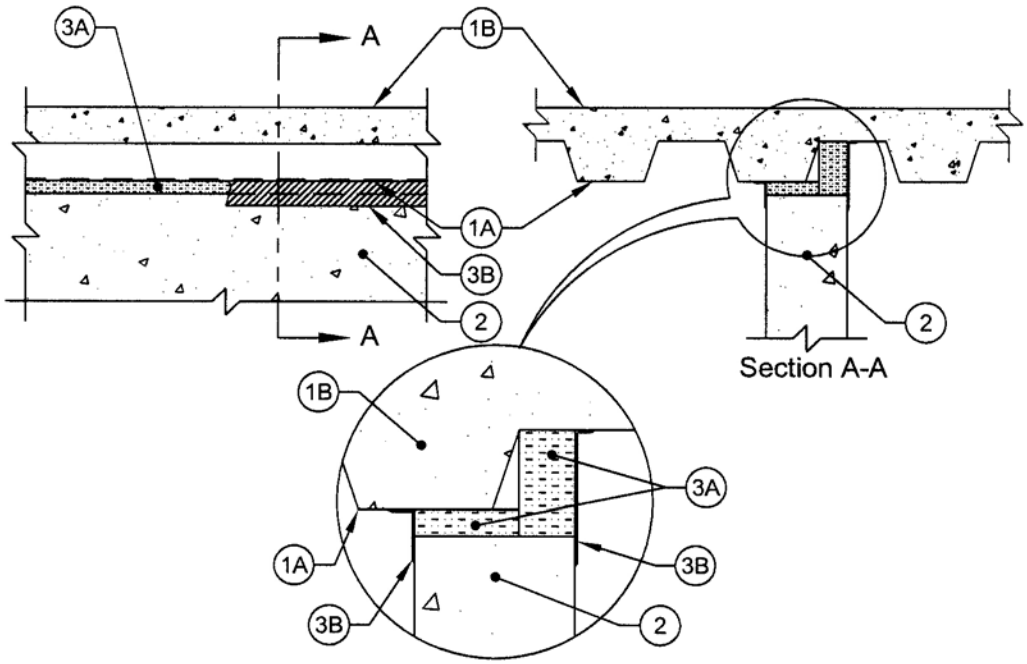
   A. **Deflection Channel –** Max 3 in. (76 mm) deep min 24 gauge galv steel channel sized to accommodate ceiling runner (Item 2A). Deflection channel installed parallel with direction of fluted steel floor units or roof deck and secured to valley with steel fasteners or welds spaced max 24 in. (610 mm) OC. Deflection channel not to cantilever more than 1-1/2 in. (38 mm) beyond edge of valley. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1/2 to 1 in. (13 to 25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner nests inside the deflection channel without attachment.

   B. **Forming Material* –** Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) wide strips of nom 4 pcf (64 kg/m^3) density mineral wool batt insulation for 1 or 2 hr rated assemblies, respectively. Strips of mineral wool compressed 50 percent in thickness and installed cut edge first to fill the gap between the top of the gypsum board and the underside of the steel floor or roof deck. The forming material shall be installed flush with both surfaces of wall.
   INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO – Delta Board
   ROXUL INC – Safe
   THERMAFIBER INC – Type SAF

   C. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. 1.6 mm dry thickness) of fill material spray applied on each side of the wall between the top of the wall and the bottom of the steel floor or roof deck, overlapping min 1/2 in. (13 mm) onto both the gypsum board and steel floor or roof deck on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in. (25 mm).	FT Ratings — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Ratings — 2 Hr
	FTH Ratings — 2 Hr
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units having a min valley width of 4-3/4 in. (121 mm).
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck having a min valley width of 4-3/4 in.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.

C. **Roof Covering* –** Hot mopped or cold-application materials compatible with insulating concrete

2. **Wall Assembly –** Min 6 in. (152 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Wall assembly to be installed parallel with fluted steel floor or roof deck with a min of 2 in. (51 mm) of the wall thickness beneath valley of deck.
See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

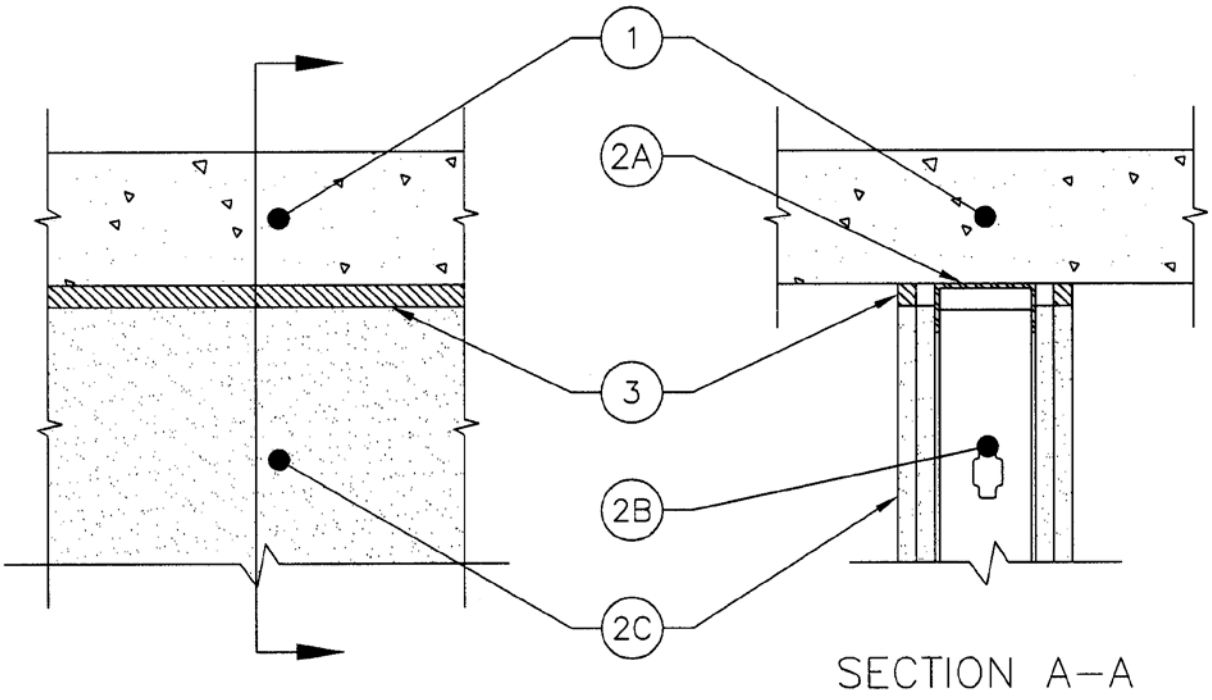
3. **Joint System – Max separation between floor or roof deck and top of gypsum board (at time of installation of joint system) is 1 in. The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of forming and a fill material, as follows:

A. **Forming Material* –** Min 6 in. (152 mm) wide sections of min 4 pcf (64 kg/m^3) density mineral wool batt insulation compressed 50 percent in thickness and installed cut edge first into gap between top of wall and bottom of steel floor or roof deck.
INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO – Delta Board
ROXUL INC – Safe
THERMAFIBER INC – Type SAF

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material spray applied on each side of the wall between the top of the wall and the bottom of the steel floor or roof deck, overlapping min 1/2 in. (13 mm) onto both the gypsum board and steel floor or roof deck on both sides of wall.
Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width — 1 in. (25 mm).	FT Ratings — 1 and 2 Hr (See Item 2)
Class II Movement Capabilities — 25% Compression or 12.5% Extension	FH Ratings — 1 and 2 Hr (See Item 2)
	FTH Ratings — 1 and 2 Hr (See Item 2)
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or 12.5% Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and Ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with min 1-1/4 in. (32 mm) flanges. Ceiling runner is secured to floor with steel masonry anchors spaced a max of 24 in. (610 mm) OC.

A1. **Light Gauge Framing* – Slotted Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner is secured to floor with steel masonry anchors spaced max 24 in. (610 mm) OC.
BRADY CONSTRUCTION INNOVATIONS INC,
DBA SLIPTRACK SYSTEMS, INC – SLP-TRK

A2. **Light Gauge Framing* — Clipped Ceiling Runner** — As an alternate to the ceiling runner in Items 2A and 2A1, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 2-1/2 in. Clipped ceiling runner secured to floor with steel masonry anchors spaced max 24 in. OC.
TOTAL STEEL SOLUTIONS L L C — Snap Trak

A3. **Light Gauge Framing* – Vertical Deflection Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, 2A1 or 2A2, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical defection clips mechanically fastened within runner. Slotted clips provided with step bushings, for permanent fastening of steel studs. Vertical deflection ceiling runner secured to floor with steel fasteners spaced max 24 in. (610 mm) OC.
THE STEEL NETWORK INC. – VeriTrack VTD358, VTD400, VTD600 and VTD800

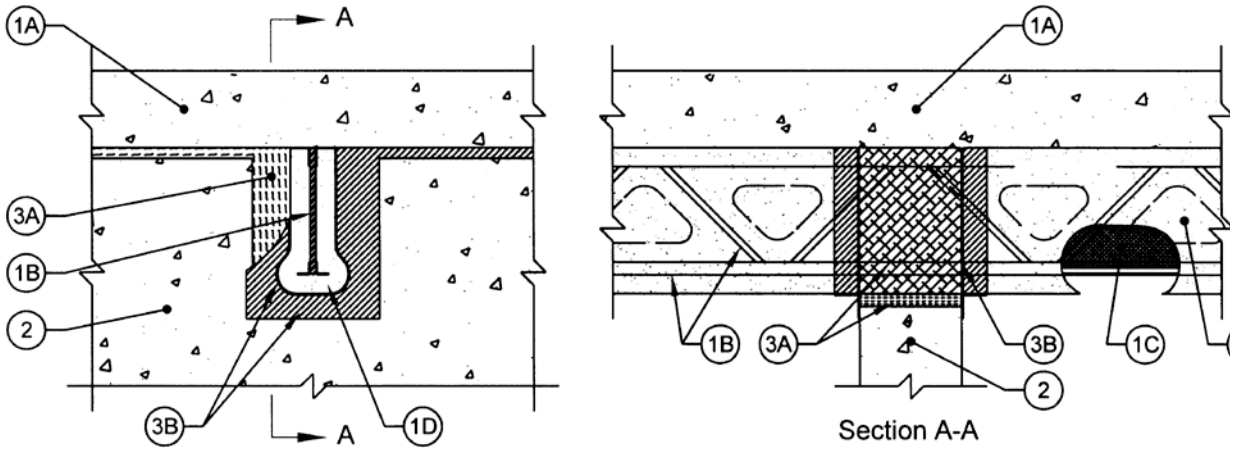
B. **Studs –** Steel studs to be min 2-1/2 in. (64 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height. Steel studs shall not be secured to ceiling runner. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. When vertical deflection ceiling runner (Item 2A3) is used, steel studs secured to slotted vertical deflection clips, through bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* –** Gypsum board sheets to be installed to a min total thickness of 5/8 in. or 1-1/4 in. (16 or 32 mm) on each side of the wall for a 1 or 2 hr fire rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the gypsum board to studs at the top of the wall shall be located 1-1/2 in. (38 mm) below the bottom of the ceiling runner (Item 2A).
The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

3. **Fill, Void or Cavity Material* – Sealant – Max separation between bottom of floor and top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or 12.5 percent extension from its installed width.** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and the bottom of floor, flush with each surface of wall.
Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Rating — 2 Hr
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FTH Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



Section A-A

1. **Floor Assembly –** The fire-rated concrete floor assembly shall include the following construction features:
   A. **Concrete –** Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.
   B. **Structural Steel Support –** Steel beam or open-web steel joist used to support floor. Structural steel support oriented perpendicular to wall assembly.
   C. **Steel Lath –** Where open-web steel joists pass through the fire rated wall, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.92 to 1.85 kg/m^2) shall be secured to one side of each joist with steel tie wire and the lath shall be fully covered with spray applied fire resistive material with no min thickness requirement.

D. **Spray-Applied Fire Resistive Material* –** Prior to installation of the forming material (Item 3A) and sealant (Item 3B), steel floor units and structural steel supports to be sprayed with the thickness of material specified in the individual N700 or N800 Series Design. The spray applied fire resistive material is mixed with water in accordance with the mixing instructions on the bag. The min average density of the spray applied fire resistive material shall be 15 pcf (240 kg/m^3) with a min individual density of 14 pcf. (224 kg/m^3). See Design Information Section in Volume 1 of the Fire Resistance Directory for method of density determination.
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY

2. **Wall Assembly –** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Block***. See **Concrete Block** (CAZT) category in Fire Resistance Directory for names of manufacturers.

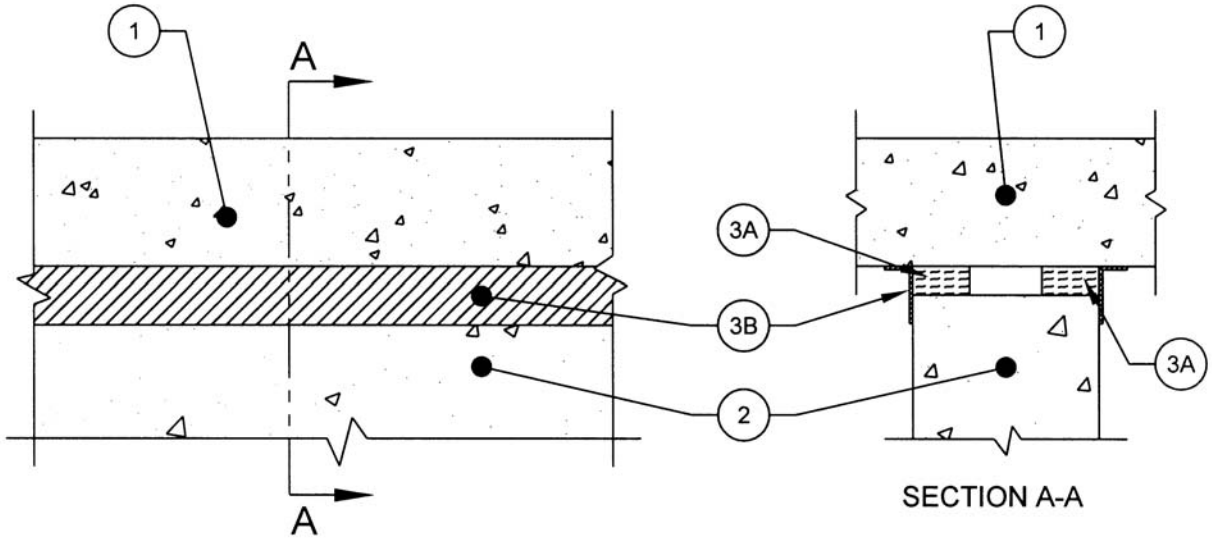
3. **Joint System – Max separation between bottom of concrete floor and top of concrete wall (at time of installation of joint system) is 1 in. (25 mm). Max separation between spray applied fire resistive material on bottom of structural support member and opening in top of wall is 1 in. (25 mm). Max clearance between spray applied fire resistive material on sides of structural steel member and opening in top of wall is 3 in. (76 mm). The joint system is designed to accommodate a max 25 percent compression or extension from it's installed width as measured between bottom of floor and top of wall.** The joint system shall consist of forming and fill materials, as follows:

   A. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation cut to a length approx 1 in. (25 mm) longer than overall thickness of wall and inserted edge-first into the spaces between the spray applied fire resistive material on the structural steel member and the opening at the top of the wall. The thickness of forming material shall be sufficient to attain a min compression of 20 percent between the sides of the opening and the protected structural steel member and a min compression of 33 percent between the bottom of the opening and the bottom of the protected structural steel member. The mineral wool batt insulation is to be additionally compressed in the length direction such that it is flush with both surfaces of the wall. Additional sections of mineral wool batt insulation to be cut to a min 2-1/4 in. (57 mm) wide, compressed 33 percent in thickness and installed cut edge first to completely fill the gap above the top of the wall on both sides of wall. The forming material shall be installed flush with both surfaces of wall.
   INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO – Delta Board or Delta-8
   ROXUL MALAYSIA SDN BHD INC – Type Safe
   ROXUL INC – Type Safe
   THERMAFIBER INC – Type SAF

   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness (dry) of fill material spray applied over the forming material on each side of the wall. Fill material to overlap a min of 1/2 in. (13 mm) onto the concrete wall and floor and a min 2 in. (51 mm) onto the spray applied material (Item 1C) on the structural steel support member on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Rating — 2 Hr
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FTH Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 25% Compression or Extension



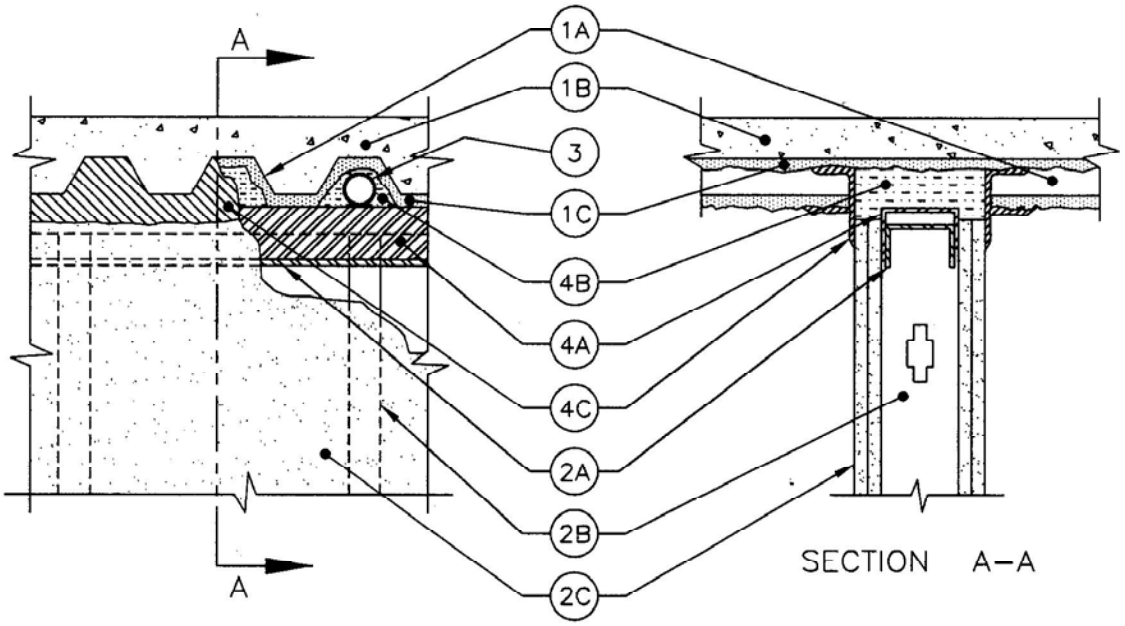
1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete.

2. **Wall Assembly –** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified **Concrete Block***. See **Concrete Block** (CAZT) category in Fire Resistance Directory for names of manufacturers

3. **Joint System – Max separation between bottom of floor and top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system consists of the following:
   A. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation to be cut to a min 2-1/4 in. (57 mm) wide, compressed 33 percent in thickness and installed cut edge first to completely fill the gap above the top of the wall on both sides of wall. The forming material shall be installed flush with both surfaces of wall.
   INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO – Delta Board or Delta-8
   ROCKWOOLMALAYSIA SDN BHD – Type Safe
   ROXUL INC – Type Safe
   THERMAFIBER INC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness (dry) of fill material spray applied over the forming material on each side of the wall. Fill material to overlap a min of 1/2 in. (13 mm) onto the concrete wall and floor on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3/4 in.(19 mm)	FT Rating — 2 Hr
Class II & Class III Movement Capabilities — 33% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3/4 in. (19 mm)
	Class II & Class III Movement Capabilities — 33% Compression or Extension



1. **Floor Assembly –** The fire rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   - B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete, as measured from the top plane of the floor units.
   - C. **Spray-Applied Fire Resistive Material* –** Prior to the installation if the deflection channel, forming material and filler material (Items 3A, 3B and 3C, respectively), steel floor units to be sprayed with a min 5/16 in. (8 mm) to max 11/16 in. (18 mm) thickness of material in accordance with the specifications in the individual D700 series designs.
     GCP APPLIED TECHNOLOGIES INC. – MK-6/HY

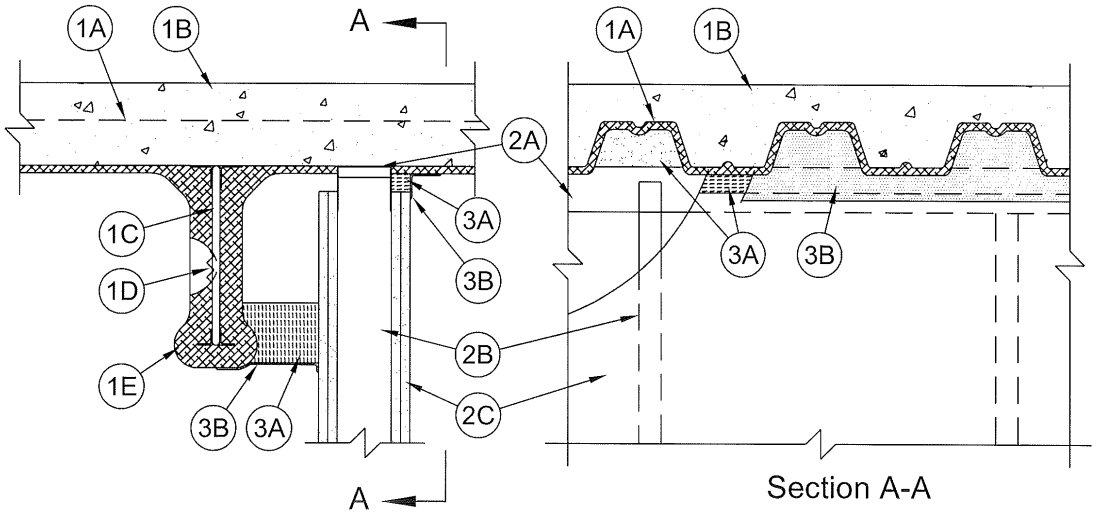
2. **Wall Assembly** – The 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 of V400 – Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner provided with min 1-1/4 in. (32 mm) flanges. When U-shaped deflection channel (Item 4A) is used, ceiling runner installed within the deflection channel with 3/4 in.(19 mm) gap maintained between the top of ceiling runner and top of deflection channel. When deflection channel is not used, ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The spray-applied material (Item 1C) shall be removed from bottom of the steel deck valleys, flush with outer surface of the wall, prior to installation of the runner onto the deck.
   A1. **Light Gauge Framing* – Slotted Ceiling Runner –** As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sizes to accommodate steel studs (Item 2B). Slotted ceiling runner is secured to floor with steel masonry anchors spaced max 24 in. (610 mm) OC. When slotted ceiling runner is used, deflection channel (Item 4A) shall not be used.
   METAL-LITE INC — The System
   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Studs cut 5/8 in.(16 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. Stud spacing not to exceed 24 in. (610 mm) OC.
   C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 1-1/4 in. (32 mm) on each side of wall. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 3/4 in. (19 mm) gap shall be maintained between top of the wallboard and the bottom of the steel floor units and the top row of screws shall be installed into the studs 1 in. (25 mm) below the bottom of the ceiling runner or deflection channel, when used.

3. **Through-Penetrants –** Max of one nonmetallic pipe or conduit routed through flute of the steel deck such that an annular space of min 0 in. (point contact) to max 1 in. (25 mm) is maintained between penetrant and spray applied material or top of wall. Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes or conduit may be used:
   A. **Polyvinyl Chloride (PVC) Pipe** – Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** – Nom 2 in. (51 mm) diam (or smaller) SDR 17 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   C. **Rigid Nonmetallic Conduit++** – Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).

4. **Joint System – Max width of joint (at time of installation of joint system) is 3/4 in. (19 mm) The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Deflection Channel –** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep, min 24 gauge steel U-shaped channel. Deflection channel installed perpendicular to direction of fluted steel floor units and secured to valleys with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 3/4 in. (19 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel. The spray-applied material (Item 1C) shall be removed from the bottom of the steel deck valley, flush with the outer surfaces of the wall, prior to installation of the runner onto the deck.
   B. **Forming Material* –** Min 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 20 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the ceiling runner or deflection channel and the steel deck, flush with the surface of the wall on both sides. Additional pieces of 1-1/4 in. (32 mm) wide mineral wool compressed 50 percent in thickness and installed edge first to fill the 3/4 in. (19 mm) gap between the top of gypsum board and the bottom of the steel floor units on both sides of wall, flush with the surface of the wall.
   INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO – Delta Safing Board
   THERMAFIBER LLC – Type SAF
   C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and spray-applied material on steel deck on both sides of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking
++ Bearing the UL Listing Mark

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Ratings — 1 and 2 Hr (See Item 2)
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width — 1 in.(25 mm)	FTH Ratings — 1 and 2 Hr (See Item 2)
Class II Movement Capabilities — 12.5% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



Section A-A

1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the floor assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The floor assembly shall include the following construction features:
   A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Structural Steel Support –** Steel beam or open-web steel joist, as specified in the individual D700 or D900 Series Floor-Ceiling Design, used to support steel floor units. Structural steel support oriented parallel to and 1 to 6 in. (25 to 152 mm) from wall assembly.

A. **Steel Lath –** When structural steel support (Item 1C) consists of open-web steel joists, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^2) shall be installed to completely cover one side of each joist which is located within 6 in. (152 mm) of wall assembly. The lath shall be secured with steel tie wire and shall be fully covered with spray applied fire resistive material.

B. **Spray-Applied Fire Resistive Material* –** After installation of the ceiling runner (Item 2A), steel floor units and structural steel supports to be sprayed with the thickness of material specified in the individual D700 Series Design or the structural steel supports to be sprayed in accordance with the specifications in the individual D900 Series Design. The flutes of the steel floor units above the structural steel supports and above the ceiling runner (Item 2A) shall be filled with spray-applied fire resistive material. As an alternate, the spray-applied fire resistive material in the flutes above the ceiling runner may be applied to follow the contour of the steel floor units. Excess material shall be removed from the flanges of the ceiling runner beyond the required thickness of spray-applied fire resistive material on the steel floor units.

GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY, MK-6/HY ES, MK-6s, RG
ISOLATEK INTERNATIONAL – Type 300

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Mineral and Fiber Board* – Min 3/4 in. (19 mm) thick boards applied in one or more layers directly over steel roof deck or over gypsum board sheathing laid atop steel roof deck.

C. **Roof Covering –** Hot-mopped or cold-application materials compatible with mineral and fiber board insulation.

D. **Structural Steel Support –** Steel beam or open-web steel joist, as specified in the individual P700 or P800 Series Roof-Ceiling Design, used to support steel floor units. Structural steel support oriented parallel to and 1 in. to 6 in. (25 to 152 mm) from wall assembly.

E. **Steel Lath –** When structural steel support (Item 1D) consists of open-web steel joists, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^2) shall be installed to completely cover one side of each joist which is located within 6 in. (152 mm) of wall assembly. The lath shall be secured with steel tie wire and shall be fully covered with spray applied fire resistive material.

F. **Spray-Applied Fire Resistive Material* –** After installation of the ceiling runner (Item 2A), steel roof deck and structural steel supports to be sprayed with a thickness of spray applied fire resistive material as specified in the individual P700 Series Roof-Ceiling design. The flutes of the steel deck above the structural steel supports and above the ceiling runner (Item 2A) shall be filled with spray-applied fire resistive material. As an alternate, the spray-applied fire resistive material in the flutes above the ceiling runner may be applied to follow the contour of the steel roof deck. Excess material shall be removed from the flanges of the ceiling runner beyond the required thickness of spray-applied fire resistive material on the steel roof deck.

GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY, MK-6/HY ES, MK-6s, RG
ISOLATEK INTERNATIONAL – Type 300

2. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Ceiling Runners —** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner to be provided with min 2 in. (51 mm) to max 3 in. (76 mm) flanges. Ceiling runner is secured to steel floor units (Item 1A) with steel fasteners or welds spaced max 24 in. (610 mm) OC. Ceiling runner to be installed parallel with structural steel support and located such that a max clearance of 4 in. (102 mm) is present between the finished wall and the spray-applied fire resistive material at the lowest elevation of the structural steel support.

   A1. **Light Gauge Framing* — Slotted Ceiling Runner —** As an alternate to the ceiling runner in Item 2A, ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Ceiling runner secured to valleys with steel fasteners spaced max 24 in. (610 mm) OC.
   CALIFORNIA EXPANDED METAL PRODUCTS COMPANY – CST
   BRADY CONSTRUCTION INNOVATIONS INC,
   DBA SLIPTRACK SYSTEMS – SLP-TRK

   A2. **Light Gauge Framing* — Clipped Ceiling Runner** — As an alternate to the ceiling runner in Items 2A and 2A1, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 2-1/2 in. (64 mm). Clipped ceiling runner secured with steel fasteners spaced max 24 in. (610 mm) OC.
   TOTAL STEEL SOLUTIONS L L C — Snap Trak

   A3. **Light Gauge Framing* – Notched Ceiling Runner –** As an alternate to the ceiling runners in Items 2A through 2A2, notched ceiling runners to consist of C-shaped galv steel channel with notched return flanges sized to accommodate steel studs (Item 2B). Notched ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys with steel masonry anchors spaced max 24 in. (610 mm) OC.
   OLMAR SUPPLY INC – Type SCR

   B. **Studs –** Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1/2 in. to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and secured to floor runner. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 (13 mm) long wafer head steel screws at midheight of slot on each side of wall. Studs to nest in ceiling runner without attachment.

   C. **Gypsum Board* –** Gypsum board sheets installed to a min total 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness on each side of wall for 1 and 2 hr fire rated assemblies, respectively. Wall to be constructed as specified in the individual U400 or V400 Series Design in the UL Fire Resistance Directory except that a max 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the bottom plane of the spray applied fire resistive material on the steel deck when D700 series assembly is used or between the top of gypsum board and the steel floor units when D900 series assembly is used, on both sides of the wall assembly. The screws attaching the gypsum board to the studs along the top of the wall shall be located 1 in. (25 mm) below the bottom of the ceiling runner. No gypsum board attachment screws shall be driven into the ceiling runner. Where the top of the wall assembly is inaccessible above the lowest elevation of the structural steel support, the gypsum board attachment screws may be omitted.

   The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

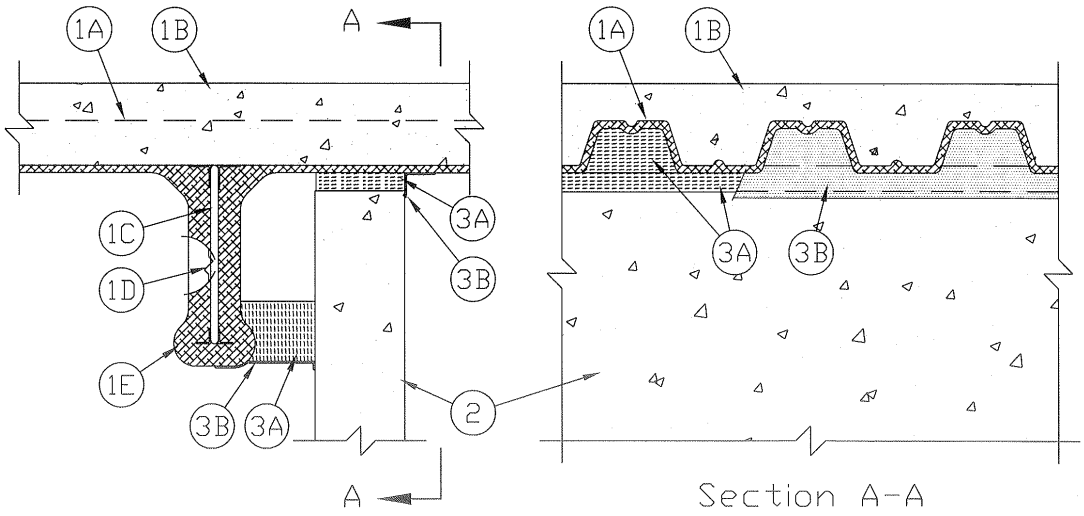
3. **Joint System – Max separation between bottom of the spray applied fire resistive material on the steel floor units and top of gypsum board (at time of installation of joint system) is 1 in. (25 mm) when D700 series assembly is used. Max separation between bottom of the steel floor units and top of gypsum board (at time of installation of joint system) is 1 in. (25 mm) when D900 series assembly is used. Max separation between spray applied fire resistive material on structural support member and surface of wall is 4 in. (102 mm).** The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width as measured between the bottom plane of the steel floor units or spray-applied fire resistive material on the steel floor units and the top of the gypsum board. The joint system shall consist of forming and fill materials, as follows:

   A. **Forming Material* –** Nom 4 pcf (64 kg/m^3) density mineral wool batt insulation. Sections of mineral wool batt cut to a width of 4 in. (102 mm) and stacked to attain a thickness which is 50 percent greater than the width of the linear gap between the spray applied fire resistive material on the structural steel member and the surface of the wall assembly. Stacked sections of mineral wool compressed 33 percent in thickness and installed cut edge first into linear gap until the bottom edge is flush with the bottom surface of the spray applied fire resistive material on the structural steel member. When the spray-applied fire resistive material in the flutes above the wall follows the contour of the steel deck, sections of mineral wool batt cut to the shape of the fluted deck and stacked to a min 6 in. (152 mm) thickness shall be installed in the flutes of the steel floor or roof deck between the top of the ceiling runner and the spray-applied fire resistive material. The mineral wool batt insulation is to be installed flush with the gypsum board surface on the side of the wall opposite the structural steel support. Additional sections of mineral wool batt insulation are compressed 50 percent in thickness and are installed cut edge first to completely fill the gap above the top of the gypsum board.
      INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING CO – Delta Board
      ROCKWOOL MALAYSIA SDN BHD – SAFE
      ROXUL INC – SAFE
      THERMAFIBER INC – Type SAF

   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied over the forming material on each side of the wall. Fill material to overlap a min of 1 in. (25 mm) onto the gypsum board and onto the steel floor units or spray-applied fire resistive material on the steel floor units and on the structural steel support member.
      Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
L Rating at Ambient — Less than 1 CFM/Lin Ft.	FT Rating — 2 Hr
L Rating at 400°F — Less than 1 CFM/Lin Ft.	FH Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FTH Rating — 2 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	L Rating at Ambient — Less than 1 CFM/Lin Ft.
	L Rating at 400°F — Less than 1 CFM/Lin Ft.
	Nominal Joint Width — 1 in. (25 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the floor assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The floor assembly shall include the following construction features:
   A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Structural Steel Support –** Steel beam or open-web steel joist, as specified in the individual D700 or D900 Series Floor-Ceiling Design, used to support steel floor units. Structural steel support oriented parallel to and 1 to 6 in. (25 to 152 mm) from wall assembly.

A. **Steel Lath –** When structural steel support (Item 1C) consists of open-web steel joists, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^2) shall be installed to completely cover one side of each joist which is located within 6 in. (152 mm) of wall assembly. The lath shall be secured with steel tie wire and shall be fully covered with spray applied fire resistive material.

B. **Spray-Applied Fire Resistive Material* –** After installation of the ceiling runner (Item 2A), steel floor units and structural steel supports to be sprayed with the thickness of material specified in the individual D700 Series Design or the structural steel supports to be sprayed in accordance with the specifications in the individual D900 Series Design. The flutes of the steel floor units above the structural steel supports and above the wall shall be filled with spray-applied fire resistive material. As an alternate, the spray-applied fire resistive material in the flutes above the wall may be applied to follow the contour of the steel floor units.
GCP ALLIED TECHNOLOGIES INC. — Type MK-6/HY, MK-6/HY ES, MK-6s, RG
ISOLATEK INTERNATIONAL — Type 300

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 or P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Mineral and Fiber Board* — Min 3/4 in. (19 mm) thick boards applied in one or more layers directly over steel roof deck or over gypsum board sheathing laid atop steel roof deck.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with mineral and fiber board insulation.

D. **Structural Steel Support –** Steel beam or open-web steel joist, as specified in the individual P700 or P800 Series Roof-Ceiling Design, used to support steel floor units. Structural steel support oriented parallel to and 1 in. to 6 in. (25 to 152 mm) from wall assembly.

E. **Steel Lath –** When structural steel support (Item 1D) consists of open-web steel joists, 3/8 in. (10 mm) diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd (0.9 to 1.8 kg/m^2) shall be installed to completely cover one side of each joist which is located within 6 in. (152 mm) of wall assembly. The lath shall be secured with steel tie wire and shall be fully covered with spray applied fire resistive material.

F. **Spray-Applied Fire Resistive Material* –** After installation of the ceiling runner (Item 2A), steel roof deck and structural steel supports to be sprayed with a thickness of spray applied fire resistive material as specified in the individual P700 Series Roof-Ceiling design or the structural steel supports to be sprayed in accordance with the specifications in the individual P900 Series Design. The flutes of the steel deck above the structural steel supports and above the wall shall be filled with spray-applied fire resistive material. As an alternate, the spray-applied fire resistive material in the flutes above the wall may be applied to follow the contour of the steel roof deck.
GCP APPLIED TECHNOLOGIES INC. – Type MK-6/HY, MK-6/HY ES, MK-6s, RG
ISOLATEK INTERNATIONAL – Type 300

2. **Wall Assembly –** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks. See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names manufacturers.

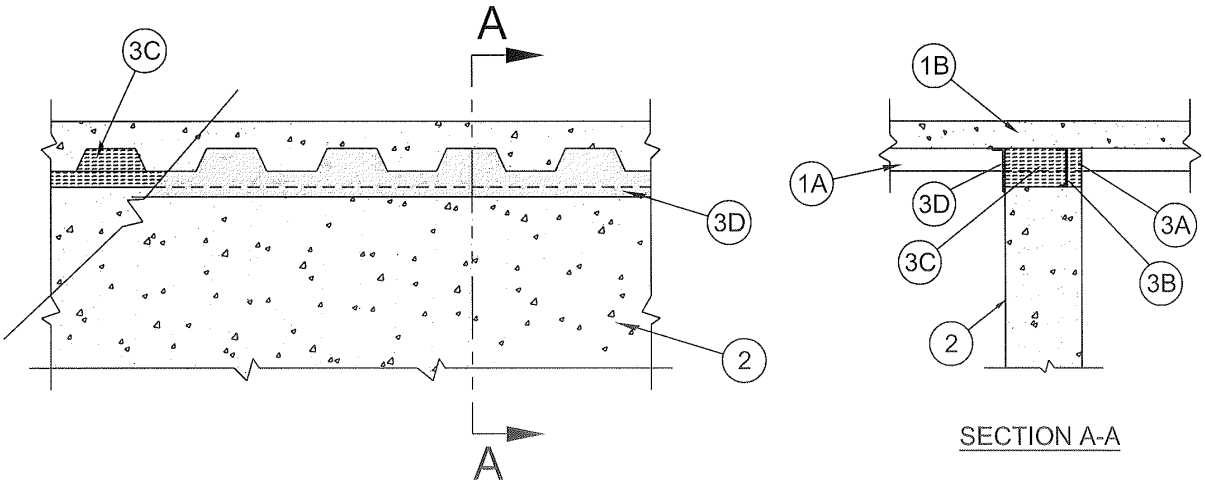
3. **Joint System — Max separation between bottom of the spray applied fire resistive material on the steel floor units and top of concrete wall (at time of installation of joint system) is 1 in. (25 mm) when D700 or D700 series assembly is used. Max separation between bottom of the steel floor units and top of concrete wall (at time of installation of joint system) is 1 in. (25 mm) when D900 or D900 series assembly is used. Max separation between spray applied fire resistive material on structural support member and surface of wall is 4 in. (102 mm).** The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width as measured between the bottom plane of the steel floor units or spray-applied fire resistive material on the steel floor units and the top of the concrete wall. The joint system shall consist of forming and fill materials, as follows:

   A. **Forming Material* –** Nom 4 pcf (64 kg/m^3) density mineral wool batt insulation. Sections of mineral wool batt cut to a width of 4 in. (102 mm) and stacked to attain a thickness, which is 50 percent greater than the width of the linear gap between the spray applied fire resistive material on the structural steel member and the surface of the wall assembly. Stacked sections of mineral wool compressed 33 percent in thickness and installed cut edge first into linear gap until the bottom edge is flush with the bottom surface of the spray applied fire resistive material on the structural steel member. When the spray-applied fire resistive material in the flutes above the wall follows the contour of the steel deck or when the steel deck is (unprotected D900 or P900 series assembly), sections of mineral wool batt insulation are compressed 50 percent in thickness and are installed cut edge first to completely fill the flutes above the wall flush with the wall surface opposite the structural support member. Additional sections of mineral wool batt insulation cut to the width of the wall and inserted edge-first between the top of the wall and steel deck or the applied fire resistive material on the steel deck, compressed 50 percent in thickness beneath each valley and flush with the wall surface.
      INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING CO – Delta Board
      ROCKWOOL MALAYSIA SDN BHD – SAFE
      ROXUL INC – SAFE
      THERMAFIBER INC – Type SAF

   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied over the forming material on each side of the wall. Fill material to overlap a min of 1 in. (25 mm) onto the concrete wall and onto the steel floor units or spray-applied fire resistive material on the steel floor units and on the structural steel support member.
      Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 2 in.(51 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 2 in.(51 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the floor assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The floor assembly shall include the following construction features:
   A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly –** Min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall shall be installed perpendicular with flutes of the steel floor and form units (Item 1A). Wall may also be constructed of any UL Classified 2 hr fire rated **Concrete Blocks***. When wall is constructed of concrete blocks, the top course of block shall be filled with concrete, grout or mortar.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names manufacturers.

3. **Joint System – Max separation between bottom of steel floor or roof units and top of wall (at time of installation of joint system) is 2 in. (51 mm).** The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width as measured between the bottom plane of the steel floor units and the top of the wall. The joint system shall consist of forming and fill materials, as follows:

A. **Forming Material* –** Min 2 in. (51 mm) wide sections of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to shape of flutes, compressed 33 percent in thickness and tightly packed into fluted area of floor or roof deck as a permanent form, flush with one surface of wall. Additional strips of mineral wool batt insulation cut to min 2 in. (51 mm) width, compressed 33 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor units as a permanent form, flush with one surface of the wall. Adjoining lengths of batt insulation to be tightly butted with seams spaced min 48 in. (1.2 m) apart along length of joint.

INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO – Delta Board
ROCKWOOL MALAYSIA SDN BHD – SAFE
ROXUL INC – SAFE
THERMAFIBER INC – Type SAF

B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied into joint to completely cover the mineral wool forming material and to overlap a min of 1 in. (25 mm) onto the steel deck and min 1/2 in. (13 mm) onto the top of concrete wall.

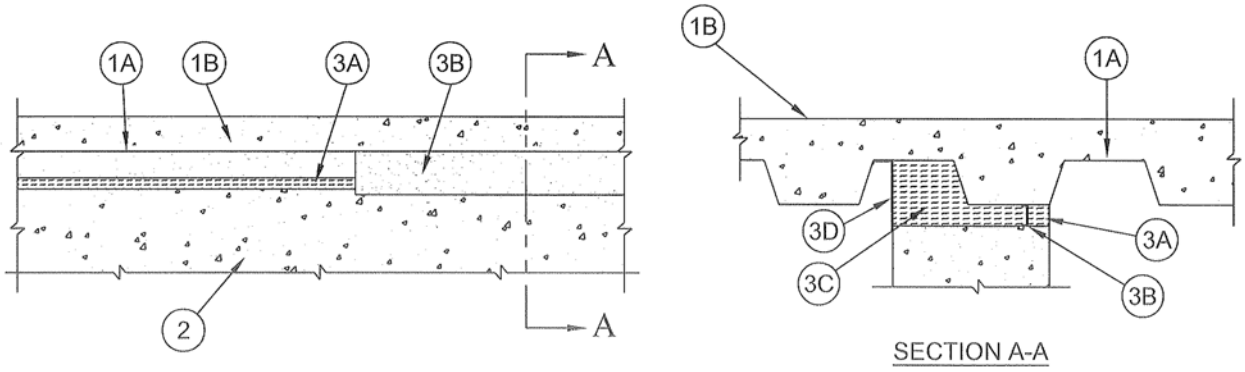
Passive Fire Protection Partners – 3500SI, 5100SP

C. **Forming Material* –** Min 6 in. (152 mm) wide sections of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to shape of flutes, compressed 33 percent in thickness and tightly packed into fluted area of floor or roof deck as a permanent form, flush with the installed forming material (Item 3A) and opposite surface of wall. Additional strips of mineral wool batt insulation cut to min 6 in. (152 mm) width, compressed 33 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor units as a permanent form, flush with the installed forming material (tem 3A) and the opposite surface of the wall. Adjoining lengths of batt insulation to be tightly butted with seams spaced min 48 in. (1.2 m) apart along length of joint.
INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
ROCK WOOL MANUFACTURING CO – Delta Board
ROCKWOOL MALAYSIA SDN BHD – SAFE
ROXUL INC – SAFE
THERMAFIBER INC – Type SAF

D. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied to completely cover the mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto concrete wall and min 1 in. (25 mm) onto steel deck on accessible side of the wall.
Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 2 in.(51 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 2 in.(51 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



1. **Floor Assembly –** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Steel Floor and Floor Units* –** Max 3 in. (76 mm) deep galv steel fluted floor units.
   - B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

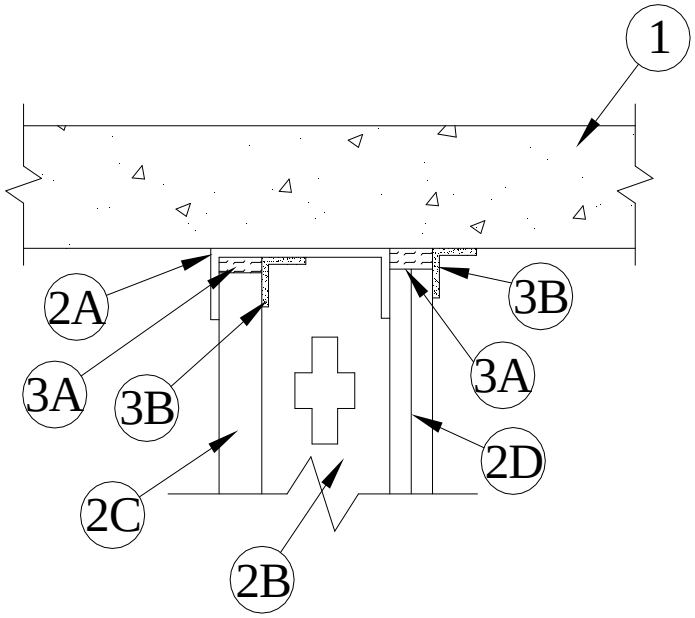
1A. **Roof Assembly –** (Not Shown) – As an alternate to the floor assembly (Item 1), a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly fire rating of the roof assembly shall be equal to or greater than the hourly fire rating of the wall assembly. The roof assembly shall include the following construction features:
   - A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.
   - B. **Roof Insulation –** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.
   - C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly –** Min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall shall be installed parallel with flutes of the steel floor and form units (Item 1A). Wall may also be constructed of any UL Classified 2 hr fire rated **Concrete Blocks***. When wall is constructed of concrete blocks, the top course of block shall be filled with concrete, grout or mortar.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names manufacturers.

3. **Joint System – Max separation between bottom of steel floor or roof units and top of wall (at time of installation of joint system) is 2 in. (51 mm).** The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width. The joint system shall consist of forming and fill materials, as follows:
   A. **Forming Material* –** Strips of min 4 pcf (64 kg/m^3) mineral wool batt insulation cut to min 2 in. (51 mm) width, compressed 50 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor units as a permanent form, flush with one surface of the wall. Adjoining lengths of batt insulation to be tightly butted with seams spaced min 48 in. (1.2 m) apart along length of joint.
      INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING CO – Delta Board
      ROCKWOOL MALAYSIA SDN BHD – SAFE
      ROXUL INC – SAFE
      THERMAFIBER INC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied into joint to completely cover the mineral wool forming material and to overlap a min of 1 in. (25 mm) onto the steel deck and min 1/2 in. (13 mm) onto the top of concrete wall.
      Passive Fire Protection Partners – 3500SI, 5100SP
   C. **Forming Material* –** Strips of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to min 6 in. (152 mm) width, compressed 50 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor or roof units flush with the installed forming material (Item 3A) and opposite surface of wall. When the void beneath the steel deck is located entirely above the wall, the void shall be completely filled with mineral wool insulation compressed 50 percent in thickness. When void beneath the steel deck is located in part above the wall, the portion of the void above the wall shall be packed with additional strips of mineral wool batt insulation compressed 50 percent in thickness flush with the surface of the wall. Adjoining lengths of batt insulation to be tightly butted with seams spaced min 48 in. (1.2 m) apart along length of joint.
      INDUSTRIAL INSULATION GROUP L L C – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING CO – Delta Board
      ROCKWOOL MALAYSIA SDN BHD – SAFE
      ROXUL INC – SAFE
      THERMAFIBER INC – Type SAF
   D. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) wet thickness or 1/16 in. (1.6 mm) dry thickness of fill material spray or brush applied to completely cover the mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto concrete wall and min 1 in. (25 mm) onto steel deck on accessible side of the wall.
      Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3/4 in.(19 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3/4 in.(19 mm)
	Class II Movement Capabilities — 25% Compression or Extension



1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Floor may also be constructed of any UL Classified hollow-core **Precast Concrete Units*.**

   See **Precast Concrete Units** (CFTV) in Fire Resistance Directory for names of manufacturers.

2. **Shaft Wall Assembly –** The 2 hr fire rated shaft wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400-Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel "C-H" studs. Flange height of ceiling runner shall be min 1/2 in. (13 mm) greater than nom joint width. Ceiling runner secured with steel masonry anchors spaced max 24 in. (610 mm) OC.

   .

B. **Steel Studs –** "C-H"-shaped steel studs to be min 2-1/2 in. (64 mm) wide and formed of min 24 MSG galv steel. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner or slotted ceiling track. Studs spaced 24 in. (610 mm) OC. After installation of gypsum board liner panels (Item 2D), studs secured to flange of floor runner on finished side of wall only with No. 6 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screws. Studs secured to flange of slotted ceiling track on finished side of wall only with No. 8 by 1/2 in. (13 mm) long self-drilling, self-tapping wafer head steel screws at slot mid height.

C. **Gypsum Board* –** 1 in. (25 mm) thick by 24 in. (610 mm) wide gypsum board liner panels. Panels cut 1 in. (25mm) less in length than floor to ceiling height. Vertical edges inserted in "H"-shaped section of "C-H" studs. Free edge of end panels attached to long leg of "J" runner (Item 2A) with 1-5/8 in. (41 mm) long Type S steel screws spaced max 12 in. (305 mm) OC.

D. **Gypsum Board* –** Gypsum board sheets, 1/2 or 5/8 in. (13 or 16 mm) thick, applied vertically or horizontally in two layers on finished side of wall as specified in the individual U400 or V400-Series Wall and Partition Design. A max 1 in. (25 mm) gap shall be maintained between the top of the gypsum board and the bottom surface of the concrete floor. The screws attaching the gypsum board layers to the C-H studs shall be located 1 in. (25 mm) below the bottom of the slotted ceiling track (Item 2C). No gypsum board attachment screws are to penetrate the slotted ceiling track.

3. **Joint System –** Max separation between bottom of floor and top of liner panel (Item 2D) and between bottom of floor and top of gypsum board sheets (Item 2E) at time of installation of joint system is 3/4 in. (19 mm). The joint system is designed to accommodate a maximum 19 percent compression or extension from its installed width. The joint system consists of the following:

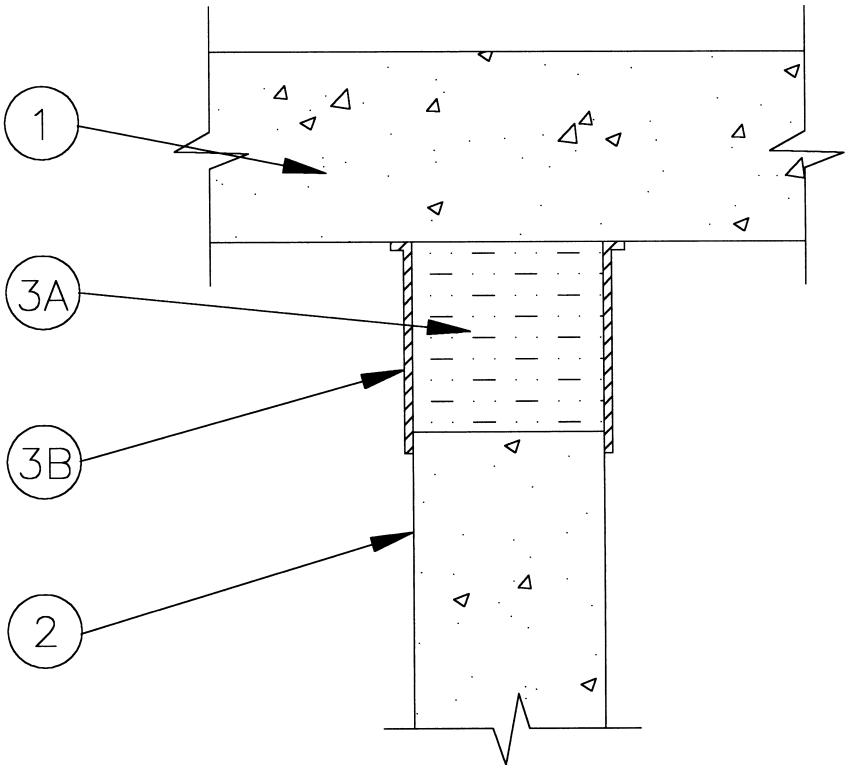
A. **Forming Material* –** Min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to a thickness equal to the overall thickness of the gypsum board and shaft liner and compressed 50 percent in height and inserted between the top of the gypsum board and bottom of floor on both sides of the wall.

B. **Fill, Void or Cavity Material* – Sealant –** Fill, Void or Cavity Material* – Sealant – Prior to the installation of the gypsum board (Item 2D), a min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on inside of ceiling runner to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto shaft liner (Item 2C) and runner (Item 2A). After installation of gypsum board (Item 2D) min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed or brushed on gypsum board on the wall to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto wall and floor

Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 3 Hr	F Rating — 3 Hr
Nominal Joint Width — 4 in.(102 mm)	FT Rating — 3 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 3 Hr
	FTH Rating — 3 Hr
	Nominal Joint Width — 4 in.(102 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension



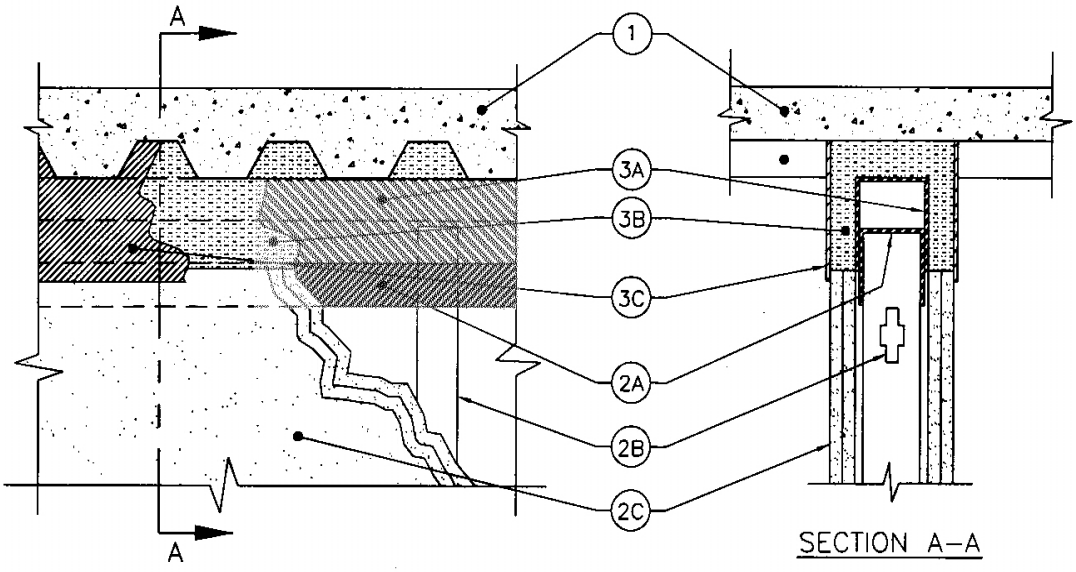
1. **Floor Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete.

2. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System – Max width of joint (at time of installation of joint system) is 4 in. (102 mm). The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Forming Material* –** Min 4 pcf or (64 kg/m^3) mineral wool batt insulation installed into joint opening as a permanent form. Batt cut to min width of 4-1/2 in. (114 mm) and installed edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 33 percent in thickness and such that the compressed batt sections are flush with the top surface of floor.
   INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING COMPANY – Delta Safing Board
   THERMAFIBER INC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on both sides of wall to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto concrete floor and wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 4-3/8 in.(111 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 45.7% Compression, 11.4% Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 4-3/8 in.(111 mm)
	Class II Movement Capabilities — 45.7% Compression, 11.4% Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor -Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (Not Shown) – As an alternative to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater that the hourly rating of the wall assembly and shall include the following construction features:

A. **Steel Roof Deck –** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation –** Min 2-1/4 in. (64 mm) thick poured insulated concrete, as measured from the top plane of the floor units.

C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly –** The 2 hr fire rated gypsum wallboard/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor And Ceiling Runners** – Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner installed within the deflection channel (Item 3A) with a max 2-1/2 in.(64 mm) gap maintained between the top of ceiling runner and top of deflection plate.

A1. **Light Gauge Framing*** – **Clipped Ceiling Runner** – As an alternate to the ceiling runner in Item 2A, clipped runner to consist of galv steel channel with clips preformed in track flanges which positively engage the inside flange of the steel studs (Item 2B). Track sized to accommodate steel studs (Item 2B). Track flanges to be min 5 in. (127 mm). Clipped ceiling runner installed perpendicular to direction of fluted steel floor units and secured to valleys of the steel floor units (Item 1A) with steel fasteners spaced max 24 in. (610 mm) OC. When clipped ceiling runner is used, deflection channel (Item 3A) shall not be used.
TOTAL STEEL SOLUTIONS LLC — Snap Trak

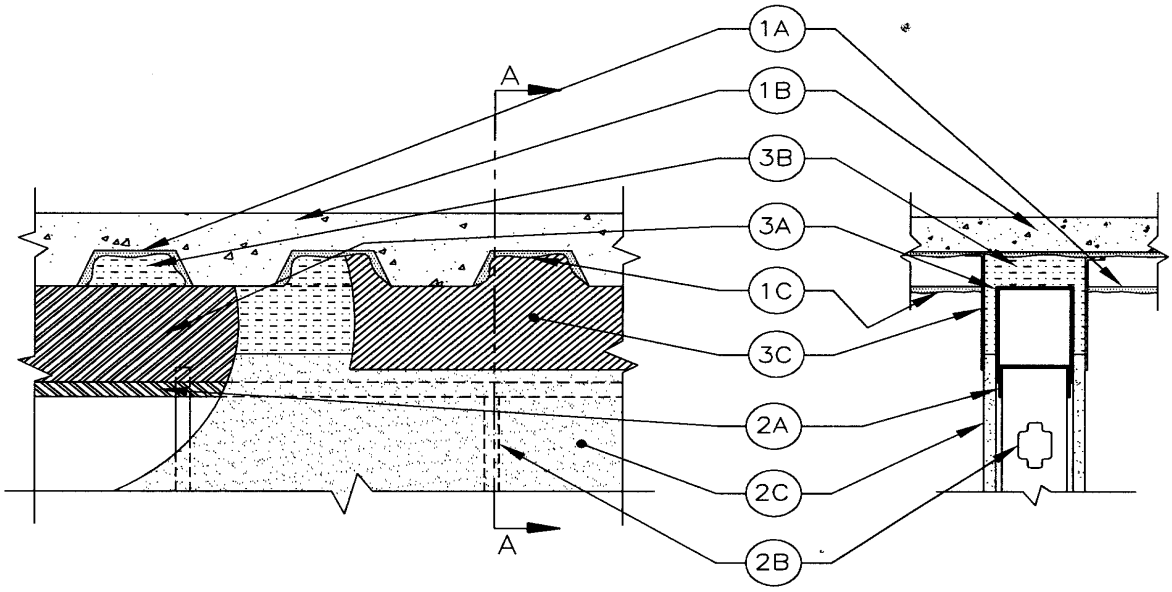
B. **Studs Steel** – Studs to be min 3-5/8 in. (92 mm) wide. Length of studs to be such that the 2-1/2 in. (64 mm) gap between ceiling runner and deflection channel is maintained. Studs attached to ceiling runner with panhead sheet metal screws. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board*** – Gypsum board sheets installed to a min total thickness of 1-1/4 in. (32 mm) on each side of wall. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a max 4-3/8 in. (111 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the floor. The screws attaching the wallboard to studs at the top of the wall shall be located 2-1/2 in. (64 mm) below the bottom of the deflection channel.

3. **Joint System** – **Max separation between bottom of floor and top of wall is 4-3/8 in. (111 mm). The joint system is designed to accommodate a max 45.7 percent compression or a max 11.4 percent extension from its installed width.** The joint system consists of a deflection channel and fill materials, as follows:
   A. **Deflection Channel** – A nom 3-3/4 in. (95 mm) wide by min 5 in. (127 mm) deep min 24 ga steel U-shaped channel. Deflection channel secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 2-1/2 in. (64 mm) gap between the top of the ceiling runner and the top of the deflection channel.
   B. **Forming Material*** – Min 6-1/4 in. (159 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the deflection channel and the steel deck, flush with both sides of wall. Additional pieces of min 1-1/4 in. (32 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation are to be cut into strips and compressed approximately 25 percent in width to fill the max 4-3/8 in. (111 mm) gap between the top of the wallboard and bottom of the steel floor units, flush with both sides of wall.
   INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
   ROCK WOOL MANUFACTURING CO – Delta Safing Board
   THERMAFIBER INC. – Type SAF
   C. **Fill, Void or Cavity Material*** – Min 1/16 in. (1.6 mm) thickness (dry) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the wallboard and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall. Gypsum board sheets installed to a min total thickness of 1-1/4 in. (32 mm) on each side of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 4-3/8 in.(111 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
Class II Movement Capabilities — 45.7% Compression, 11.4% Extension	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr See Item 2)
	Nominal Joint Width — 4-3/8 in.(111 mm)
	Class II Movement Capabilities — 45.7% Compression, 11.4% Extension



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.
   C. **Spray-Applied Fire Resistive Material –** Min 5/16 in. (8 mm) to max 11/16 in. (18 mm) thickness of spray-applied fire resistive material applied to all surfaces of steel floor units. Prior to securing ceiling runner (Item 2A), spray-applied fire resistive material to be removed from bottom surfaces of valleys on steel floor units flush with both surfaces of deflection channel (Item 3A).
   GCP APPLIED TECHNOLOGIES INC – Type MK-6/HY

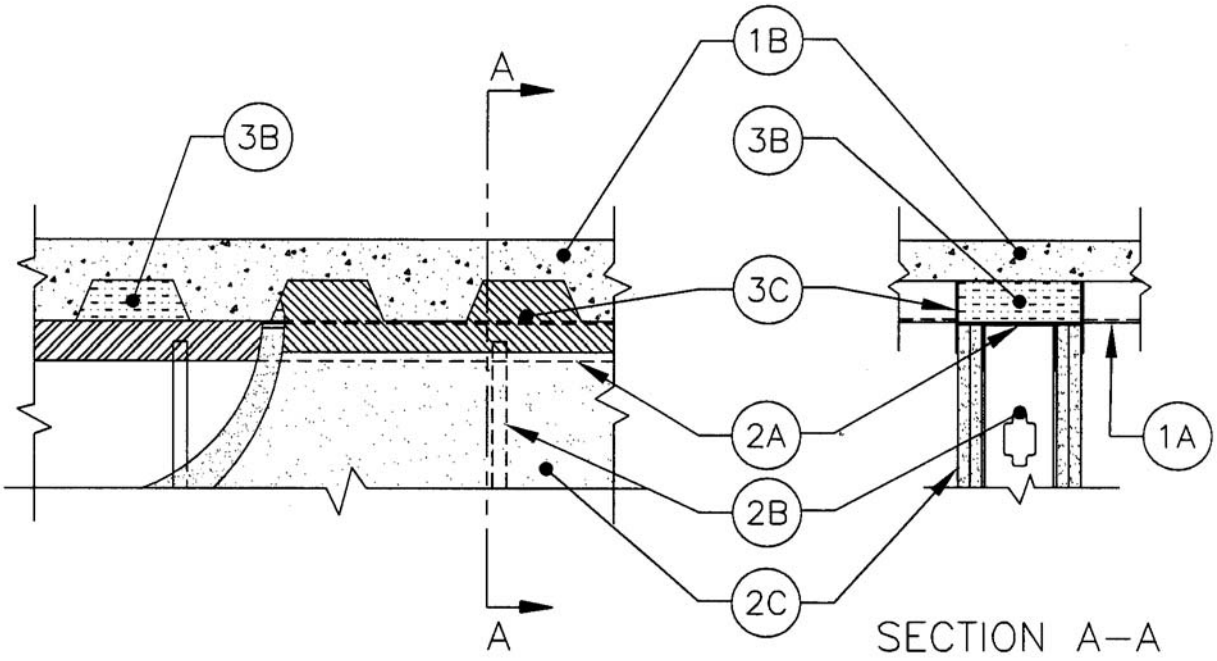
2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum wallboard/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor And Ceiling Runners** – Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Ceiling runner installed within the deflection channel (Item 3A) with a max 2-1/2 in. (64 mm) gap maintained between the top of ceiling runner and top of deflection channel.
   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide. Length of studs to be such that the 2-1/2 in. (64 mm) gap between ceiling runner and deflection channel is maintained. Studs attached to ceiling runner with panhead sheet metal screws. Stud spacing not to exceed 24 in. (610 mm) OC.
   C. **Gypsum Board –** Gypsum board sheets installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of wall for 1 and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a max 4-3/8 in. (111 mm) gap shall be maintained between the top of the wallboard and the lower surface of the floor. The screws attaching the wallboard to studs at the top of the wall shall be located 2-1/2in. (64 mm) below the bottom of the deflection channel.
   The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.

3. **Joint System – Max separation between bottom of floor and top of wall is 4-3/8 in. (111 mm). The joint system is designed to accommodate a max 45.7 percent compression and 11.4 percent extension from its installed width.** The joint system consists of a deflection channel, forming material and a fill material, as follows:
   A. **Deflection Channel –** A nom 3-3/4 in. (95 mm) wide by min 6 in. (152 mm) deep min 24 ga. steel U-shaped channel. Deflection channel secured to valleys of steel floor units (Item 1A), with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 2-1/2 in. (64 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.
   B. **Forming Material* –** Min 4-7/8 in. (124 mm) and 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for 1 and 2 hr rated assemblies, respectively, cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the deflection channel and the spray-applied material, flush with both sides of wall. Additional pieces of min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of min 4 pcf (64 kg/m^3) mineral ol batt insulation for 1 and 2 hr rated assemblies, respectively are to be cut into strips and compressed approximately 25 percent in width to fill the max 4-3/8 in. (111 mm) gap between the top of the gypsum board and bottom of the spray-applied material, flush with both sides of wall.
      INDUSTRIAL INSULATION GROUP LLC – MinWool-1200 Safing
      ROCK WOOL MANUFACTURING COMPANY – Delta Safing Board
      THERMAFIBER INC. – Type SAF
   C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) thickness (dry) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and 2 in. (51 mm) onto the spray-applied material on both sides of wall.
      Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

	Assembly Ratings – 1 & 2 Hr (See Item 2) **Maximum Joint Width – 1/4 in. (6mm)**	**HW-S-0050**

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 2)	F Ratings — 1 & 2 Hr (See Item 2)
Nominal Joint Width — 1/4 in.(6 mm)	FT Ratings — 1 & 2 Hr (See Item 2)
	FH Ratings — 1 & 2 Hr (See Item 2)
	FTH Ratings — 1 & 2 Hr (See Item 2)
	Nominal Joint Width — 1/4 in.(6 mm)



1. **Floor Assembly –** The fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:
   - A. **Steel Floor and Form Units* –** Max 3 in. (76 mm) deep galv fluted units.
   - B. **Concrete –** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

1A. **Roof Assembly –** (not shown) – As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly and shall include the following construction features:
   - A. **Steel Roof Deck –** Min 3 in. (76 mm) deep galv steel fluted roof deck.
   - B. **Roof Insulation –** Min 2-1/4 in. (64 mm) thick insulated concrete, as measured from the top plane of the floor units.
   - C. **Roof Covering* –** Hot-mopped or cold-application materials compatible with insulating concrete.

2. **Wall Assembly –** The 1 or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Steel Floor and Ceiling Runners –** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). When U-shaped deflection channel (Item 3A) is used, ceiling runner installed within the deflection channel with 1 in. (25 mm) gap maintained between the top of ceiling runner and top of deflection plate. When deflection channel is not used, ceiling runner is secured to valleys of steel floor units (Item 1A) with steel fasteners or by welds spaced max 24 in. OC.
   B. **Studs –** Steel studs to be min 3-5/8 in. (92 mm) wide spaced max 24 in. (610 m) OC.
   C. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 or 1-1/4 in. (16 to 32 mm) on each side of wall for 1 or 2 hr rated assembly, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1/4 in. (6 mm) gap shall be maintained between the top of the gypsum board and the lower surface of the steel floor or roof.
   The hourly fire rating of the joint system is dependent on the hourly fire rating of the wall.

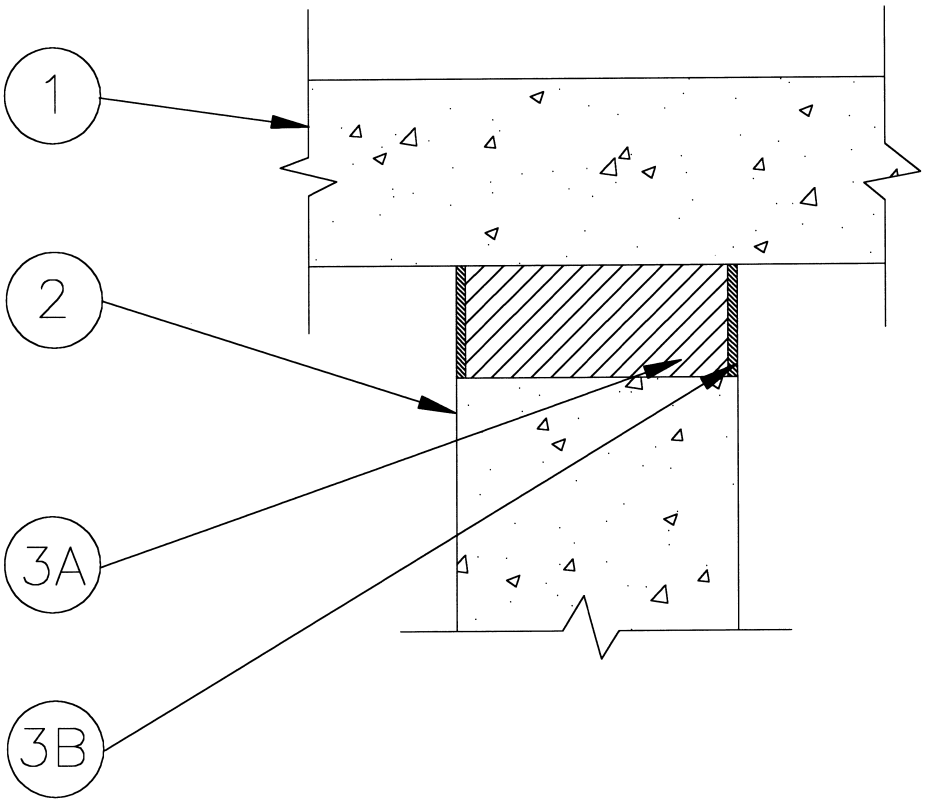
3. **Joint System – Max width joint is 1/4 in. (6 mm).** The joint system consists of the following:
   A. **Deflection Channel** (Optional) – A nom 3-5/8 in. (92 mm) wide by min 2 in. (51 mm) deep, min 24 gauge steel U-shaped channel. Deflection channel secured to valleys of steel floor units with steel fasteners or by welds spaced max 24 in. (610 mm) OC. The ceiling runner (Item 2A) is installed within the deflection channel to maintain a 1 in. (25 mm) gap between the top of the ceiling runner and the top of the deflection channel. The ceiling runner is not fastened to the deflection channel.
   B. **Packing Material –** Min 4-7/8 in. (124 mm) and 6-1/8 in. (156 mm) thickness of min 4 pcf (64 kg/m^3) density mineral wool batt insulation for 1 and 2 hr rated assemblies, respectively, cut to the shape of the fluted deck, approximately 25 percent larger than the area of the flutes and compressed into flutes of the steel floor units between the top of the deflection channel or ceiling runner and the steel deck, flush with both sides of wall.
   C. **Fill, Void or Cavity Material* –** Min 1/16 in. (1.6 mm) thickness (dry) of fill material sprayed or brushed on each side of the wall in the flutes of the steel floor units and between the top of the gypsum board and the bottom of the steel floor units to completely cover mineral wool and overlap a min of 1 in. (25 mm) onto gypsum board and steel deck on both sides of wall.

   Passive Fire Protection Partners – 3500SI, 5100SP

*Bearing the UL Classification Marking

	Assembly Rating – 2 Hr **Joint Width – 3 in. (76 mm) Max**	**HW-S-1006**

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width —3 in.(76 mm)	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3 in.(76 mm)



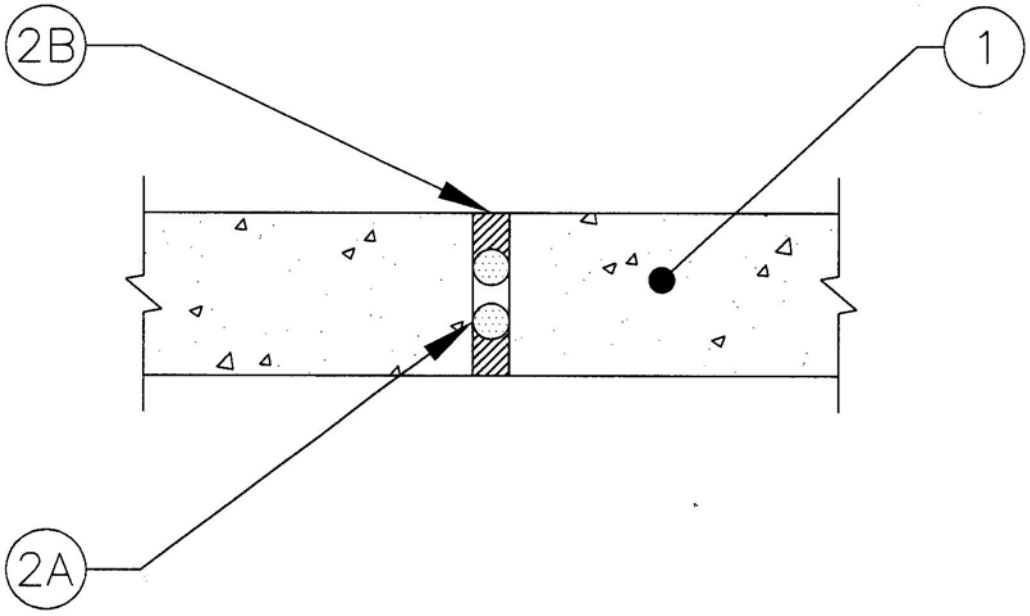
1. **Floor Assembly –** Min 5 in. (127 mm) thick steel-reinforced normal weight (140-150 pcf or 2200-2400 kg/m^3) structural concrete.

2. **Wall Assembly –** Min 7-1/2 in. (191 mm) thick reinforced normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System –** Max width of joint is 3 in. (76 mm). The joint system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. (178 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from each surface of wall as required to accommodate the required thickness of fill material.
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3.2 mm) thickness of fill material applied within the joint, flush with top surface of wall.
   Passive Fire Protection Partners – 3500SI, 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternate to the above, min 1/4 in. (6 mm) thickness of fill material applied within the joint, flush with top surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 1 in.(25 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 25% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 1 in.(25 mm)
	Class II Movement Capabilities — 25% Compression or Extension

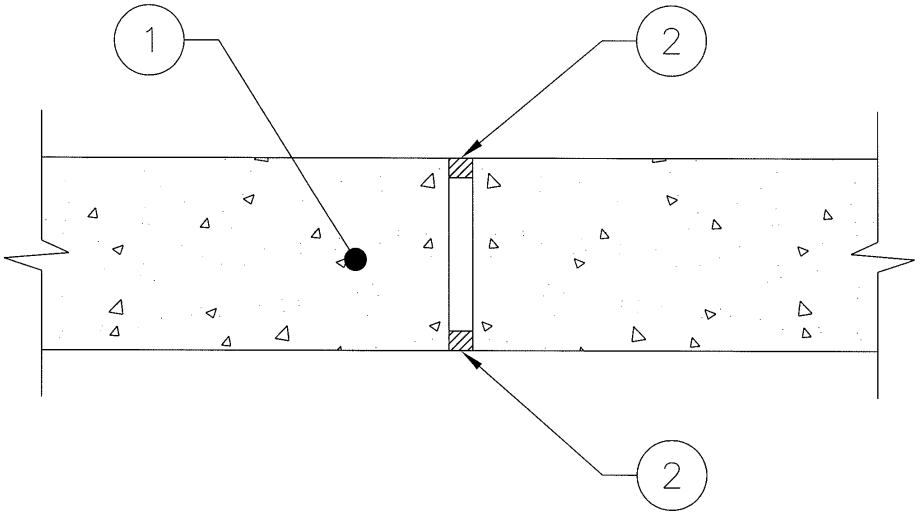


1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.***
   See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

2. **Joint System – Max width of joint (at time of installation of joint system) is 1 in. (25mm) The joint system is designed to accommodate a max 25 percent compression or extension from its installed width.** The joint system shall consist of the following:
   A. **Packing Material – Backer Rod –** Nom 1-1/4 in. (32mm) diam polyethylene backer rod compressed and firmly packed into joint opening and recessed from both sides of wall to accommodate required thickness of fill material.
   B. **Fill, Void or Cavity Material – Sealant –** Min 1 in. (25mm) thickness of fill material applied within the joint, flush with both surfaces of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3/4 in.(19 mm)	FT Rating — 2 Hr
Class II Movement Capabilities — 33% Compression or Extension	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3/4 in.(19 mm)
	Class II Movement Capabilities — 33% Compression or Extension

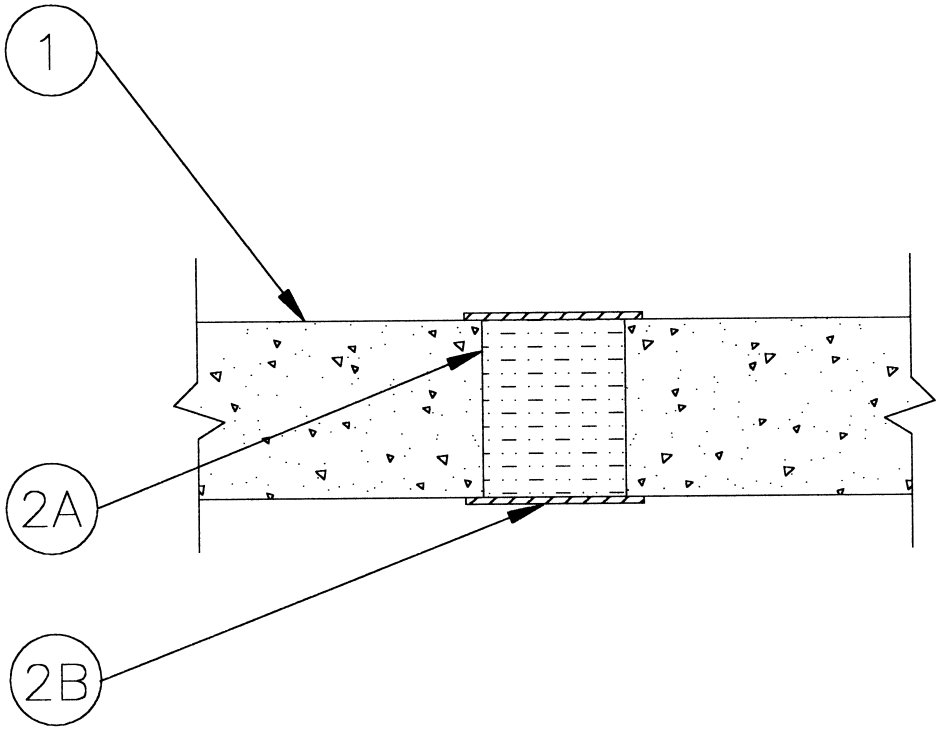


1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.***
   See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

2. **Joint System – Fill, Void or Cavity Materials* – Max width of joint (at time of installation of joint system) is 3/4 in. (19 mm). The joint system is designed to accommodate a max 33 percent compression or extension from its installed width.** The joint system shall consist of a min 5/8 in. (16 mm) thickness of fill material applied within the joint, flush with each surface of wall. **Passive Fire Protection Partners –** 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 3 Hr	F Rating — 3 Hr
Nominal Joint Width — 4 in.(102 mm)	FT Rating — 3 Hr
Class II Movement Capabilities — 12.5% Compression or Extension	FH Rating — 3 Hr
	FTH Rating — 3 Hr
	Nominal Joint Width — 4 in.(102 mm)
	Class II Movement Capabilities — 12.5% Compression or Extension

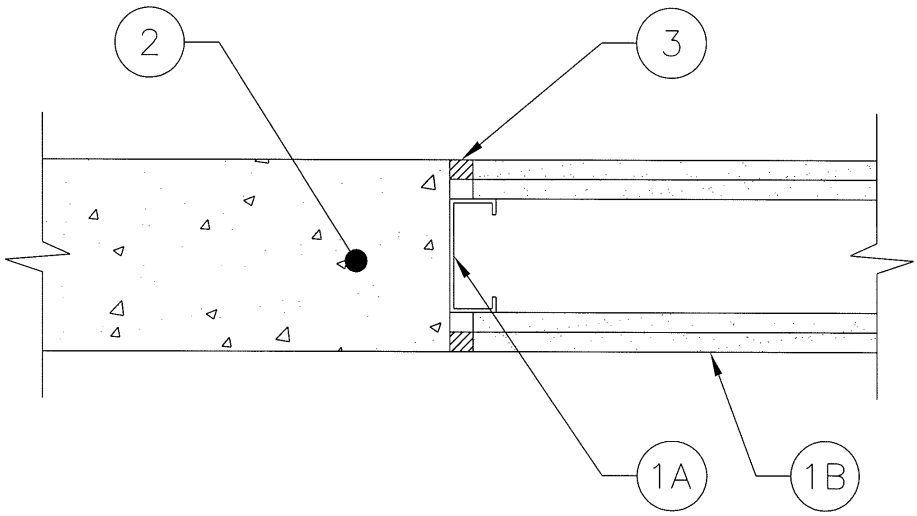


1. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Joint System –** Max width of joint (at time of installation of joint system) is 4 in. (102 mm). The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width. The joint system shall consist of the following:
   A. **Forming Material* –** Min 4 pcf (64 kg/m^3) mineral wool batt insulation installed in joint opening as a permanent form. Batt cut to min width of 4-1/2 in. (114 mm) and installed edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 33 percent in thickness and such that the compressed batt sections are flush with both sides of wall. Adjoining lengths of batt to be tightly-butted with butted seams spaced min 36 in. (914 mm) apart along the length of the joint.
   IIG Minwool LLC – MinWool – 1200 Safing
   Rock Wool Manufacturing Company – Delta Safing Board
   Thermafiber LLC – Type SAF
   B. **Fill, Void or Cavity Material* – Sealant –** Min 1/16 in. (1.6 mm) dry thickness of fill material sprayed or brushed on both sides of wall to completely cover mineral wool and overlap a min of 1/2 in. (13 mm) onto wall.
   Passive Fire Protection Partners – 3500SI, 5100SP

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 & 2 Hr (See Item 1)	F Ratings — 1 & 2 Hr (See Item 1)
Nominal Joint Width — 3/4 in.(19 mm)	FT Ratings — 1 & 2 Hr (See Item 1)
	FH Ratings — 1 & 2 Hr (See Item 1)
	FTH Ratings — 1 & 2 Hr (See Item 1)
	Nominal Joint Width — 3/4 in.(19 mm)



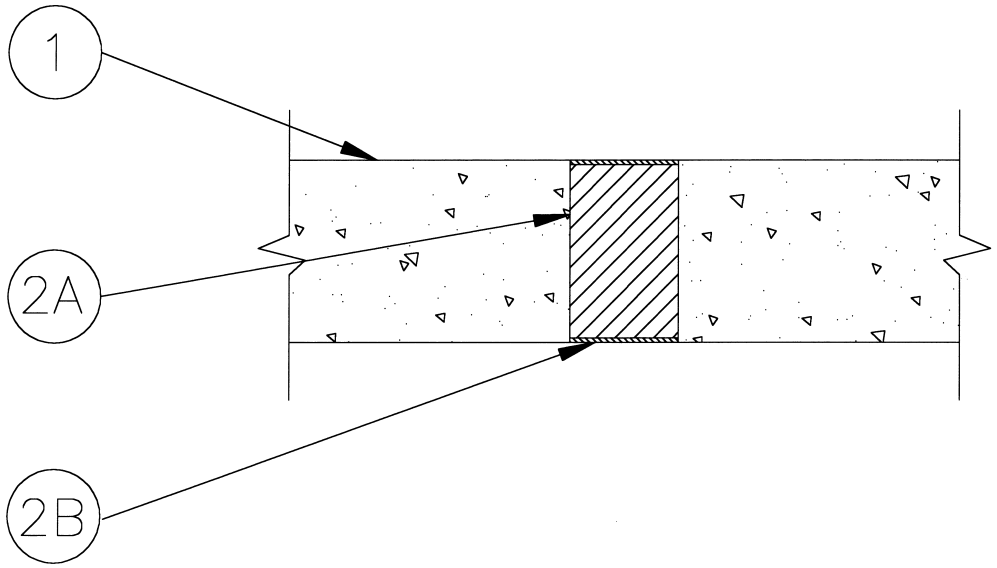
1. **Wall Assembly –** The 1 or 2 hr fire-rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs –** Steel studs to be min 3-1/2 in. (89 mm) wide by 1-1/4 in. (32 mm) deep corrosion protected min 25 MSG steel channels. Studs not to exceed 24 in. (610 mm) OC. Stud installed nominally centered at joint location.
   B. **Gypsum Board* –** Gypsum board sheets installed to a min total thickness of 5/8 in. (16 mm) or 1-1/4 in. (32 mm) on each side of wall for 1 and 2 hr fire rated assemblies, respectively.
   The hourly rating of the joint system is dependent on the hourly rating of the wall assembly in which it is installed.

2. **Wall Assembly –** Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks.***
   See **Concrete Blocks** (CATZ) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System – Fill, Void or Cavity Materials* – Max width of joint (at time of installation of joint system) is 3/4 in. (19 mm).** The joint system shall consist of a min 5/8 in. (16 mm) thickness of fill material applied within the joint, flush with each surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

ANSI/UL2079	CAN/ULC S115
Assembly Rating — 2 Hr	F Rating — 2 Hr
Nominal Joint Width — 3 in.(76 mm)	FT Rating — 2 Hr
	FH Rating — 2 Hr
	FTH Rating — 2 Hr
	Nominal Joint Width — 3 in.(76 mm)



1. **Wall Assembly –** Min 5 in. (127 mm) thick reinforced normal weight (140 - 150 pcf or 2240 – 2400 kg/m^3) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.**
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Joint System –** Max width of joint is 3 in. (76 mm). The joint system shall consist of the following:
   A. **Packing Material –** Min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from each surface of wall as required to accommodate the required thickness of fill material.
   B1. **Fill, Void or Cavity Material* – Sealant –** Min 1/8 in. (3 mm) thickness of fill material applied within the joint, flush with each surface of wall.
   Passive Fire Protection Partners – 5100SP
   B2. **Fill, Void or Cavity Material* – Sealant –** As an alternate to the above, min 1/4 in. (6 mm) thickness of fill material applied within the joint, flush with each surface of wall.
   Passive Fire Protection Partners – 3600EX, 4100NS, 4800DW

* Bearing the UL Classification Marking

1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

Understanding a ITS - Warnock Hersey - Firestop Listing

ITS-Warnock Hersey uses an Alpha/Alpha-numeric identification systems

First Alpha Component - Manufacturer's Code

Example

JWA/PHV 120-19
Grabber Construction Products

Second Alpha Component - Penetration and Orientation Code

Example

JWA/**PHV** 120-19
Penetration
Horizontal Orientation (i.e. floors)
Vertical Orientation (i.e. walls)

First Numerical Component - Hourly Rating Code

Example

JWA/PHV **120**-19
060 – 60 minutes (1 hour)
120 – 120 minutes (2 hours)
180 – 180 minutes (3 hours)
240 – 240 minutes (4 hours)

Second Numerical Component - System Number

Example

JWA/PHV 120-**19**
19th PHV system for that firestop manufacturing company

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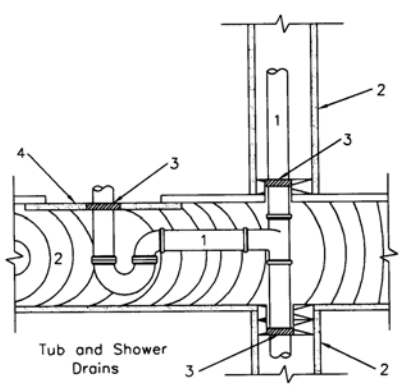
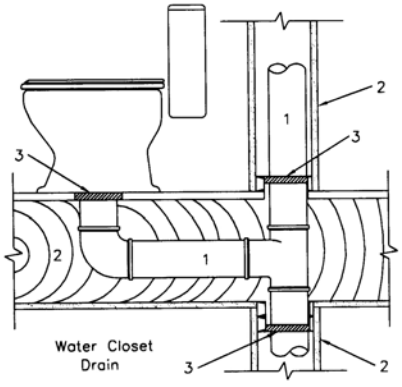
Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814
CAN/ULC S115-M11 – Non-metallic Open and Closed Systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
ccABS Plastic Pipe to 2" ***	3"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ABS Plastic Pipe to 2" ***	3"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccABS Plastic Pipe to 4" **	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ABS Plastic Pipe to 4" **	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
PVC Plastic Pipe to 4" ***	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccPVC Plastic Pipe to 4" ***	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
CPVC Plastic Pipe to 4" ***	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
Copper pipe and tubing up to 2" ID	3"	0" - 1"	Up to 1 Hour	Up to 1 Hour	23 min
Cast iron pipe up to 4" ID	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour	30 min



Configuration #1



Configuration #2

System Design Instructions

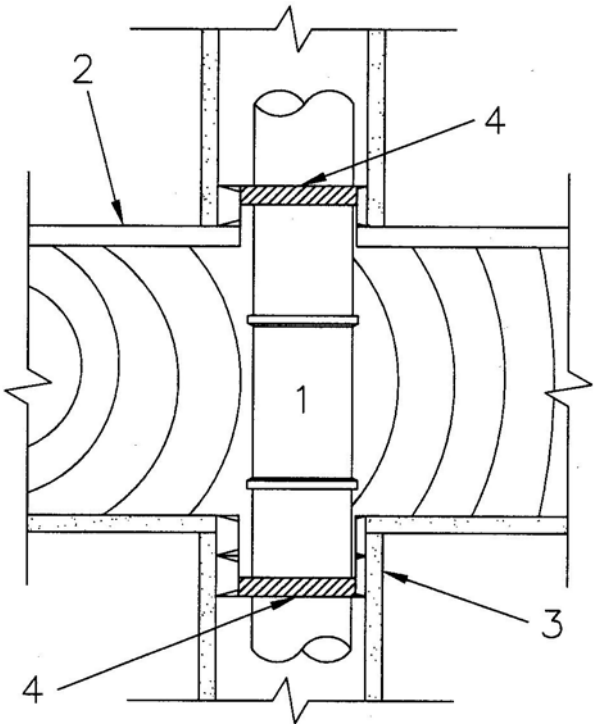
1. **Penetrating Item:** Centered or offset in hole, see table above. Elbows, Tee's and couplings can penetrate the firestop system.
2. **Floor/Ceiling or Wall Fire Separations:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board (GWB) floor/ceiling/wall assemblies with or without concrete topping, having a minimum depth of 10¾" (275mm).
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* fully filling the annular space to the full depth of the membrane. Fill all header and sill plates contained within the wall assembly to a 1" (25mm) depth. On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the GWB assembly.
4. **Firestop System, Component 2:** One layer of 5/8" Type "X" gypsum wallboard insert securely fastened with drywall screws on 4" (100mm) centers to reduce tub drain hole sizes up to 12" x 16" (300 x 400mm). Caulk a 3/8" (10mm) bead around perimeter edges of GWB insert after installation.

***WH Labeled Component**
****For use with only Configuration #2**
*****For use with both Configurations #1 & #2**

Intertek	3600EX 4800DW	PFP/PH 60-02

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814
CAN/ULC S115-M11: - Non-metallic Open and Closed Systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E814/UL 1479 "F" , "T" Rating	ULC S115 "FTH" Rating
ccABS Plastic Pipe to 2"	3"	0" - 1"	Up to 1 Hour	Up to 1 Hour
ABS Plastic Pipe to 2"	3"	0" - 1"	Up to 1 Hour	Up to 1 Hour
PVC Plastic Pipe to 4"	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour
ccPVC Plastic Pipe to 4"	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour
CPVC Plastic Pipe to 4"	5"	0" - 1"	Up to 1 Hour	Up to 1 Hour



System Design Instructions

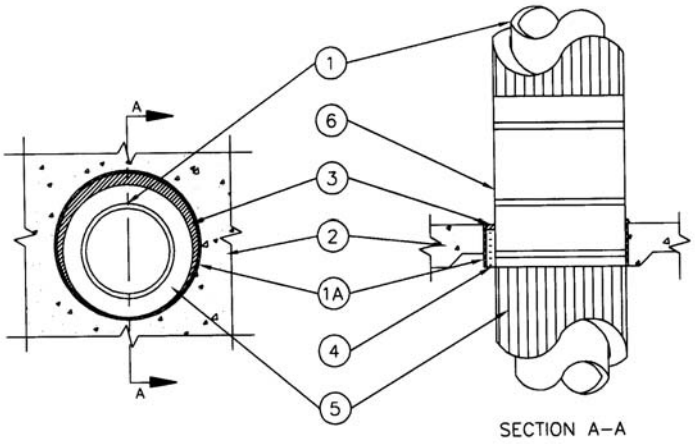
1. **Penetrating Item:** Centered or offset in hole, see table above. Couplings can penetrate the firestop system.
2. **Floor/Ceiling Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wall board (GWB) floor/ceiling/wall assembly with or without concrete topping, having a minimum depth of 10¾" (275mm).
3. **Wall Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board wall assembly.
4. **Firestop System:** PFP Partners – Firestop 3600EX* or 4800DW* fill all header and sill plates contained within the wall assembly to a 1" (25mm) depth. On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the membrane being penetrated.

***WH Labeled Component**

c US Intertek	**3600EX 4800DW**	**PFP/PH 60-03**

Single Penetrations
Horizontal (floor)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe up to 6" ID Sch 40 & up	10"	0" – 2"	1 Hour	1 Hour	1 Hour
Copper Pipe and Tubing up to 2" ID Sch 10 & up	6"	0" – 2"	1 Hour	1 Hour	1 Hour
EMT/Steel Conduit Pipe up to 4" ID	8"	0" – 2"	1 Hour	1 Hour	1 Hour



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
   a) Metal Sleeve: Min 24 gauge or heavier sheet metal sleeve fit tightly into the opening flush with or max 2" above the top surface of the floor assembly.
2. **Floor/Ceiling Fire Separations:** Min 20 gauge or heavier galvanized steel decking with up to 1½" (38mm) flute height firmly supported, with min 2½" concrete cover or min 4" (102mm) thick cast concrete
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of ½" (13mm) within the annulus on top surface of floor assembly. On 0 - ¼" (6mm) annular spaces a ½" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 3½" (90mm). Recess filler material ½" (13mm) for sealant placement.
5. **Through Insulating Materials:** Max 1" (25mm) fiberglass pipe insulation (paper faced), tightly wrapped around the penetrating item, having a minimum density of 3.5 lbs/pcf and listed to provide a flame spread rating of 25 and a smoke developed rating of 50.
6. **Aluminum Jacketing:** Min 0.016" (0.4mm) thick aluminum jacket installed within the opening tightly fitted to the pipe insulation. Jacketing sized to be flush with or max 12" (307mm) above the top surface of the floor assembly. Jacketing support to consist of ½" (13mm) wide stainless steel hose clamps spaced max 6" o/c.

***WH Labeled Component**

Single Penetrations

Horizontal (floor/ceiling)

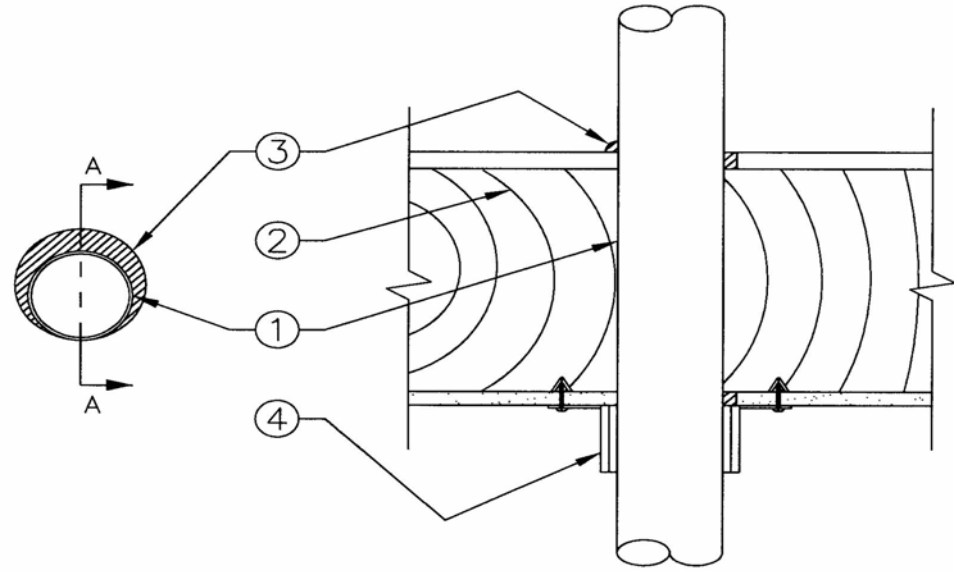
Test Standards: ASTM E-814, UL 1479 – Non-metallic Open and Closed Systems

ULC S115-M11 – Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.20 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC or ccPVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	Up to 1 Hr	Up to 1 Hr	Up to 1 Hr
CPVC Plastic Pipe 1-1/2" – 4"	5'	0" – 1/2"	Up to 1 Hr	Up to 1 Hr	Up to 1 Hr
ABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 1 Hr	Up to 1 Hr	Up to 1 Hr
ccABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 1 Hr	Up to 1 Hr	Up to 1 Hr



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor Assembly:** 1 hour rated CAN/ULC S101 or equivalent wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, minimum nominal 10" depth wood or composite wood floor joists.
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 3/4" (19mm) within the annulus on top or bottom surface of floor assembly and a min of 5/8" (15mm) within the annulus of the gypsum wallboard ceiling membrane. On 0 – 1/4" (6mm) annular spaces of the floor surface, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1-1/2" toggle bolts over fender washers, at joist locations use 1-1/2" drywall screws to fasten collar directly to joists.

***WH Labeled Component**

Single Penetrations

Horizontal (floor/ceiling)

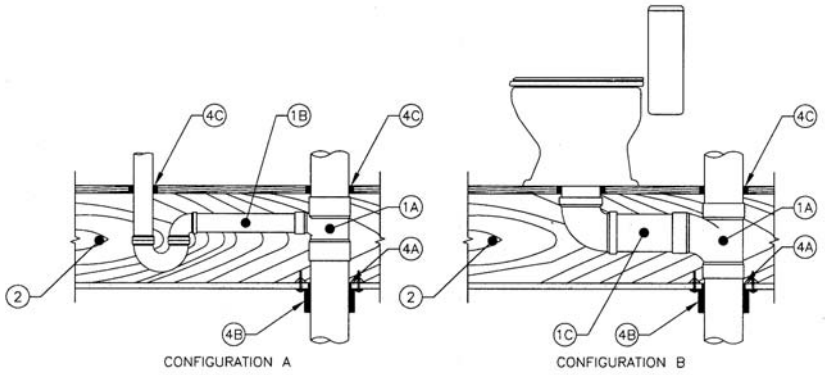
Test Standards: ASTM E-814, UL 1479 – Non-metallic Open and Closed Systems

CAN/ULC S115-M11 – Non-metallic Open and Closed Systems

Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 Fire "F" Rating	ULC S115 Fire/Hose "FH" Rating	ULC S115 Temp Rating "FTH" Rating
ccABS Plastic Pipe to 2"	3"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ABS Plastic Pipe to 2"	3"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
PVC Plastic Pipe to 2"	3"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccABS Plastic Pipe to 4"	5"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ABS Plastic Pipe to 4"	5"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
PVC Plastic Pipe to 4"	5"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccPVC Plastic Pipe to 4"	5"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
CPVC Plastic Pipe to 4"	5"	0" – 1/2"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Elbows, Tee's and couplings can penetrate the firestop system.
   a) **Max riser pipe size 4" –** Configuration A & B
   b) **Max branch pipe size 2" –** Configuration A
   c) **Max branch pipe size 4" –** Configuration B
2. **Floor/Ceiling Separations:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10¾" (275mm).
3. **Wall Fire Separations (Optional – Not Shown):** Rated or non-rated metal or wood framed gypsum wall board (GWB) wall assemblies, when used, install the firestop system as detailed in (Item 4) to the underside of single or double top plates.
4. **Firestop System Component –**
   a) PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness 5/8" (15mm) within the annulus of the gypsum wallboard ceiling membrane, as a smoke seal.
   b) PFP Partners – Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to assembly using 1-1/2" toggle bolts over fender washers, at joist locations use 1-1/4" drywall screws and fender washers to fasten collar directly to joists. Use 1-1/4" drywall screws and fender washers to fasten collar to single or double top plates, when wall is used.
   c) PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 3/4" (19mm) within the annulus on top or bottom surface of floor assembly. On 0 – 1/4" (6mm) annular spaces of the floor surface, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.

***WH Labeled Component**

Single Penetrations

Horizontal (floor/ceiling)

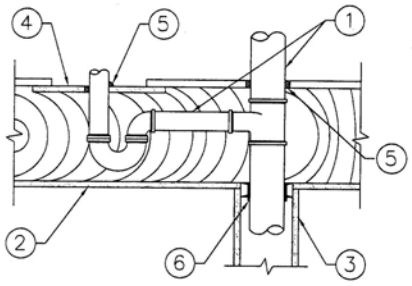
Test Standards: ASTM E-814, UL 1479 – Non-metallic Open and Closed Systems

CAN/ULC S115-M11 – Non-metallic Open and Closed Systems

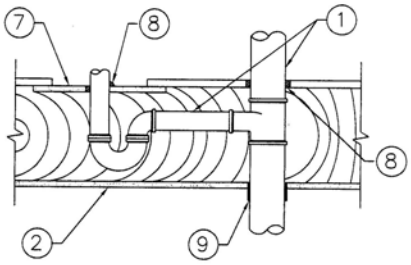
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

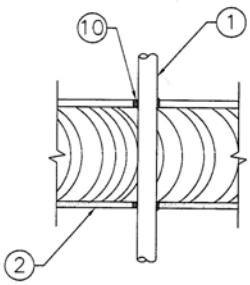
Penetrating Material & Size	Design Number	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
ccABS or ABS pipe up to 3" w/ branch line up to 1-1/2"	A	4-1/8" 2-1/2"	1/2" 0" – 1/2"	N/A	N/A	1 hour	N/A	55 min
ccPVC or PVC pipe up to 3" w/ branch line up to 1-1/2"	A	4-1/8" 2-1/2"	1/2" 0" – 1/2"	1 hour	55 min	1 hour	1 hour	55 min
CPVC pipe up to 3" w/ branch line up to 1-1/2"	A	4-1/8" 2-1/2"	1/2" 0" – 1/2"	1 hour	55 min	1 hour	1 hour	55 min
XFR PVC (IPEX) pipe up to 3" w/ branch line up to 1-1/2"	A	4-1/2" 2-1/2"	1/2" 0" – 1/2"	1 hour	1 hour	1 hour	1 hour	1 hour
ccPVC Plastic pipe up to 3" w/ branch line up to 1-1/2"	B	4-1/8" 2-1/2"	1/2" 0" – 1/2"	1 hour	1 hour	1 hour	1 hour	25 min
CPVC pipe up to 3" w/ branch line up to 1-1/2"	B	4-1/8" 2-1/2"	1/2" 0" – 1/2"	1 hour	1 hour	1 hour	1 hour	25 min
XFR PVC (IPEX) pipe up to 3" w/ branch line up to 1-1/2"	B	4-1/2" 2-1/2"	1/2" 0" – 1/2"	1 hour	1 hour	1 hour	1 hour	1 hour
ccPVC or PVC pipe up to 1-1/2"	C	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
CPVC pipe up to 1-1/2"	C	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
ccABS or ABS pipe up to 1-1/2"	C	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
Nonmetallic Rigid Conduit up to 1-1/2"	C	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
ccPVC or PVC pipe up to 1-1/2"	D	3"	¼" – ½"	1 hour	50 min	1 hour	1 hour	50 min
CPVC pipe to 1-1/2"	D	3"	¼" – ½"	1 hour	50 min	1 hour	1 hour	50 min
ccABS or ABS pipe up to 1-1/2"	D	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
Nonmetallic Rigid Conduit up to 1-1/2"	D	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	50 min



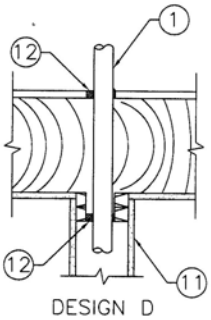
DESIGN A



DESIGN B



DESIGN C



DESIGN D

System Design Instructions

1. **Penetrating Item:** Main line to be centered in hole and branch line to be centered or offset in hole, see table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10¾" (275mm).

Design A

3. **Wall Assembly:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
4. **Firestop System Component 1:** One layer of nom 5/8" (16 mm) Type X gypsum wallboard insert securely fastened with drywall screws on 4" (100 mm) centers to reduce tub drain hole sizes up to 12" x 16" (300 x 400 mm).
5. **Firestop System Component 2:** PFP Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.
6. **Firestop System Component 3: For ccABS, ABS, PVC, ccPVC or CPVC pipe only:** For PFP Partners – Wrap Strip WS1* to be installed around penetrants and centered in membrane such that there is the same distance above and below membrane surface. Min two layers installed in the annular space between the pipe and header plate. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

6a. Firestop System Component 3: For XFR PVC pipe only: For PFP Partners – Wrap Strip WS1* to be installed around penetrants and centered in membrane such that there is the same distance above and below membrane surface. Min four layers installed in the annular space between the pipe and header plate. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place

Design B

7. **Firestop System Component 1:** One layer of nom 5/8" (16 mm) Type X gypsum wallboard insert securely fastened with drywall screws on 4" (100 mm) centers to reduce tub drain hole sizes up to 12" x 16" (300 x 400 mm).
8. **Firestop System Component 2:** PFP Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.
9. **Firestop System Component 3:** PFP Partners – Wrap Strip WS1* to be installed around penetrants and centered in membrane such that there is the same distance above and below membrane surface. Min two layers installed in the annular space between the pipe and ceiling membrane. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

9a. Firestop System Component 3: For XFR PVC pipe only: For PFP Partners – Wrap Strip WS1* to be installed around penetrants and centered in membrane such that there is the same distance above and below membrane surface. Min four layers installed in the annular space between the pipe and header plate. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place

System Design Instructions

Design C

10. Firestop System Component 1: For PVC, ccPVC or CPVC pipe only – PFP Partners - 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

10a. Firestop System Component 1: For ABS or ccABS pipe only – PFP Partners – 3600EX* fully filling the annular space to the full depth of the membrane. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item

Design D

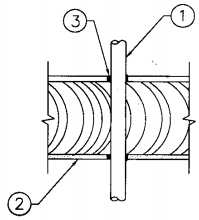
11. Wall Assembly: Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.

12. Firestop System Component 1: PFP Partners – 3600EX*, 4800DW* or 4100NS* fully filling the annular space to the full depth of the membrane. Fill header and sill plate contained in wall assembly min 5/8 in. (16 mm) depth. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

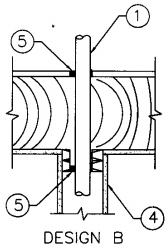
***WH Labeled Component**

Passive Fire Protection Partners
Design Number PFP/PH 60-08
Single Penetrations – Vertical (Wall) Assembly
3600EX 4100NS 4800DW PPC
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System
CAN/ULC S115**: Non-metallic Open and Closed System
Test Pressure– 2.5 Pa (0.01 in. of water) Positive Pressure Differential

Penetrating Material & Size	Design Number	Max Hole Size	Annular Space	ASTM E-814		ULC S115		
				"F"	"T"	"F"	"FH"	"FT"
PVC up to 1-1/2 in.	A	2-1/2"	0" – 1/2"	1 hour	50 min	1 hour	1 hour	50 min
PVC up to 2 in.	A	3"	0" – 1/2"	N/A	N/A	1 hour	N/A	15 min
Nonmetallic Rigid Conduit up to 1-1/2 in.	A	2-1/2"	0" – 1/2"	1 hour	50 min	1 hour	1 hour	50 min
Nonmetallic Rigid Conduit up to 2 in.	A	3"	0" – 1/2"	N/A	N/A	1 hour	N/A	15 min
PEX up to 1 in	A	2"	0" – 1/2"	1 hour	10 min	1 hour	1 hour	10 min
PE/PE-RT up to 1 in (See Item 3)	A	2"	0" – 1/2"	1 hour	10 min	1 hour	1 hour	10 min
CPVC up to 2 in.	A	3"	0" – 1/2"	N/A	N/A	1 hour	N/A	15 min
PEX up to 1 in	B	2"	0" – 1/2"	1 hour	40 min	1 hour	1 hour	40 min
PE/PE-RT up to 1 in	B	2"	0" – 1/2"	1 hour	40 min	1 hour	1 hour	40 min
PE/Al/PE up to ¾ in.	B	1-3/4"	0" – 3/4"	1 hour	1 hour	1 hour	1 hour	1 hour
PEX/Al/PEX up to ¾ in.	B	1-3/4"	0" – 3/4"	1 hour	1 hour	1 hour	1 hour	1 hour



DESIGN A



DESIGN B

System Design Instructions

1. **PENETRATING ITEM:** Centered or offset in hole, see table above. Single penetrations only, max. hole size not to exceed table above.See table above..
2. **FLOOR/CEILING ASSEMBLY:** Use a wood frame gypsum wallboard (GWB) floor/ceiling assembly, with or without concrete topping, with a min. depth of 10-3/4 in. (275mm). The floor/ceiling assembly shall have a fire resistance rating determined in accordance with ASTM E119, UL 263, or CAN/ULC-S101, as applicable. The fire resistance rating shall be equal to or greater than the "F" rating of the through-penetration firestop assembly, and shall comply with the min.

Design A

3. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners - 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 in. to 1/4 in. (6mm) annular space, a min. 1/2 in. (12mm) diameter bead of sealant must be placed around penetrating item. For PE/PE-RT tubing use 3600EX only.

Design B

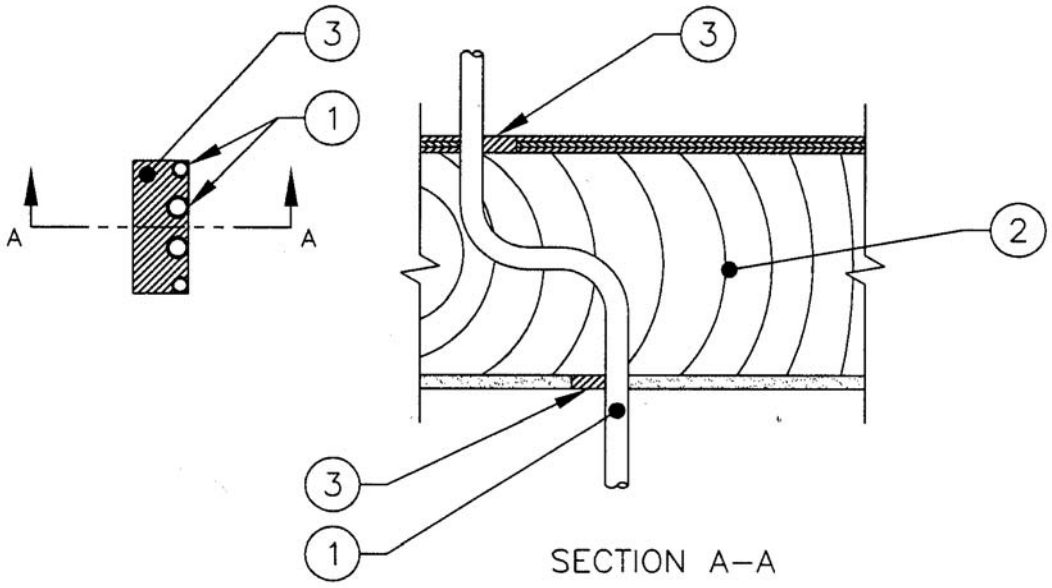
4. **WALL ASSEMBLY:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
5. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. Fill header and sill plate contained in wall assembly min. 5/8 in. (16mm) depth. On 0 in. to 1/4 in. (6mm) annular space, a min. 1/2 in. (12mm) diameter bead of sealant must be placed around penetrating item.

*WH Labeled Component
**Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.

Intertek	3600EX 4100NS 4800DW	PFP/PH 60-09

Single or Multiple Penetrations Only
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479 – Non-metallic Open and Closed Systems
ULC S115-M11** – Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	"F" Rating	"T" Rating
IPEX PE/Al/PE up to 1" ID	See Item 1	0 - 1-1/4"	1 hour	41 min
IPEX PEX/Al/PEX up to 1" ID	See Item 1	0 - 1-1/4"	1 hour	41 min



System Design Instructions

1. Penetrating Item: Centered or offset in hole, see table above. Up to 4 penetrations of polyethylene tubing, 1 in. (25mm) ID or less in diameter. Maximum opening size to be 15 sq in. ((9375 sq mm) with max dimension of 6 in. (150 mm). All penetrating items to be reliably supported.

2. Floor/Ceiling Assembly: 1 hour rated ASTM E-119 wood framed floor/ceiling assembly.
a) Subfloor with or without concrete topping mixture.
b) Wood or composite wood joists.
c) Gypsum wallboard.

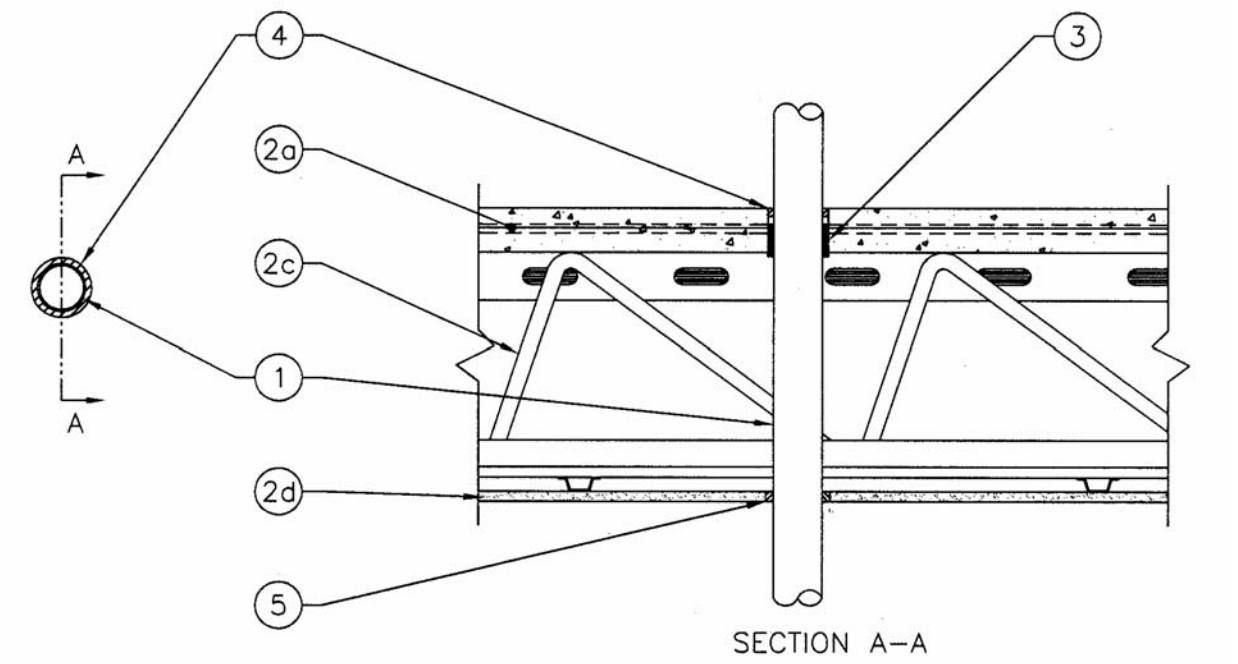
3. Firestop System, Component: PFP Partners – 3600EX*, 4100NS* or 4800DW* - Min. 3/4 in thickness of fill material applied within the annulus, flush with top surface of floor. Min 5/8 in. thickness of fill material applied within the annulus, flush with bottom surface of ceiling. Min. 1/2 in. diam. bead of fill material applied at the penetrant/floor and penetrant/ceiling interfaces at point contact locations on both sides of assembly.

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	3600EX 4100NS 4800DW WS1	PFP/PH 60-10

Single Penetration Only
Horizontal (floor/ceiling)
Test Standards: ULC S115-M11 – Non-metallic Open or Closed Systems
Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp "FTH" Rating
PVC Plastic Pipe to 102mm (4 in.) ID	127mm (5 in.)	6 mm (l/4 in.)	1 Hours	0 Hours	13 minutes
CPVC Plastic Pipe to 102mm (4 in.) ID	127mm (5 in.)	6 mm (l/4 in.)	1 Hours	0 Hours	13 minutes



SECTION A–A

System Design Instructions

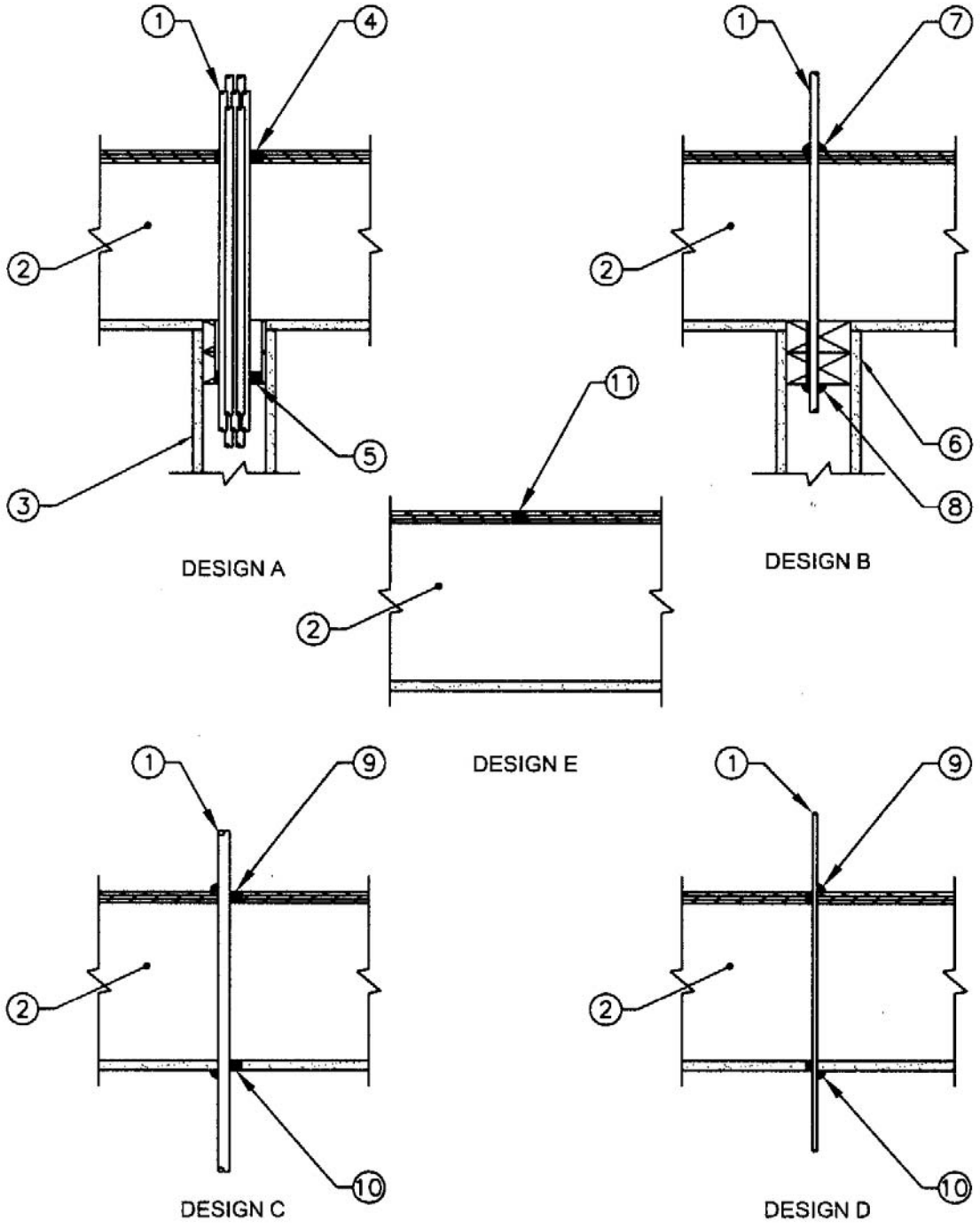
1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations: 1 hour rated CAN/ULC S101 floor/ceiling assembly consisting of:**
   a) Cast in place concrete floor with wire mesh reinforcement, having a total minimum thickness of 63 mm (2-1/2 in.),
   b) Steel form units (Optional) – (Not shown)
   c) Structural component – Steel Joist
   d) Gypsum Wallboard – Min. 16 mm (5/8 in.) thick screw attached to furring channels.
3. **Firestop System, Component 1:** PFP Partners WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 50 mm (2 in.) wide strips. Min three layers of wrap strip friction fitted into annular space. Wrap strip to extend max. 6 mm (1/4 in.) below the bottom surface of the concrete floor and fastened in place with aluminum tape.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 13mm (1/2 in.) within the annulus on top surface of floor assembly.
5. **Firestop System Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 16 mm (5/8 in.) within the annulus flush with bottom surfaces of gypsum floor/ceiling assembly.

***WH Labeled Component**

Single Penetrations

Horizontal (floor/ceiling)
Test Standards: ASTM E-814, CAN/ULC S115-M11
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Design Number	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
Single or Multiple Loomex/Romex to 2" (51 mm) OD (Nylon/PVC/CPVC Jacket)	A	3" (76 mm)	0 – 1" 0 – 25mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single or Multiple BX/Tech Cable to 2" (51 mm) OD (PVC/CPVC Jacket)	A	3" (76 mm)	0 – 1" 0 – 25mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single or Multiple Telephone, Cablevision to 3/4" (19 mm) OD (PVC/CPVC Jacket)	A	3" (76 mm)	0 – 1" 0 – 25mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Loomex/Romex to 3/4" (19 mm) OD (Nylon/PVC/CPVC Jacket)	B	1-3/4" (44 mm)	0 – 1-1/4" 0 – 32mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single BX/Tech Cable to 3/4" (19 mm) OD (PVC/CPVC Jacket)	B	1-3/4" (44 mm)	0 – 1-1/4" 0 – 32mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Telephone, Cablevision to 3/4" (19 mm) OD (PVC/CPVC Jacket)	B	1-3/4" (44 mm)	0 – 1-1/4" 0 – 32mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Loomex/Romex to 3/4" (19 mm) OD (Nylon/PVC/CPVC Jacket)	C	1-1/2" (38 mm)	0 – 3/4" 0 – 19mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single BX/Tech Cable to 3/4" (19 mm) OD (PVC/CPVC Jacket)	C	1-1/2" (38 mm)	0 – 3/4" 0 – 19mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Telephone, Cablevision to 3/4" (19 mm) OD (PVC/CPVC Jacket)	C	1-1/2" (38 mm)	0 – 3/4" 0 – 19mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Loomex/Romex to 1/2" (13 mm) OD (Nylon/PVC/CPVC Jacket)	D	3/4" (19 mm)	0 – 3/8" 0 – 10mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single BX/Tech Cable to 1/2" (13 mm) OD (PVC/CPVC Jacket)	D	3/4" (19 mm)	0 – 3/8" 0 – 10mm	1 hour	1 hour	1 hour	1 hour	1 hour
Single Telephone, Cablevision to 1/2" (13 mm) OD (PVC/CPVC Jacket)	D	3/4" (19 mm)	0 – 3/8" 0 – 10mm	1 hour	1 hour	1 hour	1 hour	1 hour
Void	E	3/4" (19 mm)	3/4" (19 mm)	1 hour	1 hour	1 hour	1 hour	1 hour


1
4
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DESIGN A
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DESIGN B
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DESIGN E
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9
2
10
DESIGN C
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9
2
10
DESIGN D

System Design Instructions

1. **Penetrating Item:** Main line to be centered in hole and branch line to be centered or offset in hole, see table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10¾" (275mm).

Design A

3. **Wall Assembly:** Min 1 hour rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
4. **Firestop System Component 1:** PFP Partners – 3300PS* fully filling the annular space to the full depth of the membrane, flush with top surface of floor assembly. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item(s). Additional 3300PS* to be forced into interstices of cable group to max extend possible.
5. **Firestop System Component 2:** Min 3/4" (19 mm) depth of PFP Partners – 3300PS* applied within the annular space, flush with bottom surface of lower top plate. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item. Additional 3300PS* to be forced into interstices of cable group to max extend possible.

Design B

6. **Wall Assembly:** Min 1 hour rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
7. **Firestop System Component 1:** PFP Partners – 3300PS* fully filling the annular space to the full depth of the membrane, flush with top surface of floor assembly. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.
8. **Firestop System Component 2:** Min 3/4" (19 mm) depth of PFP Partners – 3300PS* applied within the annular space, flush with bottom surface of lower top plate. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

Designs C & D

9. **Firestop System Component 1:** PFP Partners – 3300PS* fully filling the annular space to the full depth of the membrane, flush with top surface of floor assembly. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.
10. **Firestop System Component 2:** Min 5/8" (16 mm) depth of PFP Partners – 3300PS* applied within the annular space, flush with bottom surface of lower top plate. On 0 to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

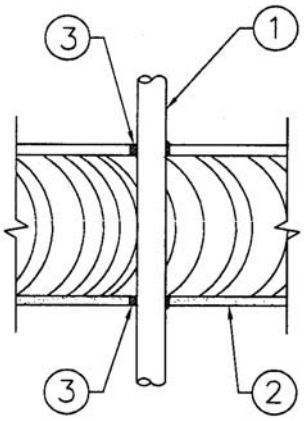
Design E

11. **Firestop System Component 1:** PFP Partners – 3300PS* fully filling the annular space to the full depth of the membrane, flush with top surface of floor assembly.

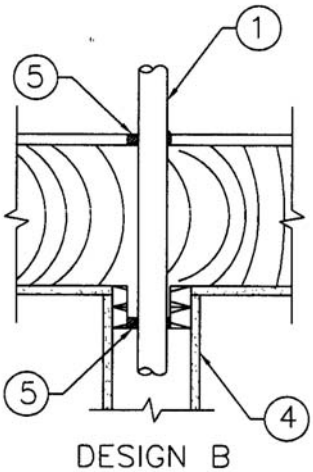
***WH Labeled Component**

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479
CAN/ULC S115-M11: non-metallic open and closed systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Design Number	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
ccPVC, PVC or CPVC pipe up to 2"	A	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
ccABS or ABS pipe up to 1-1/2"	A	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
Nonmetallic Rigid Conduit up to 2"	A	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
ccPVC, PVC or CPVC pipe up to 1-1/2"	B	3"	¼" – ½"	1 hour	50 min	1 hour	1 hour	50 min
ccABS or ABS pipe up to 1-1/2"	B	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	1 hour
Nonmetallic Rigid Conduit up to 1-1/2"	B	3"	¼" – ½"	1 hour	1 hour	1 hour	1 hour	50 min



DESIGN A



DESIGN B

System Design Instructions

1. **Penetrating Item:** Main line to be centered in hole and branch line to be centered or offset in hole, see table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10¾" (275mm).

Design A

3. **Firestop System Component 1:** PFP Partners – 3600EX* fully filling the annular space to the full depth of both the floor and ceiling membranes. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

Design B

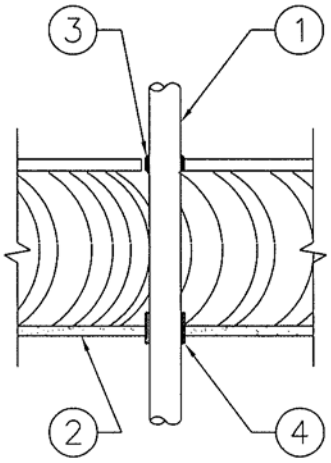
4. **Wall Assembly:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
5. **Firestop System Component 1:** PFP Partners – 3600EX* fully filling the annular space to the full depth of the floor membrane. Fill header and sill plate contained in wall assembly to a min 5/8 in. (16 mm) depth. On 0" to 1/4" (6 mm) annular space a min 1/2" (12 mm) diam bead of must be placed around penetrating item.

***WH Labeled Component**

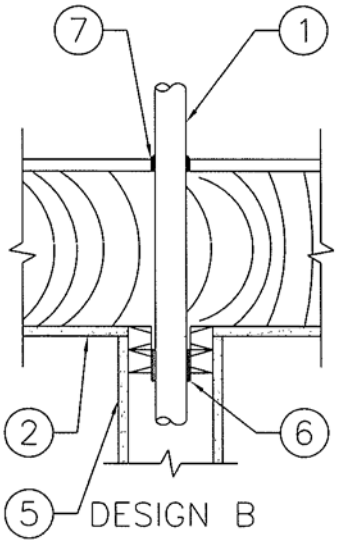
Intertek	3600EX 4100NS 4800DW Wrap Strip WS1	PFP/PH 60-13

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Design Number	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
Polypropylene SDR 7.4 32 mm OD (1-1/4" OD)	A	44.5 mm (1-3/4")	6.4 mm (1/4")	N/A	N/A	1 hour	N/A	1 hour
Polypropylene SDR 7.4 63.4 mm OD (2-1/2" OD)	B	76.2 mm (3")	6.4 mm (1/4")	N/A	N/A	1 hour	N/A	1 hour
Aquatherm Fusiolen Polypropylene Pipes								



DESIGN A



DESIGN B

System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10-3/4 in. (275mm).

Design A

3. **Firestop System Component 1:** PFP Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane.
4. **Firestop System Component 2:** PFP Partners – Wrap Strip WS1 – to be installed around penetrant and centered in the ceiling membrane such that there is the same distance above and below the ceiling membrane. Min two layers installed in the annular space between pipe and the ceiling membrane. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

System Design Instructions Continued:

Design B

5. **Wall Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall (GWB) wall assemblies.
6. **Firestop System Component 1:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the header plates such that the wrap strips extend a 1/2 in. (12 mm) below bottom of header plates. Min two layers installed in the annular space between pipe and the header plates. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
7. **Firestop System Component 2:** PFP Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane.

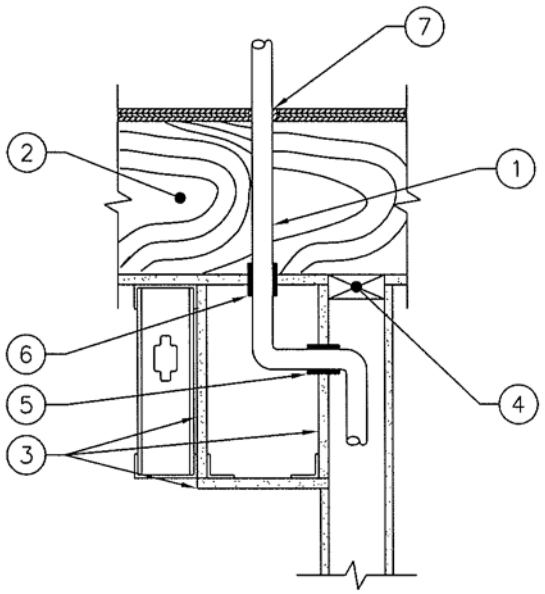
***WH Labeled Component**

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

c US Intertek	**3600EX 4100NS 4800DW Wrap Strip WS1**	**PFP/PH 60-15**

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
Polypropylene SDR 7.4 40 mm OD (1.6" OD)	63.5 mm (2-1/2")	12 mm (0.45")	1 hour	1 hour	1 hour	1 hour	1 hour
Polypropylene SDR 11 40 mm OD (1.6" OD)	63.5 mm (2-1/2")	12 mm (0.45")	1 hour	1 hour	1 hour	1 hour	1 hour
Aquatherm Fusiolen Polypropylene Pipes							



System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10-3/4 in. (275mm).
3. **Ceiling Shaft Assembly:** Rated ceiling shaft assembly to conform with the appropriate local building code and with the authority having jurisdiction requirements.
4. **Wall Assembly:** 1 hour rated or non-rated metal or wood framed gypsum wall (GWB) wall assemblies.
5. **Firestop System Component 1:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the ceiling membrane such that the wrap strips extend a 1/2 in. (12 mm) below the ceiling membrane. Min three layers installed in the annular space between pipe and the ceiling membrane. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

System Design Instructions Continued:

6. **Firestop System Component 2:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the gypsum wallboard membrane such that there is the same distance on each side of the membrane. Min three layers installed in the annular space between pipe and the gypsum wallboard membrane. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
7. **Firestop System Component 3:** PFP Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane.

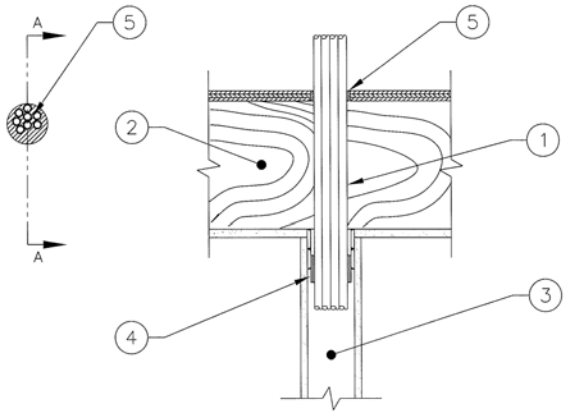
***WH Labeled Component**

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	3600EX 4100NS 4800DW Wrap Strip WS1	PFP/PH 60-16

Multiple and Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
PEX up to 25 mm (1") (X-linked Polyethylene tubing)	76 mm (3")	9.5 mm (0.375")	N/A	N/A	1 hour	N/A	1 hour



SECTION A–A

System Design Instructions

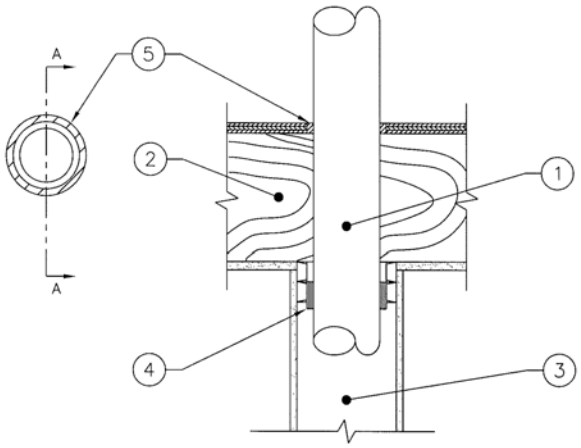
1. **Penetrating Item:** Centered in hole, see table above. 3 penetrations of X-linked polyethylene tubing 25 mm (1") or smaller in diameter; 4 penetrations of X-linked polyethylene 19 mm (3/4") or smaller in diameter; 8 penetrations of X-linked polyethylene 13 mm (1/2") or smaller in diameter. Maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10-3/4 in. (275mm).
3. **Wall Assembly:** 1 hour fire rated or non-rated fire metal or wood framed gypsum wall (GWB) wall assemblies.
4. **Firestop System Component 1:** Passive Fire Protection (PFP) Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, min three layers of wraps to be installed around penetrant and centered in the opening such that the wrap strips extend a 1/2 in. (12 mm) below the header plate. Aluminum foil tape to be installed around circumference of the outer wrap strip and penetrant for securing wrap strips in place.
5. **Firestop System Component 2:** Passive Fire Protection (PFP) Partners – 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane.

***WH Labeled Component**
**Not tested to 50pa pressure differential as required by Canadian code for combustible DWV (Drain, Waste or Vent) piping systems.

Intertek	3600EX 4100NS 4800DW Wrap Strip WS1	PFP/PH 60-17

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
Polypropylene SDR 7.4 Faser® Up to 125 mm OD (5" OD)	152.4 mm (6")	13 mm (1/2")	1 hour	1 hour	1 hour	1 hour	1 hour
Polypropylene SDR 11 Fusiotherm® Up to 125 mm OD (5" OD)	152.4 mm (6")	13 mm (1/2")	1 hour	1 hour	1 hour	1 hour	1 hour
Aquatherm Fusiolen Polypropylene Pipes							



SECTION A–A

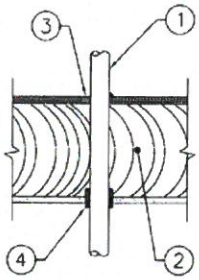
System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 275 mm (10-3/4 in.).
3. **Wall Assembly:** 1 hour rated or non-rated metal or wood framed gypsum wall (GWB) wall assemblies with studs being min 38 x 191 mm (2 x 8 in.).
4. **Firestop System Component 1:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the the header plates such that the wrap strips extend a 1/2 in. (12 mm) below bottom of the header plates. Min four layers installed in the annular space between pipe and the header plates. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
5. **Firestop System Component 2:** PFP Partners – 3600EX*, 4800DW* or 4100NS* fully filling the annular space to the full depth of the membrane.

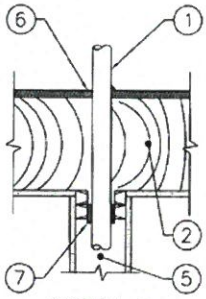
***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Passive Fire Protection Partners
Design Number PFP/PH 60-18
Single Penetrations – Horizontal (Floor/Ceiling) Assembly
3600EX 4100NS 4800DW Wrap Strip WS1
Test Standards: ASTM E814, UL 1479: Non-metallic Open and Closed System
CAN/ULC-S115: Non-metallic Closed System
Test Pressure – 50 Pa (0.2 in. of water minimum) Positive Pressure Differential

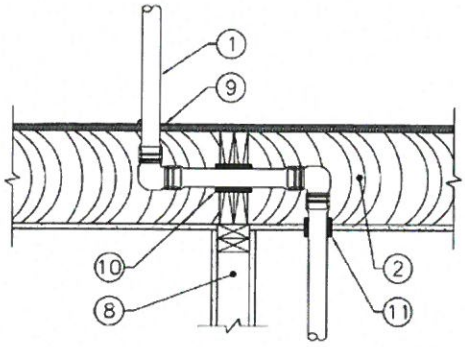
Penetrating Material & Size	Max. Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	CAN/ULC S115 "F"	CAN/ULC S115 "FH"	CAN/ULC S115 "FT"
PEX up to 2 in. (51mm) ID	See below	See below	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour
PE/PE-RT up to 2 in. (51mm) ID	See below	See below	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour
At gypsum board ceiling	67mm (2-5/8 in.)	6mm (1/4 in.)	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour
At header plates	76mm (3 in.)	12.5mm (1/2 in.)	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour
At joists	76mm (3 in.)	12.5mm (1/2 in.)	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour
At plywood sub-floor	67mm (2-5/8 in.)	0 to 13mm (0 – 1/2 in.)	1 Hour	1 Hour	1 Hour	1 Hour	1 Hour



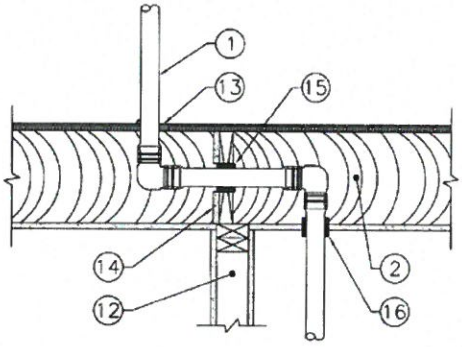
DESIGN A



DESIGN B



DESIGN C



DESIGN D

System Design Instructions

1. **PENETRATING ITEM:** Penetration to be centered in openings in gypsum board, header plates, and joists. Penetration can be centered or offset in openings in sub-floor, see table above.
2. **FLOOR/CEILING ASSEMBLY:** Use a wood frame gypsum wallboard (GWB) floor/ceiling assembly, with or without concrete topping, with a min. depth of 9-1/4 in. (235mm). The floor/ceiling assembly shall have a fire resistance rating determined in accordance with ASTM E119, UL 263, or CAN/ULC-S101, as applicable. The fire resistance rating shall be equal to or greater than the "F" rating of the through-penetration firestop assembly, and shall comply with the min. requirements below.

Design A

3. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 to 6mm (0 to 1/4 in.) annular space, a min. 12mm (1/2 in.) diameter bead of sealant must be placed around penetrating item. After the installation of the Wrap Strip WS1 (Component 2), a min. 3mm (1/8 in.) diameter bead of sealant to be applied at the interface of the WS1 and the ceiling membrane.

4. **FIRESTOP SYSTEM COMPONENT 2:** PFP Partners – Wrap Strip WS1* to be installed around penetrant and recessed into opening such that the outer edge wrap strips extend approximately 12mm (1/2 in.) below ceiling membrane surface. Min. two layers installed in the annular space between the pipe and ceiling membrane. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

Design B

5. **WALL ASSEMBLY:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
6. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 to 6mm (0 to 1/4 in.) annular space, a min. 1/2 in. (12mm) diameter bead of sealant must be placed around penetrating item. After the installation of the Wrap Strip WS1 (Component 7), a min. 3mm (1/8 in.) diameter bead of sealant to be applied at the interface of the WS1 and the bottom of the header plates.
7. **FIRESTOP SYSTEM COMPONENT 2:** PFP Partners – Wrap Strip WS1* to be installed around penetrants recessed into opening such that the outer edge wrap strips extend approximately 12mm (1/2 in.) below the header plates. Min. four layers installed in the annular space between the pipe and header plate. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.

Design C

8. **WALL ASSEMBLY:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
9. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 to 6mm (0 to 1/4 in.) annular space, a min. 1/2 in. (12mm) diameter bead of sealant must be placed around penetrating item.
10. **FIRESTOP SYSTEM COMPONENT 2:** PFP Partners – Wrap Strip WS1* to be installed around penetrants and installed within joists recessed into opening such that the outer edge wrap strips extend approximately 12mm (1/2 in.) beyond the both surfaces of the joists. Min. four layers installed in the annular space between the pipe and joists on both sides of joists. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place
11. **FIRESTOP SYSTEM COMPONENT 3:** PFP Partners – Wrap Strip WS1 to be installed per the requirements of Item 4 in Design A or Item 7 in Design B (depending on if penetrant is installed outside or inside a wall assembly).

Design D

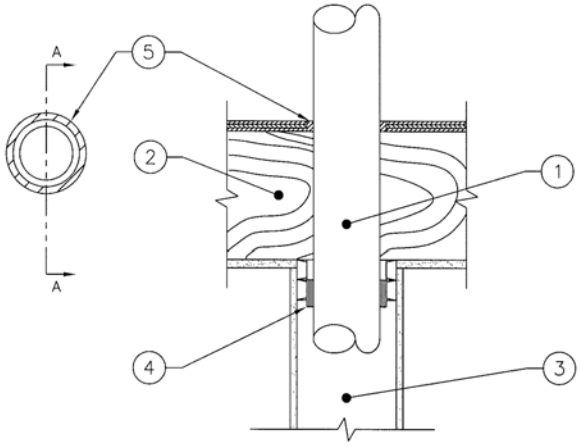
12. **WALL ASSEMBLY:** Rated or non-rated metal or wood framed gypsum wallboard (GWB) wall assemblies.
13. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 3600EX*, 4100NS*, or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 to 6mm (0 to 1/4 in.) annular space, a min. 1/2 in. (12mm) diameter bead of sealant must be placed around penetrating item.
14. **FIRESTOP SYSTEM COMPONENT 2:** One layer of nominal 16mm (5/8 in.) thick Type X gypsum wallboard inserted securely and fastened with drywall screws to the single joist to cover joist completely within joist cavity.
15. **FIRESTOP SYSTEM COMPONENT 3:** PFP Partners – Wrap Strip WS1* to be installed around penetrants and installed within joist recessed into opening such that the outer edge wrap strips is centered within the joist. Min. four layers installed in the annular space between the pipe and joist. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
16. **FIRESTOP SYSTEM COMPONENT 4:** PFP Partners – Wrap Strip WS1 to be installed per the requirements of Item 4 in Design A or Item 7 in Design B (depending on if penetrant is installed outside or inside a wall assembly).

*WH Labeled Component

Intertek	3600EX 4100NS 4800DW Wrap Strip WS1	PFP/PH 60-20

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11: Non-metallic Open and Closed Systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814		ULC S115		
			"F"	"T"	"F"	"FH"	"FT"
Polypropylene SDR 7.4 Up to 75 mm OD (3" OD)	105 mm (4-1/8")	13 mm (1/2")	N/A	1 hour	1 hour	N/A	1 hour
Polypropylene SDR 11 Up to 75 mm OD (3" OD)	105 mm (4-1/8")	13 mm (1/2")	1 hour	1 hour	1 hour	1 hour	1 hour
Aquatherm Fusiolen Polypropylene Pipes							



SECTION A–A

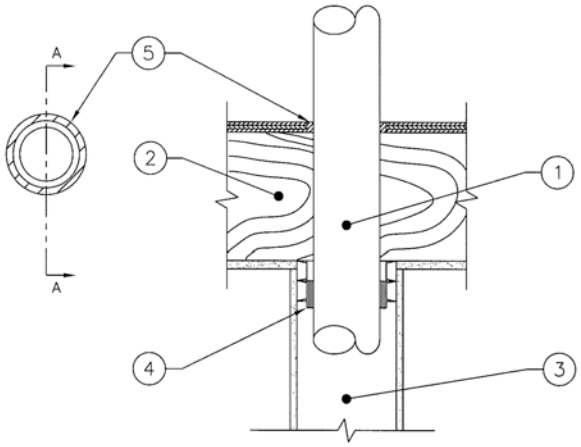
System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 275 mm (10-3/4 in.).
3. **Wall Assembly:** 1 hour rated or non-rated metal or wood framed gypsum wall (GWB) wall assemblies with studs being min 38 x 140 mm (2 x 6 in.).
4. **Firestop System Component 1:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the the header plates such that the wrap strips extend a 1/2 in. (12 mm) below bottom of the header plates. Min five layers installed in the annular space between pipe and the header plates. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
5. **Firestop System Component 2:** PFP Partners – 3600EX*, 4800DW* or 4100NS* fully filling the annular space to the full depth of the membrane.

***WH Labeled Component**

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11: Non-metallic Open and Closed Systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
Polypropylene SDR 11 Up to 110 mm OD (4.3" OD) Aquatherm Fusiolen Polypropylene Pipes	140 mm (5-1/2")	15 mm (0.6")	1 hour	1 hour	1 hour	1 hour	1 hour



SECTION A–A

System Design Instructions

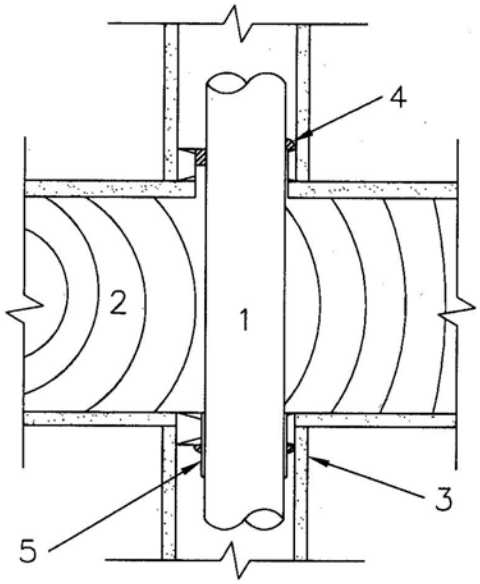
1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour fire rated ASTM E-119 or CAN/ULC S101 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, having a minimum depth of 275 mm (10-3/4 in.).
3. **Wall Assembly:** 1 hour rated or non-rated metal or wood framed gypsum wall (GWB) wall assemblies with studs being min 38 x 184 mm (2 x 8 in.).
4. **Firestop System Component 1:** PFP Partners – Wrap Strip WS1* – Nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) strips, to be installed around penetrant and centered in the the header plates such that the wrap strips extend a 1/2 in. (12 mm) below bottom of the header plates. Min five layers installed in the annular space between pipe and the header plates. Aluminum foil tape to be installed around circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
5. **Firestop System Component 2:** PFP Partners – 3600EX*, 4800DW* or 4100NS* fully filling the annular space to the full depth of the membrane.

***WH Labeled Component**

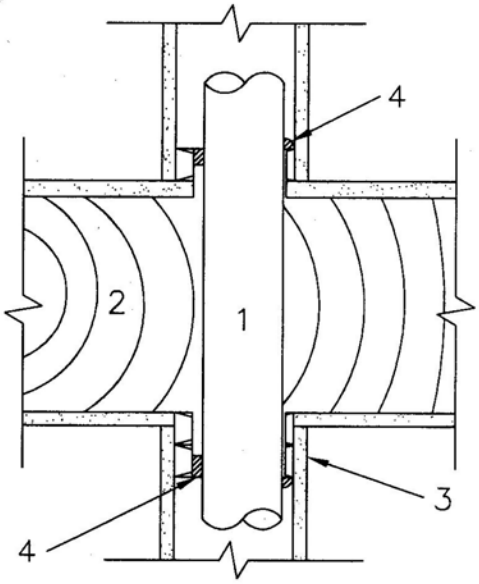
c US Intertek	**3600EX 4100NS 4800DW Wrap Strip WS1**	**PFP/PH 60-22**

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11: Non-metallic Open and Closed Systems
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E814 "F" & "T" Rating	ULC S115-M11 "F", "FH", "FTH" Rating
Wirsbo PEX up to 1-1/2" (38 mm) ID (System 1 & 2)	2" (50 mm)	0-1/2" (0 – 13 mm)	1 hour	1 hour



System 1



System 2

System Design Instructions

System 1

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetration only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 wood framed floor/ceiling/wall assemblies with or without concrete topping, having a minimum depth of 10-3/4" (275 mm).
3. **Chase Wall Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 wood framed wall assembly with single or double header plates.
4. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* fill all sill plates contained within the wall assembly to a 3/4" (18 mm) depth. A min 1/2" (13 mm) bead of sealant is applied between interface of the header plates and outer layer of plastic pie wrap strip (See Firestop System Component 2). On 0 to 1/4" (6 mm) annular spaces a 3/8" (10 mm) diameter fillet bead must be placed around the penetrating item on the surface of the membrane being penetrated.
5. **Firestop System, Component 2:** PFP Partners WS1* Wrap Strip – Nominal 1/8" (3 mm) thick intumescent material supplied in 2" (50 mm) wide strips. Min one continuous layer of wrap strip friction fitted into annular space such that 1/2" (13mm) of the wrap strip extended below the bottom surface of floor/ceiling assembly.

System Design Instructions

System 2

1. **Penetrating Item:** Offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 wood framed floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10-3/4" (275 mm).
3. **Chase Wall Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 wood framed wall assembly with double header plates.
4. **Firestop System, Component 1:** PFP Partners 3600EX* fill all header and sill plates contained within the wall assembly to a 3/4" (25 mm) depth. On 0" to 1/4" (6 mm) annular space a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the membrane being penetrated.

***WH Labeled Component**

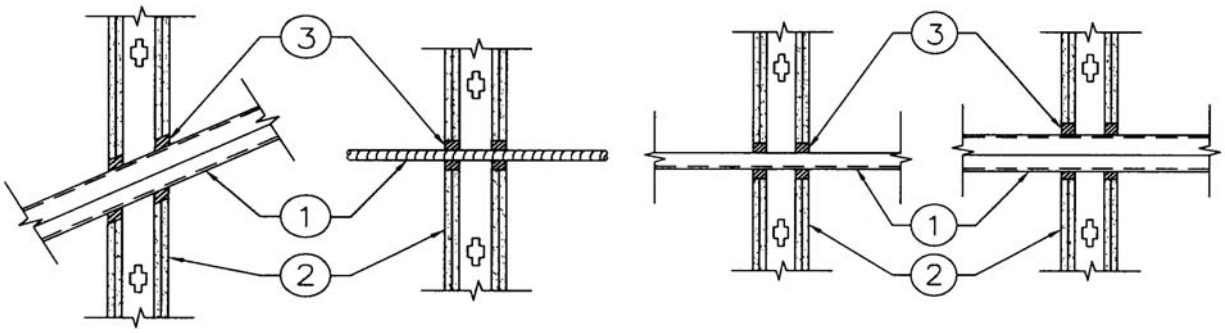
Seismic Bracing and Anti-sway Cables

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Item Seismic Bracing	Max Hole Size	Annular Space	Fire "F" Rating	Fire/ Hose "FH" Rating	Temp Rating "FTH" Rating
Galv. Steel "C" Strut, 1-5/8" x 1-5/8" (41 x 41mm) 12 ga. & up	2¾" x 2¾"	1/8" -1"	Up to 2 Hr	Up to 2 Hr	101 Min
Galv. Steel "H" Strut, 3¼" x 1-5/8"(82 x 41mm) 12 ga. & up	8-3/8"x 2¾"	1/8" -1"	Up to 2 Hr	Up to 2 Hr	86 Min
Readirod, threaded rod up to 5/8" (15mm) OD or equivalent	1½"	1/8" -1"	Up to 2 Hr	Up to 2 Hr	32 Min
Steel Pipe and Tubing to 2" (51mm) ID (closed ends)	4"	1/8" -1"	Up to 2 Hr	Up to 2 Hr	25 Min
Steel Seismic Support Cables to 3/8" (10mm) OD	1"	1/8" -1"	Up to 2 Hr	Up to 2 Hr	50 Min



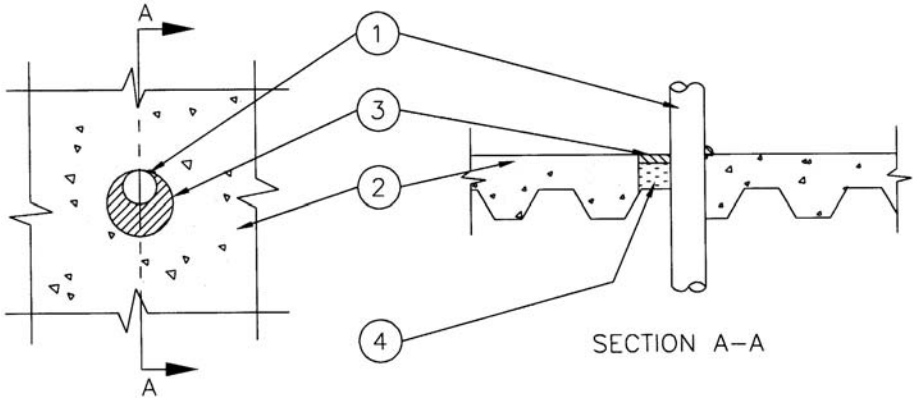
Systems Design Instructions

1. **Penetrating Item:** See table above, centered or offset in hole. Straight through or angled through penetrating items or partial poke through penetrating items anchored within the fire separation. Single penetrations only, maximum hole size not to exceed table above. Annular space not to exceed 1" (25mm). Penetration of the firestop system by nuts, bolts, clips, seismic brace anchoring devices is acceptable.
2. **Ceiling or Wall Fire Separations:**
   a) 1 and 2 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) floor/ ceiling/wall fire separations.
   b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4½" (114mm) or:
   c) Cast in place concrete wall assemblies having a minimum cross section thickness of 6" (150mm) or;
   d) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).
3. **Firestop System Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* fully filling the annular space to the full depth of the membrane on both sides. On 0" to ¼" (6mm) annular spaces a 3/8" (9mm) diameter fillet bead must be placed around the penetrating item
4. **Firestop System Component 2:** Filler material not required.

***WH Labeled Component**

Single Penetrations
Horizontal (floor)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe (1" to 24") Sch 40 & up	29"	0" - 4"	2 Hour	2 Hour	30 Min



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:** Min 20 gauge or heavier galvanized steel decking with up to 3½" (88mm) flute height firmly supported with min 2½" concrete cover.
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX*, 4100SL* or 4800DW* Each product must be installed at a minimum thickness of ½" (13mm) within the annulus on top surface of floor assembly. On 0 - ¼" (6mm) annular spaces, a ½" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 2½" (61mm). Recess filler material ½" (13mm) for sealant placement.

***WH Labeled Component**

Pipe Insulation Through Penetrations

Single Penetrations Only

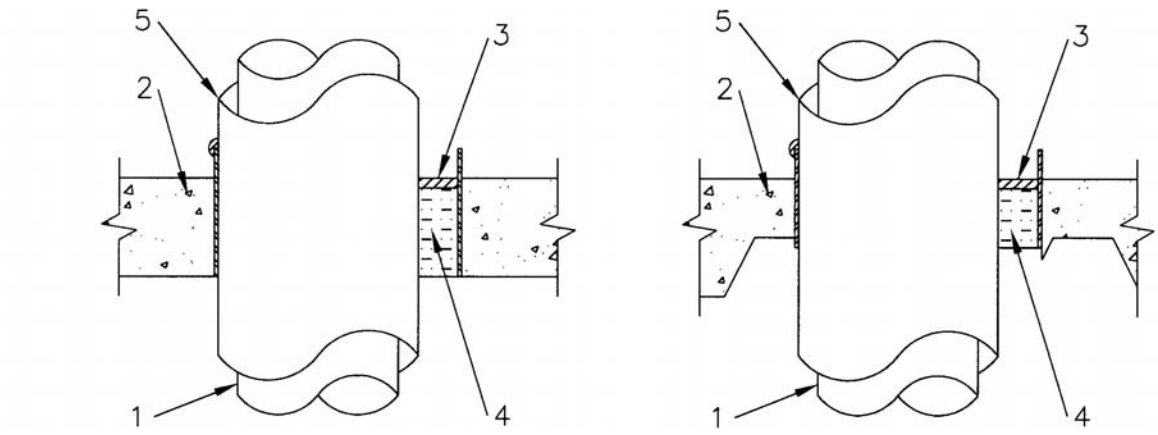
Horizontal (floor/ceiling)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Copper Pipe and tubing up to 4" ID	7"	0" – 1/2"	2 Hour	2 Hour	50 min



System Design Instructions

1. **Penetrating Item:** See table above. Single penetrations only.
   a) Metal Sleeve: Min 24 gauge or heavier metal sleeve fit tightly into the opening flush with or max 1-1/2" (38mm) above the top surface of the floor assembly.
2. **Floor/Ceiling Fire Separations:**
   a) Min 20 gauge or heavier galvanized steel decking with min 1-1/2" (38mm) flute height firmly supported, with min 3" (77mm) concrete cover.
   b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4-1/2" (115mm).
3. **Firestop System, Component 1:** PFP Partners – 3600EX* or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on the top surface of the floor assembly. On 0" to 1/4" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the concrete.
4. **Firestop System, Component 2:** Filler material, mineral wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2" (90mm). Recess filler material 1/2" (13mm) for sealant placement.
5. **Through Insulating Material:** Max 1" (26 mm) thick fiberglass pipe or batt insulation (paper-faced), tightly wrapped around the penetrating item having a minimum density of 3.5 lbs/pcf and listed to have a flame spread rating of 25 and a smoke developed rating of 50.

***WH Labeled Component**

Pipe Insulation Through Penetrations

Single Penetrations Only

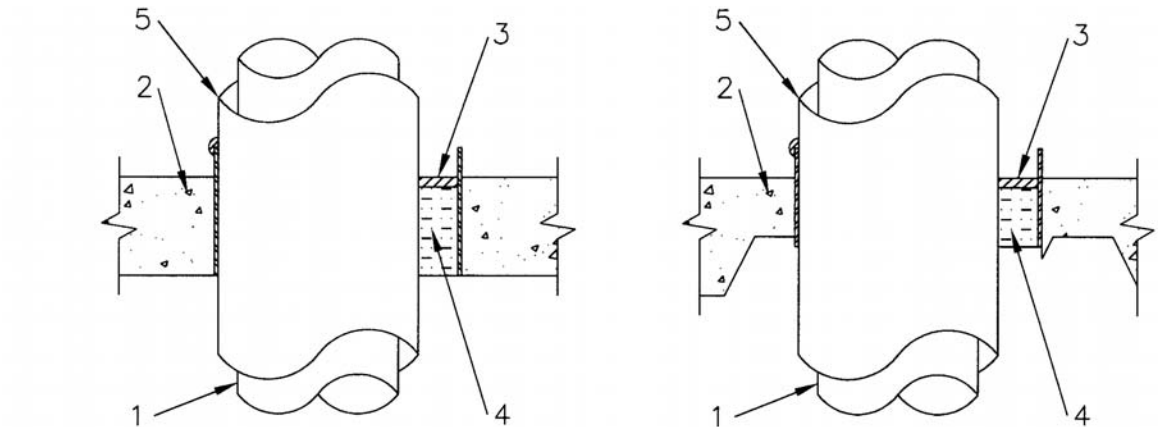
Horizontal (floor/ceiling)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe to 8" Sch 10 & up	10"	0" – 1/2"	2 Hour	2 Hour	69 min



System Design Instructions

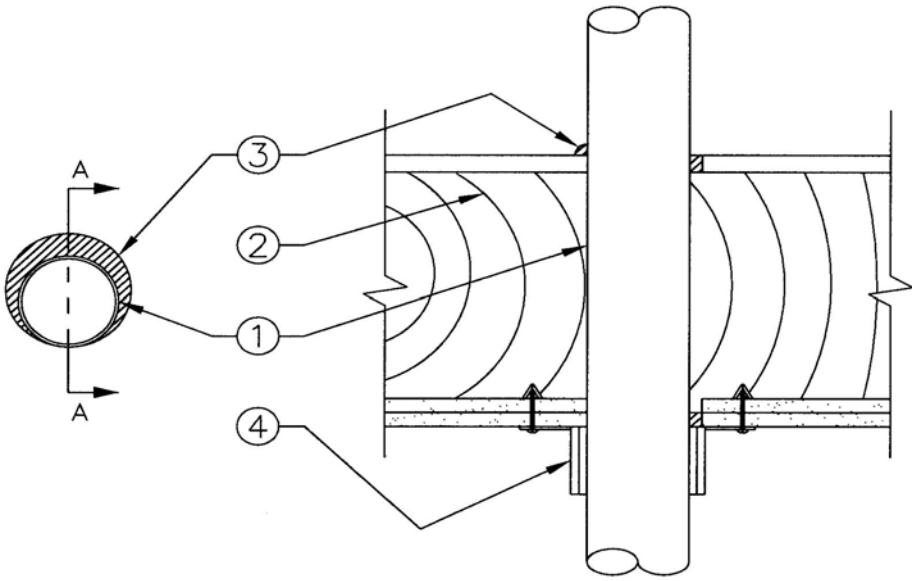
1. **Penetrating Item:** See table above. Single penetrations only.
   a) Metal Sleeve: Min 24 gauge or heavier metal sleeve fit tightly into the opening flush with or max 1-1/2" (38mm) above the top surface of the floor assembly.
2. **Floor/Ceiling Fire Separations:**
   a) Min 20 gauge or heavier galvanized steel decking with min 1-1/2" (38mm) flute height firmly supported, with min 3" (77mm) concrete cover.
   b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4-1/2" (115mm).
3. **Firestop System, Component 1:** PFP Partners – 3600EX* or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on the top surface of the floor assembly. On 0" to 1/4" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the concrete.
4. **Firestop System, Component 2:** Filler material, mineral wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2" (90mm). Recess filler material 1/2" (13mm) for sealant placement.
5. **Through Insulating Material:** Koolphen K rigid phenolic foam insulation having a 1" (25mm) wall thickness.

***WH Labeled Component**

c US Intertek	**3600EX 4800DW**	**PFP/PH 120-06**

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Temp Rating "T" Rating
PVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" – 4"	5'	0" – 1/2"	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr
ccABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr
ABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr
FRPP Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** 1 or 2 hour rated ASTM E-119 wood framed gypsum wallboard (GWB) floor/ceiling assemblies with or without concrete topping, minimum nominal 10" depth wood or composite wood floor joists.
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 3/4" (19mm) within the annulus on top surface of floor assembly and a min of 5/8" (18mm) within the annulus of the gypsum wallboard ceiling membrane. On 0 – 1/4" (6mm) annular spaces of the floor surface, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1-1/2" toggle bolts over fender washers, at joist locations use 1-1/2" drywall screws to fasten collar directly to joists.

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	3600EX 4800DW	PFP/PH 120-07

Single Penetrations

Horizontal (floor/ceiling)

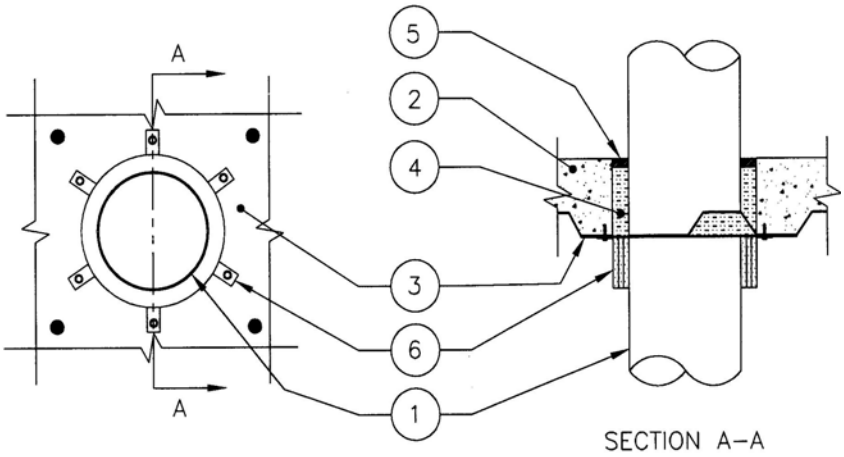
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11**: Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Temp Rating "T" Rating
PVC Plastic Pipe 1-1/2" - 6"	7"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" - 6"	7'	0" – 1/4"	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe 1-1/2" - 6"	7"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr
ccABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr
ABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr
FRPP Plastic Pipe 1-1/2" - 4"	5"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

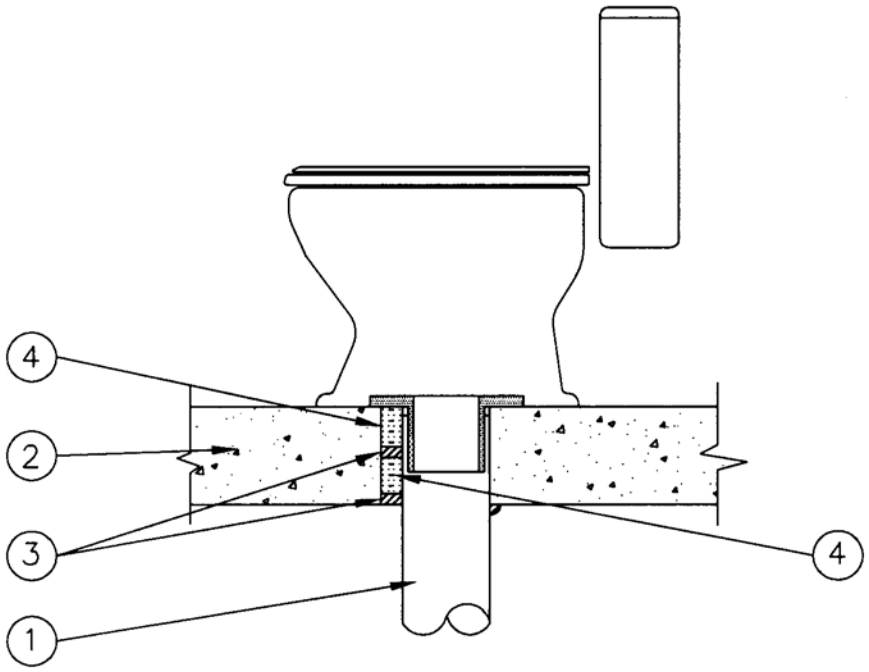
1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** Min 20 gauge or heavier galvanized steel decking with min 2" (50mm) flute depth with min 2-1/2" concrete cover.
3. **Firestop System, Component 1:** Min 18 gauge or heavier 12"x12" steel plate. Steel plate securely fastened to underside of floor separation with concrete anchors.
4. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material 1/2" (13mm) for sealant placement.
5. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly. On 0 – 1/4" (6mm) annular spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
6. **Firestop System, Component 4:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers.

***WH Labeled Component**

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Single Penetration Only
Horizontal (floor/ceiling)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water)
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F"Rating	Fire/Hose "FH" Rating	Temp "FTH" Rating
Steel and Cast Iron Pipe to 102 mm (4 in.) Sch 10 & up	152mm (6 in.)	0 – 38 mm (I-1/2 in.)	2 Hours	2 Hours	2 Hours



Water Closet Drains

System Design Instructions

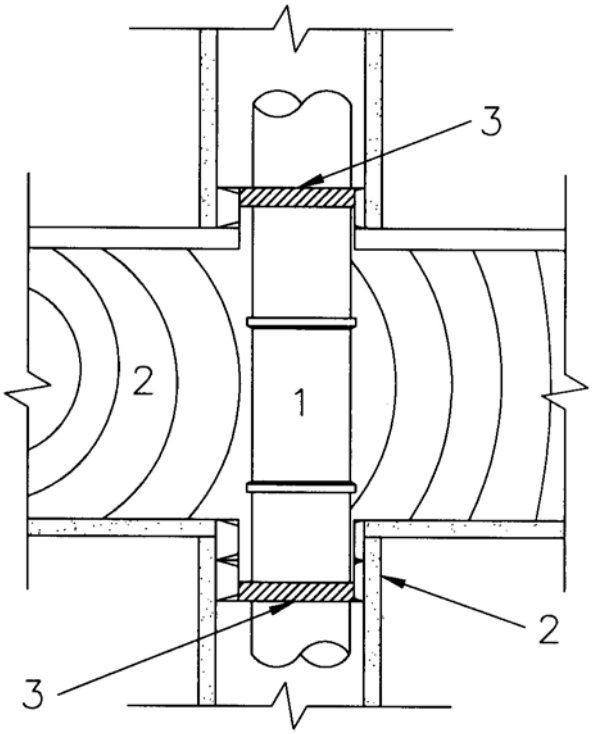
1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:** Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 115 mm (4-1/2 in.).
3. **Firestop System, Component 1:** PFP Partners – 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus to completely cover the underside of both mineral wool inserts. On 0 to 6 mm (1/4 in.) annular spaces a min 10 mm (3/8 in.) diameter fillet bead must be placed around the penetrating item on the bottom surface of the concrete.
4. **Firestop System, Component 2:** Filler material, mineral wool insulation with a minimum density of 4-68 kg/m^3 (6 PCF) compressed a minimum of 25% into the annular space in two pieces at a minimum total thickness of 90 mm (3-1/2 in.). Top insert of mineral wool to be min 51mm (2 in.) thick and bottom insert of mineral wool to be min 39 mm (1-1/2 in.) thick. Recess filler material 13 mm (1/2 in.) from the bottom surface of the concrete for sealant placement.

***WH Labeled Component**

Intertek	3600EX	PFP/PH 120-15

Single Penetrations Only
Horizontal (floor/ceiling)
Test Standards: ASTM E-814
ULC S115-M11: non-metallic open and closed systems
Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	E 814 & UL 1479 "F" Rating	E 814 & UL 1479 "T" Rating	ULC S115 "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic pipe to 4"	5"	0" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	2 Hours	2 Hours
ccPVC Plastic pipe to 4"	5"	0" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	2 Hours	2 Hours
CPVC Plastic pipe to 4"	5"	0" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	2 Hours	2 Hours
ccABS Plastic pipe to 4"	5"	0" – 1"	0 Hr	0 Hr	Up to 2 Hr	0 Hr	0 Hr
ABS Plastic pipe to 4"	5"	0" – 1"	0 Hr	0 Hr	Up to 2 Hr	0 Hr	0 Hr



System Design Instructions

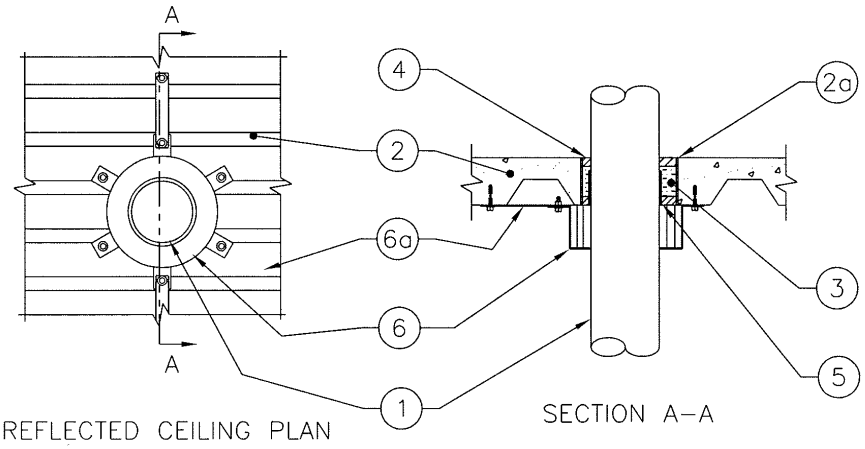
1. **Penetrating Item:** Centered or offset in hole, see table above. Couplings can penetrate the firestop system.
2. **Floor/Ceiling Fire Separation**: 1 or 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board floor/ceiling assemblies with or without concrete topping, having a minimum depth of 10-3/4" (275mm). For 1 hour ratings the penetrating item shall be contained in a 1 hour rated wall assembly. For 2 hour ratings the penetrating item shall be contained in a 2 hour rated wall assembly.
3. **Firestop System:** Passive Fire Protection Partners – 3600EX*, fill all header and sill plates contained within the wall assembly to a 1" (25mm) depth. On 0" to 1/4" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the component being penetrated.

***WH Labeled Component**

Intertek	3600EX PPC WS1	PFP/PH 120-18

Single Penetrations
Horizontal (floor/ceiling)
Test Standards: CAN/ULC S115-M11: Non-metallic open and closed systems
Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire Rating "F"	Temp Rating "T"	Hose Rating "FH"
PVC Plastic Pipe to 152mm (6 in.) ID	203mm (8 in.)	13 – 25mm (1/2 – 1 in.)	Up to 2 Hr	72 min	n/a
ccPVC Plastic Pipe to 152mm (6 in.) ID	203mm (8 in.)	13 – 25mm (1/2 – 1 in.)	Up to 2 Hr	72 min	n/a
CPVC Plastic Pipe to 152mm (6 in.) ID	203mm (8 in.)	13 – 25mm (1/2 – 1 in.)	Up to 2 Hr	72 min	n/a



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Assembly:** Min 20 gauge or heavier galvanized steel decking with min 38mm (1-1/2 in.) flute depth with min 63mm (2-1/2 in.) concrete cover. Opening to be sleeved.
   a) **Metal Sleeve:** Min 22 gauge or heavier metal sleeve friction fit, cast in place or welded within opening, flush with the top and bottom surfaces of the floor assembly.
3. **Firestop System, Component 1:** Filler material, mineral rock wool insulation with a minimum density of 68 kg/m3 (4-6 PCF) compressed a minimum of 25% into the annular space at a minimum depth of 76mm (3 in.). Recess filler material 13mm (1/2 in.) from top and bottom surfaces of floor assembly for sealant placement (Component 2).
4. **Firestop System, Component 2:** Passive Fire Protection Partners – 3600EX* installed at a minimum thickness of 13mm (1/2 in.) within the annulus on top and bottom surfaces of floor assembly. At point contact location between edge of metal sleeve and steel decking, a 13mm (1/2 in.) diameter fillet bead must be placed at all interfaces.
5. **Firestop System Component 4:** Passive Fire Protection Partners – WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 2 in.(50 mm) wide strips. One layer of wrap strip to be installed flush with bottom surface of metal sleeve, fastened in place with aluminum tape.
6. **Firestop System, Component 3:** Passive Fire Protection Partners – Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 6mm (1/4 in.) diameter by 32mm (1-1/4 in.) long steel masonry anchors over fender washers.
   a) **Metal Straps:** Min 25mm (1 in.) wide 22 gauge or heavier galv. steel metal straps sized to extend from PPC anchor tabs to underside of steel decking flutes. Maximum three metal straps installed per PPC. Metal straps secured to PPC using 6mm (1/4 in.) diameter by 25mm (1 in.) long steel bolts with nuts over fender washers. Max length of straps to be 144mm (4-1/2 in.).

***WH Labeled Component**

Single Penetrations

Horizontal (floor/ceiling)

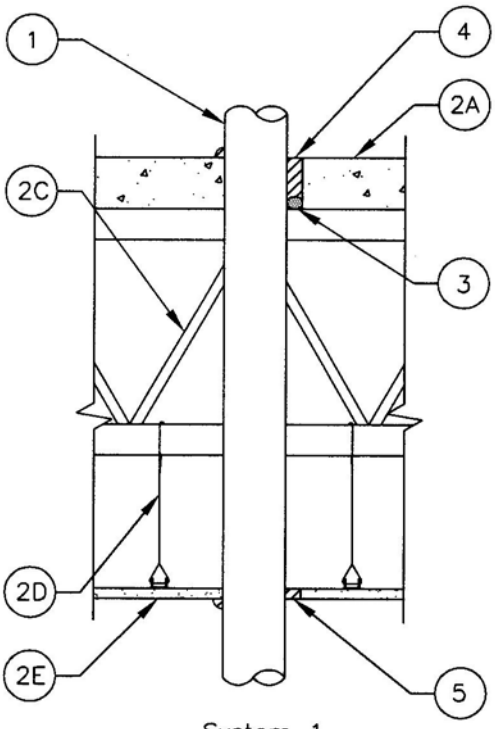
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11: Non-metallic Open and Closed Systems

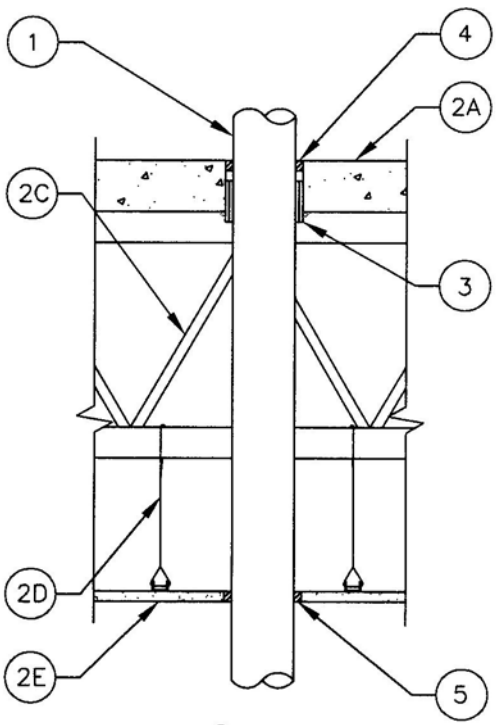
Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating
Wirsbo PEX up to 50 mm (2") ID (System 1)	88 mm (3-1/2")	0-34 mm (1-3/8")	2 Hours
Wirsbo PEX up to 50 mm (2") ID (System 2)	63 mm (2-1/2")	3 mm (1/8") – 9 mm (3/8")	2 Hours



System 1



System 2

System Design Instructions

System 1

1. **Penetrating Item:** Offset in hole - having point contact on one side and 34 mm (1 3/8") annular space on other side, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations: 2 hour rated CAN/ULC S101 floor/ceiling assembly consisting of:**
   a) Cast in place concrete floor with wire mesh reinforcement, having a total minimum thickness of 63 mm (2-1/2"),
   b) Steel form units (optional),
   c) Structural component – Steel Joist
   d) Hanger Wire – Min. 2.5 mm diameter galvanized steel wire tired to lower chord of joists and furring channels or steel framing members.
   e) Gypsum Wallboard – Min. 13 mm (1/2 in.) thick.

System 1 – Continued

3. **Firestop System Component 1:** Damming material: Backer Rod. Min 13 mm (1/2") diameter backer rod recessed within the annulus flush with bottom surface of concrete floor/ceiling assembly.
4. **Firestop System Component 2:** PFP Partners – 3500SI* installed at a minimum thickness of 50 mm (2") or 63 mm (2-1/2") within the annulus flush with top surface of concrete floor/ceiling assembly. On 0 mm to 6 mm (1/4") annular spaces a 13 mm (1/2") diameter fillet bead must be places around the penetrating item.
5. **Firestop System Component 3:** PFP Partners – 3600EX* installed at a minimum thickness of 13 mm (1/2") within the annulus flush with both top and bottom surfaces of gypsum floor/ceiling assembly. On 0 mm to 6 mm (1/4") annular spaces a 13 mm (1/2") diameter fillet bead must be places around the penetrating item.

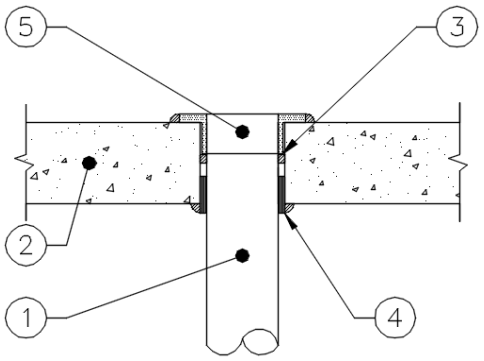
System 2

1. **Penetrating Item:** Centered or offset in hole – having min. 3 mm (1/8") and max. 9 mm (3/8") annular space, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:**
   a) Cast in place concrete floor with wire mesh reinforcement, having a total minimum thickness of 63 mm (2-1/2"),
   b) Steel form units (optional),
   c) Structural component – Steel Joist
   d) Hanger Wire – Min. 2.5 mm diameter galvanized steel wire tired to lower chord of joists and furring channels or steel framing members.
   e) Gypsum Wallboard – Min. 13 mm (1/2 in.) thick.
3. **Firestop System Component 1:** PFP Partners WS1 Wrap Strip* – Nominal 3 mm (1/8") thick intumescent material supplied in 50 mm (2") wide strips. Where penetrant is offset in opening, min. 1 layer of wrap strip fitted between penetrant and opening on one side and min 3 layers of wrap strip on the other side of penetrant. Where penetrant is concentric in opening, min two continuous layers of wrap strip friction fitted into annular space such that 13 mm (1/2") of the wrap strip extended below the bottom surface of the floor/ceiling assembly.
4. **Firestop System Component 2:** PFP Partners – 3600EX*, 4100NS* or 4800DW* – installed at a minimum thickness of 13 mm (1/2") within the annulus flush with top surface of concrete floor/ceiling assembly. A min of 13 mm (1/2") bead of 3600EX*, 4100NS* or 4800DW* is applied between interface of the concrete floor/ceiling assembly and outer layer of plastic pipe wrap strip (See Firestop System Component 3).
5. **Firestop System Component 3:** PFP Partners – 3600EX*, 4100NS* or 4800DW* – installed at a minimum thickness of 13 mm (1/2") within the annulus flush with both top and bottom surfaces of gypsum floor/ceiling assembly.

***WH Labeled Component**

Passive Fire Protection Partners
Design Number PFP/PH 120-23
Single Penetrations Only – Horizontal (Floor/Ceiling) Assembly
3600EX 4100NS 4800DW Wrap Strip WS1
Test Standards: ASTM E814, UL 1479, CAN/ULC-S115: Non-metallic Open and Closed System
Test Pressure – 50 Pa (0.2 in. of water) Positive Pressure Differential

Penetration Item Material	Nominal Pipe Size	Annular Space	Layers of Wrap Strip	ASTM E-814/ UL 1479 "F" Rating	ASTM E-814/ UL 1479 "T" Rating	CAN/ULC S115 "F" & "FH" Rating	CAN/ULC S115 "FTH" Rating
ABS Pipe	2,3 and 4 in.	3/8 in.	3	Up to 2 Hours	Up to 2 Hours	Up to 2 Hours	2 Hours
PVC Pipe	2,3 and 4 in.	3/8 in.	3	Up to 2 Hours	Up to 2 Hours	Up to 2 Hours	2 Hours



System Design Instructions

1. **PENETRATING ITEM:** Centred in opening. See table above. Single penetrations only.
2. **FLOOR/CEILING ASSEMBLY:** Use a floor/ceiling assembly with a fire-resistance rating determined in accordance with ASTM E119, UL 263, or CAN/ULC-S101, as applicable. The floor/ceiling assembly fire rating shall be equal to or greater than the "F" rating of the through-penetration firestop assembly, and shall comply with the following min. requirements:
   a) Cast in place, normal or light density concrete floor/ceiling assemblies having a min. thickness of 4-1/2 in. (113mm).
   b) Min. 20 GA or heavier galvanized steel decking with min. 1-1/2 in. (38mm) flute height firmly supported, with min. 4-1/2 in. (120.7mm) concrete cover.
3. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – 4800DW*, 4100NS*, or 3600EX* installed at a min. thickness of 1/4 in. (6mm) within the annulus at top surface of floor assembly. A min. of 1/2 in. (13mm) bead of PFP Partner 4800DW*, 4100NS*, or 3600EX* is to be applied to the interface between the penetrating item (Item 1) and the flange (Item 5), above the outer layer of intumescent wrap strip (see Firestop System Component 2).
4. **FIRESTOP SYSTEM COMPONENT 2:** PFP Partners WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 2 in. (50mm) wide strips. Wrap strip to extend to max. 1/4 in. (6mm) below the bottom surface of the floor and fastened in place with aluminum tape.
5. **SHOWER DRAIN OR TOILET FLANGE:** Use ABS or PVC, nominal 2 in. (50.8mm) shower drain flange, 3 in. (76.2mm) or 4 in.(101.6mm) toilet flange. Fitting is to slip onto the penetrating item (Item 1) and sit flush to the top surface of the floor/ceiling assembly.

*WH Labeled Component

Single Penetrations

Horizontal (floor)

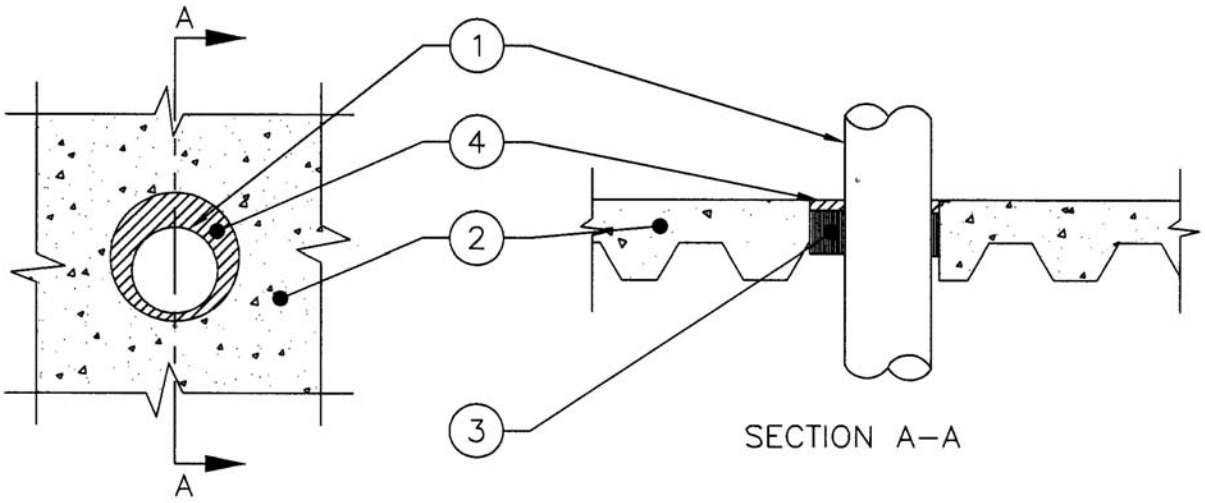
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11** Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E 814/ UL 1479 "F"	ASTM E 814/ UL 1479 "T"	ULC S115 "FH"	ULC S115 "FTH"
PVC Pipe (1" to 4")	6"	3/8" – 1-1/8"	3 Hour	121 Min.	3 Hour	121 Min.
ccPVC Pipe (1" to 4")	6"	3/8" – 1-1/8"	3 Hour	121 Min.	3 Hour	121 Min.
CPVC Pipe (1" to 4")	6"	3/8" – 1-1/8"	3 Hour	121 Min.	3 Hour	121 Min.



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:** Min 20 gauge or heavier galvanized steel decking with up to 3-1/2" (88mm) flute height firmly supported with min 2-1/2" (63 mm) concrete cover.
3. **Firestop System, Component 1:** PFP Partners – Wrap Strip WS1* – Nominal 1/8 in. thick intumescent material supplied in 2 in. (50 mm) wide strips. Min 3 layers of wrap strip to be wrapped entirely around pipe with additional wraps strips to be friction fitted to completely fill the annular space. Wrap strips to be recessed a min 1/2 in. (13 mm) below the top surface of the floor assembly to accommodate Firestop System, Component2.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*. Product must be installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly.

***WH Labeled Component**

**** Tested in accordance to Canadian Code Requirements for closed (supply) piping systems. Not tested to 50 Pa pressure differential as required by Canadian Code Requirements for combustible DWV pipes.**

Single Penetrations

Vertical (walls)

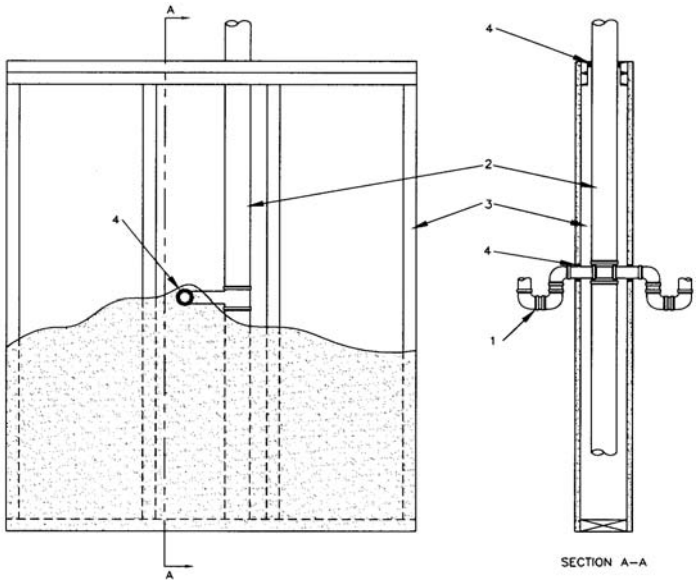
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11**: Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential - 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Item - Horizontal Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic Pipe to 1½" (open and closed systems)	2½"	¼" – 3/8"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccPVC Plastic Pipe to 1½" (open and closed systems)	2½"	¼" – 3/8"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
CPVC Plastic Pipe to 1½" (open and closed systems)	2½"	¼" – 3/8"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
Penetrating Item - Vertical Material & Size					
PVC Plastic Pipe to 3" (open and closed systems)	4"	0" - ½"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
ccPVC Plastic Pipe to 3" (open and closed systems)	4"	0" - ½"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour
CPVC Plastic Pipe to 3" (open and closed systems)	4"	0" - ½"	Up to 1 Hour	Up to 1 Hour	Up to 1 Hour



System Design Instructions

1. **Penetrating Item Horizontal:** Centered or offset in hole, see table above. Couplings can penetrate the firestop system.
2. **Penetrating Item Vertical:** Centered or offset in hole, see table above. Couplings can penetrate the firestop system.
3. **Wall Fire Separations:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board (GWB) wall assemblies.
4. **Firestop System:** PFP Partners – Firestop 3600EX* or 4800DW* fully filling the annular space to the full depth of the membrane at gypsum locations and to a 1" (25mm) depth at plate locations. On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the penetrated membrane.

***WH Labeled Component**

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	**3600EX 4800DW**	**PFP/PHV 60-02**

Single Penetrations

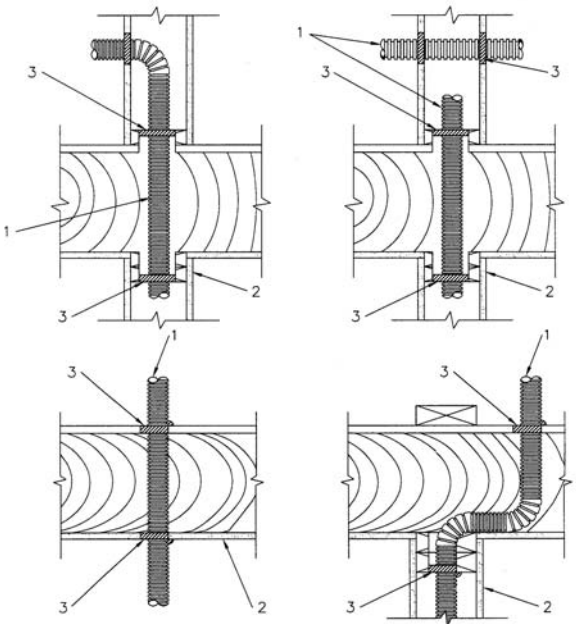
Horizontal (floor) or Vertical (wall)

Test Standards: ASTM E-814, ULC S115-M11**: Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential - 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Temperature "T" Rating
Flexible Electrical Non-metallic Tubing (ENT) up to 1-1/2 in. (38 mm)	2-1/2 in. (63.5 mm)	0 – 1 in. (0 – 25 mm)	Up to 1 Hour	Up to 1 Hour



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. ENT to be installed in accordance with Article 331 of the National Electrical Code (NFPA No. 70).
2. **Floor/Ceiling or Wall Assembly**
   a) 1 hour rated ASTM E119 wood framed floor/ceiling assembly with or without concrete topping, minimum nominal 10" (250 mm) depth wood floor joists.
   b) 1 hour rated ASTM E119 metal or wood framed gypsum wall assembly.
3. **Firestop System:** PFP Partners – Firestop 3600EX* or 4800DW* can be used as a single component firestop for service penetrations where the annual space does not exceed 1" (25mm). On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the membrane being penetrated.
   a) Framed Wall Assembly: for through penetrations install 3600EX* or 4800DW* to the full depth of the GWB membrane on both sides of the wall; for membrane penetration install 3600EX* or 4800DW* in the annular space to the full depth of the GWB membrane.
   b) Gypsum Ceiling: install 3600EX* or 4800DW* in the annular space to the full depth of the GWB membrane.
   c) Header and Sill Plates: 3600EX* or 4800DW* at minimum depth of 1" (25mm) at header plate and sill plate.
   d) Plywood Subfloor: 3600EX* or 4800DW* at minimum depth of ¾" (19mm) at plywood subfloor membrane and minimum depth of 1" at header plate.

***WH Labeled Component**

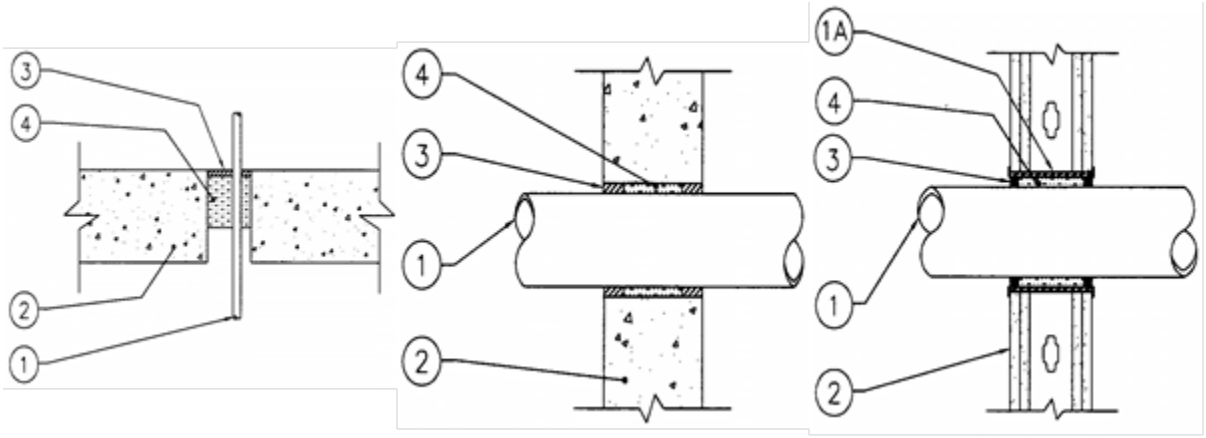
**** Not Tested to 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste Or Vent Piping Systems**

Passive Fire Protection Partners
Design Number: PFP/PHV 120-01
Single and Multiple Penetrations – Horizontal or Vertical (Floor/Ceiling and Walls)
4100NS 4100SL 4800DW 5100SP

Test Standards: ASTM E814, UL 1479, CAN/ULC S115-11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Min

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe (1 in. to 3 in.) Sch 10 & up	11 in.	1/4 in. – 4 in.	2 Hour	2 Hour	35 Min
Steel and Cast Iron Pipe (3½ in. to 8 in.) Sch 10 & up	16 in.	1/4 in. – 4 in.	2 Hour	2 Hour	19 Min
Steel and Cast Iron Pipe (8½ in. to 24 in.) Sch 10 & up	26 in.	1/4 in. – 1 in.	2 Hour	2 Hour	15 Min
Stainless Steel Pipe (1/8 in. to 24 in.) Sch 5 & up	26 in.	1/4 in. – 2-1/2 in.	2 Hour	2 Hour	15 Min
EMT/Steel Conduit Pipe (½ in. to 1 in.) Sch 10 & up	9 in.	1/4 in. – 4 in.	2 Hour	2 Hour	60 Min
EMT/Steel Conduit Pipe (1¼ in. to 6 in.) Sch 10 & up	8 in.	1/4 in. – 1 in.	2 Hour	2 Hour	15 Min
Copper Pipe and Tubing up to 4 in. ID	12 in.	1/4 in. – 4 in.	2 Hour	2 Hour	50 Min
BX/Teck Cables up to 3-3/8 in. OD (Plastic Jacket)	7 in.	1/4 in. – 2-1/2 in.	2 Hour	2 Hour	2 Hour
Loomex/Romex Electrical Wiring to 1½ in.	6-1/2 in.	1/4 in. – 2-1/2 in.	2 Hour	2 Hour	2 Hour
25Pr Telephone Cable (Plastic Jacket)	4 in.	1/8 in. – 1 in.	2 Hour	2 Hour	2 Hour
5/16 in. OD Cablevision Wire (Plastic Jacket)	4 in.	1/8 in. – 1 in.	2 Hour	2 Hour	2 Hour



System Design Instructions

1. PENETRATING ITEM: Centered or offset in hole, see table above. Single penetrations for steel pipes 6 in. to 16 in. (150 to 400mm), up to five penetrations for steel pipe, conduit or electrical wiring 1 in. (25mm) or less in diameter, up to three penetrations for copper pipe when two are 1/2 in. (13mm) or less. Steel pipes over 8 in. (200mm) in diameter, require ceramic fiber filler material (Item 4).

a) Metal Sleeve: Minimum 28 Ga or heavier metal sleeve fit tightly into the opening with a maximum annular space around sleeve to GWB of 1/16 in. (1.5mm). Metal sleeve used to support mineral wool filler material (Item 4) within hollow cavities.

2. FLOOR/CEILING OR WALL FIRE SEPARATIONS:

a) 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wallboard (GWB) wall assemblies. (Note all GWB assemblies require metal sleeves when using 4100NS*)

b) Cast in place normal or light density concrete floor/ceiling assemblies minimum thickness of 4-1/2 in. (114mm) or;

c) Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;

d) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3. **FIRESTOP SYSTEM COMPONENT 1:** PFP Partners – Firestop 4100NS* (non sag) or 4800DW* for vertical or horizontal applications or 4100SL* (self leveling) for horizontal applications. Each product must be installed at a minimum thickness of 1/4 in. (6mm) or 5100SP* (mastic) for vertical or horizontal applications sprayed into place with a minimum wet film thickness of 1/8 in. (3mm). Use 5100SP* only where the annular space does not exceed 2 in. (50mm). Always overlap 5100SP* onto the surface of the substrate a minimum of 1/2 in. (13mm). Do not thin 5100SP* firestop mastic when spraying, use equipment capable of applying material as supplied. On GWB and metal sleeve installations use only 4100NS* or 4800DW* at a minimum thickness of 1/4 in. (6mm).

4. **FIRESTOP SYSTEM COMPONENT 2:** Filler Material, mineral rock wool or ceramic fiber insulation with minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2 in. (88mm). Recess filler material 1/4 in. (6mm) for 4100NS* or 4800DW* sealant placement. Do not recess filler material for 5100SP* applications. On GWB and metal sleeve installations fill to full depth of sleeve allowing 1/4 in. (6mm) for sealant placement on each side.

***WH Labeled Component**

Single and Multiple Penetrations

Horizontal or Vertical (floor/ceiling and walls)

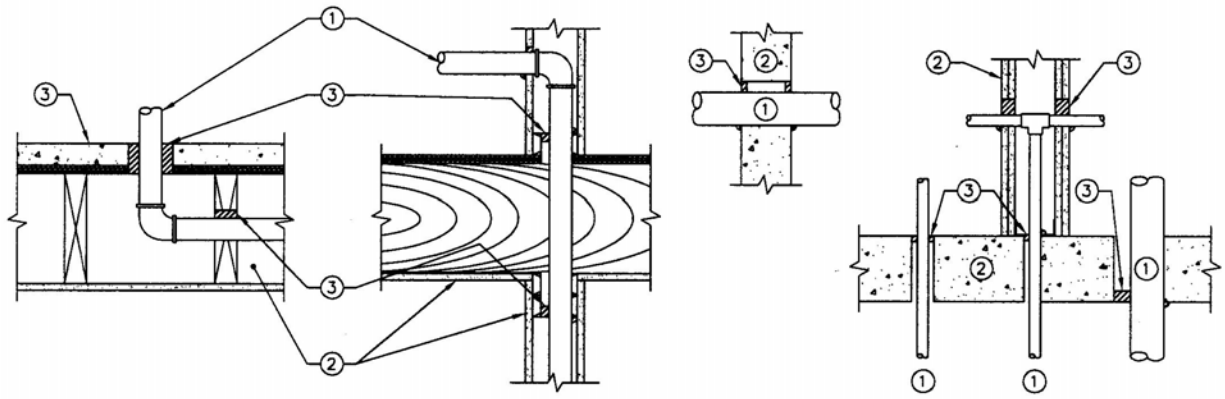
Test Standards: ASTM E-814 for all penetrations

ULC S115-M11 for metallic, electrical, optical, glass penetrations only

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
For Use In The United States Only					
PVC Plastic Pipe up to 2½" OD (Process & Supply Pipe)	5½"	0" - 1½"	2 Hour	2 Hour	2 Hour
CPVC Plastic Pipe up to 3" ID (Process & Supply Pipe)	6"	0" - 1½"	2 Hour	2 Hour	2 Hour
For Use In Canada And The United States					
Steel, EMT, Cast Pipe up to 24" (Schedule 10 and up)	26"	¼" - 1"	2 Hour	2 Hour	15 Min
Super Flo Steel Pipe up to 4" ID (Thin Wall and up)	10½"	0" - 3½"	2 Hour	2 Hour	25-88 Min
Copper Pipe and Tubing up to 4" ID (Thin Wall and up)	8"	0" - 2"	2 Hour	2 Hour	22 Min
Loomex/Romex to 1½" OD (PVC/CPVC Jacket)	4½"	0" - 1½"	2 Hour	2 Hour	18 Min
BX/Teck Cable to 3-3/8" OD (PVC/CPVC Jacket)	7"	0" - 2½"	2 Hour	2 Hour	1 and 2 Hour
Telephone, Cablevision, Fiber Optic Cable to 1" OD (PVC/CPVC Jacket)	4"	0" - 1½"	2 Hour	2 Hour	1 and 2 Hour
Single or Multiple BX/Teck Cable to 3-3/8" OD	7"	0" - 1½"	2 Hour	2 Hour	1 and 2 Hour
Borosilicate Glass Pipe up to 4" OD	7"	0" - 1½"	2 Hour	2 Hour	22 Min



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Up to 10 penetrations of steel pipe, conduit or electrical wiring 1" (25mm) diameter or less, up to 3 penetrations of copper pipe when 2 are ½" (13mm) diameter or less. Elbows, Tee's and couplings can penetrate the firestop system.
2. **Floor/Ceiling or Wall Fire Separations:** 1 hour or 2 hour rated ASTM E-119 or CAN/ULC S101 assemblies as follows:
   a) Metal or wood framed gypsum wall board (GWB) wall assemblies or;
   b) Wood framed (GWB) floor/ceiling assemblies with min. nominal 8" depth joists, with or without concrete topping.
   c) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4½" (114mm) or;
   d) Cast in place concrete wall assemblies having a minimum cross section thickness of 6" (150mm) or;
   e) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).

3. Firestop System Component 1: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* can be used as a single component firestop for service penetrations where the annular space does not exceed 1½" (37mm). For annular space exceeding 1½" (37mm) see Section 4. Firestop System Component 2. Hollow cavity GWB fire separations also require a seal where penetrating items, from the table above, exit the header or sill plates into the adjoining fire separation. On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be placed around the penetrating item. Metallic pipe and electrical penetrations of horizontal concrete fire separations require the use of filler material, see 4. Firestop System Component 2.

a) Vertical concrete fire separations: 3600EX*, 4100NS* or 4800DW* at a minimum depth of ½" (12mm). Horizontal concrete fire separations: 3600EX*, 4100NS* or 4800DW* at a minimum sealant depth of ½" (12mm) with 3" of 4-6 lb. density mineral wool compressed 25% into the annular space.

b) Framed fire separations: 3600EX*, 4100NS* or 4800DW* filled to the full depth of the GWB membrane on both sides of the fire separation.

c) Header and sill plates: 3600EX*, 4100NS* or 4800DW* at a minimum depth of ¾" at sill plate and a minimum depth of 1" at header plate.

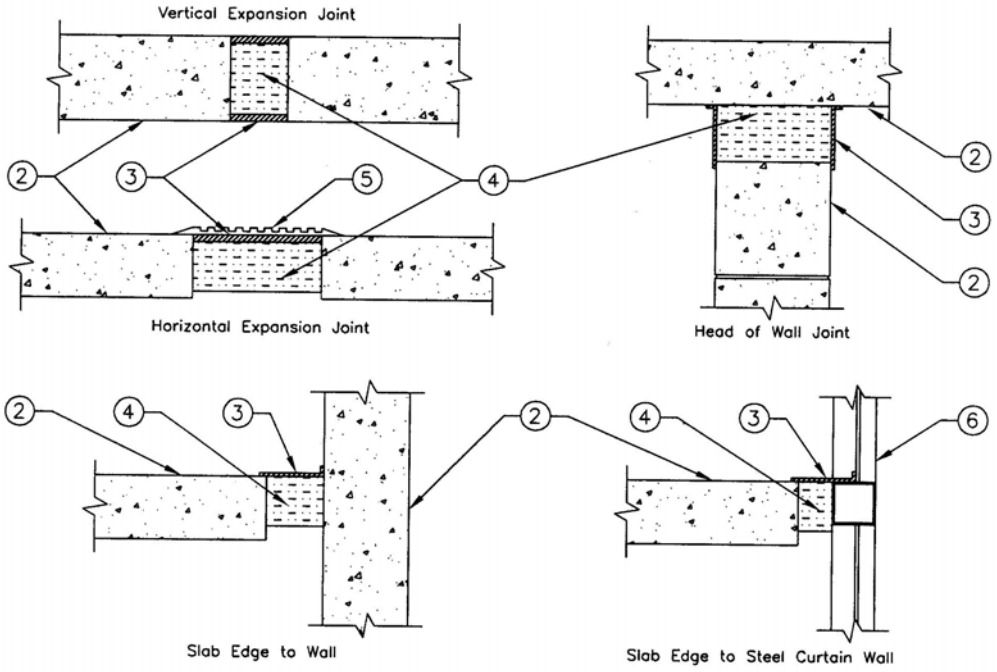
4. Firestop System Component 2: Filler Material – For annular space exceeding 1½" (37mm), install 4-6 PCF density mineral wool compressed 25% into the annular space at a depth of 3" (75mm). Recess from the surface to allow for placement of sealant.

***WH Labeled Component**

Horizontal or Vertical Expansion/Control Joints

Test Standards: ASTM E-814, UL 1479, UL 2079, ULC S115-M11
**L-Rating At Ambient < 1 CFM/Lin Ft
**L-Rating At 400° F < 1 CFM/Lin Ft
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
Max. Joint Movement – Compression 1", Extension 0"
CSI Code: 07 84 43 Fire-Resistance Joints Sealants

Penetrating Material & Size	Max Width	Fire "F" Rating	Hose "FH" Rating	Temperature "FTH" Rating
Vertical & Horizontal Joints	6" (152 mm)	Up to 2 hours	Up to 2 hours	Up to 2 hours
Horizontal Joints with Metal Cover Plate	12" (305 mm)	Up to 2 hours	Up to 2 hours	Up to 2 hours
Horizontal Joints without Cover Plate	12" (305 mm)	Up to 2 hours	N/A	Up to 2 hours



System Design Instructions

1. **Penetrating Item:** For service penetrations see System Design PFP/PHV 120-01.
2. **Floor/Ceiling or Wall Assemblies:** ASTM E-119 and CAN/ULC S101 up to 2 hour rated floor/ceiling or wall assemblies conforming to as follows:
   a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4 ½" (114mm) or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 6" (150mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).
3. **Firestop System Component 1:** PFP Partners – Firestop 4100NS* (non-sag) for vertical or horizontal applications or 4100SL* (self-leveling) for horizontal applications at a minimum wet film thickness ¼" (6mm) or 5100SP* (mastic) for vertical or horizontal applications sprayed into place with a minimum wet film thickness of 1/8" (3mm). Always overlap 5100SP* onto the surface of the substrate a minimum of ½" (13mm). Do not thin 5100SP* firestop mastic when spraying, use equipment capable of applying material as supplied.

4. **Fire System Component 2:** Filler material mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the joint space at a minimum depth of 3-1/2" (88 mm). Recess filler material 1/4" (6 mm) for 4100* series sealant placement. On joints less than 1/4" (6 mm), filler material not required.
5. **Metal Cover Plate:** On expansion/control joints over 6" (150mm) in width, cover top surface of joint with minimum 18 gauge sheet metal or 3/16" (5mm) aluminum cover plate. Overlap cover plate onto the concrete a minimum of 1½" (37mm) on each side. Reliably fasten on 8" (400mm) centers one side of the cover plate only to the concrete surface to allow for expansion/contraction.
6. **Steel Curtain Wall:** This design was tested from concrete slab edge to simulated steel curtain wall. However, possible deflection of the curtain wall system due to fire exposure has not been evaluated. The design should ensure rigidity of the curtain wall system to prevent such movement.

***WH Labeled Component**

**** Leakage Test performed on 6 inch joint using 5100SP - cycled 500 times at 10 cycles/min - 16.7% compression and extension.**

Single and Multiple Penetrations
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

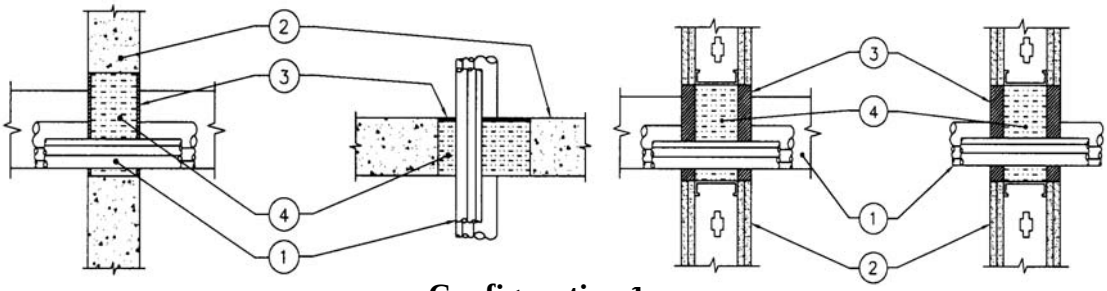
Configuration 1

Penetrating Material & Size	Annular Space	E814 & UL 1479 Fire "F" Rating	E814 & UL 1479 Temp "T" Rating	CAN/ULC S115 Fire "F" Rating	CAN/ULC S115 Fire/Hose "FH" Rating	CAN/ULC S115 Temp Rating "FTH" Rating
EMT/Steel Conduit and Pipe (1/2 to 1) Sch 10 & up	0" - 3"	Up to 2 Hour	90 Min	Up to 2 Hour	Up to 2 Hour	90 Min
EMT/Steel Conduit and Pipe (1-1/4 to 6) Sch 40	0" - 3"	Up to 2 Hour	25 Min	Up to 2 Hour	Up to 2 Hour	25 Min
Copper Pipe and Tubing up to 2" ID	0" - 3"	Up to 2 Hour	55 Min	Up to 2 Hour	Up to 2 Hour	55 Min
Multple BX/Teck Cable to 3-3/8 OD	0" - 3"	Up to 2 Hour	45 Min	Up to 2 Hour	Up to 2 Hour	45 Min

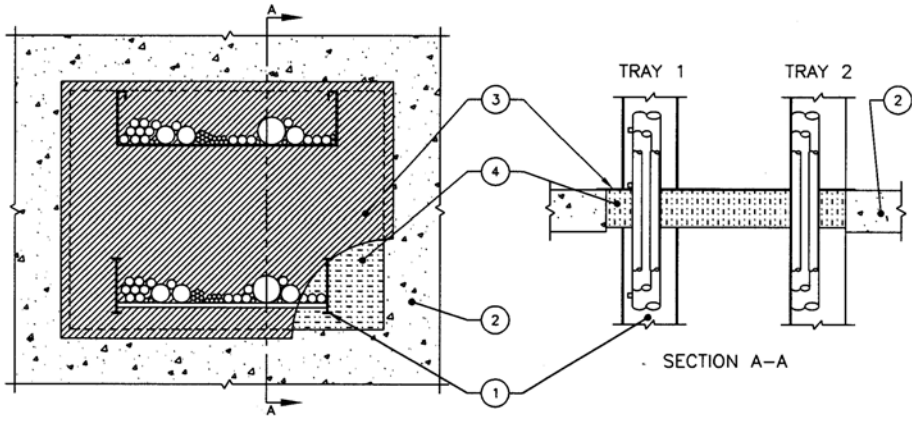
Configuration 2

L Rating At Ambient – 7.1 CFM
L Rating At 400° F – 5.8 CFM

Penetrating Material & Size	Annular Space	E814 & UL 1479 Fire "F" Rating	E814 & UL 1479 Temp "T" Rating	CAN/ULC S115 Fire "F" Rating	CAN/ULC S115 Fire/Hose "FH" Rating	CAN/ULC S115 Temp Rating "FTH" Rating
Cable Trays	See Item 1	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
EMT/Steel Conduit and Pipe (1/2 to 4) Sch 10 & up	See Item 1	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
EMT/ Flexible Steel Conduit (1/2 to 4)	See Item 1	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Insulated Copper Pipe and Tubing up to 4" ID	See Item 1	Up to 2 Hour	90 Min	Up to 2 Hour	Up to 2 Hour	90 Min
Multple BX/Teck Cable to 3-3/8 OD	See Item 1	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min



Configuration 1.



Configuration 2.

System Design Instructions

Configuration 1

1) **Penetrating Item:**
   a. Steel cable tray 4 in. x 30 in. (100 x 750 mm) filled to a maximum of 50% with any of the items in the table above or,
   b. Bundled cables, tubing, conduits and pipes listed in table above installed within the opening such that aggregate cross sectional area of penetrants in the opening is max 58 percent of the cross sectional area of the opening in assembly. The annular space between penetrants and the periphery of the opening are to be min 0 in. (point contact) to max 3 in. (75 mm).
   c. The maximum opening is 480 in^2 (0.31 m^2). All penetrating items must be reliably supported.

2) **Floor/Ceiling or Wall Assemblies:** 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 wall or floor/ceiling assemblies as follows:
   a. Metal or wood framed gypsum wall board (GWB) wall assemblies with opening within the wall assembly completely framed to form a rectangular box or;
   b. Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4-1/2 in. (112mm) or;
   c. Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;
   d. Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3) **Firestop System Component 1:** PFP Partners –
   a. Firestop 4100NS* (non sag, 4800DW* or 3600EX* for vertical or horizontal applications or 4100SL* (self leveling) for horizontal applications. Each product must be installed at a minimum wet film thickness of 1/4 in. (6mm).
   b. 5100SP* (mastic) for vertical or horizontal applications sprayed into place with a minimum wet film thickness of 1/8 in. (3mm). Always overlap 5100SP* onto the surface of the substrate a minimum of 1/2 in. (13mm). Do not thin 5100SP* firestop mastic when spraying, use equipment capable of applying material as supplied.

4) **Firestop System Component 2:** Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4 in. (100 mm). Recess filler material 1/4 in. (6mm) for 3600EX*, 4100NS*, 4100SL* or 4800DW* sealant placement. Do not recess filler material for 5100SP* applications.

Configuration 2.

1) **Penetrating Item:**
Cable Tray: Maximum 2 cable trays per opening. Maximum 24 in. wide by 6 in. steel, aluminum or stainless steel cable tray solid back or ladder type. Cable tray spacing to be minimum 6 in. to a maximum 11 in. apart. The cable trays are to be installed a minimum of 0 in. (point contact) to max 6 in. from the periphery of the opening. Maximum cable tray fill to be 40% by area. All penetrating items must be reliably supported. Cable trays to may be filled with any combination of the following:

- **Cables:** Communication or power cables, single or in bundles and installed with rigid support on both sides of opening.
- **Steel Conduit / EMT:** Nominal 4 in. diameter or smaller flexible steel or steel tubing.
  Steel conduit or EMT to be installed with such that a min 1/2 in. annular space is maintained between steel conduit/EMT and other penetrants.
- **Insulated Metallic Pipes:** Maximum 4 in. diameter (or smaller) copper piping or tubing. Pipes to be insulated with nominal 1 in. thick mineral wool pipe insulation.

2) **Floor/Ceiling or Wall Assemblies:** 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 wall or floor/ceiling assemblies having a maximum opening size 884 sq. in. with max dimension of 34 in. as follows:

a. Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4-1/2 in. (112mm) or;
b. Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;
c. Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3) **Firestop System Component 1:** PFP Partners –

a. Firestop 3600EX*, 4100NS* (non sag), or 4800DW* for vertical or horizontal applications or 4100SL* (self leveling) for horizontal applications. Each product must be installed at a minimum wet film thickness of 1/4 in. (6mm).
b. 5100SP* (mastic) for vertical or horizontal applications sprayed into place with a minimum wet film thickness of 1/8 in. (3mm). Always overlap 5100SP* onto the surface of the substrate a minimum of 1/2 in. (13mm). Do not thin 5100SP* firestop mastic when spraying, use equipment capable of applying material as supplied.

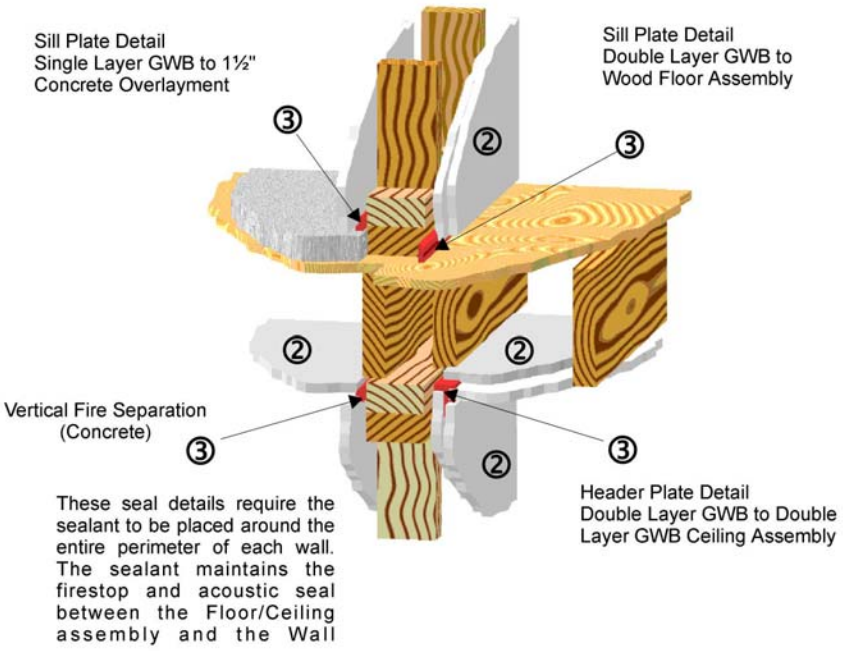
4) **Firestop System Component 2:** Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 40% into the annular space at a minimum depth of 4 in. (100 mm). Recess filler material 1/4 in. (6mm) for 3600EX*, 4100NS*, 4100SL* or 4800DW* sealant placement. Do not recess filler material for 5100SP* applications.

***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW**	**PFP/PHV 120-06**

****Fire Rated Non-Flammable Acoustic Firestop Sealant**
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

	Fire "F" Rating	**Fire/Hose "FH" Rating**	**Temp "FTH" Rating**
ASTM E-814	2 Hour	2 Hour	2 Hour
CAN/ULC S115	2 Hour	2 Hour	2 Hour



System Design Instructions

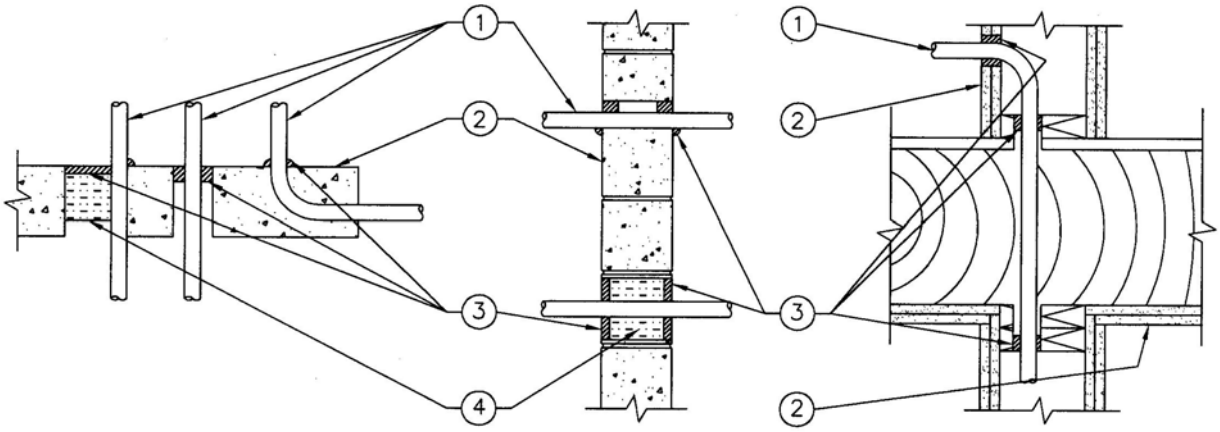
1. **Penetrating Item:** Not applicable.
2. **Floor/Ceiling or Wall Fire Separations:** 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 concrete, metal or wood framed fire rated gypsum wall board (GWB) floor/ceiling/wall assemblies.
3. **Firestop System Component 1:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* firestop sealant at a minimum bead diameter of 3/8" (10mm) caulked into the corner and behind the GWB around the entire perimeter or the fire rated wall assembly. Attach gypsum wall board (GWB) membranes into the sealant within 15 min of sealant placement or prior to sealant skinning.
4. **Firestop System Component 2:** Filler material not required.

***WH Labeled Component**
****The acoustic claims have not been verified by Intertek Testing Services.**

Intertek	**3600EX 4800DW**	**PFP/PHV 120-11**

Single and Multiple Penetrations
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Temperature "T" Rating
Plasco X-Linked Polyethylene Tubing to 1" (25 mm) ID	4-1/4" (108 mm)	0 – 3" 0 – 76 mm	Up to 2 Hrs	Up to 2 Hrs
Wirsbo X-Linked Polyethylene Tubing to 1-1/2" (38 mm) ID	4-3/4" (121 mm)	0 – 3" 0 – 76 mm	Up to 2 Hrs	Up to 2 Hrs



System Design Instructions

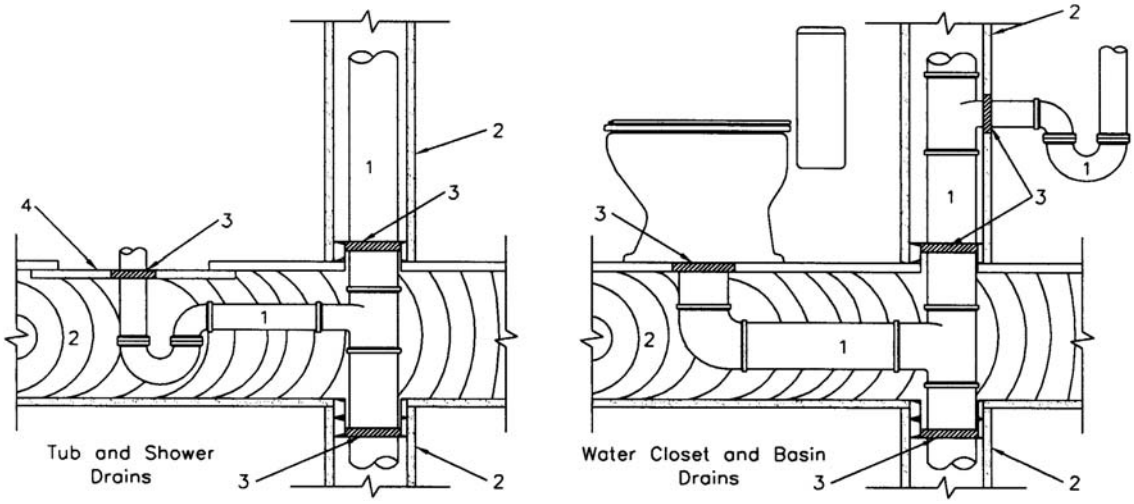
1. **Penetrating Item:** Centered or offset in hole, see table above. For horizontal concrete fire separations, 1 penetration of Wirsbo X-linked polyethylene tubing, 1½" (38mm) or 1¼" (32mm) in diameter; up to 5 penetrations of Wirsbo or Plasco X-linked polyethylene tubing, 1" (25mm) or less in diameter; up to 9 penetrations of Wirsbo or Plasco X-linked polyethylene tubing, ¾" (19mm) or less in diameter. For gypsum wallboard penetrations, 1 penetration per opening. PE, PVC sleeving and bend support hardware may be used in the installation. Elbows, Tee's and couplings can penetrate the firestop system. Do not use this system design on combustible (plastic) Drain Waste Vent (DWV) piping.
2. **Floor/Ceiling or Wall Fire Separations:** 1 or 2 hour rated ASTME-119 floor/ceiling/wall assemblies as follows:
   a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4½" (114mm) or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 4½" (114mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 4½" (114mm).
   d) Metal or wood framed gypsum wallboard (GWB) wall floor/ceiling assemblies.
3. **Firestop System Component 1:** PFP Partners – Firestop 4800DW* or 3600EX* firestop sealant must be installed on both sides of wall assemblies. On 0" to ¼" (6mm) annular spaces a 3/8" (9mm) diameter surface fillet bead must be placed around the penetrating item.
   a) Concrete assemblies: 4800DW* or 3600EX* firestop sealant can be used as a single component on penetrations of concrete fire separations where the annular space does not exceed 1" (25mm). Install 4800DW* to a 1" (25mm) depth. For annular space exceeding 1", (25mm) install 4-6 lb. (64 kg/m^3) density mineral wool compressed 25% into the annular space. Install 4800DW* or 3600EX* firestop sealant to a ½" (12 mm) depth. See Section 4. Firestop System Component 2.
   b) Gypsum Wall Board assemblies: 4800DW* or 3600EX* firestop sealant filled to the full depth of the membrane on both sides of the wall assembly. Fill all header and sill plates contained within the wall assembly to a minimum 1" (25mm) depth.
4. **Firestop System Component 2:** Filler material: For concrete and concrete block assemblies when annular space exceeds ½" (12mm). Install 4-6 lb. (64 kg/m^3) density mineral wool compressed 25% into the annular space to a depth of 3" (75mm). Recess filler material to allow for sealant placement.

***WH Labeled Component**

Single Penetrations

Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814 for all penetrations;
ULC S115-M11** for metallic open and closed systems only
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
ccABS Plastic Pipe to 4" (open and closed systems)	7"	1/8" - ½"	Up to 1 Hr	Up to 1 Hr	45 Min
ABS Plastic Pipe to 4" (open and closed systems)	7"	1/8" - ½"	Up to 1 Hr	Up to 1 Hr	45 Min
PVC Plastic Pipe to 4" (open and closed systems)	5¼"	0" - ¾"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe to 4" (open and closed systems)	5¼"	0" - ¾"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe to 4" (open and closed systems)	5¼"	0" - ¾"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
Polyethylene Plastic Pipe to 1" (closed systems)	3"	¼" -½"	Up to 1 Hr	Up to 1 Hr	Up to 1 Hr
Copper Pipe and Tubing up to 4" ID	7"	¼" -½"	Up to 2 Hr	Up to 2 Hr	23 Min
Cast Iron Pipe up to 4" ID	7"	¼" -½"	Up to 2 Hr	Up to 2 Hr	55 Min



System Design Instructions

1. Penetrating Item: Centered or offset in hole, see table above. Elbows, Tee's and couplings can penetrate the firestop system.

2. Floor/Ceiling or Wall Fire Separations:

a) 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wallboard (GWB) floor/ceiling/wall assemblies with or without concrete topping.

b) 1 or 2 hour rated metal or wood framed gypsum wallboard wall assemblies.

c) Wood framed floor/ceiling assemblies:
1 Hour Assembly with minimum nominal 10" (254 mm) depth wood floor joists.
2 Hour Assembly with minimum nominal 10" (254 mm) depth wood floor joists.

d) Concrete floor assemblies minimum 4½" (114mm) depth provided the penetrating item is contained within a fire rated wall assembly.

3. **Firestop System Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* fully filling the annular space to the full depth of the membrane. Fill all header and sill plates contained within the wall assembly to a 1" (25mm) depth. On 0" to ¼" (6mm) annular spaces a 3/8" (10mm) diameter fillet bead must be place around the penetrating item on the surface of the GWB assembly.
4. **Firestop System Component 2:** One layer of 5/8" Type “X” gypsum wallboard filler material securely fastened with drywall screws on 4" (100mm) centers to reduce tub drain hole sizes up to 12" x 16" (300 x 400mm). Caulk a 3/8" (10mm) bead around perimeter edges of GWB insert after installation.

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	3600EX 4800DW	PFP/PHV 120-15

Single Penetrations

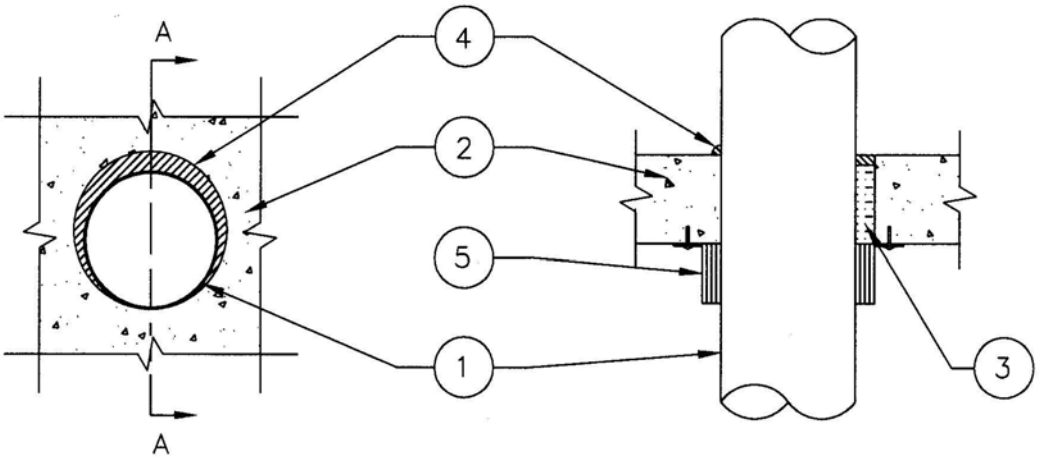
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" - 4"	5'	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ABS Plastic Pipe 1-1/2" - 2"	3"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccABS Plastic Pipe 1-1/2" - 2"	3"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
FRPP Plastic Pipe 1-1/2" - 2"	3"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe 1-1/2" – 3"*	4"	0" – 1/2"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. *CPVC pipe for non-DVW (drain, waste or vent) applications only.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4 1/2 in. thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. thick concrete blocks (filled or unfilled).
3. **Firestop System, Component 1** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material 1/2" (13mm) for sealant placement.
4. **Firestop System, Component 2:** PFP Partners – Firestop 4800DW* or 3600EX* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 1/4" (6mm) annular spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
5. **Firestop System, Component 3:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

Intertek	3600EX 4800DW	PFP/PHV 120-16

Single Penetrations

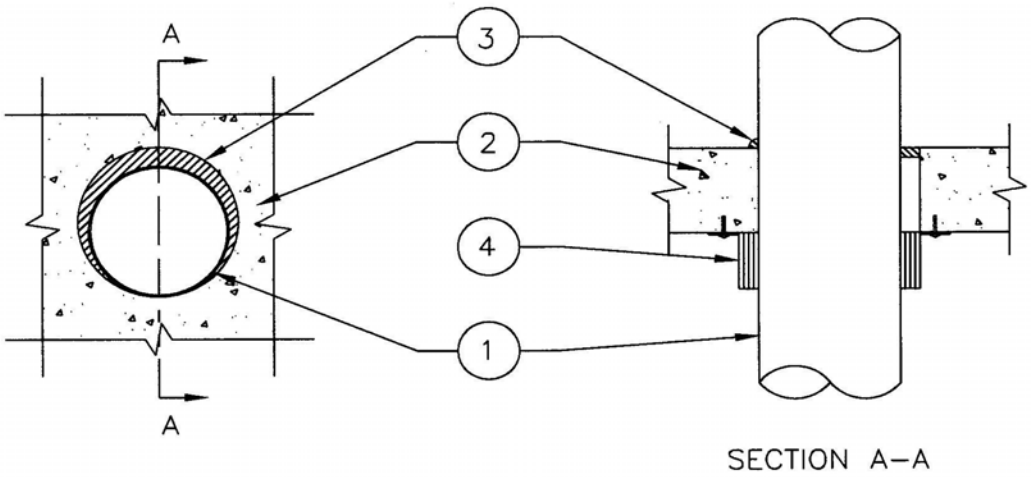
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ABS Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	110 min.
ccABS Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	110 min.
FRPP Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4-1/2" thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8" thick concrete blocks (filled or unfilled).
   Hole Core Concrete (Not Shown): Hollow core pre-cast concrete floor/ceiling assembly having a min cross sectional thickness of 6 in. to be sealed on the both sides of the floor with a min 1/2" thickness of PFP Partners – Firestop 4800DW* or 3600EX* caulking.
3. **Firestop System, Component 1** PFP Partners – Firestop 3600EX* or 4800DW* installed as 1/2" diameter fillet bead around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

Intertek	3600EX 4800DW	PFP/PHV 120-17

Single Penetrations - (Process & Supply)**

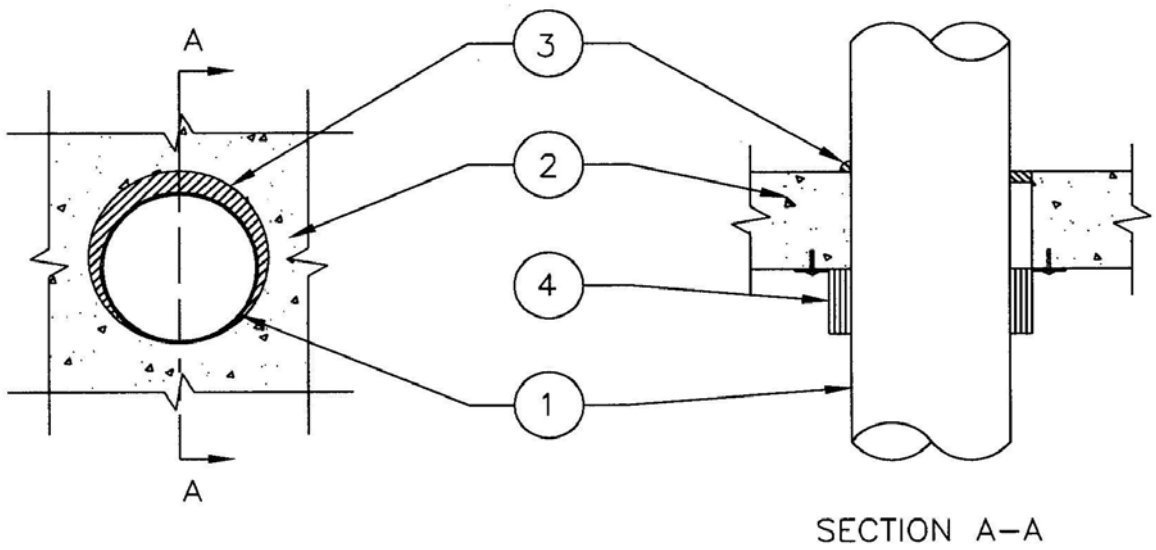
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
CPVC Plastic Pipe 1-1/2" - 2"	2 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
PVC Plastic Pipe 1-1/2" - 4"	4 1/2"	0" – 1/4"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item**:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4-1/2 in. thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. thick concrete blocks (filled or unfilled).
3. **Firestop System, Component 1** PFP Partners – Firestop 3600EX* or 4800DW* installed as 1/2" (13mm) diameter fillet bead around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners – Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Intertek	3600EX 4100NS 4800DW	PFP/PHV 120-18

Single Penetrations Only

Horizontal (floor/ceiling) or Vertical (wall)

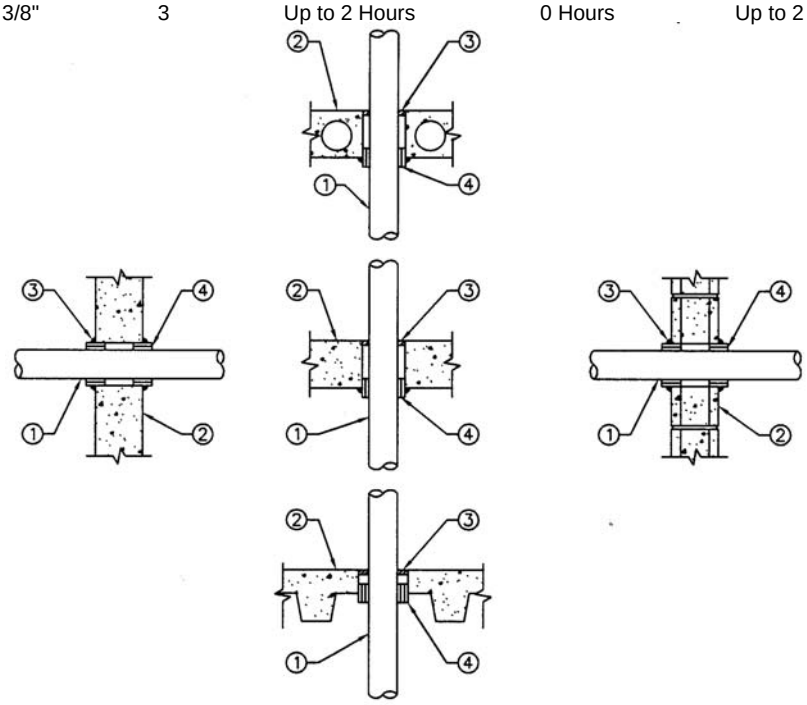
Test Standards: ASTM E-814, UL 1479: open and closed systems

ULC S115-M11** – Closed systems

Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Item Material	Nom Pipe Size (in.)	Annular Space (in.)	Layers of Wrap Strip	ASTM E814/UL1479 "F" Rating	ASTM E814/UL1479 "T" Rating	ULC S115 "F" & "FH" Rating	ULC S115 "FTH" Rating
PVC Pipe	Up to 3"	1/4"	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ccPVC Pipe	Up to 3"	1/4"	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
CPVC Pipe	Up to 3"	1/4"	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ABS Pipe	Up to 3"	1/4"	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
FRPP Pipe	Up to 2"	1/8"	1	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
FRPP Pipe	Up to 3"	1/4"	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
FRPP Pipe	Up to 4"	3/8"	3	Up to 2 Hours	0 Hours	Up to 2 Hours	0 Hours



System Design Instructions

1. Penetrating Item: Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.

2. Floor/Ceiling or Wall Assembly:

a) Hollow core pre-cast concrete floor/ceiling assembly having a min cross section thickness of 6 in. (150 mm),

b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4 1/2 in.(113 mm),

c) Cast in place concrete wall assemblies having a minimum cross section thickness of 4 1/2 in. (113 mm) ,

d) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 6 in. (150mm) or,

e) Min. 2 hour fire rated floor assembly. Min. 20 gauge or heavier galvanized steel decking with min. 4 ½" (113mm) concrete cover.

3. Firestop System Component 1: PFP Partners – 3600EX*, 4100NS*, or 4800DW* installed at a minimum thickness of 1/4 in. (6 mm) within the annulus at top surface of floor assembly. A minimum of 1/2 in. (13 mm) bead of PFP Partner 3600EX*, 4100NS* or 4800DW* is to be applied between interface of the floor or wall and the outer layer of intumescent wrap strip (see Firestop System Component 2).

4. Firestop System Component 2: PFP Partners WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 2 in. (50 mm) wide strips. See table for number of layers of wrap strip friction fitted into annular space. Wrap strip to extend max. 1/4 in. (6mm) below the bottom surface of the floor or both sides of the wall and fastened in place with aluminum foil tape.

*** WH Labeled Component**

** **Tested in accordance to Canadian Code requirements for FRPP pipes. PVC, ABS and CPVC not tested to 50 Pa Pressure Differential as required by Canadian Code Requirements for combustible DWV pipes.**

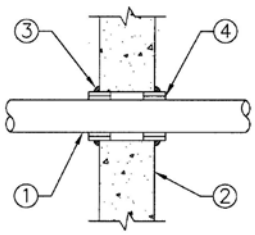
ITS Intertek Testing Services

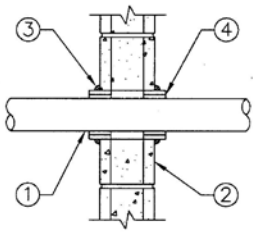
FL06/13

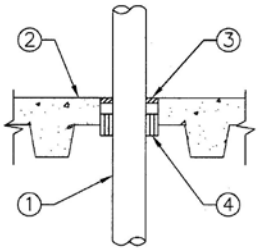
Passive Fire Protection Partners
Design No. PFP/PHV 120-19
Single Penetrations Only - Horizontal (floor/ceiling) or Vertical (wall) Firestopping
3600EX 4100NS 4800DW Wrap Strip WS1
Test Standards: ASTM E814, UL 1479, CAN/ULC-S115: Non-metallic Open and Closed Systems
Test Pressure – 50 Pa (0.2 in. of water) Positive Pressure Differential

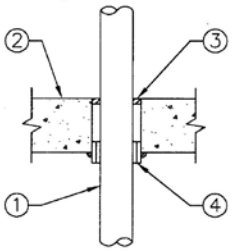
Penetrating Item Material	Nominal Pipe Size	Annular Space	Layers of	ASTM E814/ UL1479 "F" Rating	ASTM E814/ UL1479 "T" Rating	CAN/ULC S115 "F" & "FH" Rating	CAN/ULC S115 "FTH" Rating
PEX Pipe	Up to 2 in. ID	1/4 in.	2	Up to 2 hours	1/4 Hour	Up to 2 Hours	1/4 Hour
PE/PE-RT Pipe	Up to 2 in. ID	1/4 in.	2	Up to 2 hours	1/4 Hour	Up to 2 Hours	1/4 Hour
PVC Pipe	Up to 2 in.	1/8 in.	1	Up to 2 Hours	3/4 Hour	Up to 2 Hours	3/4 Hour
PVC Pipe	< 2 in. to 3 in.	1/4 in.	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
PVC Pipe	<3 in. to 4 in.	3/8 in.	3	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ccPVC Pipe	Up to 2 in.	1/8 in.	1	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ccPVC Pipe	< 2 in. to 3 in.	1/4 in.	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ccPVC Pipe	< 3 in. to 4 in.	3/8 in.	3	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
CPVC Pipe	Up to 2 in.	1/8 in.	1	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
CPVC Pipe	< 2 in. to 3 in.	1/4 in.	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
CPVC Pipe	< 3 in. to 4 in.	3/8 in.	3	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ABS Pipe	Up to 2 in.	1/8 in.	1	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ABS Pipe	< 2 in. to 3 in.	1/4 in.	2	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
ABS Pipe	<3 in. to 4 in.	3/8 in.	3	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours
FRPP Pipe**	Up to 2 in.	1/8 in.	1	Up to 2 Hours	2 Hours	Up to 2 Hours	2 Hours

**** Not tested through concrete fluted deck floor assembly**









1. **PENETRATING ITEM:** Centered in hole, See table above. Single penetrations only.

2. **FLOOR/CEILING OR WALL FIRE SEPARATION:** Use a floor/ceiling or wall assembly with a fire resistance rating determined in accordance with ASTM E119, UL263 or CAN/ULC S101, as applicable. The floor/ceiling or wall assembly fire rating shall be equal to or greater than the "F" rating of the through-penetration firestop assembly, and shall comply with the following min. requirements:

   A. Cast in place, normal or lightweight density concrete floor/ceiling assembly having a minimum cross section thickness of 4-1/2 in. (113 mm);
   B. Cast in place concrete wall assembly having a minimum cross section thickness of 4-1/2 in. (113 mm) or
   C. Holl or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar, having a min. cross section thickness 8 in. (200 mm) or
   D. Min. 20 GA or heavier steel decking with min. 1-1/2 in. (36 mm) flute height firmly supported, with min. 3 in. (75 mm) concrete cover.

3. **FIRESTOP SYSTEM, COMPONENT 1:** PFP Partners – 4800DW*, 4100NS* or 3600EX* installed at a minimum thickness of 1/4 in. (6 mm) within the annulus at top surface of floor assembly. A minimum of 1/2 in. (13 mm) bead of PFP Partner 4800DW*, 4100NS* or 3600EX* is to be applied between interface of the floor or wall and the outer layer of intumescent wrap strip (see Firestop System Component 2). Note: For PE (Polyethylene Pipe) use only 3600EX.

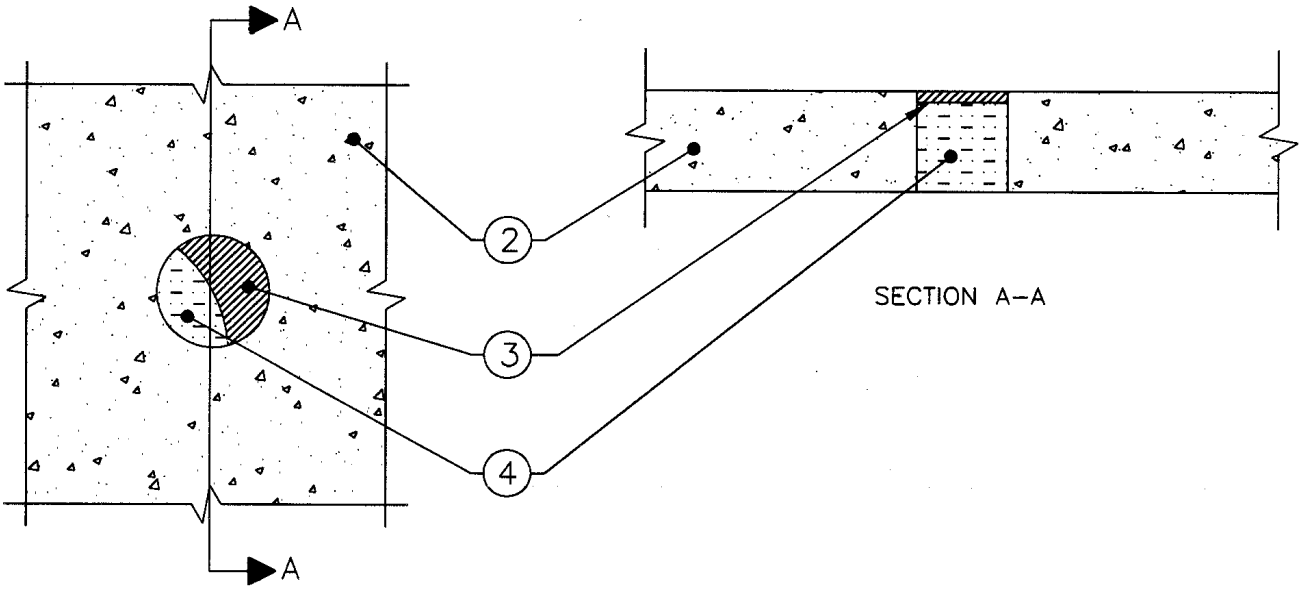
4. **FIRESTOP SYSTEM, COMPONENT 2:** PFP Partners WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 2 in. (50 mm) wide strips. See table for number of layers of wrap strip friction fitted into annular space. Wrap strip to extend max. 1/4 in. (6 mm) below the bottom surface of the floor or both sides of the wall and fastened in place with aluminum tape. PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1- 1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along seam of sleeve of firestop component 1.

***WH Labelled Component**

Intertek	**3600EX 4100NS 4100SL 4800DW 5100SP**	**PFP/PHV 120-20**

Voids
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Maximum Opening	ASTM E814/UL 1479 "F" Rating	ASTM E814/UL 1479 "T" Rating	ULC S115 "FTH" Rating
8 in. (200 mm)	Up to 2 Hours	Up to 2 Hours	Up to 2 Hours



System Design Instructions

1. Penetrating Item: None.

2. Floor/Ceiling Assemblies:

a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4 ½" (114mm).

b) Cast in place concrete wall assemblies having a minimum cross section thickness of 6" (150mm) or;

c) Hollow or Concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).

3. Firestop System Component 1:

a) PFP Partners - Firestop 3600EX*, 4100NS*, or 4800DW* for vertical or horizontal applications. Each product must be installed at a minimum thickness of ½" (13 mm) on top surface of floor or both surfaces of wall.

b) PFP Partners - Firestop 5100SP* (sprayable mastic) for vertical or horizontal applications or 4100SL* (self-leveling) for horizontal applications. Firestop 5100SP* to be sprayed into place with a minimum wet film thickness of ¼" (6 mm) on top surface of floor or both surfaces of wall. Do not thin 5100SP* firestop mastic when spraying, use equipment capable of applying material as supplied. Firestop 4100SL* to be installed into place with a minimum wet thickness of ¼" (6 mm) on top surface of floor.

4. Firestop System Component 2: Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed to a minimum of 30% into the annular space at a minimum depth of 4" (100mm). Recess filler material ½" (13mm) for 3600EX*, 4100NS* or 4800DW* caulk placement. Recess filler material ¼" (6mm) for 4100SL* self leveling sealant and 5100SP* spray applications.

***WH Labeled Component**

Intertek	3600EX 4100NS 4800DW	PFP/PHV 120-22

Single Penetrations

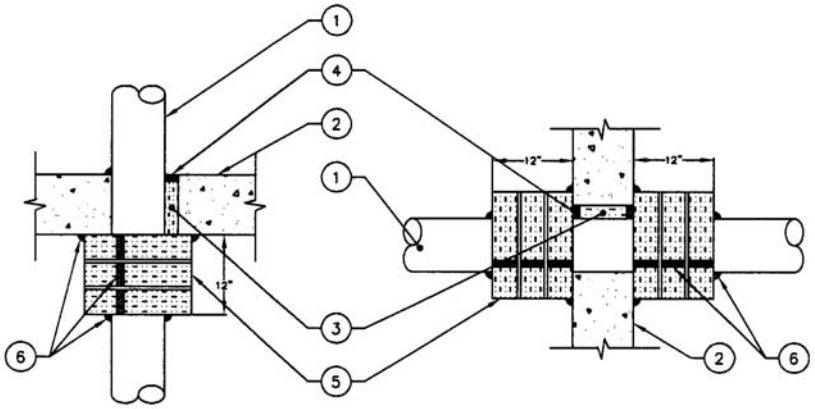
Horizontal or Vertical (floor/ceiling and walls)

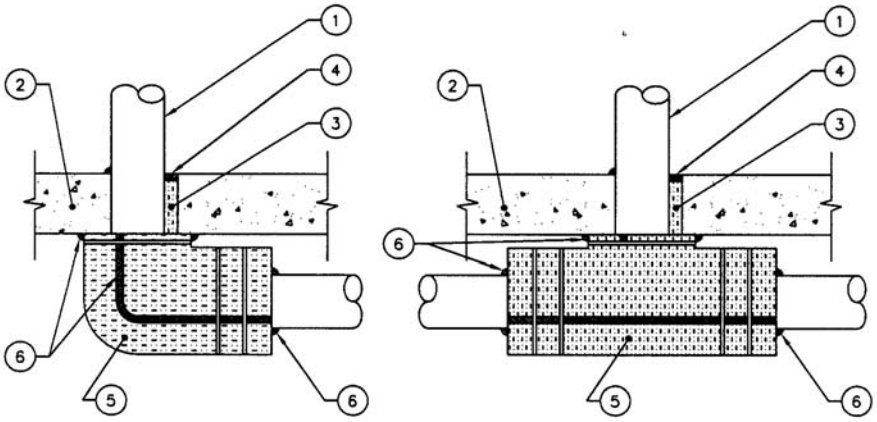
Test Standards: ASTM E-814, UL 1479, ULC S115-M11

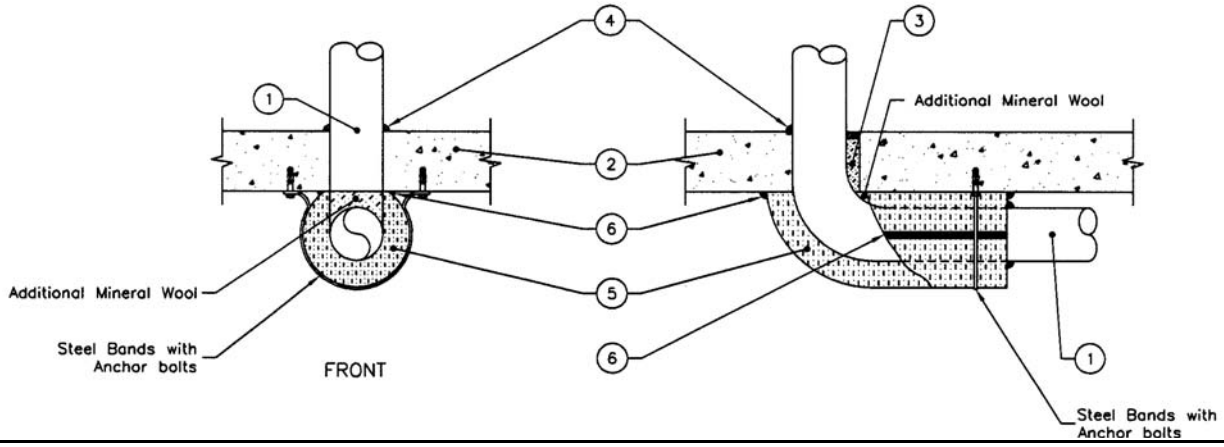
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

	Max Hole	Annular	ASTM E814 / UL 1479		ULC S115
Penetrating Material and Size	**Size**	**Space**	**"F" Rating**	**"T" Rating**	**"FTH" Rating**
Steel Pipe Sch 40 (or heavier) up to 4"	5"	0" – 1"	2 hours	2 hours	2 hours
Cast Iron Pipe Sch 40 (or heavier) up to 4 " - Produced by Canadian Foundry Association Member Companies	5"	0" – 1"	2 hours	2 hours	2 hours







ITS Intertek Testing Services

FL06/13 (1)

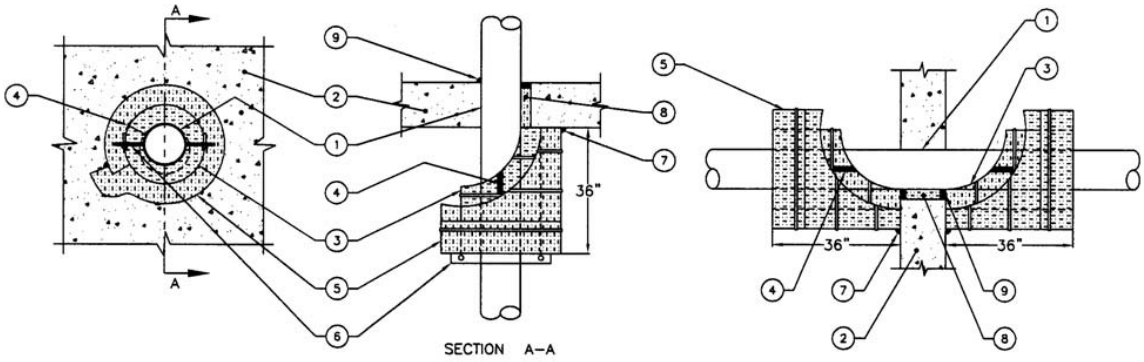
System Design Instructions

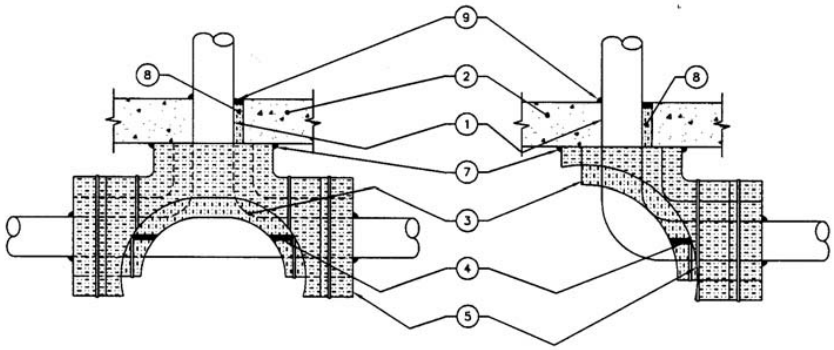
1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Penetrating item may be connected to an elbow, coupler or tee fitting below slab.
2. **Floor/Ceiling or Wall Fire Separation:** Fire rated ASTM E-119 and CAN/ULC S101 floor/ceiling/wall assemblies as following:
   a) Cast in place normal or lightweight density concrete floor/ceiling assembly having a minimum cross section thickness of 7 in. (179 mm);
   b) Cast in place concrete wall assembly having a minimum cross section thickness of 7 in. (179 mm) or;
   c) Concrete block wall assembly solidly filled with cementitous grout having a minimum cross section of 8 in. (200 mm).
3. **Firestop System, Component 1:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 6 in. (150 mm). Recess filler material 1/2 in. (13 mm) from top surface of floor and both sides of wall assembly for sealant placement.
4. **Firestop System, Component 2:** PFP Partners – 3600EX*, 4100NS* or 4800DW* to be installed at a minimum thickness of 1/2 in. (13 mm) within the annulus on top surface of floor or both surfaces of wall assembly. On 0 – 1/4 in. (6 mm) annular spaces, a 1/2 in. (13 mm) diameter fillet bead must be placed around the penetrating item on top surface of floor or both surfaces of wall assembly.
5. **Firestop System, Component 3:** Sleeve, min 2 in. thick by min 12 in. (306 mm) long mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) installed around penetrating item. Sleeve to be held in place with steel hose clamps spaced min 6 in. (153 mm) OC and butted to the underside of the concrete floor or both surfaces of wall assembly. If pipe is connected to a elbow or tee under slab that is closer than 2” (50 mm) below slab, mineral wool may be fastened to underside of slab. If concrete slab is greater than 7” (180 mm) in thickness, the 12” (305 mm) length of insulation may be reduced by the value of that slab exceeds 7” (180 mm) in thickness.
6. **Firestop System, Component 4:** PFP Partners – 3600EX*, 4100NS* or 4800DW* min 1/2 in. (13 mm) diam bead applied at sleeve/concrete and sleeve/penetrant interface. An additional 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along seam of sleeve.

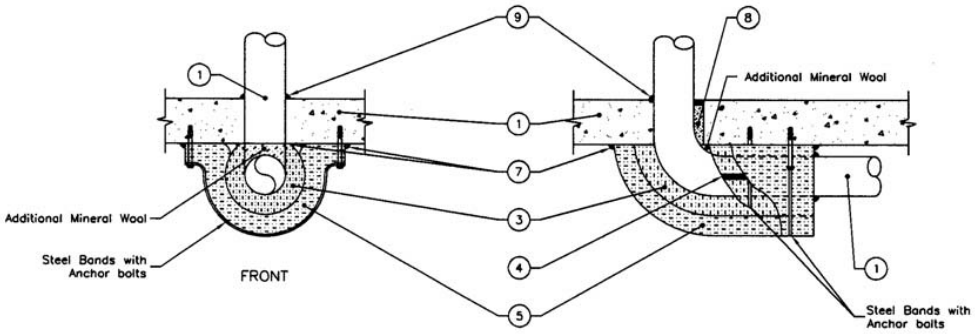
***WH Labeled Component**

Passive Fire Protection Partners
Design No. PFP/PHV 120-23
Horizontal (floor/ceiling) or Vertical (wall) Firestopping
3600EX, 4100NS, 4800DW
ASTM E814, UL 1479, CAN/ULC-S115
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water column) Minimum

Penetrating Material and Size	Max. Hole Size	Annual Space	ASTM E814/UL 1479 "F" Rating	ASTM E814/UL 1479 "T" Rating	CAN/ULC-S115 "FTH" Rating
Copper Pipe or Tubing up to 4"	5"	0" – 1"	2 hours	2 hours	2 hours
Rigid Steel Conduit or EMT up to 4"	5"	0" – 1"	2 hours	2 hours	2 hours
Sch 5 (or heavier) Cast Iron Pipe up to 4" - Produced by Canadian Foundry Association Member Companies	5"	0" – 1"	2 hours	2 hours	2 hours
Sch 5 (or heavier) Carbon Steel Pipe up to 4"	5"	0" – 1"	2 hours	2 hours	2 hours







1. **PENETRATING ITEM:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Firestop system components may be installed over tees, elbows and couplers for pipes sized not to exceed table above.

2. **FLOOR/CEILING OR WALL FIRE SEPARATION:** 2 hour fire rated ASTM E-119 and CAN/ULC S101 floor/ceiling/wall assemblies as follows:

   A. Cast in place normal or lightweight density concrete floor/ceiling assembly having a minimum cross section thickness of 5-1/2 in. (138 mm);
   B. Cast in place concrete wall assembly having a minimum cross section thickness of 5-1/2 in. (138 mm) or
   C. Concrete block wall assembly solidly filled with cementitious grout having a minimum cross section of 8 in. (200 mm).

3. **FIRESTOP SYSTEM, COMPONENT 1:** Min 2 in. thick by min 36 in. (650 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m3) installed around penetrating item. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4” (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 8 in. (200 mm) OC. If pipe is connected to a tee or elbow that is closer than 2” (50 mm) below slab, additional mineral wool is to be packed between pipe and underside of slab and the “U” shape sleeve to be attached to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 8 in. (200 mm) OC.

4. **FIRESTOP SYSTEM, COMPONENT 2:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1- 1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along seam of sleeve of firestop component 1.

5. **a) FIRESTOP SYSTEM, COMPONENT 3a:** Min 2 in. thick by min 36 in. (650 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m3) installed around first sleeve. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4” (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 8 in. (200 mm) OC.

   b) FIRESTOP SYSTEM, COMPONET 3b: As an alternative to Item 5a, min 2 in. thick by min 36 in. (650 mm) long mineral wool insulation with a minimum density of 4-6 PCF (68 kg/m3) wrapped around first sleeve. Mineral wool to overlap min 2 in. at longitudinal joints and be tightly butted at transverse joints. Sleeve to be held in place with steel hose clamps spaced min 8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4” (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel bands and anchor bolts spaced max 8 in. (200 mm) OC.

6. **FIRESTOP SYSTEM, COMPONENT 4:** Riser Clamp, for vertical pipes only, where elbows and/or tees are not used, min 4 in. (100 mm) galvanized steel riser clamp installed below mineral wool sleeves to retain the material in position against the underside of the floor. Min 1/2 in (13mm) thick, min 4 PCF mineral wool to be installed between clamp and pipe to ensure a tight fit.

7. **FIRESTOP SYSTEM, COMPONENT 5:** PFP Partners – 3600EX*, 4100NS* or 4800DW* min 1/2 in. (13 mm) diameter bead applied at sleeve/concrete and sleeve/penetrant interface.

8. **FIRESTOP SYSTEM, COMPONENT 6:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 5 in. (125 mm). Recess filler material 1/2 in. (13 mm) for sealant placement.

9. **FIRESTOP SYSTEM, COMPONENT 7:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 5 in. (125 mm). Recess filler material 1/2 in. (13 mm) for sealant placement.

***WH Labelled Component**

Intertek	3600EX 4100NS 4100SL 4800DW	PFP/PHV 120-25

Single and Multiple Penetrations

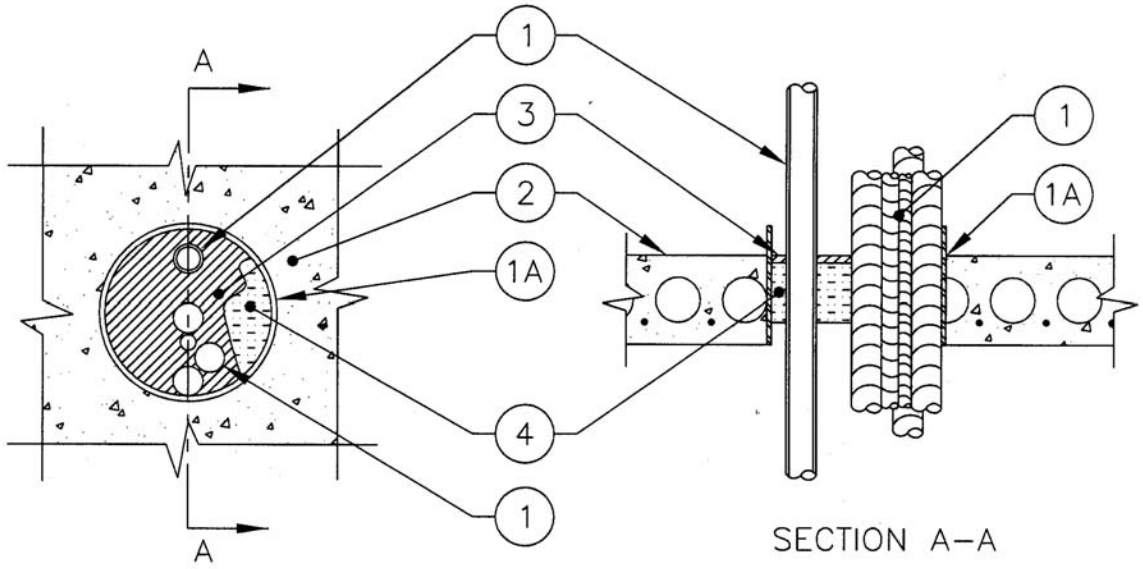
Horizontal or Vertical (floor/ceiling and walls)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe (1" to 4") Sch 10 & up	8"	0" – 3-1/2"	2Hour	2 Hour	15 Min
Steel and Cast Iron Pipe (4½" to 24") Sch 10 & up	26"	0" – 1-7/8"	2 Hour	2 Hour	15 Min
EMT/Steel Conduit Pipe (1/2" to 6") Sch 10 & up	8"	0" – 1-7/8"	2 Hour	2 Hour	15 Min
Copper Pipe and Tubing up to 6" ID	8"	0" – 1-7/8"	2 Hour	2 Hour	15 Min
BX/Teck Cables up to 3-3/8" OD (Plastic Jacket)	6"	0" – 2-1/8"	2 Hour	2 Hour	45 Min
Loomex/Romex Electrical Wiring to 1½"	6"	0" – 2-1/8"	2 Hour	2 Hour	45 Min
25Pr Telephone Cable (Plastic Jacket)	6"	0" – 2-1/8"	2 Hour	2 Hour	45 Min
5/16" OD Coaxial Cable (Plastic Jacket)	6"	0" – 2-1/8"	2 Hour	2 Hour	45 Min



System Design Instructions

1. Penetrating Item: Centered or offset in hole, see table above. Single penetrations for steel pipes 6" to 24" (150 to 400mm), up to 6 penetrations for steel pipe, conduit or electrical wiring 1" (25mm) or less in diameter, up to 3 penetrations for copper pipe when 2 are 1/2" (13mm) or less. Min hole size to be 3/8" (10 mm) larger than OD of pipe, max hole size not to exceed table above.

a) Metal Sleeve: 24 gauge or heavier metal sleeve fit tightly, casted or grouted into the opening flush with or max 1-1/2" (38 mm) above the top surface of the floor or from both sides of wall assembly. Metal sleeve used to support mineral wool or ceramic fiber filler material (Item 4) within hollow cavities.

2. Floor/Ceiling or Wall Fire Separations:

a) Cast in place normal or light density concrete floor/ceiling assemblies minimum thickness of 4-1/2" (114 mm) or;

b) Cast in place normal or light density concrete wall assemblies minimum thickness of 6" (150mm) or;

c) Concrete block wall assemblies, min thickness 8" (200 mm) or; Hollow core pre-cast concrete floor/ceiling assembly have a min cross section thickness of 6 (150 mm)

3. **Firestop System Component 1:** PFP Partners – Firestop 3600EX*, 4100NS* (non sag), 4100SL* (self leveling) or 4800*DW installed at a minimum thickness of 1/2” (13 mm) within the annulus on the top surface of the floor or both surfaces of wall assembly. On 0” to 1/4” (6 mm) annular spaces a 3/8 “ (10 mm) diameter of fillet bead must be placed around the penetrating item on the surface of the concrete.
4. **Firestop System Component 2:** Filler Material, mineral rock wool or ceramic fiber insulation with minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4” (100 mm). Recess filler material 1/2” (13 mm) for sealant placement .

***WH Labeled Component**

Intertek	**3600EX 4100NS 4100SL 4800DW WS1 PPC**	**PFP/PHV 120-26**

Single Penetrations

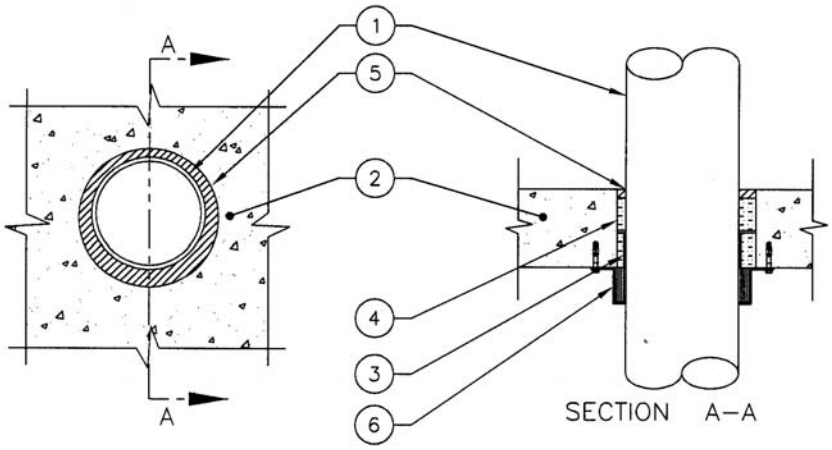
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic Pipe 1-1/2" – 6"	8"	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" - 6"	8'	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe 1-1/2" – 6"	8"	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4 1/2"(115mm) thick lightweight or normal weight concrete or hollow-core concrete. Wall may also be constructed of nominal 8"(203mm) thick concrete blocks (filled or unfilled).
   Hole Core Concrete (Not Shown): Seal the annular space at pipe penetration on the floor side with a min 1/2" (13mm) thickness of PFP Partners – Firestop 3600EX*, 4100NS*, 4100SL*, or 4800DW*. Caulking is applied over min 2" (102mm) thickness of mineral wool. Bottom side of floor assembly firestop as per Firestop Systems, Components 1, 2 & 4 (See below).
3. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8" (3 mm) thick intumescent material supplied in 2"(50mm) wide strips. Min 1 layer of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
4. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 2" (102mm) on each side of the floor or wall assembly. Recess filler material 1/2" (13mm) for sealant placement, not required for wall assemblies. For walls, filler material to be flush with both sides of the assembly.
5. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS*, 4100SL*, or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly, not required for wall assemblies.
6. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 1/4"(6mm) diameter by 1-1/4"(32mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

System Design Instructions Continued:

7. **Firestop System, Component 5: (Not Shown) – (Optional) – Metal Tab Extender Straps**: When anchoring holes in the PPC are to close to the edge of opening, steel extender straps may be added. Straps to be min 25mm (1 in.) wide 22 gauge or heavier galv. steel metal straps sized to extend from PPC anchor tabs to underside of concrete wall or floor assembly. Maximum three metal straps installed per PPC. Metal straps secured to PPC using 6mm (1/4 in.) diameter by 25mm (1 in.) long steel bolts with nuts over fender washers. Max length of straps to be 144mm (4-1/2 in.).

***WH Labeled Component**

Intertek	3600EX PPC	PFP/PHV 120-27

Single Penetrations

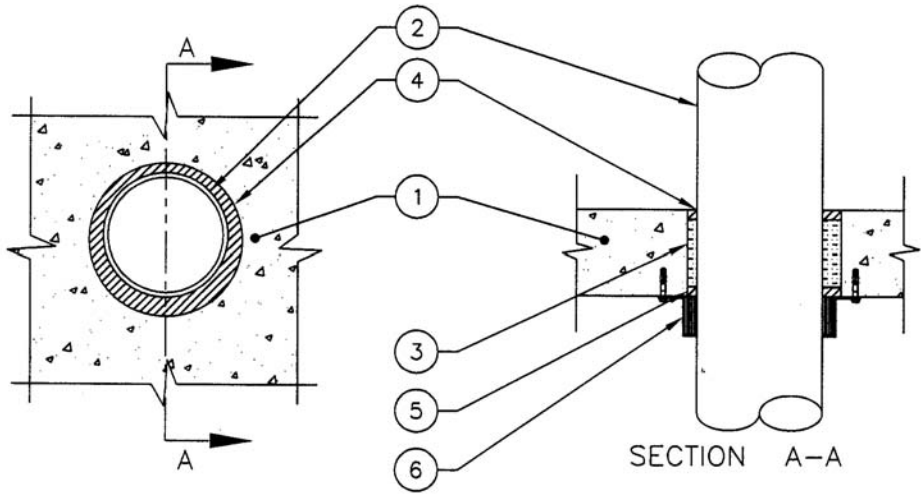
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Plastic Pipe 1-1/2" – 6"	8"	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
CPVC Plastic Pipe 1-1/2" – 6"	8"	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
ccPVC Plastic Pipe 1-1/2" - 6"	8'	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
XFR-PVC (IPEX) Plastic Pipe 1-1/2" – 6"	8"	1/2" – 1"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4 1/2"(115mm) thick lightweight or normal weight concrete or hollow-core concrete. Wall may also be constructed of nominal 8"(203mm) thick concrete blocks (filled or unfilled).
   Hole Core Concrete (Not Shown): Seal the annular space at pipe penetration on the floor side with a min 1/2" (13mm) thickness of PFP Partners – 3600EX*. Caulking is applied over min 2" (102mm) thickness of mineral wool
3. **Firestop System, Component 1:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 2" (102mm) on each side of the floor or wall assembly. Recess filler material 1/2" (13mm) for sealant placement at top and bottom of floor assembly and on both sides of the wall assemblies.
4. **Firestop System, Component 2:** PFP Partners – 3600EX* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly or minimum thickness of 1/2" (13mm) on both sides of the wall assemblies.
5. **Firestop System, Component 3:** PFP Partners – 3600EX* installed at a minimum thickness of 1/4" (7 mm) within the annulus on bottom surface of floor assembly, or minimum thickness of 1/2" (13mm) on both sides of the wall assemblies.
6. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 1/4"(6mm) diameter by 1-1/4"(32mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

System Design Instructions Continued:

7. **Firestop System, Component 5: (Not Shown) – (Optional) – Metal Tab Extender Straps**: When anchoring holes in the PPC are to close to the edge of opening, steel extender straps may be added. Straps to be min 25mm (1 in.) wide 22 gauge or heavier galv. steel metal straps sized to extend from PPC anchor tabs to underside of concrete wall or floor assembly. Maximum three metal straps installed per PPC. Metal straps secured to PPC using 6mm (1/4 in.) diameter by 25mm (1 in.) long steel bolts with nuts over fender washers. Max length of straps to be 144mm (4-1/2 in.).

***WH Labeled Component**

Intertek	**3600EX 4800DW**	**PFP/PHV 120-28**

Single Penetrations

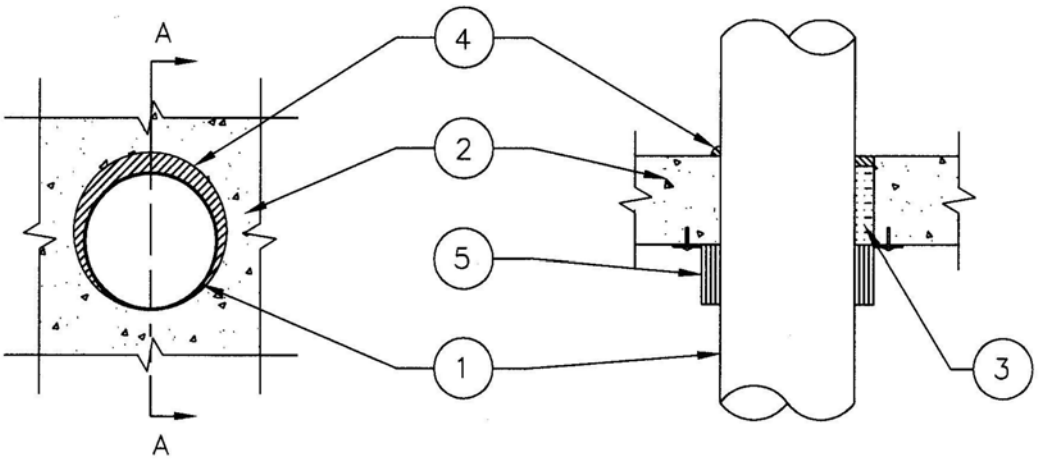
Horizontal (floor/ceiling) or Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC Schedule 80 Pipe 1-1/2" – 2"	3-1/2"	0" – 1-1/8"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
CPVC Schedule 80 Pipe 1-1/2" – 2"	3-1/2"	0" – 1-1/8"	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. *CPVC pipe for non-DWV (drain, waste or vent) applications only.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4 1/2 in. thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. thick concrete blocks (filled or unfilled).
3. **Firestop System, Component 1** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material 1/2" (13mm) for sealant placement.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 1/4" (6mm) annular spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
5. **Firestop System, Component 3:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly using 1/4" (6 mm) diameter by 1-1/4" (32 mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

Pipe Insulation Through Penetrations

Single Penetrations Only

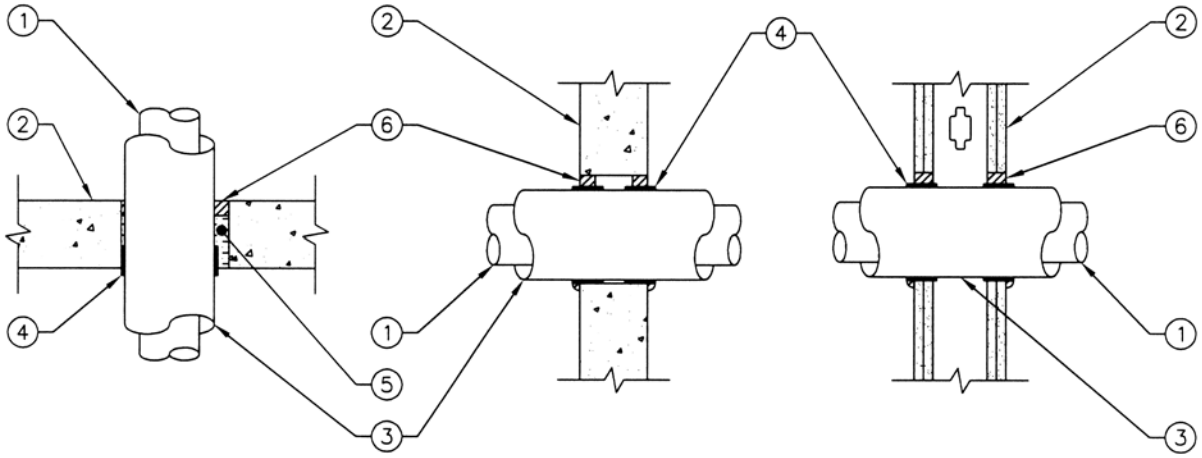
Horizontal or Vertical (floor/ceiling and walls)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe to 12" (305 mm) Sch 10 & up	18" (457 mm)	0" – 5/8" (0 – 22 mm)	1 and 2 Hour	1 and 2 Hour	1 and 2 Hour



System Design Instructions

1. **Penetrating Item:** See table above. Single penetrations only.
2. **Floor/Ceiling or Wall Assemblies:** Fire rated ASTM E-119 and CAN/ULC S101 floor/ceiling/wall assemblies as follows:
   a) Cast in place normal or light density concrete floor/ceiling assemblies, minimum thickness of 4-1/2" (114mm) or;
   b) Cast in place concrete wall assemblies, minimum thickness 6" (150mm) or;
   c) Concrete block wall assemblies, minimum thickness 8" (200mm) or;
   d) 1 or 2 Hour Rated Gypsum Wall Board (GWB) assemblies having a minimum wall thickness of 4-1/2" (112mm).
3. **Through Insulating Materials:** Nom 2 in. (50 mm) thick min 2.2 pcf (35 kg/m^3) Koolphen K rigid phenolic foam insulation units. Longitudinal joints sealed with self-sealing lap tape. Transverse joints secure with butt tape. Annular space as indicated in table above.

4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8” (3 mm) thick intumescent material supplied in 2”(50mm) wide strips. Min 2 layer of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strips are slid along the insulated penetration into annulus such that 1/4 in. (6 mm) of the wrap strip protrudes beyond the surface of the wall assembly or the bottom of the floor assembly. One set of wrap strips to be installed on each side of a wall assembly.
5. **Firestop System Component 2:** Filler material:
   a) Optional, for penetrations through wall assemblies. Poly backer rod, fiberglass insulation, mineral wool insulation or other forming materials can be used and left in the penetration after the firestop installation.
   b) For penetrations through floor/ceiling assemblies a backer support material of 4-6 pcf (64-96 kg/m^3) density mineral wool compressed 25% into the annular space at a depth of 4" (102mm) is required. Recess from the surface to allow for 3600EX*, 4100NS* or 4800DW* sealant placement.
6. **Firestop System Component 3:** PFP Partners – Firestop 3600EX, 4100NS* or 4800DW* firestop sealant can be used as a single component for service penetrations through wall assemblies. See Section 4 Firestop System Component 2.
   a) Concrete Assemblies: 3600EX, 4100NS* or 4800DW* firestop sealant at a minimum depth of 1/2" (13 mm).
   b) Gypsum Wall Board Assemblies: 3600EX, 4100NS* or 4800DW* firestop sealant filled to the full depth of the membrane on both sides of the wall assembly.

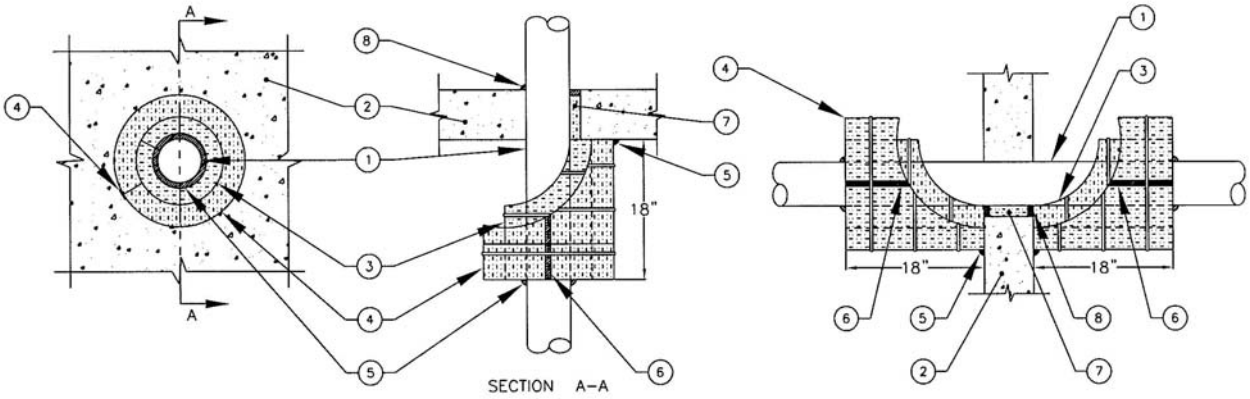
***WH Labeled Component**

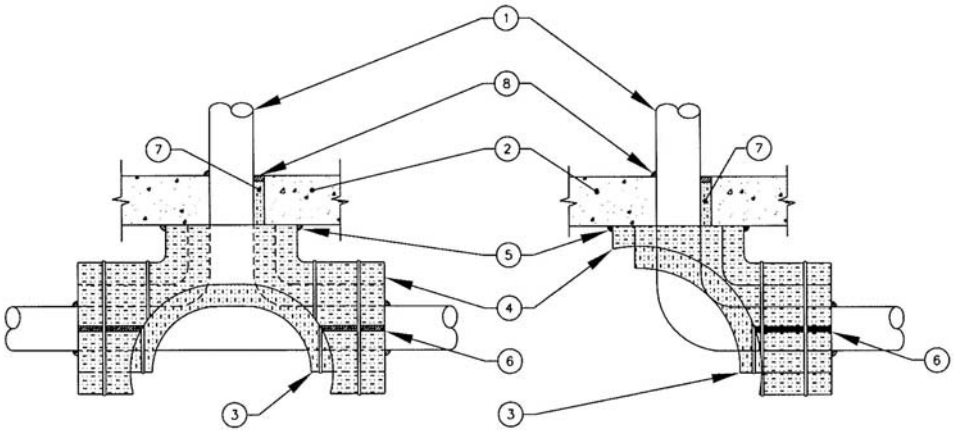
Intertek	**3600EX 4100NS 4800DW**	**PFP/PHV 120-30**

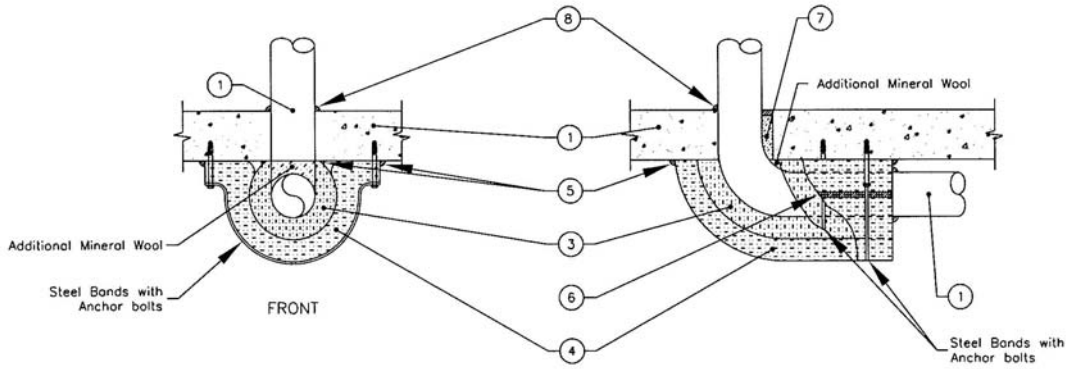
Single Penetrations

Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material and Size	Max Hole Size	Annular Space	ASTM E814 / UL 1479 "F" Rating	ASTM E814 / UL 1479 "T" Rating	ULC S115 "FTH" Rating
Steel Pipe Sch 40 (or heavier) up to 6" (152mm)	8" (203 mm)	0" – 1-1/2" (0 – 38 mm)	2 hours	2 hours	2 hours
Cast Iron Pipe Sch 40 (or heavier) up to 6" (152mm)	8" (203 mm)	0" – 1-1/2" (0 – 38 mm)	2 hours	2 hours	2 hours







ITS Intertek Testing Services

FL06/13 (1)

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Firestop system components may be installed over tees, elbows and couplers for pipes sized not to exceed table above.
2. **Floor/Ceiling or Wall Fire Separation:** 2 hour fire rated ASTM E-119 and CAN/ULC S101 floor/ceiling/wall assemblies as follows:
   a) Cast in place normal or lightweight density concrete floor/ceiling assembly having a minimum cross section thickness of 4-1/2 in. (114 mm);
   b) Cast in place concrete wall assembly having a minimum cross section thickness of 4-1/2 in. (114 mm) or
   c) Concrete block wall assembly solidly filled with cementitous grout having a minimum cross section of 8 in. (200 mm).
3. **Firestop System, Component 1:** Min 1 in. thick by min 18 in. (457 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around penetrating item. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be butted to the underside of the concrete floor assembly.
4. **Firestop System, Component 2:** Min 1 in. thick by min 18 in. (457 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around first sleeve. Joints between sleeves to be staggered. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps or with min 0.03 in. (0.08 mm) diam steel wire spaced min 6 in. (152 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 2" (50 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 6 in. (152 mm) OC
5. **Firestop System, Component 3:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/2 in. (13 mm) diam bead applied at sleeve/concrete and sleeve/penetrant interface.
6. **Firestop System, Component 4:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along seam of sleeve of firestop component 2.
7. **Firestop System, Component 5:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 4 in. (102 mm). Recess filler material 1/2 in. (13 mm) for sealant placement.
8. **Firestop System, Component 6:** PFP Partners – 4800DW*, 4100NS* or 3600EX* to be installed at a minimum thickness of 1/2 in. (13 mm) within the annulus on top surface of floor assembly. On 0 – 1/4 in. (6 mm) annular spaces, a 1/2 in. (13 mm) diameter fillet bead must be placed around the penetrating item on top surface of floor assembly.
9. **Firestop System, Component 7:** Riser Clamp (Not Shown – Optional But Recommended For Vertical Pipes), where elbows and/or tees are not used, min 4 in. (100 mm) galv steel riser clamp installed below mineral wool sleeves to retain the material in position against the underside of the floor. Min 1/2 in (13mm) thick, min 4 PCF mineral wool to be installed between clamp and pipe to ensure a tight fit.

***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW PPC WS1**	**PFP/PHV 120-31**

Single Penetrations

Horizontal (floor/ceiling) or Vertical (Wall)

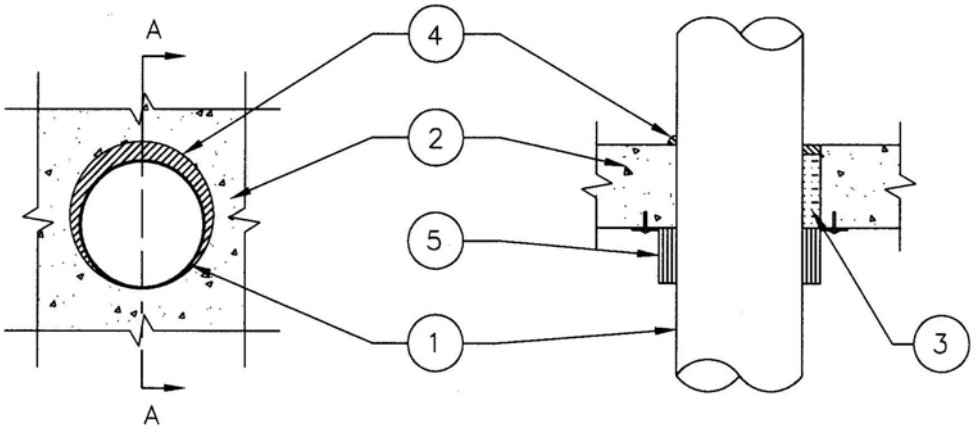
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11** Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene SDR 7.4 20 to 125 mm (3/4 to 5 in.) OD	150 mm (6 in.)	0 – 25 mm 0 – 1 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
Polypropylene SDR 11 20 to 125 mm (3/4 to 5 in.) OD For pipe sizes less than 75 mm OD (3 in. OD) see Item 6 below Aquatherm Fusiolen Polypropylene Pipes	150 mm (6 in.)	0 – 25 mm 0 – 1 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 114 mm (4 1/2 in.) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 203 mm (8 in.) thick concrete blocks (filled or unfilled).
3. **Firestop System, Component 1** Filler material, mineral rock wool insulation with a minimum density of 64 – 96 kg/m^3 (4-6 PCF) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material 13 mm (1/2 in.) for sealant placement.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*, 4100NS*, or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 6 mm (0 – 1/4 in) annular spaces, a 13 mm (1/2 in.) diameter fillet bead must be placed around the penetrating item.
5. **Firestop System, Component 3:** PFP Partners – Plastic Pipe Collar (PPC)* specifically sized for diameter of pipe. PPC* secured to floor/ceiling assembly using 6 mm (1/4 in.) diameter by 32 mm (1-1/4 in.) long steel masonry anchors with min 25 mm (1 in.) fender washers. For walls, the system shall be symmetrical, with PPC* installed on each side of the assembly and fixed in the manner as described for floor penetrations.
6. **Firestop System, Component 4:** For use with pipe size smaller than 75 mm (3 in.) – Min 1 layer of PFP Partners – Wrap Strip WS1* – to be installed in the annular space between PFP Partners – Plastic Pipe Collar (PPC)* and pipe. Aluminum foil tape to be installed around the circumference of the outer wrap strip and pipe assembly for securing wrap strips in place. For walls, the system shall be symmetrical, with PPC* and WS1* installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

**** Not Tested to 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste Or Vent Piping Systems**

c US Intertek	**3600EX 4100NS 4800DW WS1**	**PFP/PHV 120-32**

Single Penetrations

Horizontal (floor/ceiling) or Vertical (wall)

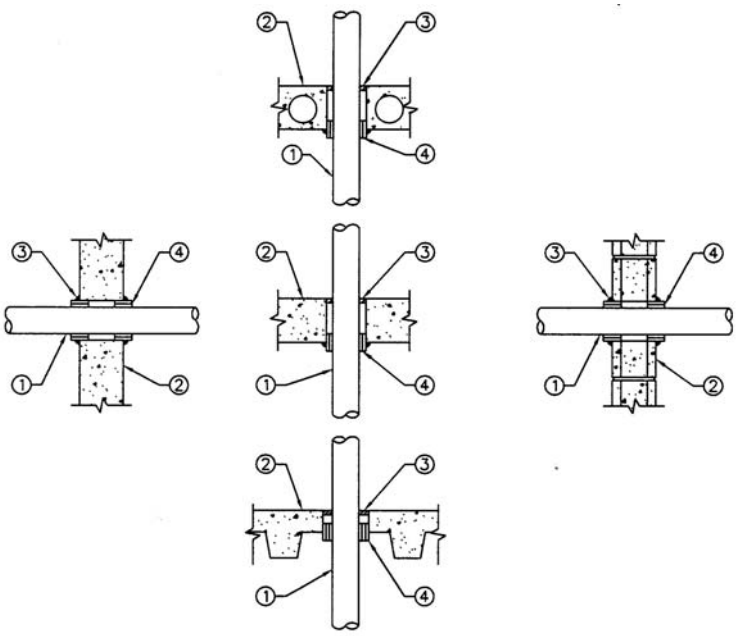
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11 Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Annular Space	Layers of Wrap Strip	ASTM E814/UL1479 "F" Rating	ULC S115 "F" Rating	ULC S115 "FH" Rating	ULC S115 "FTH" Rating
Polypropylene SDR 7.4 Faser ® up to 63.5 mm OD (2.5" OD)	6.4 mm 1/2 in.	2	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
Polypropylene SDR 11 Fusiotherm® up to 63.5 mm OD (2.5" OD) Aquatherm Fusiolen Polypropylene Pipes	6.4 mm 1/2 in.	2	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling or Wall Assembly:**
   a) Hollow core pre-cast concrete floor/ceiling assembly having a min cross-section thickness of 6 in. (150 mm).
   b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4 1/2" (113 mm).
   c) Cast in place concrete wall assemblies having a minimum cross section thickness of 4 1/2" (113 mm) or,
   d) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 6" (150mm).
   e) Min. 2 hour fire rated floor assembly. Min. 20 gauge or heavier galvanized steel decking with min. 4 1/2" (113mm) concrete cover.
3. **Firestop System Component 1:** PFP Partners – 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 1/2" (13 mm) within the annulus at top surface of floor assembly. A minimum of 1/2 in. (13 mm) bead of PFP Partners caulking to be applied between interface of the floor or wall and the outer layer of intumescent wrap strip (see Firestop System Component 2).
4. **Firestop System Component 2:** PFP Partners – Wrap Strip WS1* – Nominal 1/8 in. thick intumescent material supplied in 2 in. (51 mm) wide strips. See table for number of layers of wrap strip friction fitted into annular space. Wrap strip to extend max. 1/4 in. (6 mm) below the bottom surface of the floor or both sides of the wall and fastened in place with aluminum foil tape.

***WH Labeled Component**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

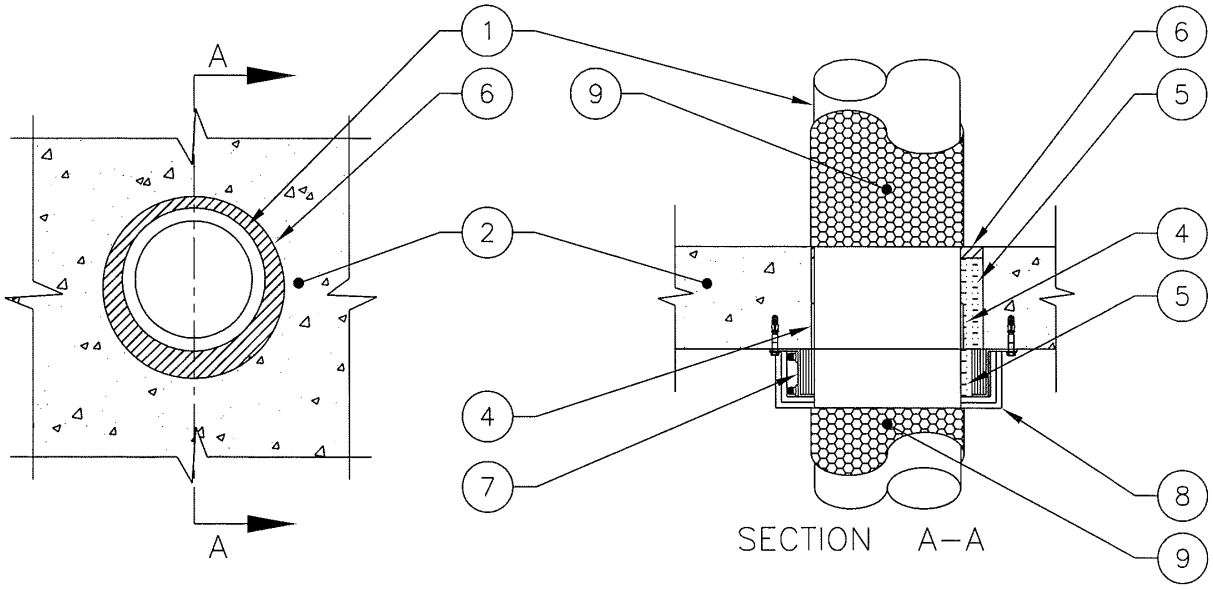
ULC S115-M11** Non-metallic Closed Systems

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene SDR 7.4 Faser® 20 to 160 mm (3/4 to 6-3/8 in.) OD	200 mm (7-7/8 in.)	0 – 20 mm 0 – 0.7 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr
Polypropylene SDR 11 Fusiotherm® 20 to 160 mm (3/4 to 6-3/8 in.) OD	200 mm (7-7/8 in.)	0 – 20 mm 0 – 0.7 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr

Aquatherm Fusiolen Polypropylene Pipes



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4-1/2 in. (114 mm) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. (203 mm) thick concrete blocks (filled or unfilled).
3. **Hole Core Concrete (Not Shown):** Seal the annular space at pipe penetration on the floor side with a min 1/2 in. (13mm) thickness of PFP Partners – 3600EX*, 4100NS* or 4800DW*. Caulking is applied over min 2 in. (102mm) thickness of mineral wool. Bottom side of floor assembly firestop as per Firestop Systems, Components 1, 2, 3 & 4 (See below).
4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8 in. (3 mm) thick intumescent material supplied in min 2 in. (50mm) wide strips. Min 1 layer of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
5. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (64 – 96 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2 in. (89mm). Packing material to be recessed from top surface of floor or from both sides of the wall to accommodate the required thickness of fill material (Item 6). An additional min 2 in. (50.8 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool to be installed within the firestop device collar (Item 7) so as to completely fill all voids within the collar.

Intertek	**3600EX 4100NS 4100SL 4800DW WS1 PPC**	**PFP/PHV 120-36**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

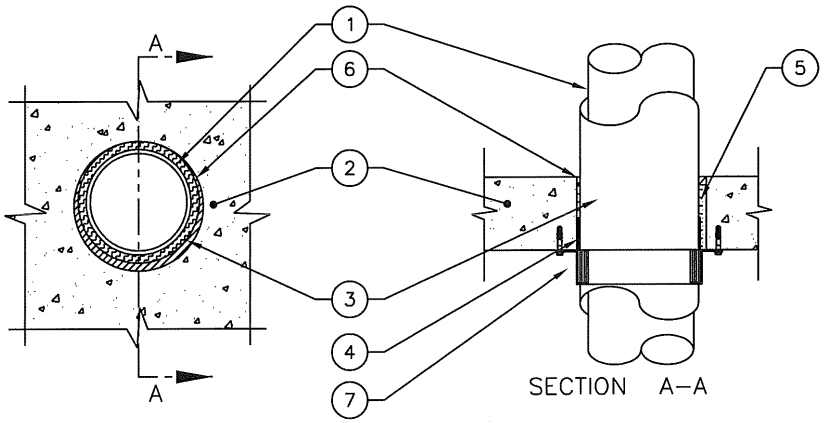
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11 Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene Pipe 2 – 6" (OD) Centrotherm PP Vent Pipe Or Equivalent	8" (203mm)	1/8 – 1" (3 – 25mm)	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4 1/2"(115mm) thick lightweight or normal weight concrete or hollow-core concrete. Wall may also be constructed of nominal 8"(203mm) thick concrete blocks (filled or unfilled).
3. **Pipe Covering Material:** – Fiberglass Insulation – Single layer of 1/2" (12 mm) thick fiberglass insulation installed as per third party agencies Flame Spread and Smoke Development Listing. Insulation to be tightly butted to top and bottom of collar for both floor or wall assemblies. All seams longitudinal and traverse joints to the sealant with min 2 in. (51mm) wide aluminum foil tape.
4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8" (3 mm) thick intumescent material supplied in 2"(50mm) wide strips. Min 1 layer of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
5. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 2" (102mm) on each side of the floor or wall assembly. Recess filler material 1/2" (13mm) for sealant placement, not required for wall assemblies. For walls, filler material to be flush with both sides of the assembly.
6. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS*, 4100SL*, or 4800DW* installed at a minimum thickness of 1/2" (13mm) within the annulus on top surface of floor assembly, not required for wall assemblies. On 0 – 1/4" (0 – 6 mm) annular spaces, a 1/2" (13 mm) diameter fillet bead must be placed around the penetrating item.
7. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 1/4"(6mm) diameter by 1-1/4"(32mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations.

***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW PPC WS1**	**PFP/PHV 120-37**

Single Penetrations

Horizontal (floor/ceiling) or Vertical (Wall)

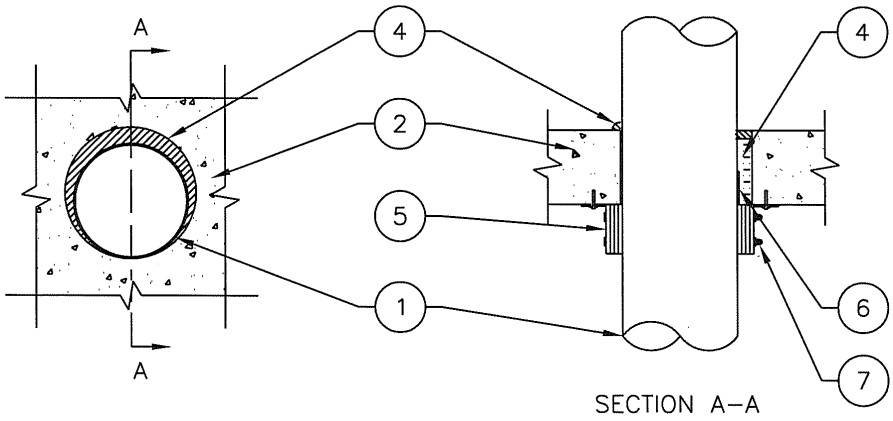
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11: Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E814/UL1479 "F" Rating	ULC S115 "F" Rating	ULC S115 "FH" Rating	ULC S115 "FTH" Rating
Polypropylene SDR 7.4 to SDR11 20 to 110 mm (3/4 to 5 in.) OD Aquatherm Fusiolen Polypropylene Pipes	127 mm (5 in.)	2.5 – 23 mm (0.1 – 0.9 in.)	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 114 mm (4 1/2 in.) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 203 mm (8 in.) thick concrete blocks (filled or unfilled).
3. **Firestop System, Component 1:** Filler material, mineral rock wool insulation with a minimum density of 64 – 96 kg/m^3 (4-6 PCF) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material 13 mm (1/2 in.) for sealant placement.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*, 4100NS*, or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 6 mm (0 – 1/4 in) annular spaces, a 13 mm (1/2 in.) diameter fillet bead must be placed around the penetrating item.
5. **Firestop System, Component 3:** PFP Partners – Plastic Pipe Collar (PPC)* specifically sized for diameter of pipe. PPC* secured to floor/ceiling assembly using 6 mm (1/4 in.) diameter by 32 mm (1-1/4 in.) long steel masonry anchors with min 25 mm (1 in.) fender washers. For walls, the system shall be symmetrical, with PPC* installed on each side of the assembly and fixed in the manner as described for floor penetrations.
6. **Firestop System, Component 4:** Min 1 layer of PFP Partners – Wrap Strip WS1* – to be installed in the annular space between concrete and pipe, the bottom of wrap strips flush with bottom of concrete. For walls, the system shall be symmetrical, with PPC* and WS1* installed on each side of the assembly and fixed in the manner as described for floor penetrations.
7. **Firestop System, Component 5:** Nom 4 in. (102 mm) and 3 in. (76 mm) collars to be secured using two 1/2 in. (13 mm) wide stainless steel hose clamp. Bend 3 symmetrically tabs at the bottom of the collar back and up to prevent the clamps from sliding off.

***WH Labeled Component**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

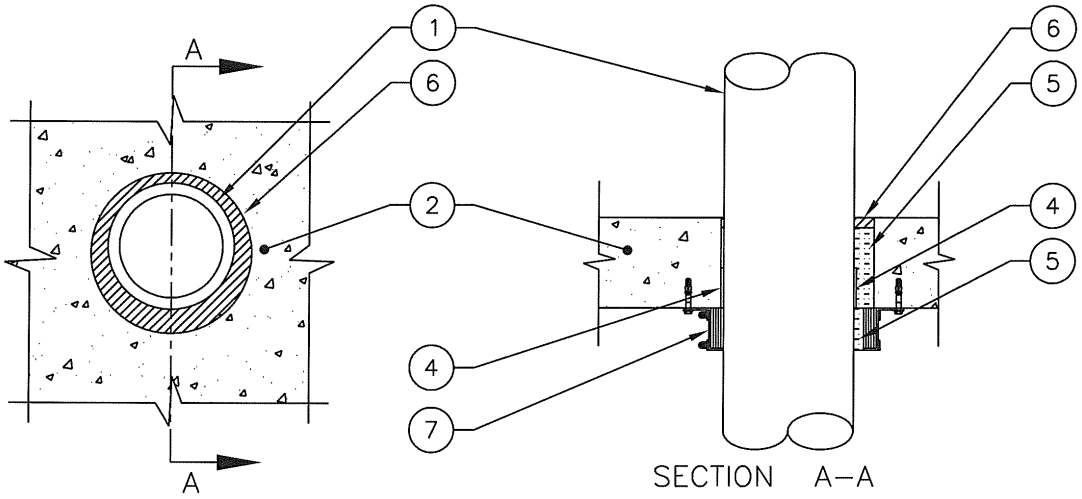
ULC S115-M11 Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene SDR 11 Fusiotherm® 20 to 125 mm (3/4 to 5 in.) OD	152 mm (6 in.)	3 – 23 mm 0.1 – 0.9 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr

Aquatherm Fusiolen Polypropylene Pipes



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4-1/2 in. (114 mm) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. (203 mm) thick concrete blocks (filled or unfilled).
3. **Hole Core Concrete (Not Shown):** Seal the annular space at pipe penetration on the floor side with a min 1/2 in. (13mm) thickness of PFP Partners – 3600EX*, 4100NS* or 4800DW*. Caulking is applied over min 2 in. (102mm) thickness of mineral wool. Bottom side of floor assembly firestop as per Firestop Systems, Components 1, 2, 3 & 4 (See below).
4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8 in. (3 mm) thick intumescent material supplied in min 2 in. (50mm) wide strips. Min 1 layer of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
5. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (64 – 96 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2 in. (89mm). Packing material to be recessed from top surface of floor or from both sides of the wall to accommodate the required thickness of fill material (Item 6). An additional min 2 in. (50.8 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool to be installed within the firestop device collar (Item 7) so as to completely fill all voids within the collar.

System Design Instructions

6. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 6 mm (0 – 1/4 in) annular spaces, a 13 mm (1/2 in.) diameter fillet bead must be placed around the penetrating item.
7. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 1/4 in. (6mm) diameter by 1-1/4 in. (32mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations. For nom 4 in. (102 mm) (or smaller) collars to be secured using min one 1/2 in. wide stainless steel hose clamp. For nom 6 in. (152 mm) collars to be secured using two 1/2 in. wide stainless steel hose clamps.

***WH Labeled Component**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

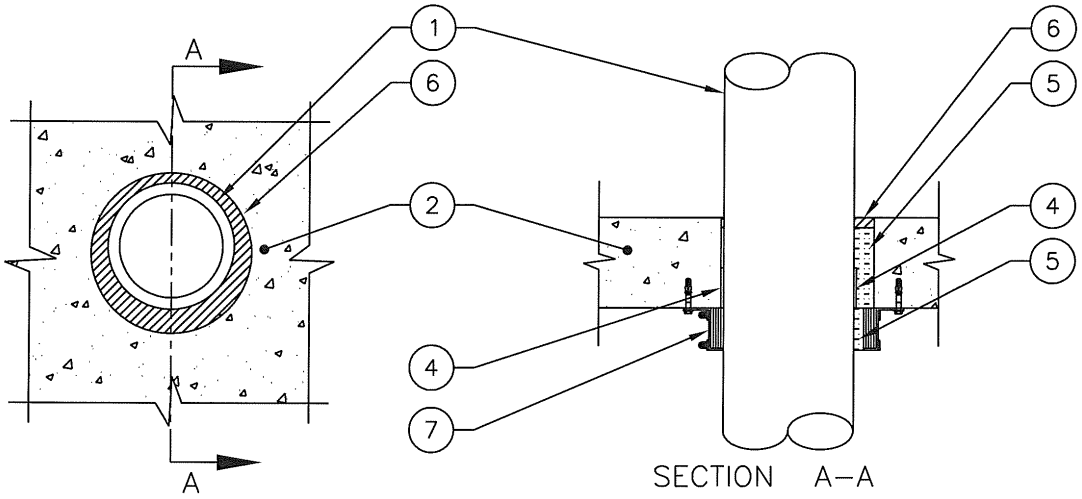
ULC S115-M11 Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene SDR 7.4 Faser® 20 to 125 mm (3/4 to 5 in.) OD	152 mm (6 in.)	10 – 15 mm 0.4 – 0.6 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr

Aquatherm Fusiolen Polypropylene Pipes



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 4-1/2 in. (114 mm) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 8 in. (203 mm) thick concrete blocks (filled or unfilled).
3. **Hole Core Concrete (Not Shown):** Seal the annular space at pipe penetration on the floor side with a min 1/2 in. (13mm) thickness of PFP Partners – 3600EX*, 4100NS* or 4800DW*. Caulking is applied over min 4 in. (102mm) thickness of mineral wool. Bottom side of floor assembly firestop as per Firestop Systems, Components 1, 2, 3 & 4 (See below).
4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 1/8 in. (3 mm) thick intumescent material supplied in min 2 in. (50mm) wide strips. Min 2 layers of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
5. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (64 – 96 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2 in. (89mm). Packing material to be recessed from top surface of floor or from both sides of the wall to accommodate the required thickness of fill material (Item 6). An additional min 2 in. (50.8 mm) thickness of min 4 pcf (64 kg/m^3) mineral wool to be installed within the firestop device collar (Item 7) so as to completely fill all voids within the collar.

System Design Instructions

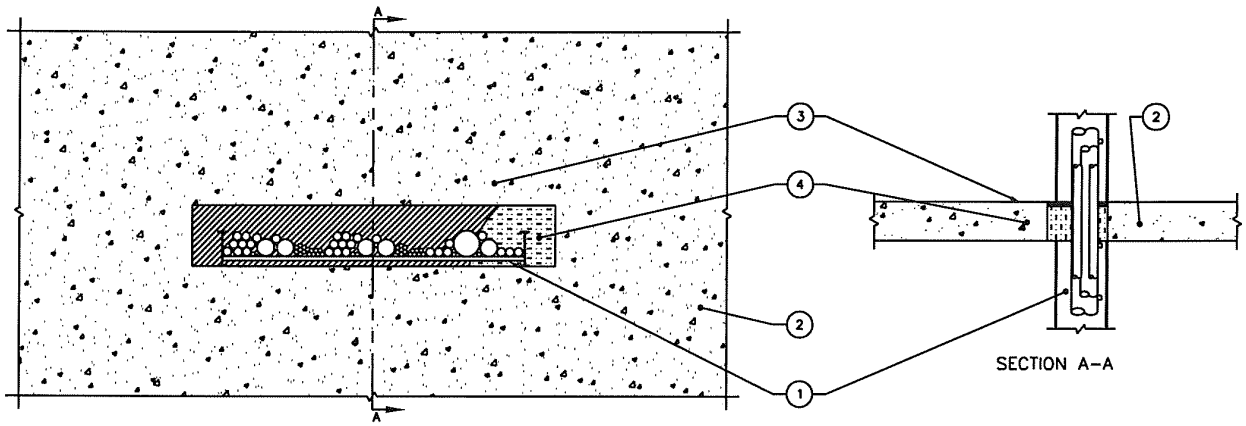
6. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus on top surface of floor assembly or at both sides of the wall assembly.
7. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 1/4 in. (6mm) diameter by 1-1/4 in. (32mm) long steel masonry anchors over fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations. For nom 4 in. (102 mm) (or smaller) collars to be secured using min one 1/2 in. wide stainless steel hose clamp. For nom 6 in. (152 mm) collars to be secured using two 1/2 in. wide stainless steel hose clamps.
8. **Firestop System, Component 5:** Foil/Bubble Reflective Insulation – Reflectix* – A single layer of min 3 in. (75 mm) wide insulation to be tightly wrapped around collar with min 1 in. (25 mm) overlap and secured to collar and concrete floor or wall assembly using min 2 in. (51 mm) wide aluminum tape. All seams longitudinal and traverse joints to be sealed with min 2 in. wide (51 mm) aluminum foil tape.

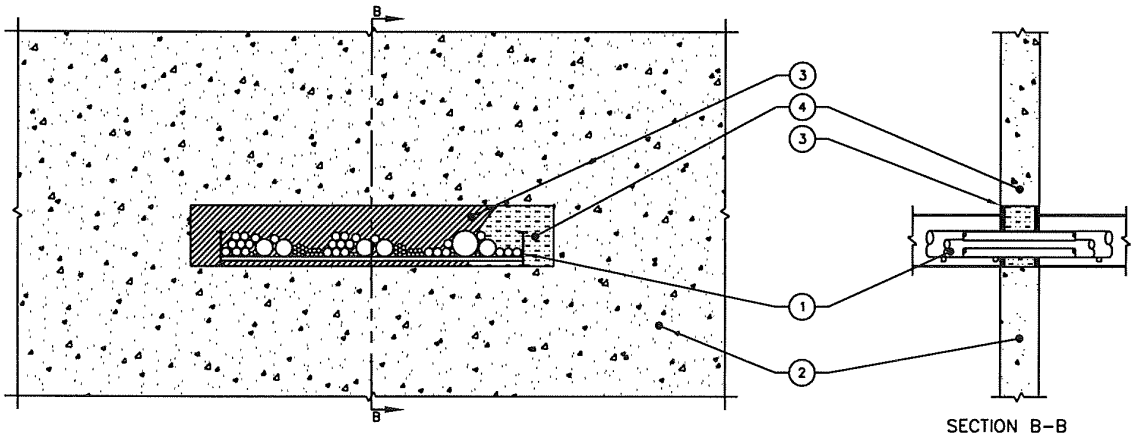
***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW**	**PFP/PHV 120-40**

Single Penetration
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

		E814 & UL 1479		CAN/ULC S115		
Penetrating Material & Size	**Annular Space**	**Fire "F" Rating**	**Temp "T" Rating**	**Fire "F" Rating**	**Fire/Hose "FH" Rating**	**Temp Rating "FTH" Rating**
Cable Trays	0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Multple BX/Teck Cable to 3-3/8 OD	(0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Loomex/Romex to 1½" OD (PVC/CPVC Jacket)	(0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Telephone, Cablevision, Fiber Optic Cable to 1" OD (PVC/CPVC Jacket)	(0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Loomex/Romex to 1½" OD (PVC/CPVC Jacket)	(0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min





Date: May 9, 2014
Project No. G101468716

Intertek

System Design Instructions

1) **Penetrating Item:**
   a. Steel cable tray 4 in. x 36 in. (102 x 914 mm) filled to a maximum of 40% with any of the items in the table above or,
   b. Bundled cables listed in table above installed within the opening such that aggregate cross sectional area of penetrants in the opening is max 40 percent of the cross sectional area of the opening in assembly. The annular space between penetrants and the periphery of the opening are to be min 0 in. (point contact) to max 3 in. (75 mm).
   c. The maximum opening is 294 in^2 (0.19 m^2). All penetrating items must be reliably supported.

2) **Floor/Ceiling or Wall Assemblies:** 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 wall or floor/ceiling assemblies as follows:
   a. Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4-1/2 in. (112mm) or;
   b. Metal or wood framed gypsum wall board (GWB) wall assemblies with opening within the wall assembly completely framed to form a rectangular box or;
   c. Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;
   d. Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3) **Firestop System Component 1:** PFP Partners – Firestop 4100NS* 4800DW* or 3600EX* to be installed at a minimum wet film thickness of 1/2 in. (13 mm) flush with top surface of floor or on with both surfaces of the wall.

4) **Firestop System Component 2:** Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 30% into the annular space at a minimum depth of 4 in. (102 mm). Recess filler material 1/2 in. (13mm) from the top surface of the floor or from both surface of the wall for 3600EX*, 4100NS* or 4800DW* sealant placement (Item 3).

***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW PPC WS1**	**PFP/PHV 120-41**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

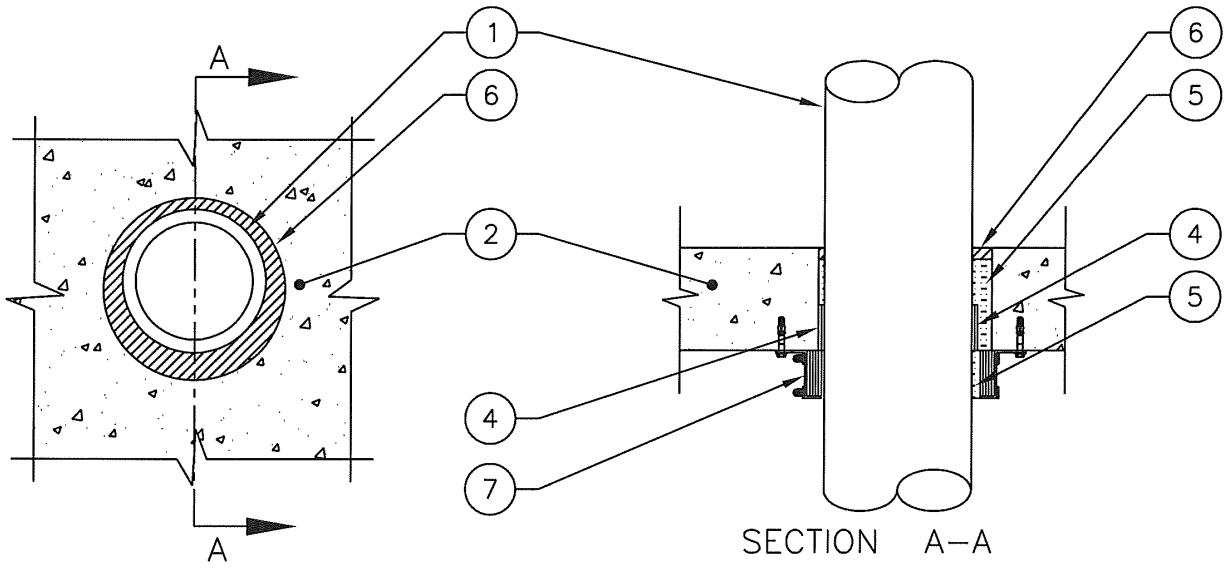
ULC S115-M11 Non-metallic Open and Closed Systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Polypropylene SDR 17.6 125 mm (5 in.) OD	152 mm (6 in.)	5 – 20 mm 0.2 – 0.8 in.	Up to 2 Hr	Up to 2 Hr	Up to 2 Hr

Aquatherm Polypropylene Pipes



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor or Wall Assembly:** Code conforming 2 hour rated floor or wall assembly having a min. nominal 114 mm (4-1/2 in.) thick lightweight or normal weight concrete. Wall may also be constructed of nominal 203 mm (8 in.) thick concrete blocks (filled or unfilled).
3. **Hole Core Concrete (Not Shown):** Seal the annular space at pipe penetration on the floor side with a min 13mm (1/2 in.) thickness of PFP Partners – 3600EX*, 4100NS* or 4800DW*. Caulking is applied over min 51 mm (2 in.) thickness of mineral wool. Bottom side of floor assembly firestop as per Firestop Systems, Components 1, 2, 3 & 4 (See below).
4. **Firestop System, Component 1:** PFP Partners – WS1 Wrap Strip* – Nominal 2.5 mm (1/8 in.) thick intumescent material supplied in min 51 mm (2 in.) wide strips. Min 2 layers of strip to be wrap tightly round penetration and fastened in place with aluminum foil tape. Wrap strip to be flush with bottom surface of floor or both sides of the wall.
5. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 64 – 96 kg/m^3 (4-6 PCF) compressed a minimum of 25% into the annular space at a minimum depth of 101 mm (3-1/2 in.). Packing material to be recessed from top surface of floor or from both sides of the wall to accommodate the required thickness of fill material (Item 6). An additional min 51 mm (2 in.) thickness of min 64 kg/m^3 (4 pcf) mineral wool to be installed within the firestop device collar (Item 7) so as to completely fill all voids within the collar.

System Design Instructions

6. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 13 mm (1/2 in.) within the annulus on top surface of floor assembly or at both sides of the wall assembly. On 0 – 6 mm (0 – 1/4 in.) annular spaces, a 13 mm (1/2 in.) diameter fillet bead must be placed around the penetrating item.
7. **Firestop System, Component 4:** PFP Partners – Plastic Pipe Collar* (PPC) specifically sized for diameter of pipe. PPC secured to floor/ceiling assembly or wall assembly using 6 mm (1/4 in.) diameter by 32 mm (1-1/4 in.) long steel masonry anchors over 25 mm (1 in.) wide fender washers. For walls, the system shall be symmetrical, with PPC installed on each side of the assembly and fixed in the manner as described for floor penetrations. The nom 152 mm (6 in.) collar to be secured using two 13 mm (1/2 in.) wide stainless steel hose clamps.

***WH Labeled Component**

Single Penetrations

Horizontal (Floor/Ceiling) or Vertical (Wall)

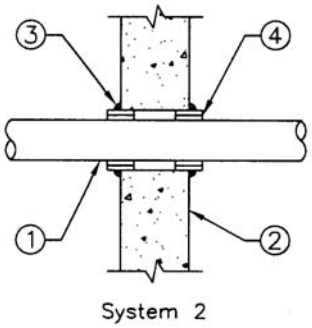
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems

ULC S115-M11 Non-metallic Open and Closed Systems

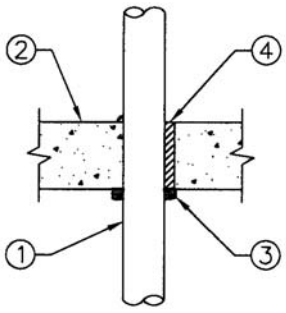
Test Furnace Internal Positive Pressure Differential – 50 Pa (0.2 in. of water)

CSI Code: 07 84 13 Penetration Firestopping

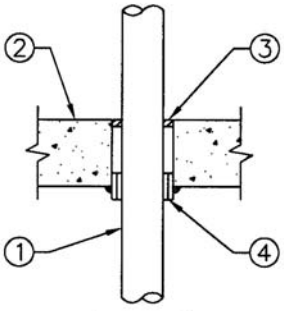
Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Wirsbo PEX up to 2" ID (System 1)	3"	0-7/8"	2 Hours	2 Hours	15 min.
Wirsbo PEX up to 2" ID (System 2)	2-1/2"	1/4"	2 hours	2 Hours	15 min.



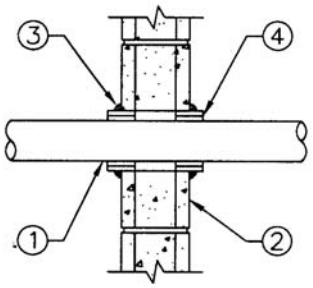
System 2



System 1



System 2



System 2

System Design Instructions

System 1

1. **Penetrating Item:** Offset in hole - having point contact on one side and 7/8 in. annular space on other side, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:**
   a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4 1/2" (113 mm).
3. **Firestop System Component 1:** Damming material: expanding urethane insulation foam used around pipe on underside of floor to prevent firestop sealant (item 4) from leaking. Masking or duct tape are to be installed around pipe on underside of floor to prevent foam from expanding into annular space.
4. **Firestop System Component 2:** PFP Partners – Firestop 3500SI* installed at a minimum thickness of 4 1/2" (113 mm) within the annulus flush with both top and bottom surfaces of floor or both sides of wall assembly. On 0" to 1/4" (6mm) annular spaces a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.

System Design Instructions

System 2

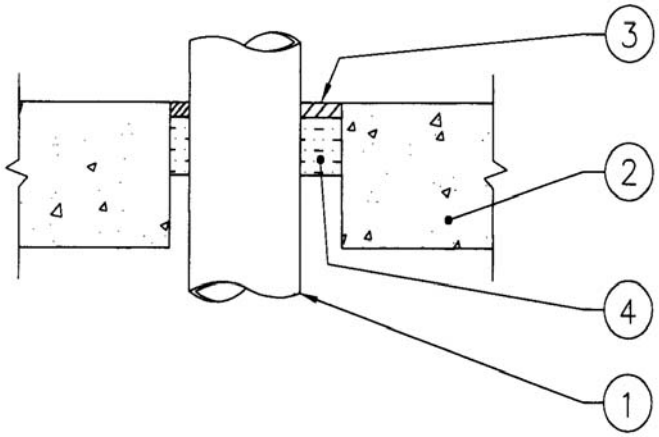
1. **Penetrating Item:** Centered in hole – having min 1/4 in. annular space, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Floor/Ceiling Fire Separations:**
   a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum thickness of 4 1/2" (113 mm).
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 4 1/2" (113 mm) or,
   c) Concrete unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).
3. **Firestop System Component 1:** PFP Partners 3600EX*, 4100NS* or 4800DW* – Installed at a minimum thickness of 1/2" (13 mm) within the annulus at top surface of floor assembly. A minimum of ½ in. bead of 3600EX*, 4100NS* or 4800DW* is to be applied between interface of the floor or wall and the outer layer of intumescent wrap strip (see Firestop System Component 2).
4. **Firestop System Component 2:** PFP Partners WS1 Wrap Strip* – Nominal 1/8 in. thick intumescent material supplied in 2 in. wide strips. Min two continuous layers of wrap strip friction fit into annular space such that ½ in. of the wrap strip extended below the bottom surface of the floor or both sides of the wall.

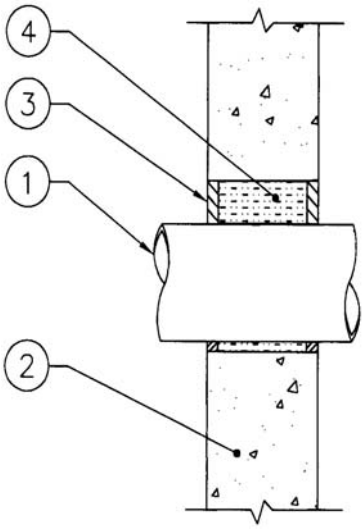
***WH Labeled Component**

Single Penetrations

Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe (up to 4") Sch 40 & up	6"	½" - 1"	3 Hour	3 Hour	66 Min
EMT/Steel Conduit Pipe (up to 4")	6"	½" - 1"	3 Hour	3 Hour	66 Min
Stainless Steel Pipe and Tubing (up to 4")	6"	½" - 1"	3 Hour	3 Hour	45 Min





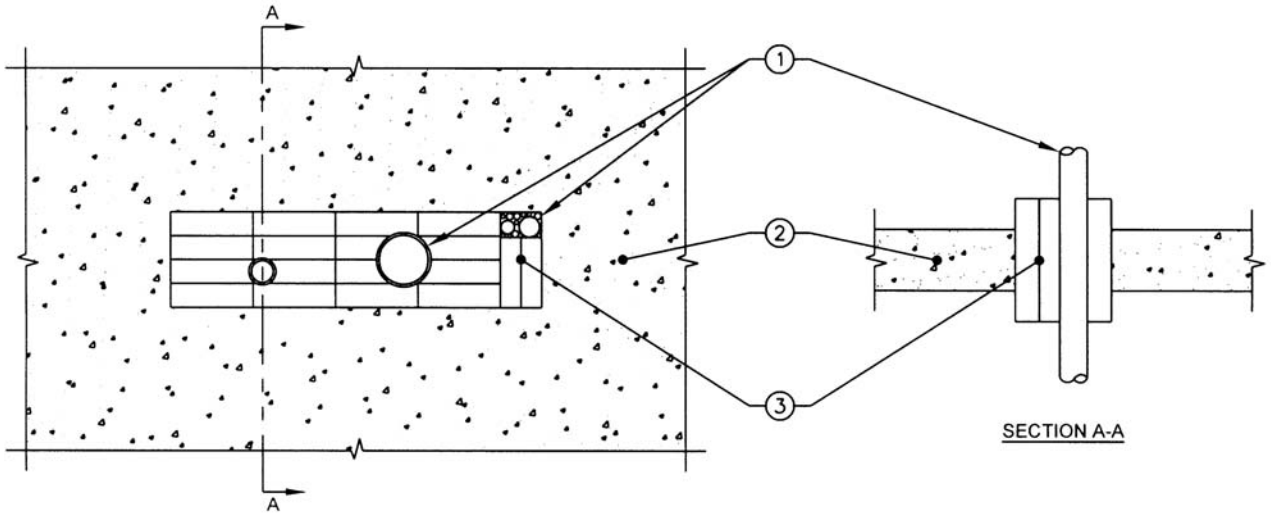
System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations require ceramic fiber filler material (Item 4). Elbows, Tee's and couplings can penetrate the firestop system.
2. **Floor/Ceiling or Wall Fire Separations:**
   a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4½" (114mm) or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 4½" (114mm) or;
   c) Concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 4½" (114mm).
3. **Firestop System Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* for vertical and horizontal applications. Product must be installed at a minimum thickness of ½" (13mm). For penetrations of vertical separations, sealant is required on both sides.
4. **Firestop System Component 2:** Filler material, ceramic fiber insulation with a minimum density of 4-6 PCF (68kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 4" (102mm). Recess filler material ½" (13mm) for sealant placement.

***WH Labeled Component**

Single and Multiple Penetrations
Horizontal or Vertical (floor/ceiling and walls)
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Annular Space	E814 & UL 1479 Fire "F" Rating	E814 & UL 1479 Temp "T" Rating	CAN/ULC S115 Fire "F" Rating	CAN/ULC S115 Fire/Hose "FH" Rating	CAN/ULC S115 Temp Rating "FTH" Rating
EMT/Steel Conduit and Pipe (3/4 to 2in.) (19 – 51mm) Sch 5 or heavier	3/4" – 7" (19 – 178mm)	Up to 3 Hrs	19 Min	Up to 3 Hrs	Up to 3 Hrs	19 Min
Steel or Iron Pipe up to 4 in. (102 mm) ID Sch 40 or heavier	3/4" – 7" (19 – 178mm	Up to 3 Hrs	19 Min	Up to 3 Hrs	Up to 3 Hrs	19 Min
Copper Pipe and Tubing up to 4 in (102 mm) ID	3/4" – 7" (19 – 178mm)	Up to 3 Hrs	19 Min	Up to 3 Hrs	Up to 3 Hrs	19 Min
Multiple BX/Teck Cable to 4 in. (102 mm) OD	3/4" – 7" (19 – 178mm)	Up to 3 Hrs	19 Min	Up to 3 Hrs	Up to 3 Hrs	19 Min



System Design Instructions

1. Penetrating Item:

a) Bundled cables, tubing, conduits and pipes listed in table above installed within the opening such that aggregate cross sectional area of penetrants in the opening is max 60 percent of the cross sectional area of the opening in assembly. The annular space between penetrants and the periphery of the opening are to be min 3/4 in. (19 mm) to max 7 in. (178 mm).

b) The maximum opening is 189 in^2 (0.12 m^2). All penetrating items must be reliably supported

2. **Floor/Ceiling or Wall Assemblies:** 1, 2, and 3 hour rated ASTM E-119 or CAN/ULC S101 wall or floor/ceiling assemblies as follows:

a) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4-1/2 in. (114mm) or;

b) Cast in place concrete wall assemblies having a minimum cross section thickness of 4-1/2 in. (114 mm) or;

c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3. **Firestop System Component 1:** PFP Partners – Firestop Pillows, 9 in. long by 6 in. wide by 2 in thick or 9 in. long by 3 in. wide by 2 in. thick plastic covered intumescent pillows tightly packed into opening. Pillows installed with 9 in. dimension projecting through wall or floor and centered within the opening. Pillows tightly packed into opening to fill the annular space between penetrations and periphery of opening and between penetrations. Pillows are compressed 25 percent in the vertical direction.

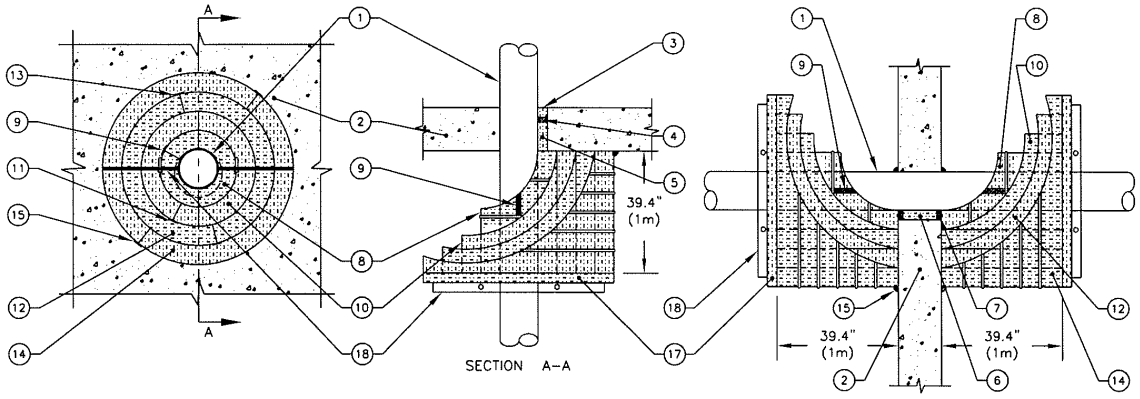
***WH Labeled Component**

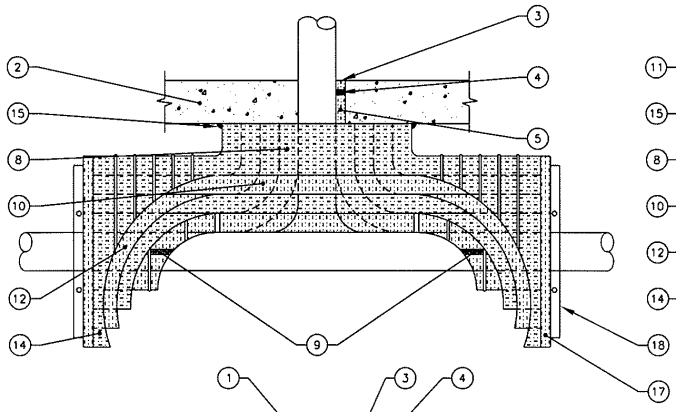
Intertek	**3600EX 4100NS 4800DW**	**PFP/PHV 240-01**

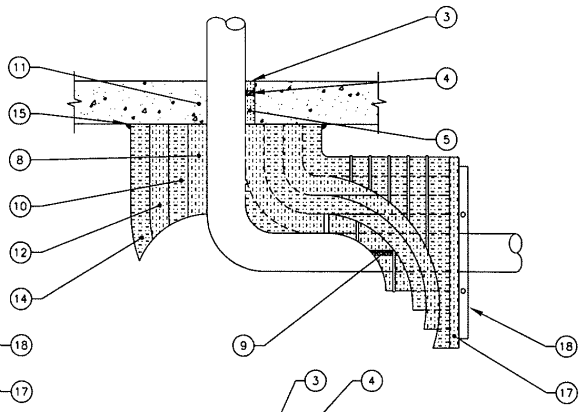
Single Penetrations

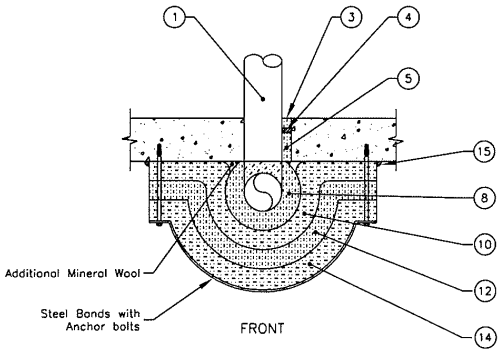
Horizontal (floor/ceiling) or Vertical (wall)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

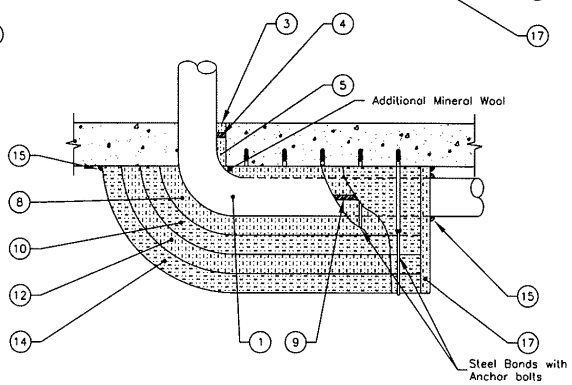
Penetrating Material and Size	Max Hole Size	Annular Space	ASTM E814 / UL 1479 "F" Rating	ASTM E814 / UL 1479 "T" Rating	ULC S115 "FTH" Rating
Copper Pipe or Tubing up to 4" (102 mm)	6" (152 mm)	0 – 2" (51 mm)	4 hours	4 hours	4 hours
Rigid Steel Conduit or EMT up to 4" (102 mm)	6" (152 mm)	0 – 2" (51 mm)	4 hours	4 hours	4 hours
Steel Pipe Sch 40 (or heavier) up to 6" (152 mm)	8" (203 mm)	0 – 1-1/2" (0 – 38 mm)	4 hours	4 hours	4 hours
Cast Iron Pipe Sch 40 (or heavier) up to 6" (152 mm)	8" (203 mm)	0 – 1-1/2" (0 – 38 mm)	4 hours	4 hours	4 hours











ITS Intertek Testing Services

FL06/13 (1)

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Firestop system components may be installed over tees, elbows and couplers for pipes sized not to exceed table above.
2. **Floor/Ceiling or Wall Fire Separation:** 4 hour fire rated ASTM E-119 and CAN/ULC S101 floor/ceiling/wall assemblies as follows:
   a) Cast in place normal or lightweight density concrete floor/ceiling assembly having a minimum cross section thickness of 8-1/2 in. (216 mm) for 4 hour rating; 6 in. (150 mm) for 3 hour rating or
   b) Cast in place concrete wall assembly having a minimum cross section thickness of 8-1/2 in. (216 mm) for 4 hour rating; 6 in. (150 mm) for 3 hour rating or
   c) Concrete block wall assembly solidly filled with cementitous grout having a minimum cross section of 8 in. (200 mm).
3. **Firestop System, Component 1 (Floors):** In 1 in. (25 mm) thickness of filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space and recessed from bottom of floor assembly at a minimum depth of 3 in. (76 mm).
4. **Firestop System, Component 2 (Floors):** PFP Partners – 4800DW*, 4100NS* or 3600EX* to be installed at a minimum thickness of 1/2 in. (13 mm) within the annulus to completely cover mineral rock wool insulation. On 0 – 1/4 in. (6 mm) annular spaces, a 1/2 in. (13 mm) diameter fillet bead must be placed around the penetrating item on bottom surface of floor assembly.
5. **Firestop System, Component 3 (Floors):** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3 in. (76 mm).
6. **Firestop System, Component 4 (Walls or Floor):** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 5 in. (127 mm). Recess filler material 1/2 in. (13 mm) from top surface of floor and both sides of wall assembly for sealant placement.
7. **Firestop System, Component 5 (Walls or Floor):** PFP Partners – 4800DW*, 4100NS* or 3600EX* to be installed at a minimum thickness of 1/2 in. (13 mm) within the annulus on top surface of floor or both surfaces of wall assembly. On 0 – 1/4 in. (6 mm) annular spaces, a 1/2 in. (13 mm) diameter fillet bead must be placed around the penetrating item on top surface of floor or both surfaces of wall assembly.
8. **Firestop System, Component 6:** Min 2 in. thick by min 39.4 in. (1000 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around penetrating item. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 7-7/8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4" (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 7-7/8 in. (200 mm) OC. If pipe is connected to a tee or elbow that is closer than 2" (50 mm) below slab, additional mineral wool is to be packed between pipe and underside of slab and the "U" shape sleeve to be attached to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 7-7/8 in. (200 mm) OC.
9. **Firestop System, Component 7:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along all seams on sleeves of firestop component 4 and at the sleeve/concrete and sleeve/penetrant interface. Prior to sealant being applied to the seams, all seams to be stuffed with ceramic fiber. After sealant application, all seams covered with min 3 in. aluminum foil tape.
10. **Firestop System, Component 8:** Min 2 in. thick by min 39.4 in. (1000 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around first sleeve. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 7-7/8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4" (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 7-7/8 in. (200 mm) OC.

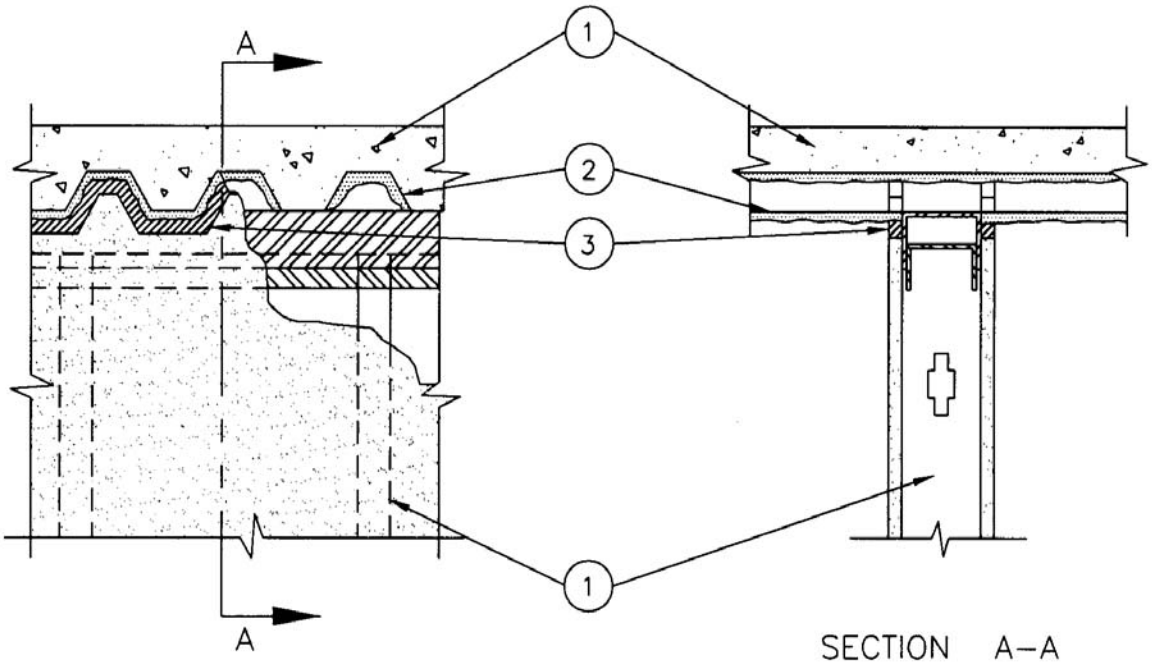
System Design Instructions

11. **Firestop System, Component 9:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along all seams on sleeves of firestop component 6 and at the sleeve/concrete and sleeve/penetrant interface. Prior to sealant being applied to the seams, all seams to be stuffed with ceramic fiber. After sealant application, all seams covered with min 3 in. aluminum foil tape.
12. **Firestop System, Component 10:** Min 2 in. thick by min 39.4 in. (1000 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around second sleeve. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 7-7/8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4" (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 7-7/8 in. (200 mm) OC.
13. **Firestop System, Component 11:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along all seams on sleeves of firestop component 8 and at the sleeve/concrete and sleeve/penetrant interface. Prior to sealant being applied to the seams, all seams to be stuffed with ceramic fiber. After sealant application, all seams covered with min 3 in. aluminum foil tape.
14. **Firestop System, Component 12:** Min 2 in. thick by min 39.4 in. (1000 mm) long hollow cylindrical mineral wool sleeve insulation with a minimum density of 8 PCF (128 kg/m^3) installed around third sleeve. Aluminum foil surface jacket is optional. Mineral wool to be tightly butted at longitudinal joint. Sleeve to be held in place with steel hose clamps spaced min 7-7/8 in. (200 mm) OC and butted to the underside of the concrete floor assembly. If pipe is connected to a tee or elbow that is closer than 4" (100 mm) below slab, sleeve to be fastened to underside of slab with 1/2 in. (13 mm) wide steel band and anchor bolts spaced max 7-7/8 in. (200 mm) OC.
15. **Firestop System, Component 13:** PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/16 in. (1-1/2 mm) thickness by 1/2 in. (13 mm) wide layer to be applied along all seams on sleeves of firestop component 10 and at the sleeve/concrete and sleeve/penetrant interface. Prior to sealant being applied to the seams, all seams to be stuffed with ceramic fiber. After sealant application, all seams covered with min 3 in. aluminum foil tape.
16. **Firestop System, Component 14:** (Not Shown) – PFP Partners – 4800DW*, 4100NS* or 3600EX* min 1/4 in. (6 mm) thickness applied to bottom to completely cover the bottom of all sleeves.
17. **Firestop System, Component 15:** Min 1 in. thick of a minimum density of 8 PCF (128 kg/m^3) cut and installed to completely cover all sleeves.
18. **Firestop System, Component 16:** Riser Clamp, for vertical pipes only, where elbows and/or tees are not used, min 4 in. (100 mm) galv steel riser clamp installed below mineral wool sleeves to retain the material in position against the underside of the floor. Min 1/2 in (13mm) thick, min 4 PCF mineral wool to be installed between clamp and pipe to ensure a tight fit.

***WHi Labeled Component**

Intertek	**3600EX 4100NS 4800DW**	**PFP/PV 60-01**

Metal Decking to Vertical Wall Assemblies
Rating: Up to 1 Hour "FTH"
Test Standards: ULC S115-M11
Rating: Up to 1 Hour "F Rating"
Test Standards: ASTM E-814, UL 2079
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
Joint System Cycled 500 Times at 10 Cycles Per Minute – 33% Compression or Extension
CSI Code: 07 84 43 Fire-Resistance Joint Sealant



SECTION A–A

System Design Instructions

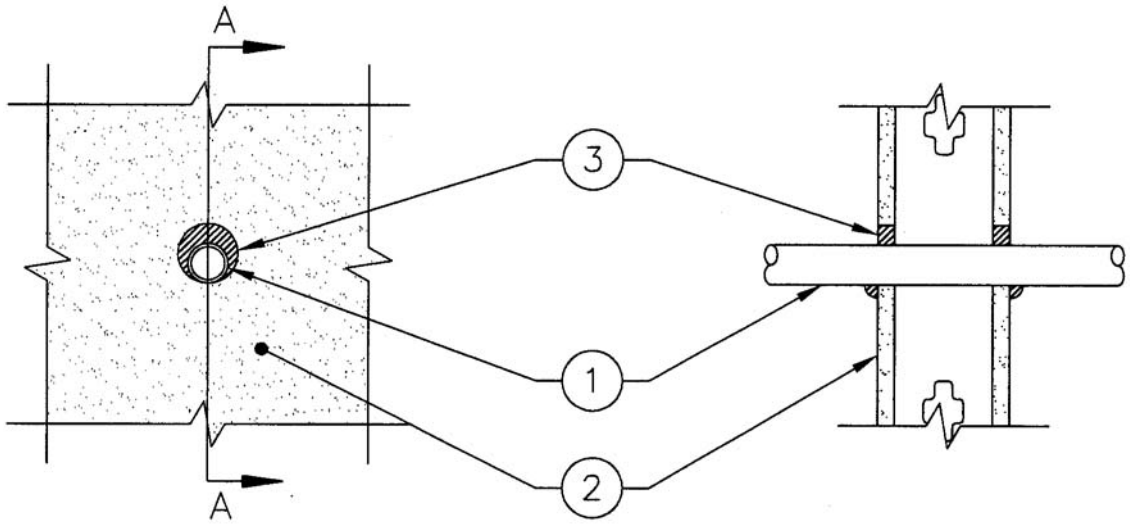
1. **Floor/Ceiling Fire Separation:** 1 or 2 hour ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.
   Wall Fire Separation: 1 hour ASTM E-119 or ULC S101 metal framed gypsum wall board (GWB) wall assemblies with a single slip track ceiling runner or a double top track system consisting of a single top track with a deflection channel. Gypsum board cut to profile of coated fluted steel deck with a nominal 3/4 in. (19mm) joint between the top of the gypsum board and the bottom of the spray applied fire resistive material. Steel studs to be cut 1/2 to 3/4 in. less than assembly height.
2. **Firestop System Component 1:** Min 3/8 in. to max 15/16 in. thickness of MK-6 spray applied fire resistive material applied to the underside of the floor/ceiling assembly.
3. **Firestop System Component 2:** Caulk 3600EX*, 4100NS* or 4800DW* into the gap between the top of the gypsum wallboard and the spray applied fire resistive material to the full depth of the gypsum board membrane on both sides of the wall assembly.

***WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW**	**PFP/PV 60-02**

Single Penetrations
Vertical (wall)
Test Standards: ASTM E-814, UL 1479 – Non-metallic open and closed systems
ULC S115-M11** – Closed systems
Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E814/UL 1479 "F", "T" Rating	ULC S115 "FTH" Rating
CPVC Pipe up to 1-1/2"	2-1/2"	0" – 1"	Up to 1 Hour	Up to 1 Hour
PE/AL/PE Pipe up to 3/4"	1-3/4"	0" – 1"	Up to 1 Hour	Up to 1 Hour
PEX/AL/PEX Pipe up to 3/4"	1-3/4"	0" – 1"	Up to 1 Hour	Up to 1 Hour



System Design Instructions

1. **Penetrating Item**:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly**: Code conforming 1 hour rated nominal 2 in. by 4 in. metal or wood framed gypsum wallboard (GWB) wall assemblies.
3. **Firestop System, Component 1**: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 5/8" (18mm) within the annulus on both surfaces of wall assembly. Between 0-1/4" (6mm) annulus spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.

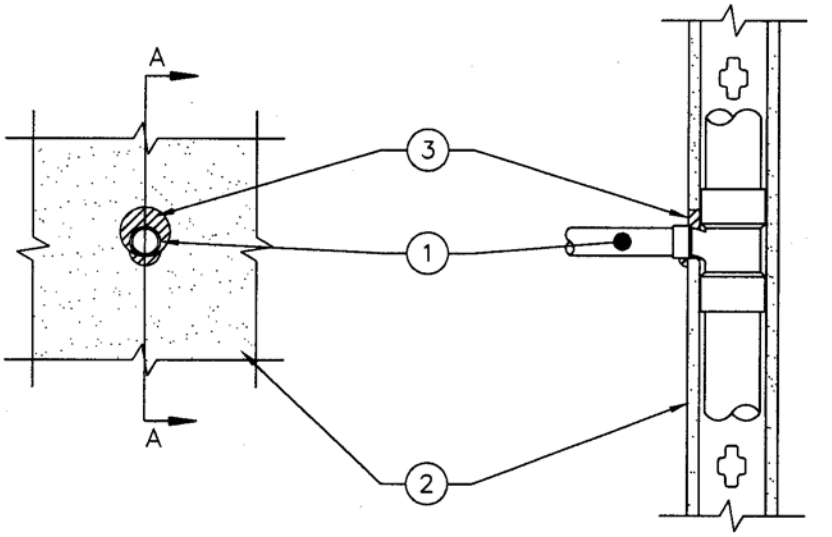
*WH Labeled Component

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems, but is applicable for process and supply pipes.**

Note:
PE/AL/PE – abbv. for polyethylene aluminum polyethylene composite pipe
PEX/AL/PEX – abbv. for cross linked polyethylene aluminum polyethylene composite pipe

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed Systems
ULC S115-M11**: Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E814/UL 1479 "F" Rating	ASTM E814/UL 1479 "F" Rating
ABS w/ Branch Line to 1-1/2 in.	3 in.	0 – 1 in.	Up to 1 hour	Up to 45 min
ccABS w/ Branch Line to 1-1/2 in	3 in.	0 – 1 in.	Up to 1 hour	Up to 45 min



SECTION A–A

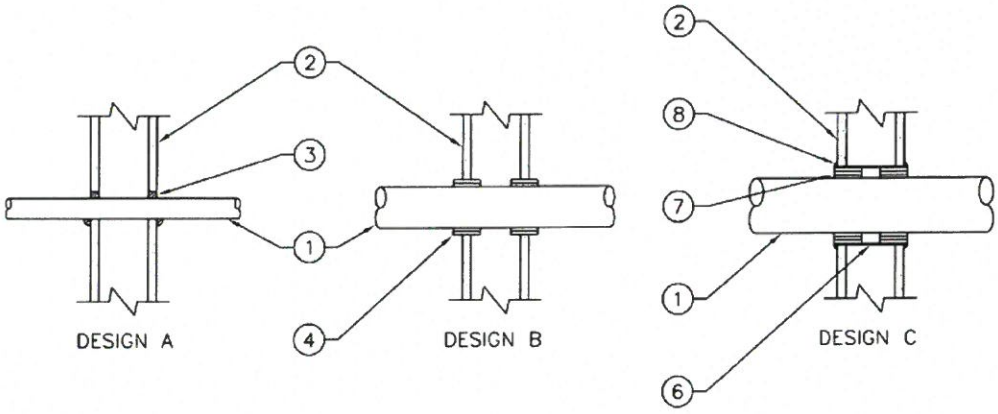
System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Branch line connected to max 3 in. diam. ABS stack.
2. **Wall Assembly:** Code conforming 1 hr (ASTME-119) wood or metal framed fire rated gypsum wall assembly with nom. 3-5/8 in. wide wood or steel studs.
3. **Firestop System; Component 1:** PFP Partners – Firestop 4800DW*, 4100NS*, 3600EX installed at a minimum thickness of 5/8 in.(18mm) within the annulus of wall assembly. Between 0-1/4 in. (6mm) annulus spaces, a 1/2 in. (13mm) diameter fillet bead must be placed around the penetrating item.

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**
(cc abv. for Cellular Core)

Passive Fire Protection Partners
Design Number PFP/PV 60-04
Single Penetrations – Vertical (Wall) Assembly
3600EX 4100NS 4800DW Wrap Strip WS1
Test Standards: ASTM E814, UL 1479, CAN/ULC-S115: Non-metallic Open and Closed System
Test Pressure– 50 Pa (0.2 in. of water minimum) Positive Pressure Differential

Penetrating Material & Size	Design Number	Max. Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	CAN/ULC S115 "F"	CAN/ULC S115 "FTH"
ABS up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	50 min.	1 Hour	50 min.
ccABS up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	50 min.	1 Hour	50 min.
PEX up to 1 in. (See Note on Item 3)	A	1-1/2 in.	0 in. – 3/8 in.	1 Hour	8 min.	1 Hour	8 min.
PE/PE-RT up to 1 in. (See Note on Item 3)	A	1-1/2 in.	0 in. – 3/8 in.	1 Hour	8 min.	1 Hour	8 min.
PVC up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	1 Hour	1 Hour	1 Hour
ccPVC up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	1 Hour	1 Hour	1 Hour
CPVC up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	1 Hour	1 Hour	1 Hour
Nonmetallic Rigid Conduit up to 1-1/2 in.	A	2 in.	0 in. – 1/2 in.	1 Hour	1 Hour	1 Hour	1 Hour
ABS up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
ccABS up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
PEX up to 2 in.	B	2-5/8 in.	1/4 in.	1 Hour	17 min.	1 Hour	17 min.
PE/PE-RT up to 2 in.	B	2-5/8 in.	1/4 in.	1 Hour	17 min.	1 Hour	17 min.
PVC up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
ccPVC up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
CPVC up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
Nonmetallic Rigid Conduit up to 3 in.	B	4 in.	1/4 in.	1 Hour	1 Hour	1 Hour	1 Hour
ABS up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour
ccABS up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour
PVC up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour
ccPVC up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour
CPVC up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour
Nonmetallic Rigid Conduit up to 4 in.	C	5-1/4 in.	3/8 in.	1 Hour	1 Hour	1 Hour	1 Hour



System Design Instructions

1. **PENETRATING ITEM:** Centered or offset in hole, see table above. Single penetrations only, max. hole size not to exceed table above.
2. **WALL ASSEMBLY:** Use a metal or wood frame gypsum wallboard (GWB) wall assembly with a fire resistance rating determined in accordance with ASTM E119, UL 263, or CAN/ULC-S101, as applicable. The wall assembly fire rating shall be equal to or greater than the "F" rating of the through-penetration firestop assembly and shall comply with the min. requirements below.

Design A

3. **FIRESTOP SYSTEM; COMPONENT 1:** PFP Partners – Firestop 3600EX*, 4100NS*, or 4800DW* installed at a min. thickness of 5/8 in. (18mm) within the annulus of wall assembly. Between 0 in. – 1/4 in. (6mm) annulus spaces, a 1/2 in. (13mm) diameter fillet bead must be placed around the penetrating item. FOR PEX TUBING USE ONLY 3600EX.

Design B

4. **FIRESTOP SYSTEM; COMPONENT 2:** PFP Partners – Wrap Strip WS1*, nominal 1/8 in. thick intumescent material supplied in 2 in. wide strips. Min. two continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be centered in membrane such that there is the same distance on each side of membrane surface.
5. **FIRESTOP SYSTEM, COMPONENT 3:** (Optional, Not Shown) PFP Partners – Firestop 3600EX*, 4100NS*, or 4800DW*, min. 1/4 in. diameter bead of caulk to be applied at wrap strip/wallboard interface on both surfaces of wall.

Design C

6. **FIRESTOP SYSTEM, COMPONENT 4:** Min. 20 GA sheet metal sleeve, outside diameter of sleeve to be tightly fitted with inside diameter of opening, flush with or extend max. 1/2 in. past both surfaces of wall.
7. **FIRESTOP SYSTEM; COMPONENT 5:** PFP Partners – Wrap Strip WS1*, nominal 1/8 in. thick intumescent material supplied in 2 in. wide strips. Min. three continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Wrap strips to be flush with both ends of sheet metal sleeve.
8. **FIRESTOP SYSTEM, COMPONENT 6:** PFP Partners – Firestop 3600EX*, 4100NS*, or 4800DW*, min. 1/4 in. diameter bead of caulk shall be applied at sheet metal sleeve/wallboard interface on both surfaces of wall.

*WH Labeled Component

Multiple Penetrations

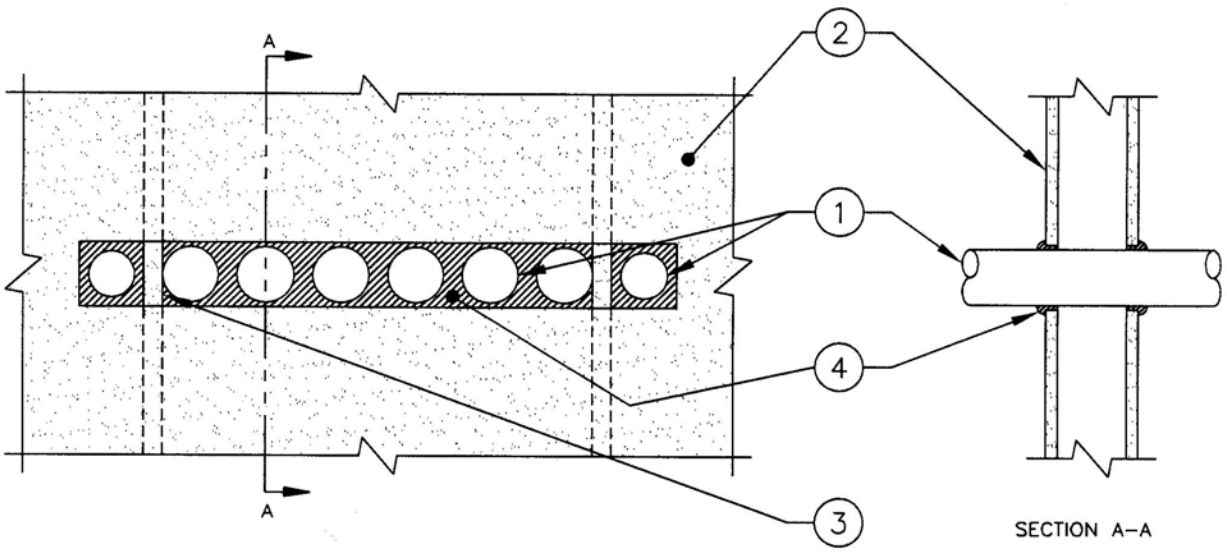
Vertical (wall)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Size Area	Annular Space	ASTM 814/UL1479 "F" Rating	ASTM 814/UL1479 "T" Rating	ULC S115 "F" & "FH" Rating	ULC S115 "FT" Rating
Copper Pipe up to 3"	32" x 3-1/2"	0" – 3/4"	60 minutes	20 minutes	60 minutes	20 minutes
Cast Iron Pipe up to 3"	32" x 3-1/2"	0" – 3/4"	60 minutes	20 minutes	60 minutes	20 minutes
Steel Pipe up to 3"	32" x 3-1/2"	0" – 3/4"	60 minutes	20 minutes	60 minutes	20 minutes



System Design Instructions

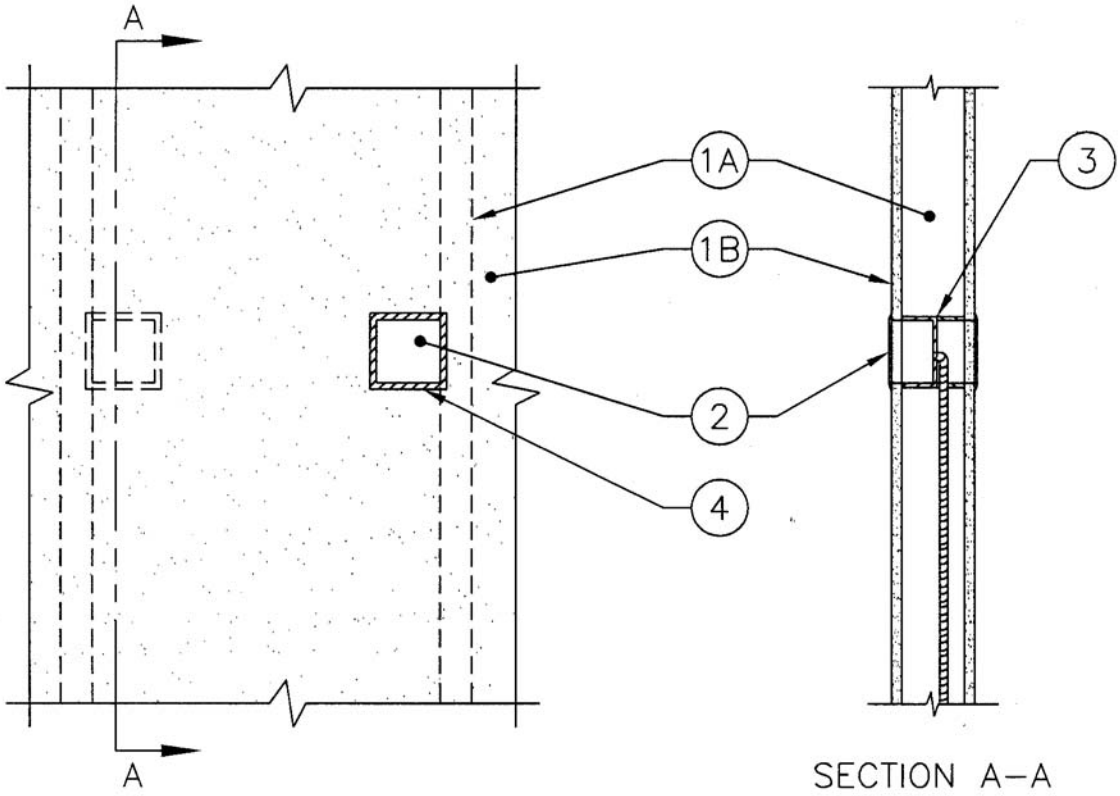
1. **Penetrating Item:** Centered or offset in hole, see table above. Multiple penetrations, maximum hole size not to exceed table above.
2. **Wall Assembly**: Code conforming 1 hour rated nominal 2 in. by 4 in. metal or wood framed gypsum wallboard (GWB) wall assemblies.
3. **Wall Assembly**: Where studs are exposed through opening a min 5/8 in. thick Type X gypsum wallboard to be fastened to exposed area on both sides of wall.
4. **Firestop System, Component 1**: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 5/8" (18mm) within the annulus on both surfaces of wall assembly. Between 0-1/2" (12mm) annulus spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.

*WH Labeled Component

Intertek	3600EX 4100NS 4800DW MP1 - Putty Pad	PFP/PV 60-06

Wall Opening Protection
Test Standards: ASTM E-119, UL 263, CAN/ULC S101-M07
Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Metallic Outlet Box Size	Max Opening Size	Annular Space	"F" Rating	"T" Rating	"FTH" Rating
Max 4 by 4 in. (102 by 102 mm)	20.3 sq in. (114.3 sq, mm)	1/4 in. (6.4 mm)	1 hour	1 hour	1 hour



System Design Instructions

1. **Wall Assembly –** Code conforming 1 hour rated nominal 2 by 4 in. (39 by 89 mm) wood framed gypsum wallboard (GWB) wall and partition assemblies and shall include the following construction features:
   A. **Studs –** Wall framing shall consist of min nom 2 by 4 in. (39 by 89 mm) wood studs spaced max 16 in. (406 mm) OC.
   B. **Wallboard, Gypsum –** Thickness, type, number of layers and fasteners as specified in the individual wall and partition design.

System Design Instructions

2. **Partial Penetrants** – Max 4 by 4 in. (102 by 102 mm) metallic outlet box, with steel cover, installed either concentrically or eccentrically within the wall opening, on opposing studs spaced max 16 in. (406 mm) OC. The annular space between electrical receptacle outlet box and periphery of opening shall be min 0 in. (0 mm) (point contact) to max 1/4 in. (6.4 mm).

3. **Fill, Void or Cavity Material – PFP Partners – MP1 – Putty Pad*** – Min 1/8 in. (3.2 mm) thick moldable putty pads are to be installed to completely cover the exterior surfaces of the outlet box (except for the side of the outlet box against the stud) and completely seal against the stud within the stud cavity. An additional 3/4 in. (19 mm) ball of putty pad material used to plug the end of each electrical metallic tube or conduit at its connection to the box. When moldable putty pad outlet box protective material is used on boxes on both sides of wall as directed, the horizontal separation between boxes on opposite sides of the wall may be less than 16 in. (406 mm) provided that the boxes are not installed back to back.

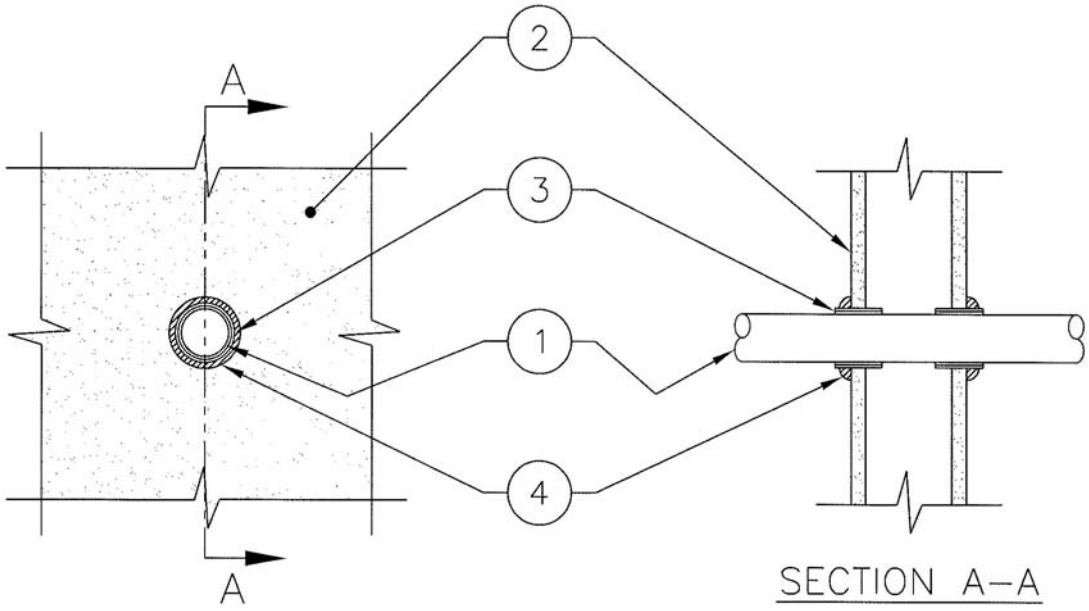
4. **Firestop System, Component: PFP Partners – 3600EX*, 4100NS* or 4800DW*** – Min. 1/4 in. (6.4 mm) diam. bead of fill material applied within the annulus around the perimeter of the electrical box and the gypsum wallboard interface.

***WH Labeled Component**

Intertek	3600EX 4100NS 4800DW WS1	PFP/PV 60-08

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479
CAN/ULC S115-M11: non-metallic closed systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FTH"
Polypropylene SDR 7.4 Faser ® up to 50 mm OD (2.0" OD)	63.5 mm (2-1/2")	6.4 mm (1/4")	N/A	1 hour	1 hour	0 min
Polypropylene SDR 11 Fusiotherm® up to 50 mm OD (2.0" OD) Aquatherm Fusiolen Polypropylene Pipes	63.5 mm (2-1/2")	6.4 mm (1/4")	N/A	1 hour	1 hour	0 min



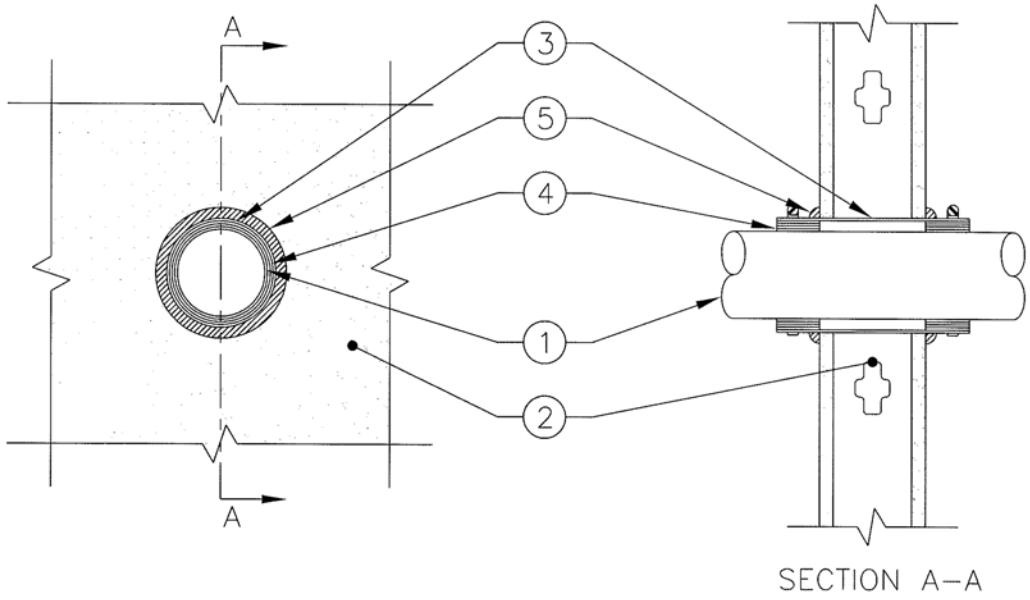
System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly:** 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.
3. **Firestop System; Component 1:** PFP Partners – Wrap Strip WS1* Nom 3 mm (1/8 in.) thick intumescent material supplied in 50 mm (2 in.) wide strips. Min two continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be centered in membrane such that there is the same distance on each side of membrane surface.
4. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* min 6 mm (1/4 in.) diam bead of caulk to be applied at wrap strip/wallboard interface on both surfaces of wall.

*WH Labeled Component

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479
CAN/ULC S115-M11**: non-metallic closed systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	**Hole Size**	**Space**	**"F"**	**"T"**	**"F"**	**"FT"**	**"FH"**
Polypropylene SDR 7.4 Faser ® 125 mm OD (5.0" OD) or smaller	152.4 mm (6")	13 mm (1/2")	N/A	N/A	1 hour	49 min	0 min
Polypropylene SDR 11 Fusiotherm® 125 mm OD (5.0" OD) or smaller Aquatherm Fusiolen Polypropylene Pipes	152.4 mm (6")	13 mm (1/2")	N/A	N/A	1 hour	49 min	0 min



SECTION A–A

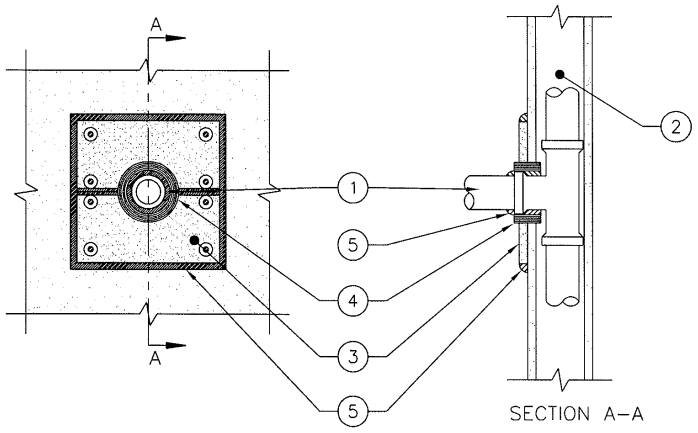
System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly:** 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.
3. **Firestop System; Component 1:** Metallic Sleeve – Cylindrical sleeve fabricated from No. 22 ga galv sheet metal and having a min 38 mm (1-1/2 in.) lap along the longitudinal seam. Length of steel sleeve to 101 mm (4 in.) greater than the thickness of the wall. Sleeve installed by coiling the sheet steel to a diameter smaller than the through opening, inserting the coil through the opening and releasing the coil to let it uncoil against the circular cutouts in the gypsum wallboard. The ends of the sleeve shall extend 51 mm (2 in.) beyond each surface of the wall. Device secured using 6 mm (1/2 in.) wide stainless steel hose clamp one each side of the wall.
4. **Firestop System; Component 2:** PFP Partners – Wrap Strip WS1* Nom 1/8 in. thick intumescent material supplied in 51 mm (2 in.) wide strips. Min four continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into sleeve such that edges of the wrap strips are flush with outer edge of metallic sleeve on each side of the wall.
5. **Firestop System, Component 3:** PFP Partners – Firestop 4800DW*, 4100NS* or 3600EX* min 1/4 in. diam bead of caulk to be applied at steel sleeve /wallboard interface on both surfaces of wall.

*WH Labeled Component
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479
CAN/ULC S115-M11**: non-metallic closed systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	Hole Size	Space	"F"	"T"	"F"	"FT"	"FH"
Polypropylene SDR 7.4 Faser ® 90 mm OD (3.5" OD) or smaller	116 mm (4.5")	13 mm (1/2")	1 hour	47 min	1 hour	47 min	1 hour
Polypropylene SDR 11 Fusiotherm® 90 mm OD (3.5" OD) or smaller	116 mm (4.5")	13 mm (1/2")	1 hour	47 min	1 hour	47 min	1 hour
Polypropylene SDR 7.4 Faser ® 110 mm OD (4.3" OD)	136 mm (5.3")	13 mm (1/2")	N/A	N/A	1 hour	1 hour	N/A
Polypropylene SDR 11 Fusiotherm® 110 mm OD (4.3" OD) or smaller	136 mm (5.3")	13 mm (1/2")	N/A	N/A	1 hour	1 hour	N/A
Polypropylene SDR 7.4 Faser ® 125 mm OD (5.0" OD)	152.4 mm (6")	13 mm (1/2")	1 hour	1 hour	1 hour	1 hour	1 hour
Polypropylene SDR 11 Fusiotherm® 125 mm OD (5.0" OD)	152.4 mm (6")	13 mm (1/2")	1 hour	1 hour	1 hour	1 hour	1 hour
Aquatherm Fusiolen Polypropylene Pipes							



System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly:** 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.
3. **Firestop System; Component 1:** Gypsum Batch – Two piece of min 16 mm (5/8 in.) thick Type 'X' gypsum board. Patch to be min 254 by 254 mm (10 by 10 in.). Each half shall be tightly butted and secured to gypsum board with a min of four nom 4.8 mm (3/16 in.) (or larger) diam steel toggle bolts with 25 mm (1 in.) diam steel washers, located in each corner of the patch. Max diam of opening is 26 mm (1 in.) larger than outside diam of penetrant.
4. **Firestop System; Component 2:** PFP Partners – Wrap Strip WS1* Nom 1/8 in. thick intumescent material supplied in 51 mm (2 in.) wide strips. Min five continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into patch and gypsum board such that the outer edges of the wrap strips extend approximately 13 mm (1/2 in.) beyond the surface of the patch.
5. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min 16mm (5/8 in.) diam bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface. A min 13 mm (1/2 in.) diam bead of sealant shall be applied at the wrap/strip penetrant interface.

*WH Labeled Component

**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Single Penetrations

Vertical (wall) Assembly

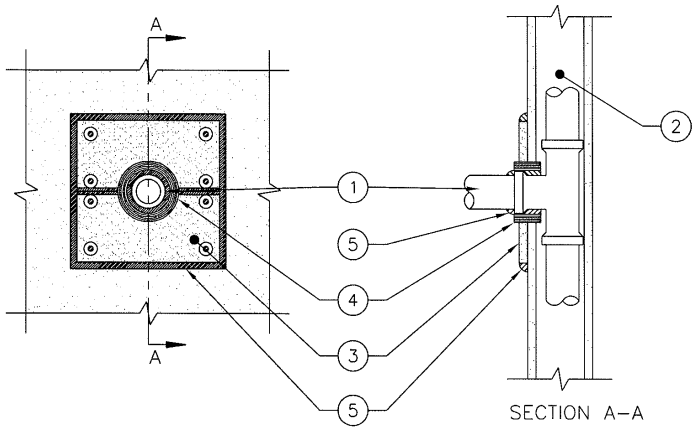
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System

CAN/ULC S115-M11: Non-metallic Open and Closed System

Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	Hole Size	Space	"F"	"T"	"F"	"FT"	"FTH"
Polypropylene SDR 7.4 to SDR 11 75 mm OD (3" OD) or smaller Aquatherm Fusiolen Polypropylene Pipes	116 mm (4.5")	13 mm (1/2")	N/A	N/A	1 hour	1 hour	N/A



System Design Instructions

1. Penetrating Item: Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.

2. Wall Assembly: 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.

3. Firestop System; Component 1: Gypsum Batch – Two piece of min 16 mm (5/8 in.) thick Type 'X' gypsum board. Patch to be min 254 by 254 mm (10 by 10 in.). Each half shall be tightly butted and secured to gypsum board with a min of four nom 4.8 mm (3/16 in.) (or larger) diam steel toggle bolts with 25 mm (1 in.) diam steel washers, located in each corner of the patch. Max diam of opening is 26 mm (1 in.) larger than outside diam of penetrant.

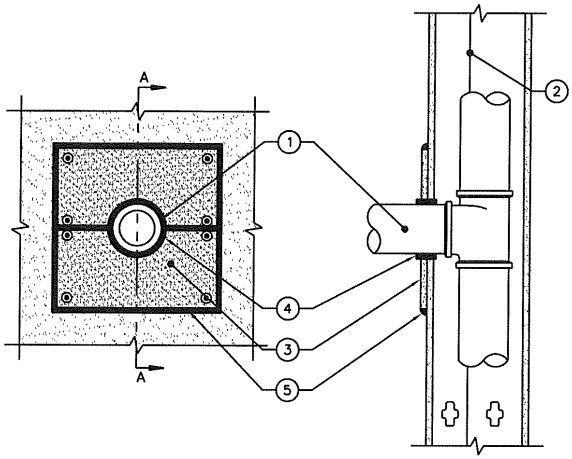
4. Firestop System; Component 2: PFP Partners – Wrap Strip WS1* Nom 1/8 in. thick intumescent material supplied in 51 mm (2 in.) wide strips. Min five continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into patch and gypsum board such that the outer edges of the wrap strips extend approximately 13 mm (1/2 in.) beyond the surface of the patch.

5. Firestop System, Component 3: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min 16mm (5/8 in.) diam bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface. A min 13 mm (1/2 in.) diam bead of sealant shall be applied at the wrap/strip penetrant interface.

*WH Labeled Component

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System
CAN/ULC S115-M11: Non-metallic Open and Closed System
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	**Hole Size**	**Space**	**"F"**	**"T"**	**"F"**	**"FT"**	**"FTH"**
Polypropylene SDR 7.4 to SDR 11 125 mm OD (5" OD) or smaller Aquatherm Fusiolen Polypropylene Pipes	152 mm (6")	13 mm (1/2")	N/A	N/A	1 hour	1 hour	N/A



SECTION A–A

System Design Instructions

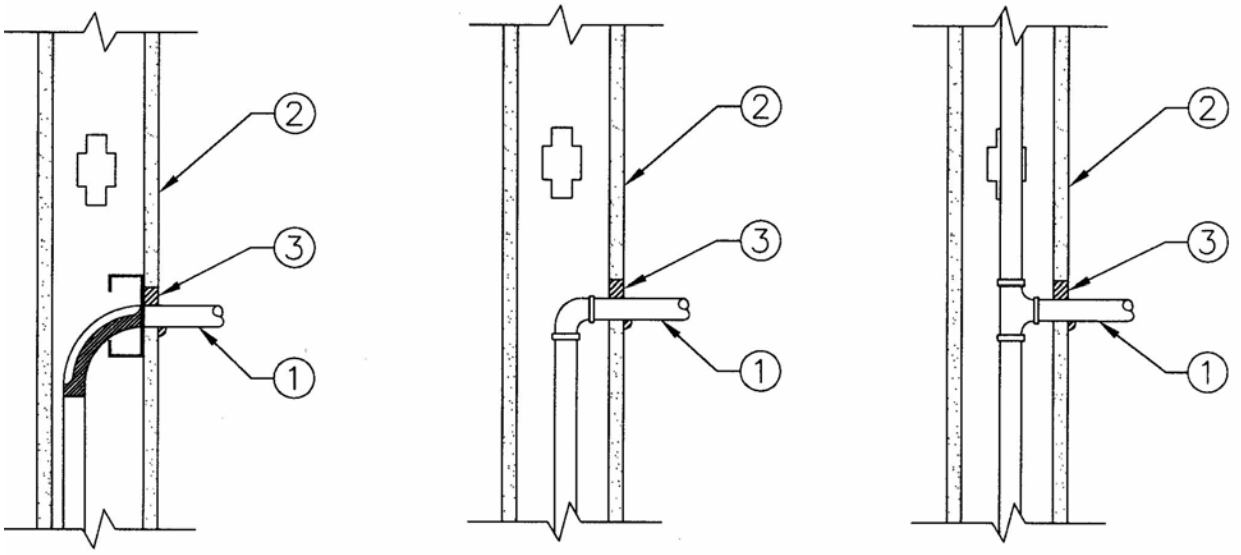
1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly:** 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly. Minimum stud space 241 mm (9-1/2 in.).
3. **Firestop System; Component 1:** Gypsum Batch – Two piece of min 16 mm (5/8 in.) thick Type 'X' gypsum board. Patch to be min 305 by 305 mm (16 by 16 in.). Each half shall be tightly butted and secured to gypsum board with a min of four nom 4.8 mm (3/16 in.) (or larger) diam steel toggle bolts with 25 mm (1 in.) diam steel washers, located in each corner of the patch. Max diam of opening is 26 mm (1 in.) larger than outside diam of penetrant.
4. **Firestop System; Component 2:** PFP Partners – Wrap Strip WS1* Nom 1/8 in. thick intumescent material supplied in 51 mm (2 in.) wide strips. Min five continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into patch and gypsum board such that the outer edges of the wrap strips extend approximately 13 mm (1/2 in.) beyond the surface of the patch.
5. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min 16mm (5/8 in.) diam bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface. A min 13 mm (1/2 in.) diam bead of sealant shall be applied at the wrap/strip penetrant interface.

*WH Labeled Component

Intertek	**3600EX 4100NS 4800DW**	**PFP/PV 60-13**

Single Penetration
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System
CAN/ULC S115-M11: Non-metallic Open and Closed System
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating ***Material & Size***	**Max Hole Size**	**Annular Space**	**ASTM E814 "F" & "T" Rating**	**ULC S115-M11 "F, FH, FTH" Rating**
Wirsbo PEX up to 3/4" (75 mm) ID	1-1/4" (32 mm)	0-1/2" (0 – 13 mm)	1 hour	1 hour



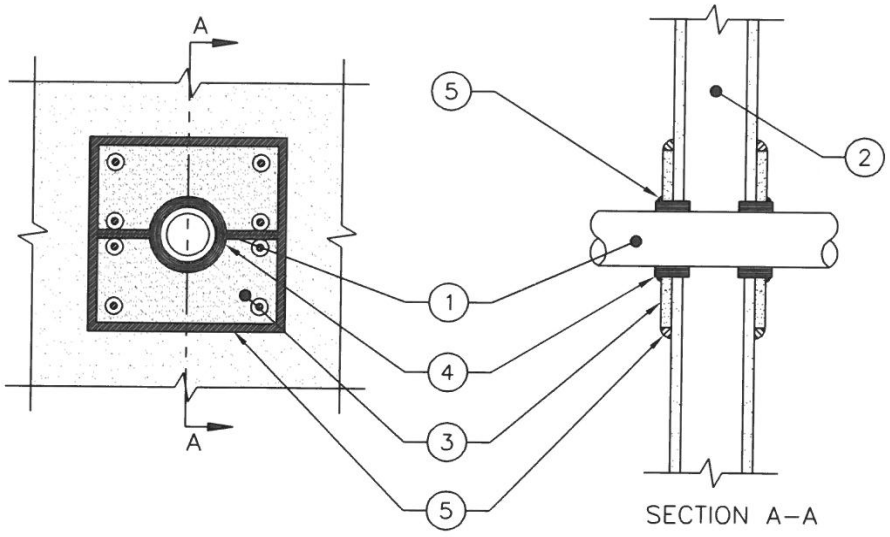
System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Elbows, tees, couplings and metal or plastic bend support hardware can be within wall assembly.
2. **Wall Assembly:** 1 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board (GWB) wall assembly.
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane. On 0 to 1/4" (6 mm) annular spaces a 3/8" (10 mm) diameter fillet bead must be placed around the penetrating item on the surface of the membrane being penetrated.

*WH Labeled Component

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System
CAN/ULC S115-M11: Non-metallic Open and Closed System
Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	Hole Size	Space	"F"	"T"	"F"	"FT"	"FTH"
Polypropylene SDR 7.4 to SDR 11 90 mm OD (3" ID) or smaller Aquatherm Fusiolen Polypropylene Pipes	92 mm (3-5/8")	15 mm (3/5")	N/A	45 min	1 hour	0 hour	45 min



System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Wall Assembly:** 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.
3. **Firestop System; Component 1:** Gypsum Batch – Two piece of min 16 mm (5/8 in.) thick Type 'X' gypsum board. Patch to be min 254 by 254 mm (10 by 10 in.). Each half shall be tightly butted and secured to gypsum board with a min of four nom 4.8 mm (3/16 in.) (or larger) diam steel toggle bolts with 25 mm (1 in.) diam steel washers, located in each corner of the patch. Max diam of opening is 30 mm (1.1 in.) larger than outside diam of penetrant.
4. **Firestop System; Component 2:** PFP Partners – Wrap Strip WS1* Nom 3mm (1/8 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. Min five continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into patch and gypsum board such that the outer edges of the wrap strips extend approximately 13 mm (1/2 in.) beyond the surface of the patch.
5. **Firestop System, Component 3:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min 16mm (5/8 in.) diam bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface. A min 6 mm (1/4 in.) diam bead of sealant shall be applied at the wrap strip / drywall interface, bead applied prior to the installation of the aluminum foil in Item 4.

*WH Labeled Component

Single Penetrations

Vertical (wall) Assembly

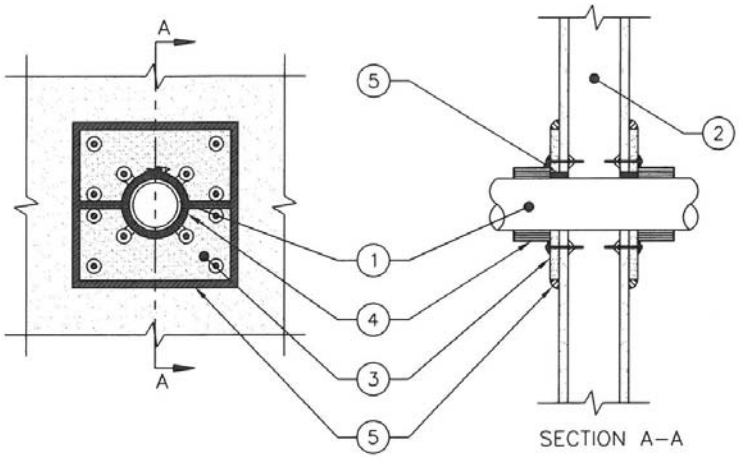
Test Standards: ASTM E-814, UL 1479: Non-metallic Open and Closed System

CAN/ULC S115-M11: Non-metallic Open and Closed System

Positive Pressure Differential – 50 Pa (0.2 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	Hole Size	Space	"F"	"T"	"F"	"FT"	"FTH"
Polypropylene SDR 7.4 to SDR 11 90 mm OD (3" ID) or smaller Aquatherm Fusiolen Polypropylene Pipes	92 mm (3-5/8")	15 mm (3/5")	N/A	30 min	1 hour	0 hour	30 min



System Design Instructions

1. Penetrating Item: Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.

2. Wall Assembly: 1 hour ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall assembly.

3. Firestop System; Component 1: Gypsum Batch – Two piece of min 16 mm (5/8 in.) thick Type 'X' gypsum board. Patch to be min 254 by 254 mm (10 by 10 in.). Each half shall be tightly butted and secured to gypsum board with a min of four nom 4.8 mm (3/16 in.) (or larger) diam steel toggle bolts with 25 mm (1 in.) diam steel washers, located in each corner of the patch. Max diam of opening is 30 mm (1.1 in.) larger than outside diam of penetrant.

4. Firestop System; Component 2: PFP Partners – PPC* – Collar to be installed in accordance with the manufacturer's instructions. Collar to be installed and latched around pipes and secured to gypsum board patch on both sides of wall with min 3 mm (1/8 in.) diam steel toggle bolts in conjunction with steel nuts and 32 mm (1-1/4 in.) diam steel washers. Min of two, three, and four bolts for nom 2 in. (51 mm) (and smaller), nom 3 in. (76 mm) and 4 in. (102 mm) diam collars. Collars to be secured using min one 13 mm (1/2 in.) wide stainless steel hose clamp on both sides of the wall.

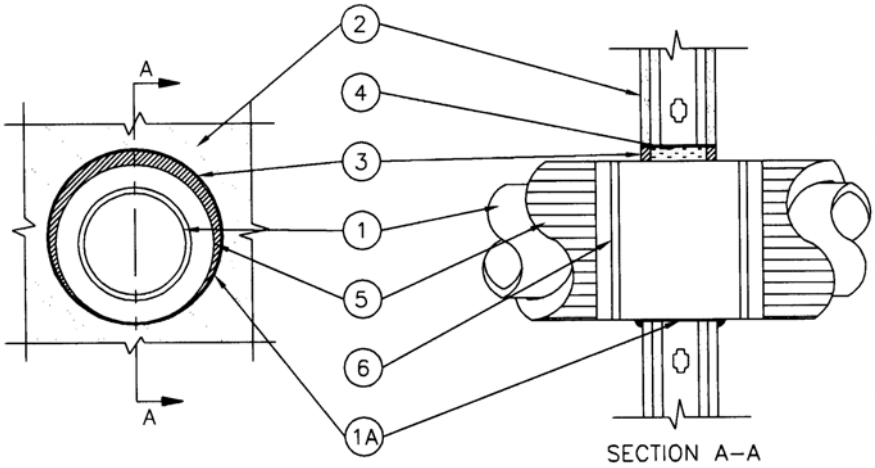
5. Firestop System, Component 3: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min 16mm (5/8 in.) diam bead of sealant shall be applied over the butted seam of the gypsum board patch and around the entire perimeter of patch at the gypsum board/gypsum board patch interface. Additional, min 32 mm (1-1/4 in.) thickness of fill material applied within the annulus, flush with both surfaces of gypsum board batch (Item 3), prior to the installation of the PPC – Collar (Item 4).

*WH Labeled Component

Intertek	3600EX 4800DW	PFP/PV 120-01

Single Penetrations
Vertical (wall)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
Steel and Cast Iron Pipe up to 6" ID Sch 40 & up	10"	0" – 2"	2 Hour	2 Hour	67 Min
Copper Pipe and Tubing up to 2" ID Sch 10 & up	6"	0" – 2"	2 Hour	2 Hour	67 Min
EMT/Steel Conduit Pipe up to 4" ID	8"	0" – 2"	2 Hour	2 Hour	67 Min



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
   a) Metal Sleeve: Min 24 gauge or heavier sheet metal sleeve fit tightly into the opening flush with both surfaces of the wall assembly.
2. **Wall Fire Separations:**
   a) 2 hour ASTME-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall fire separations framed with 3½" (88mm) studs or;
   b) Cast in place normal or light density concrete wall having a min cross section thickness of 6" (150mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of ½" (13mm) within the annulus on both surfaces of wall assembly. On 0 - ¼" (6mm) annular spaces, a ½" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** Filler material, mineral rock wool insulation with a minimum density of 4-6 PCF (68 kg/m3) compressed a minimum of 25% into the annular space at a minimum depth of 5-1/8" (131mm). Recess filler material ½" (13mm) for sealant placement.
5. **Through Insulating Materials:** Max 1" (25mm) fiberglass pipe insulation (paper faced), tightly wrapped around the penetrating item, having a minimum density of 3.5 lbs/pcf and listed to provide a flame spread rating of 25 and a smoke developed rating of 50.
6. **Aluminum Jacketing:** Min 0.016" (0.4mm) thick aluminum jacket installed within the opening tightly fitted to the pipe insulation. Jacketing sized to extend min 3" (75mm) from both surfaces of the wall assembly except that jacket may extend to 12" (300mm), however "T" rating is undetermined when jacket extends beyond 3" (75mm). Jacketing support to consist of ½" (13mm) wide stainless steel hose clamps spaced max 6" o/c.

***WH Labeled Component**

Single Penetrations

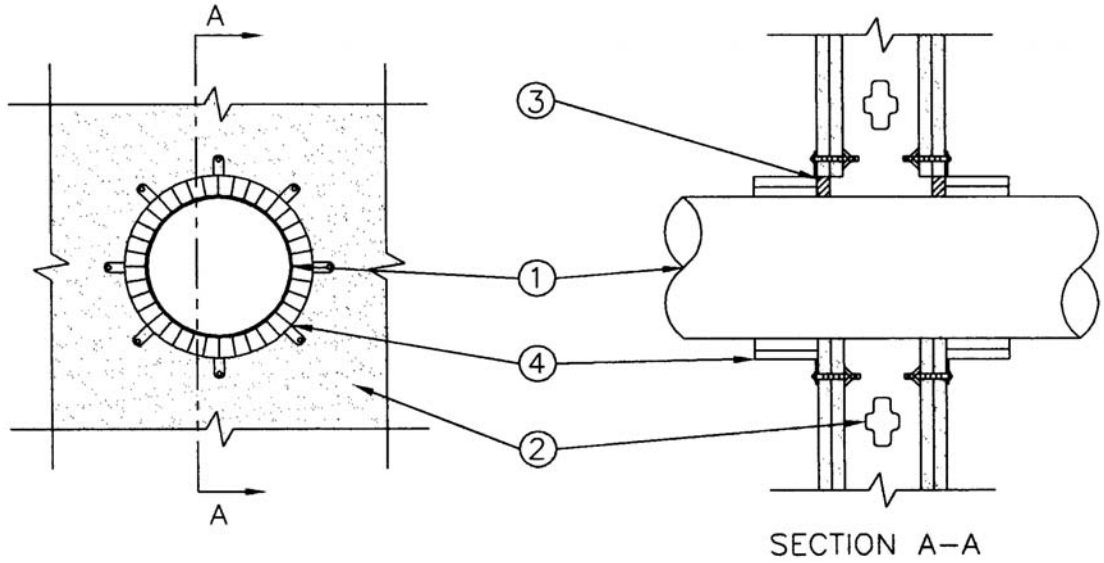
Vertical (wall)

Test Standards: ASTM E-814, UL 1479

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Temp Rating "T" Rating
PVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	1 & 2 Hr	1 & 2 Hr
ccPVC Plastic Pipe 1-1/2" – 4"	5'	0" – 1/2"	1 & 2 Hr	1 & 2 Hr
CPVC Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	1 & 2 Hr	1 & 2 Hr
ccABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	1 & 2 Hr	38 & 80 Min
ABS Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	1 & 2 Hr	38 & 80 Min
FRPP Plastic Pipe 1-1/2" - 4"	5"	0" – 1/2"	1 & 2 Hr	38 & 80 Min



System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Ratings achieved will not be greater than the rating of the wall assembly.
2. **Wall Assembly:**
   a) 1 & 2 hour ASTME-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wall board (GWB) wall fire assemblies framed with 3½" (88mm) studs or;
   b) Cast in place normal or light density concrete wall having a min cross section thickness of 4 1/2" (112 mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm)
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 5/8" (18mm) within the annulus on both surfaces of wall assembly. On 0 – 1/4" (6mm) annular spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to gypsum wall assemblies using 1-1/2" toggle bolts over fender washers, at stud locations use 1-1/2" drywall screws to fasten collar directly to studs. PPC secured to concrete wall assemblies using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers.

***WH Labeled Component**

c US Intertek	**3600EX 4800DW**	**PFP/PV 120-03**

Single Penetrations

Vertical (wall)

Test Standards: ASTM E-814, UL 1479,

ULC S115-M11: open and closed systems

Test Furnace Internal Positive Pressure Differential – 50 Pa (0.20 in. of water) Minimum

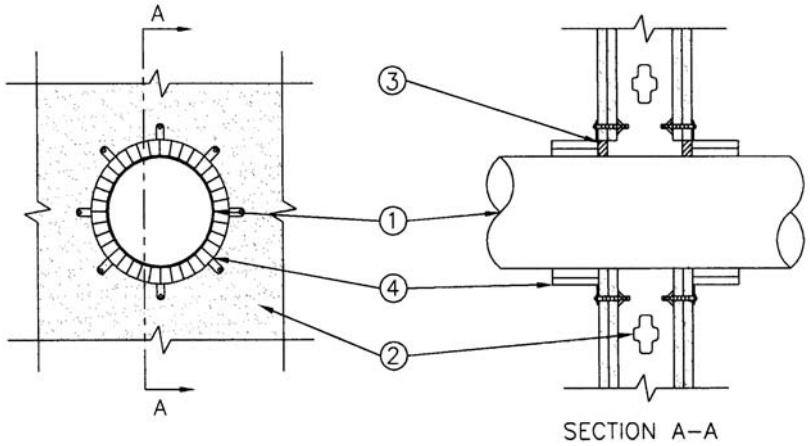
CSI Code: 07 84 13 Penetration Firestopping

1 Hour Fire Rated Wall Systems

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC or ccPVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	1 Hr	1 Hr	55 min
XFR PVC (IPEX) Pipe 1-1/2" – 4"	5"	0" – 1/2"	1 Hr	1 Hr	50 min
CPVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	1 Hr	1 Hr	55 min
ABS Plastic Pipe 1-1/2" - 4"	4 3/4"	0" – 1/4"	1 Hr	1 Hr	45 min
ccABS Plastic Pipe 1-1/2– 4"	4 3/4"	0" – 1/4"	1 Hr	1 Hr	45 min

2 Hour Fire Rated Wall Systems

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
PVC or ccPVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	2 Hr	2 Hr	116 min
XFR PVC (IPEX) Pipe 1-1/2" – 4"	5"	0" – 1/2"	2 Hr	2 Hr	120 min
CPVC Plastic Pipe 1-1/2" – 4"	5"	0" – 1/2"	2 Hr	2 Hr	116 min
ABS Plastic Pipe 1-1/2" - 4"	4 3/4"	0" – 1/4"	2 Hr	2 Hr	112 min
ccABS Plastic Pipe 1-1/2– 4"	4 3/4"	0" – 1/4"	2 Hr	2 Hr	112 min



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above. Ratings achieved will not be greater than that of the wall assembly.
2. **Wall Fire Separations:**
   a) 1 or 2 hour CAN/ULC S101 or ASTM E119 equivalent metal or wood framed fire rated gypsum wall board (GWB) wall fire separations framed with 3½" (88mm) studs or;
   b) Cast in place normal or light density concrete wall having a min cross section thickness of 4 ½ " (112mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).
3. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX* or 4800DW* installed at a minimum thickness of 5/8" (18mm) within the annulus on both surfaces of wall assembly. On 0 – 1/4" (6mm) annular spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.
4. **Firestop System, Component 2:** PFP Partners - Plastic Pipe Collar (PPC) specifically sized for diameter of pipe. PPC secured to gypsum wall assemblies using 1-1/2" toggle bolts over fender washers, at stud locations use 1-1/2" drywall screws to fasten collar directly to studs. PPC secured to concrete wall assemblies using 1/4" diameter by 1-1/4" long steel masonry anchors over fender washers.

***WH Labeled Component**

Pipe Insulation Through Penetrations

Single Penetrations Only

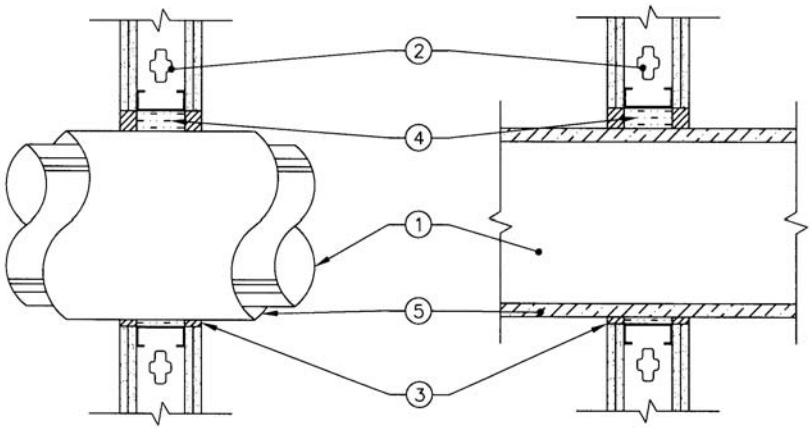
Vertical (walls)

Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	Fire "F" Rating	Fire/Hose "FH" Rating	Temp Rating "FTH" Rating
24" x 24" Steel Duct – 16 gauge (or heavier)	27-1/4" x 27-1/4"	1/2" – 3/4"	Up to 2 Hours	Up to 2 Hours	*
16" Steel Duct – 24 gauge (or heavier)	20"	1/2" – 1-1/2"	Up to 2 Hours	Up to 2 Hours	Up to 2 Hours



System Design Instructions

1. Penetrating Item: Centered or offset in hole, see table above. Single penetrations only.
* Temperature rating is 52 min. and 2 hours for 1 hour and 2 hour wall assemblies respectively.

2. Wall Assemblies: 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board (GWB) wall assemblies.

3. Firestop System, Component 1:** PFP Partners – 3600EX or 4800DW fully filling the annular space to the full depth of the gypsum wallboard (GWB) on both sides of the fire separation.

4. Firestop System, Component 2: Filler material:
a) Mineral fiber wool insulation with a minimum density of 4-6 pcf firmly packed into the annular space at a minimum depth of 3-5/8" (92mm).

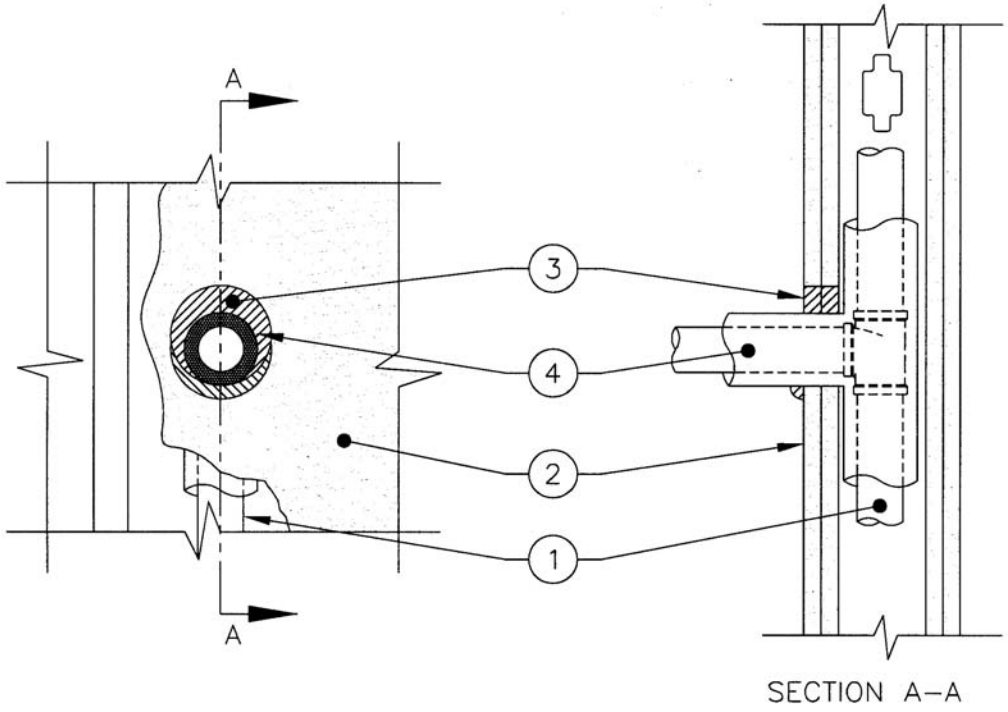
5. Through Insulating Material: Fiberglass duct wrap insulation having a 2" (51mm) wall thickness with a minimum density of .75 - 1.5 pcf installed as per manufacturer's installation instructions.

****WH Labeled Component**

Intertek	**3600EX 4100NS 4800DW**	**PFP/PV 120-05**

Single Penetrations
Vertical (walls)
Test Standards: ASTM E-814, UL 1479, ULC S115-M11: open and closed systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	E 814 & UL 1479 "F" Rating	ULC S115 Fire/Hose "FH" Rating
Copper pipe to 2”	5-1/2”	0" – 1"	Up to 2 Hr	Up to 2 Hr
Cast Iron pipe to 4”	7-1/2”	0” – 1”	Up to 2 Hr	Up to 2 Hr
Steel pipe to 4”	7-1/2”	0” – 1”	Up to 2 Hr	Up to 2 Hr



SECTION A–A

System Design Instructions

1. **Penetrating Item:** Centered of offset in hole, see table above. Couplings can penetrate the firestop system.
2. **Wall Assemblies:** 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed insulated gypsum wall board (GWB) wall assemblies.
3. **Firestop System:** PFP Partners Firestop 3600EX*, 4100NS* or 4800DW* fully filling the annular space to the full depth of the membrane. On 0” to 1/4” (6mm) annular spaces a 3/8” (10mm) diameter fillet bead must be placed around the penetrating item on the surface of the gypsum wall board.
4. **Through Insulation Materials: –** (Optional) – Maximum 3/4 in. thick arcylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The annular space between tube insulation and the periphery of the opening shall be minimum 0 in. (point contact) to maximum 1 in. Any listed tube insulation having a Flammability Classification of 94-5VA may be used.

***WH Labeled Component**

Metal Decking to Vertical Wall Assemblies

Rating: Up to 2 Hours "FTH"

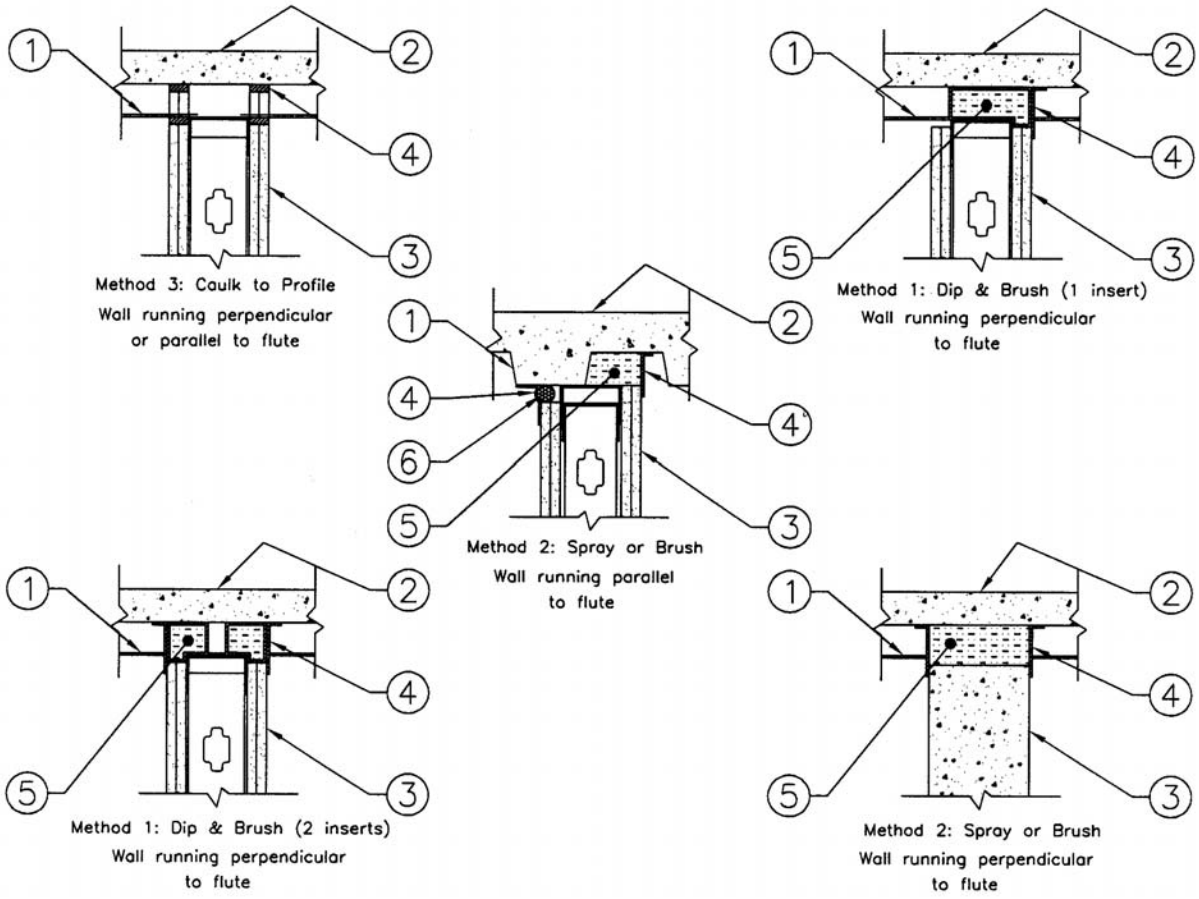
Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

Max Joint Width – 1in.

Joint System Cycled 500 Times at 10 Cycles Per Minute – 25% Compression or Extension

CSI Code: 07 84 43 Fire-Resistance Joint Sealant



System Design Instructions

1. Steel Decking: Minimum 22 gauge or equal galvanized steel decking with up to 3½" (88mm) flute height firmly supported, with or without concrete cover.

2. Floor/Ceiling Fire Separations:

a) 1 and 2 hour ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.

3. Wall Fire Separations Terminating at Fluted Steel Deck:

a) 1 and 2 hour ASTM E-119 or CAN/ULC S101 metal or wood framed gypsum wall board (GWB) assemblies or;

b) Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 4½" (114mm) or;

c) Cast in place concrete wall assemblies having a minimum cross section thickness of 6" (150mm) or;

d) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8" (200mm).

4. Firestop System Component 1:

Method 1: Dip & Brush: Dip each insert individually and fully coat in 5100SP* (firestop mastic), insert into flute opening to the desired depth. Brush exposed surface of insert on both sides smooth overlapping ½" (13mm) onto metal decking and/or the wall assembly to ensure complete coverage and no small gaps or pin holes exist. Brush excess material between flute foot and deflection/slip track to the next open flute cavity, sealing the seam between the steel decking and the deflection/slip track. If larger spaces are evident, fill tightly with mineral wool and brush a 1/16" (60mil) coat of 5100SP* to fully cover the area.

Method 2: Spray or Brush: Install each insert at the desired location and spray or brush one heavy coat of 5100SP*, 1/8" (120mil) thick, on both sides of the assembly, fully covering all voids and overlapping a minimum of ½"(13mm) onto the metal deck and wall assembly

Method 3: Caulk to profile: Cut the gypsum wallboard to the profile of the deck and install to within ¾" of the deck. Caulk 3600EX*, 4100NS* or 4800DW* into the gap between the gypsum board and the deck to the depth of the gypsum board membrane.

5. Firestop System Component 2: Flute Opening: Insert of 4-6 PCF (68kg/m3) mineral wool, cut 10% larger than the opening area. Depth: Cut the mineral wool insert to a depth of 5" (125mm) for the single insert detail, for the two-piece detail cut two 2½" deep inserts. Two-piece details can be installed one on each side of the assembly flush with the membrane surface. Additional pieces of mineral wool batt insulation are to be compressed 33 percent in thickness and are installed to completely fill the gap above the top of the wall and the bottom of the steel floor units, flush with both surfaces of wall. Mineral wool inserts can be installed in any of the configurations detailed in Methods 1 and 2. Exception: when flutes are running parallel with the wall, cut 4-6 PCF (68kg/m3) mineral wool inserts to the desired shape, 10% larger than the opening area and compress into the open cavity. All details require sealant as outlined in Section 4 of this system design.

6. Firestop System Component 3: (Optional) – When gaps between top of wall and bottom of the steel deck is less than or equal to 3/4 in. – Nom 1 in. diam polyethylene rod compressed and firmly packed into the nom 3/4 in. gap between the top of the wall and the bottom of the steel deck and forming material (Item 5) in areas of fluted deck. Backer rod compressed to be flush with surface of wall.

***WH Labeled Component**

Metal Decking to Vertical Wall Assemblies

Test Standards: UL 2079, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

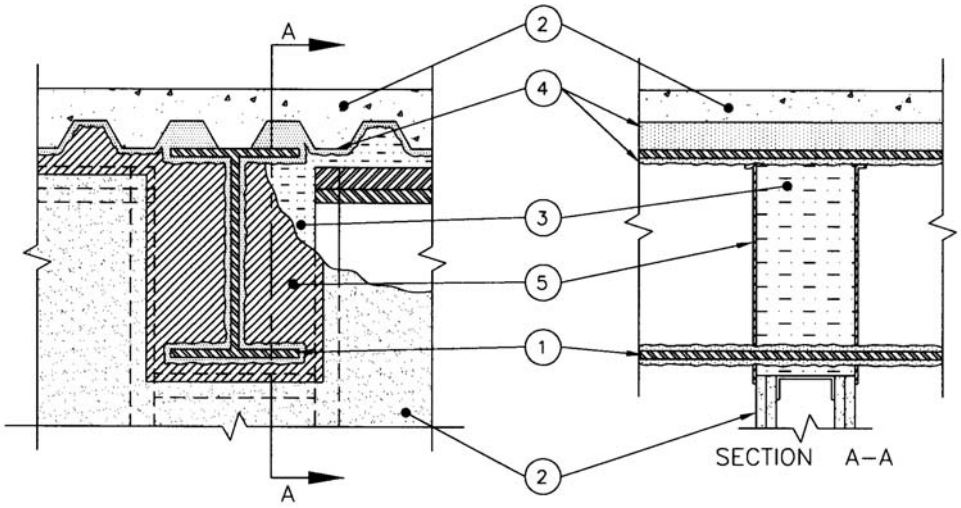
Max Joint Width at top of Wall – 3/4"

Joint System Cycled 500 Times at 10 Cycles Per Minute – 33% Compression or Extension

CSI Code: 07 84 43 Fire-Resistance Joint Sealants

RATINGS

TEST STANDARD	F/FH	T
UL 2079	Up to 2 HR.	Up to 2 HR.
ULC S115	Up to 2 HR.	Up to 2 HR.



System Design Instructions

1. Penetrating Item: Steel beam or open-web steel joist, as specified in the individual roof/ceiling or floor/ceiling design, used to support fluted steel deck. Structural steel support oriented perpendicular to wall assembly. Where open-web steel joists pass through the fire rated wall, 3/8 in. diamond mesh expanded steel lath having a nom weight of 1.7 to 3.4 lb per sq yd shall be secured to one side of each joist with galvanized steel tie wire and the lath shall be fully covered with spray-applied fire resistive material applied in accordance with the specifications in the individual roof/ceiling or floor/ceiling design.

2. Roof/Ceiling or Floor/Ceiling Assembly: 1 or 2 hour rated ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.

Wall Assembly: 1 or 2 hour rated ASTM E-119 or ULC S101 metal framed gypsum wall board (GWB) wall assemblies with a double top track consisting of a single top track with a deflection channel or slip track.

The hourly rating of the joint system is equal to the lesser hourly rating of either the roof/floor/ceiling or wall assembly.

3. Firestop System, Component 1: Filler material, Min 4-6 PCF (68 kg/m3) density mineral wool insulation at a min depth of 6-1/8" (157mm) compressed into each flute opening in the steel deck and into the framed beam opening in the wall assembly flush with both sides of the wall assembly.

4. Firestop System, Component 2: Cafco 300 or WR Grace Type MK-6/HY applied to the underside of the roof/ceiling or floor/ceiling assembly and all surfaces of the structural steel support. Sprayed applied in accordance with the specifications in the individual roof/ceiling or floor/ceiling design.

5. Firestop System, Component 3:

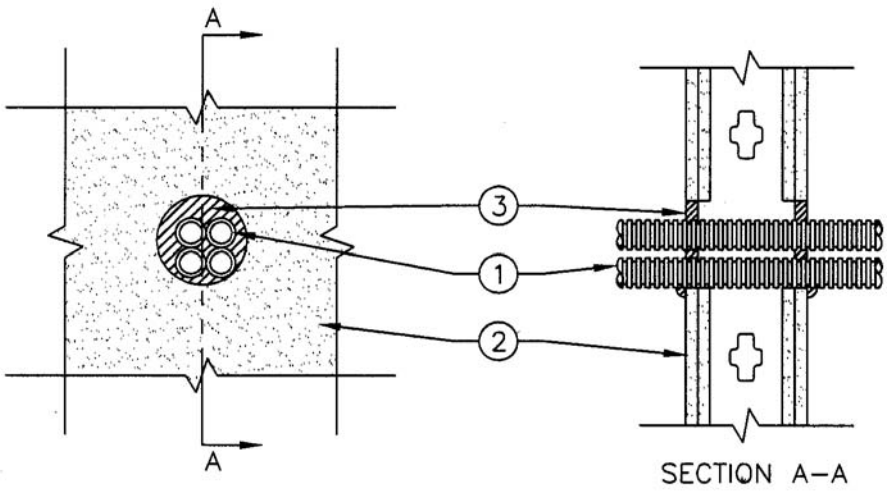
Method 1: Spray or Brush: One heavy coat of 5100SP*, 1/16" (60mil) dry thickness, on both sides of the assembly, fully covering all voids and overlapping a minimum of 1" (25mm) onto the metal deck, steel beam and wall assembly.

Method 2: Caulk: Min 1/8" (3mm) thickness of 3600EX*, 4100NS* or 4800DW* applied between the gypsum wall board and spray applied fire resistance material on both sides of the assembly, fully covering all voids, and overlapping a minimum of 1/8" (3mm) onto the metal deck, steel beam and wall assembly.

***WH Labeled Component**

Single and Multiple Penetrations
Vertical (walls)
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11: closed systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	"F" Rating	"T" Rating
Up to 1" Diam. Electrical Non-metallic Tubing (PVC) up to 4	4-1/2"	0" – 1"	Up to 2 Hr	75 min



System Design Instructions

1. **Penetrating Item:** Either singly or combination, including all. Centered or offset in hole, see table above. All penetrating items must be reliably supported.

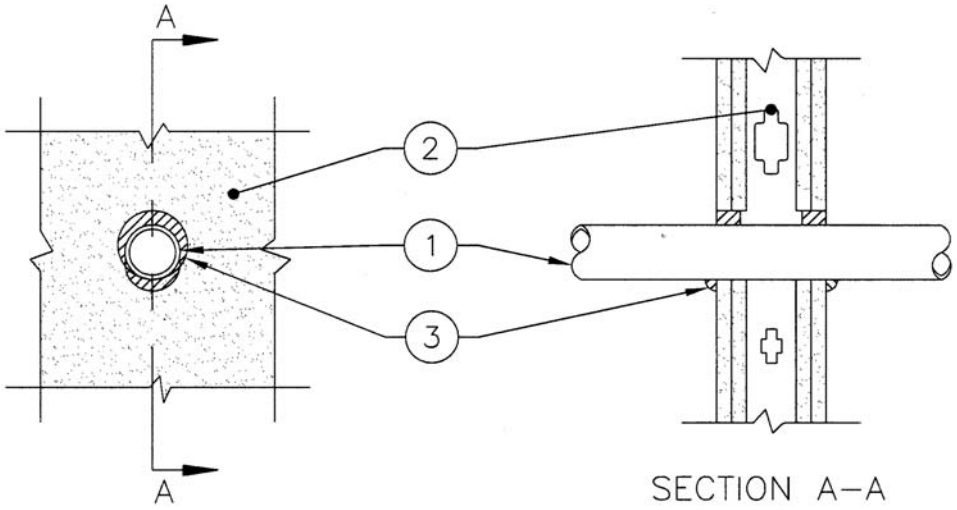
2. **Wall Assemblies:** 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a) metal or wood framed gypsum wall board (GWB) wall assemblies.
   b) cast in place lightweight or normal weight concrete wall assemblies having a minimum cross section thickness of 4-½ in.
   c) hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in.

3. **Firestop System:** PFP Partners Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum thickness of 5/8" within the annulus on both surfaces of wall assembly. Between 0" to 1/4" annular spaces, a ½ in. diameter fillet bead must be placed around the interface between penetrating item and the surface of the wall.

***WH Labeled Component**

Single Penetrations
Vertical (wall)
Test Standards: ULC S115-M11** – Non-metallic closed systems
Test Standards: ASTM E-814, UL 1479 – Non-metallic open and closed systems
Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Max Hole Size	Annular Space	ASTM E-814 "F"	ASTM E-814 "T"	ULC S115 "F"	ULC S115 "FH"	ULC S115 "FT"
PVC Sch 40 pipe up to 1-1/2"	2-1/2" 64mm	0" – 1" 0 – 25mm	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs
CPVC Sch 40 pipe up to 1-1/2"	2-1/2" 64mm	0" – 1" 0 – 25mm	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs
PVC Sch 40 pipe up to 2"	3" 76mm	0" – 1" 0 – 25mm	Up to 2 hrs	15 min	Up to 2 hrs	Up to 2 hrs	15 min
CPVC Sch 40 pipe up to 2"	3" 76mm	0" – 1" 0 – 25mm	Up to 2 hrs	15 min	Up to 2 hrs	Up to 2 hrs	15 min



System Design Instructions

1. Penetrating Item:** Centered or offset in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.

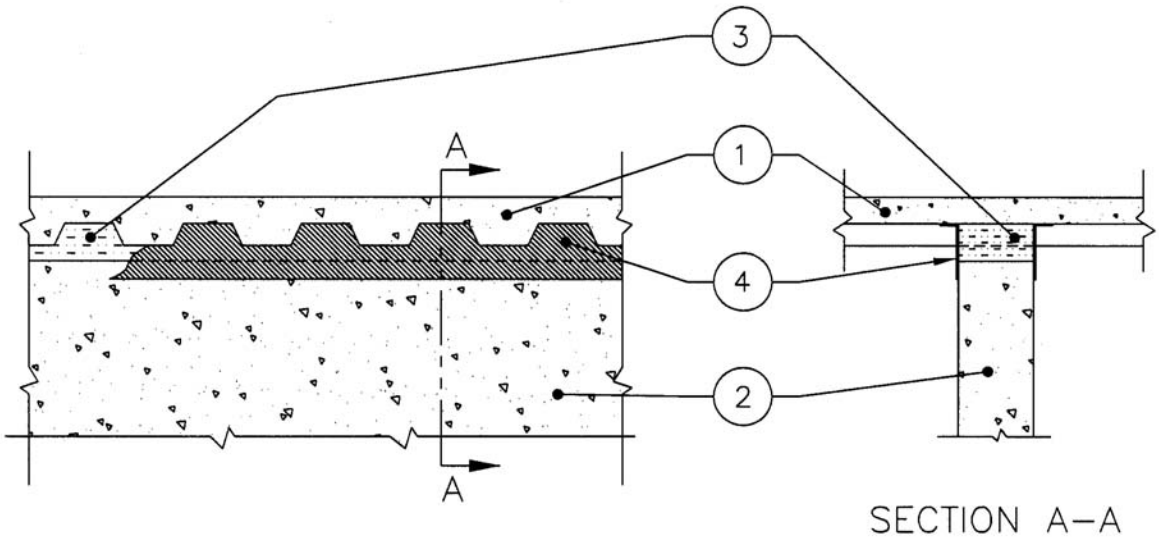
2. Wall Assembly: Code conforming 1 or 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
a) Nominal 2 in. by 4 in. (38 mm by 89 mm) metal or wood framed gypsum wallboard (GWB) wall assemblies.
b) Cast in place lightweight or normal weight concrete wall assemblies having a minimum cross section thickness of 6 in. (152 mm)
c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (203 mm)

3. Firestop System, Component 1: PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW* installed at a minimum 5/8" (18mm) or 1" (25 mm) thickness of fill material applied within the annulus on both surfaces of wall assembly for 1 or 2 hr walls, respectively. Between 0-1/4" (6mm) annulus spaces, a 1/2" (13mm) diameter fillet bead must be placed around the penetrating item.

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems, but is applicable for process and supply pipes.**

Intertek	**5100SP**	**PFP/PV 120-10**

Metal Decking to Vertical Wall Assemblies
Rating: Up to 2 Hour "FTH"
Test Standards: ULC S115-M11, UL 2079
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
Max Joint Width – 2-1/4 in. (57mm)
Joint System Cycled 500 Times at 10 Cycles Per Minute – 50% Compression or 33% Extension
CSI Code: 07 84 43 Fire-Resistance Joint Sealants



SECTION A–A

System Design Instructions

1. **Floor/Ceiling Fire Separation:** 2 hour rated ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.

2. **Wall Fire Separation:** 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a) Cast in place concrete wall assemblies having a minimum cross section thickness of 6-1/8 in. (155mm) or;
   b) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3. **Firestop System Component 1:** 4-6 pcf (64-96 kg/m³) mineral wool compressed 33% installed in the 2-1/4 in. (57mm) joint between the top of the wall assembly and underside of the flutes, flush with both sides of the wall. Installed within each flute 4-6 pcf (64-96 kg/m³) mineral wool cut to the shape of the deck, compressed 33% flush with both sides of the wall.

4. **Firestop System Component 2:** Spray or Brush 5100SP* 1/16 in. (63 mil) (dry) thickness on both sides of the assembly, fully covering mineral wool and overlapping a minimum of 1/2 in. (13mm) onto the metal deck and wall assembly.

***WH Labeled Component**

Voids

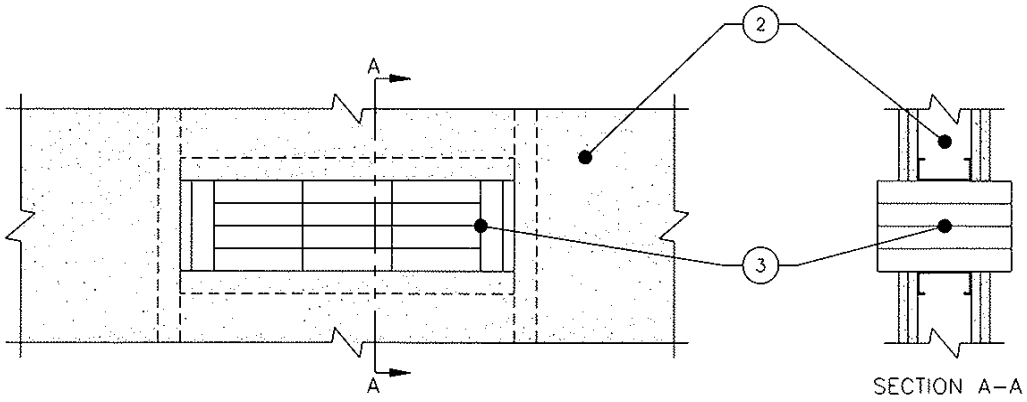
Vertical (wall)

Test Standards: ULC S115-M11, ASTM E-814, UL 1479

Positive Pressure Differential – 2.5 pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Maximum Opening Size	ASTM E-814/UL 1479		ULC S115		
	"F"	"T"	"F"	"FH"	"FT"
6" x 24"	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs	Up to 2 hrs



System Design Instructions

1. Penetrating Item: None.

2. Wall Assembly: Code conforming 1 & 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:

a) Nominal 2 in. by 4 in. (38 mm by 89 mm) metal or wood framed gypsum wallboard (GWB) wall assemblies. Additional framing members to be installed with the stud cavity in such a manner to form a rectangular box.

b) Cast in place lightweight or normal weight concrete wall assemblies having a minimum cross section thickness of 6 in. (152 mm)

c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (203 mm)

3. Firestop System, Component 1: PFP Partners – Firestop Pillows, 9 in. long by 6 in. wide by 2 in thick or 9 in. long by 3 in. wide by 2 in. thick plastic covered intumescent pillows tightly packed into opening, with min 25 percent compression in the vertical direction. Pillows installed with 9 in. dimension projecting through wall and centered within the opening.

***WH Labeled Component**

Metal Decking to Vertical Wall Assemblies

Rating: Up to 2 Hours "FTH"

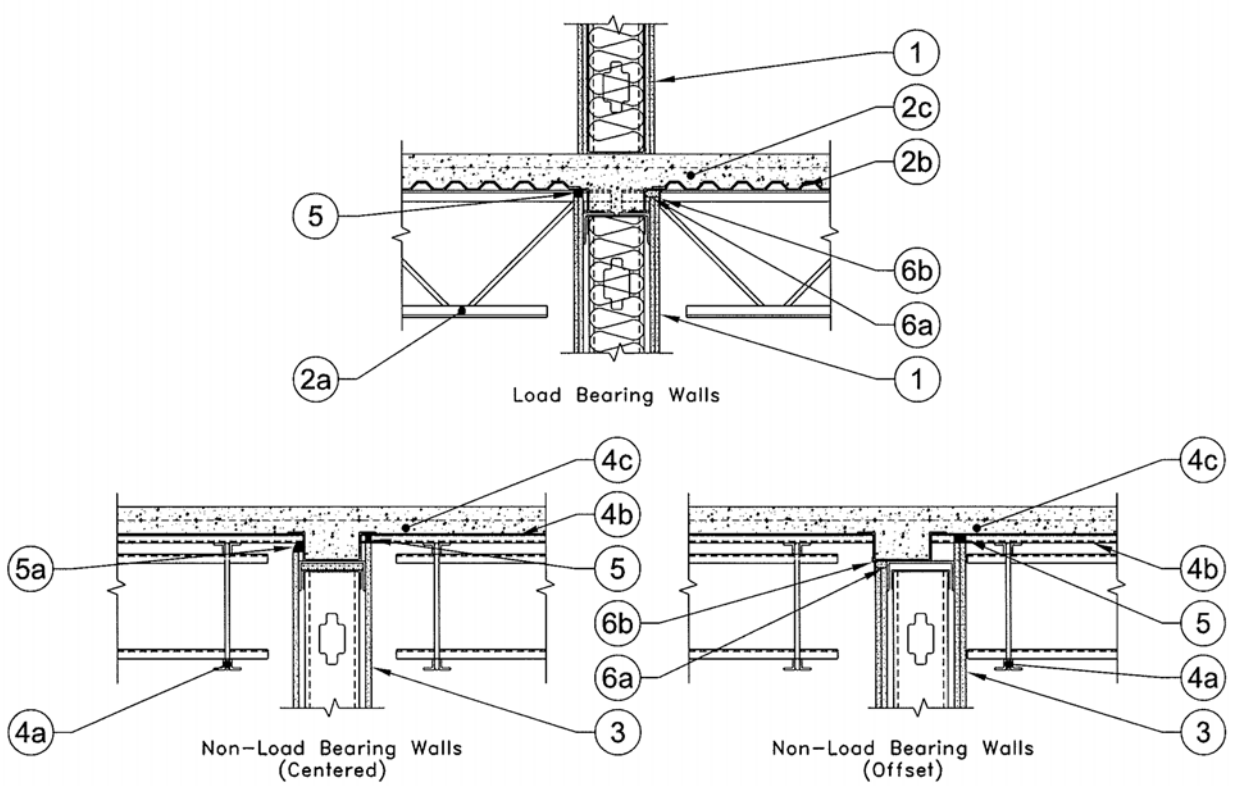
Test Standards: ASTM E-814, UL 1479, ULC S115-M11

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

Max Joint Width – 3/4in.

Joint System Cycled 500 Times at 10 Cycles Per Minute – 25% Compression or Extension

CSI Code: 07 84 43 Fire-Resistance Joint Sealants



System Design Instructions

Load Bearing Wall Systems

1. **Load Bearing Wall Fire Separations Terminating at Fluted Steel Deck:** 1 and 2 hour ASTM E-119 or CAN/ULC S101 metal framed loaded bearing wall board (GWB) assemblies.

2. **Floor/Ceiling Fire Separations:** 1 and 2 hour ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.
   a) **Open Web Steel Joist:** Minimum 10 in. (250 mm) open web steel joists.
   b) **Steel Decking:** Non-composite fluted type, 1 in. (22 mm) nominal depth, minimum 22 gauge firmly attached to supports.
   c) **Concrete:** Min 2-1/2 in. (64 mm) as measured from the top plane of the steel floor and form units with Welded Wire Fabric installed at approximately mid depth between top place of steel deck and top plane of concrete.

Non-Load Bearing Wall Systems

3. **Non-load Bearing Wall Fire Separations Terminating at Fluted Steel Deck:** 1 and 2 hour ASTM E-119 or CAN/ULC S101 metal framed non-loaded bearing wall board (GWB) assemblies.
   a) **Batt Insulation (Optional):** Max 3/4 in. (19 mm) thickness of batt insulation installed between the ceiling runner and deflection track.

4. **Floor/Ceiling Fire Separations:** 1 and 2 hour ASTM E-119 or CAN/ULC S101 fluted steel deck roof/ceiling or floor/ceiling assemblies.
   a) **Open Web Steel Joist:** Minimum 10 in. (250 mm) open web steel joists.
   b) **Steel Decking:** Non-composite fluted type, 1 in. (22 mm) nominal depth, minimum 22 gauge firmly attached to supports.
   c) **Concrete:** Min 2-1/2 in. (64 mm) as measured from the top plane of the steel floor and form units with Welded Wire Fabric installed at approximately mid depth between top place of steel deck and top plane of concrete.

Firestopping Methods

5. **Firestop System Method 1: Drywall cut to profile**
   Component 1: Caulk to profile: Cut the gypsum wallboard to the profile of the deck and the OWSJ and install to within 3/4 in. (19 mm) of the deck. Caulk 4100NS*, 4800DW* or 3600EX* into the gap between the gypsum board and the deck and the OWSJ to the depth of the gypsum board membrane.

5a) Firestop System Method 1a: (As an alternative to Item 5) – Drywall cut straight
   Component 1: Caulk gypsum to floor system: Gypsum wallboard to be cut to overlap distribution angle (load bearing walls) or deflection track (non-load bear walls) by min 1 in. (25 mm). Caulk 4100NS*, 4800DW* or 3600EX* into the gap between the gypsum board and the floor system, min 1/2 in. (13 mm) diam bead.

6. **Firestop System Method 2**
   a) **Component 1:** Insert of 4-6 PCF (68kg/m3) mineral wool insulation are to be compressed 33 percent in thickness and are installed to completely fill the gap above the top of the wall and the bottom of the steel floor units and around OWSJ, flush with both surfaces of wall.
   b) **Component 2:** Spray or Brush: Install each insert at the desired location and spray or brush one heavy coat of 5100SP*, 1/16 in. (62 mil) thick, on both sides of the assembly, fully covering all voids and overlapping a minimum of 1/2 in. (13 mm) onto the metal deck and wall assembly

***WH Labeled Component**

Single and Multiple Penetrations

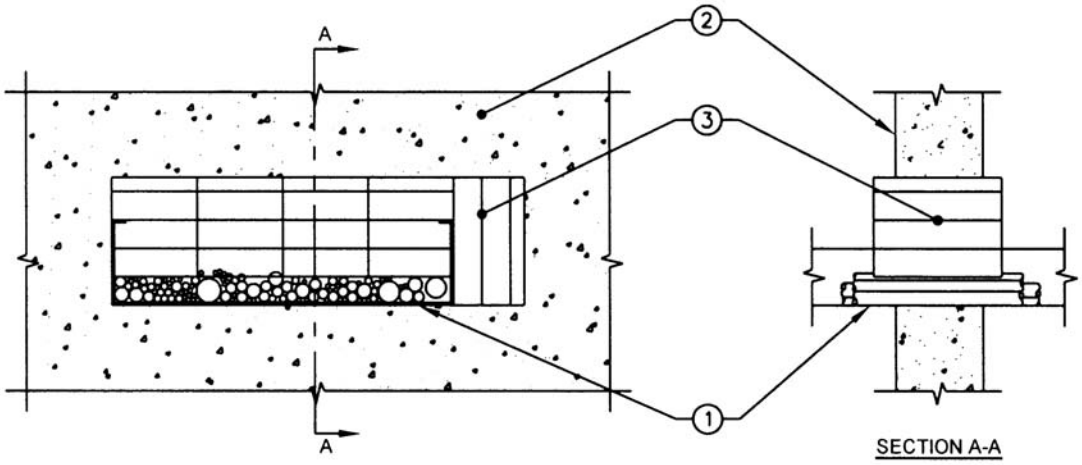
Vertical (walls)

Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11

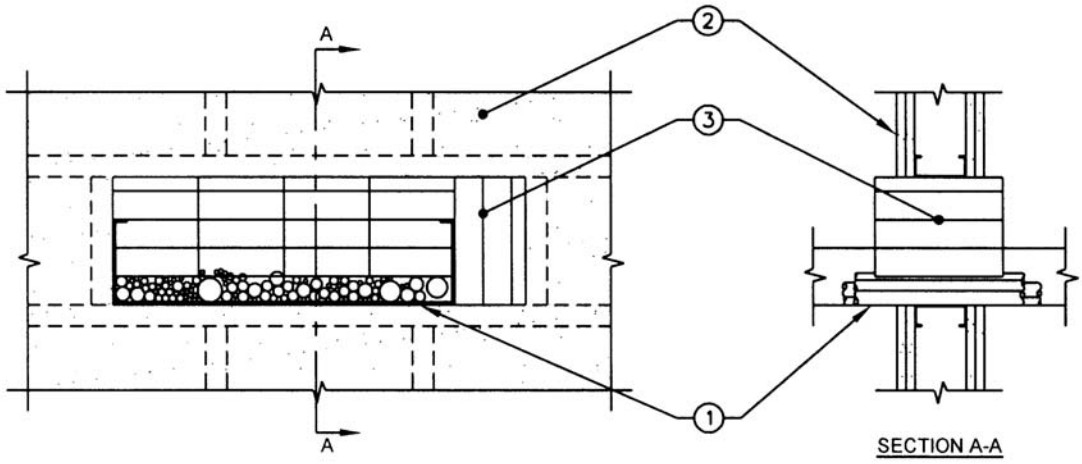
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

		E814 & UL 1479		CAN/ULC S115		
Penetrating Material & Size	**Annular Space**	**Fire "F" Rating**	**Temp "T" Rating**	**Fire "F" Rating**	**Fire/Hose "FH" Rating**	**Temp Rating "FTH" Rating**
Cable Trays	3/4" – 7" (19 – 178mm)	Up to 2 Hrs	15 Min	Up to 2 Hrs	Up to 2 Hrs	15 Min
EMT/Steel Conduit and Pipe (3/4 to 4 in.(19 to 102 mm)) Sch 5 & up	3/4" – 7" (19 – 178mm	Up to 2 Hrs	15 Min	Up to 2 Hrs	Up to 2 Hrs	15 Min
Multple BX/Teck Cable to 3-3/8 in. (86 mm) OD	3/4" – 7" (19 – 178mm)	Up to 2 Hrs	90 Min	Up to 2 Hrs	Up to 2 Hrs	90 Min



SECTION A-A



SECTION A-A

System Design Instructions

1. Penetrating Item:

a) Steel cable tray 4 in. x 30 in. (100 x 750 mm) filled to a maximum of 50% with any of the items in the table above or,

b) Bundled cables, tubing, conduits and pipes listed in table above installed within the opening such that aggregate cross sectional area of penetrants in the opening is max 58 percent of the cross sectional area of the opening in assembly. The annular space between penetrants and the periphery of the opening are to be min 3/4 in.(19 mm) to max 7 in. (178 mm).

c) The maximum opening is 480 in^2 (0.31 m^2). All penetrating items must be reliably supported.

2. Wall Assemblies: 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:

a) Metal or wood framed gypsum wall board (GWB) wall assemblies with opening within the wall assembly completely framed to form a rectangular box or;

b) Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;

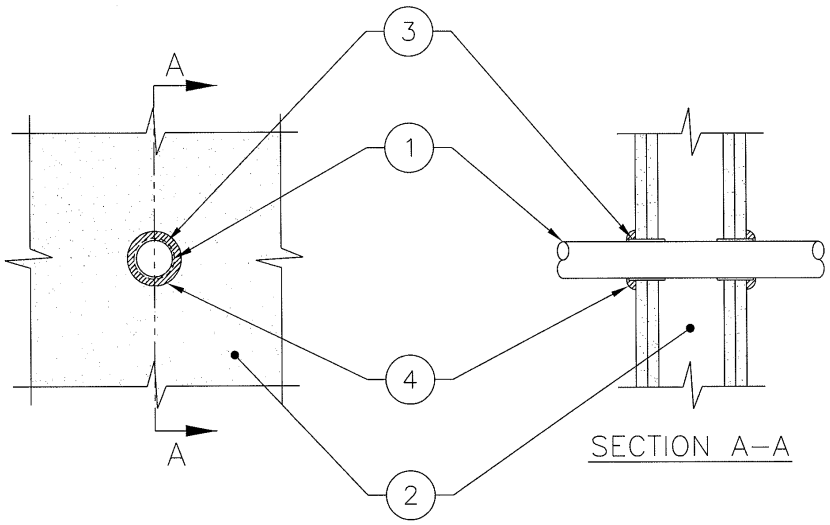
c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3. Firestop System Component 1: PFP Partners – Firestop Pillows, 9 in. long by 6 in. wide by 2 in (229 mm by 150 mm by 51 mm) thick or 9 in. long by 3 in. wide by 2 in. (229 mm by 76 mm by 51 mm) thick plastic covered intumescent pillows tightly packed into opening. Pillows installed with 9 in. dimension projecting through wall and centered within the opening. Pillows tightly packed into opening to fill the annular space between penetrations and periphery of opening and between penetrations. Pillows are compressed 25 percent in the vertical direction.

***WH Labeled Component**

Passive Fire Protection Partners
Design Number PFP/PV 120-14
Single Penetrations Only – Vertical (Wall) Assembly
3600EX 4100NS 4800DW Wrap Strip WS1
Test Standards: ASTM E814, UL 1479: Non-metallic Open and Closed System
CAN/ULC-S115**: Non-metallic Closed System
Test Pressure – 2.5 Pa (0.01 in. of water) Positive Pressure Differential

Penetration Material & Size	Max Hole Size	Annular Space	ASTM E-814		CAN/ULC S115		
			"F"	"T"	"F"	"T"	"FTH"
PEX up to 2 in. (51 mm) OD	2-1/2 in.	1/4 in.	2 Hour	2 Hour	2 Hour	2 Hour	2 Hour
PE/PE-RT up to 2 in. (51 mm) OD	2-1/2 in.	1/4 in.	2 Hour	2 Hour	2 Hour	2 Hour	2 Hour



System Design Instructions

1. **Penetrating Item**** – Centered in hole, see table above. Single penetration only, max hole size not to exceed table above. Ratings achieved will not be greater than that of the wall assembly.
2. **Wall Fire Separations**:
   a) Use metal or wood framed fire rated gypsum wall board (GWB) wall fire separations framed with 3-1/2 in. (88mm) studs or;
   b) Cast in place normal or light density concrete wall having a min cross section thickness of 4-1/2 in. (112mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section of 8 in. (200 mm).
3. **Firestop System; Component 1:** PFP Partners – Wrap Strip WS1* Nom 1/8 in. (3.175 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Min two continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strip to be centered in membrane such that there is the same distance on each side of membrane surface.
4. **Firestop System; Component 2:** (Optional) PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*, min 1/4 in. (6.25 mm) diameter bead of caulk to be applied at wrap strip/wallboard interface on both surfaces of the wall.

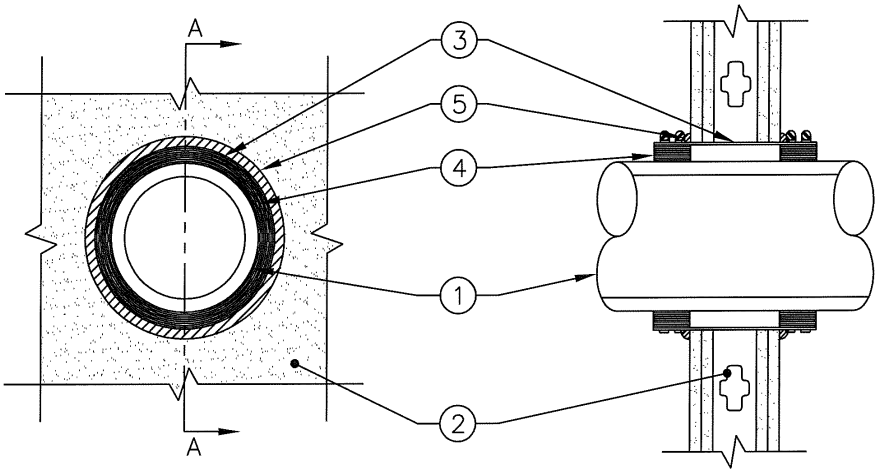
***WH Labeled Component**

****Not tested to 50 Pa pressure differential as required by Canadian code for combustible DWV (Drain, Waste or Vent) piping systems.**

Intertek	3600EX WS1	PFP/PV 120-20

Single Penetrations
Vertical (wall) Assembly
Test Standards: ASTM E-814, UL 1479 – Non-metallic Open or Closed Systems
CAN/ULC S115-M11** – Non-metallic Closed Systems
Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
CSI Code: 07 84 13 Penetration Firestopping

Penetration	Max	Annular	ASTM E-814		ULC S115		
Material & Size	Hole Size	Space	"F"	"T"	"F"	"FT"	"FH"
Polypropylene SDR 7.4 Faser ® 200 mm OD (7.9 in. OD) or smaller Aquatherm Fusiolen Polypropylene Pipes	251 mm (9.8 in.)	25 mm (1 in.)	2 hour	2 hour	2 hour	2 hour	2 hour



SECTION A–A

System Design Instructions

1. Penetrating Item: Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. Wall Fire Separations:
- a) 2 hour rated ASTM E-119 or CAN/ULC S101 metal or wood framed fire rated gypsum wallboard (GWB) wall assemblies.
- b) Cast in place concrete wall assemblies having a minimum cross section thickness of 150mm (6 in.) or;
- c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 200 mm (8 in.).

3. Firestop System; Component 1: Metallic Sleeve – Cylindrical sleeve fabricated from No. 22 ga galv sheet metal and having a min 38 mm (1-1/2 in.) lap along the longitudinal seam. Length of steel sleeve to 101 mm (4 in.) greater than the thickness of the wall. Sleeve installed by coiling the sheet steel to a diameter smaller than the through opening, inserting the coil through the opening and releasing the coil to let it uncoil against the circular through opening. Sleeved to be centered in the wall such that the ends of the sleeve extend 51 mm (2 in.) beyond each surface of the wall. Device secured using two 6 mm (1/2 in.) wide stainless steel hose clamp, two clamps on each side of the wall.

4. Firestop System; Component 2: PFP Partners – Wrap Strip WS1* Nom 2.5 mm (1/8 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. Min nine continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into sleeve such that edges of the wrap strips are flush with outer edge of metallic sleeve on each side of the wall.

5. Firestop System, Component 3: PFP Partners – Firestop 3600EX* min 13 mm (1/2 in.) diam bead of caulk to be applied at steel sleeve /wallboard interface on both surfaces of wall.

6. Firestop System, Component 4: Sleeve Covering Material (Not Shown) – Foil/Bubble Reflective Insulation – Reflectix – Single layer of min 76 mm (3 in. wide) piece of insulation tightly butted to wall surface and pipe such insulation completely covers sleeve and wrap strips. Insulation to overlap a min of 51 mm (2 in.) along the longitudinal seam. All seams (longitudinal and traverse joints) to be sealed with min 51 mm (2 in.) wide aluminum foil tape

***WH Labeled Component**
**** Not Tested To 50 Pa Pressure Differential As Required By Canadian Code Requirements For Combustible Drain, Waste or Vent Piping Systems.**

Single Penetration

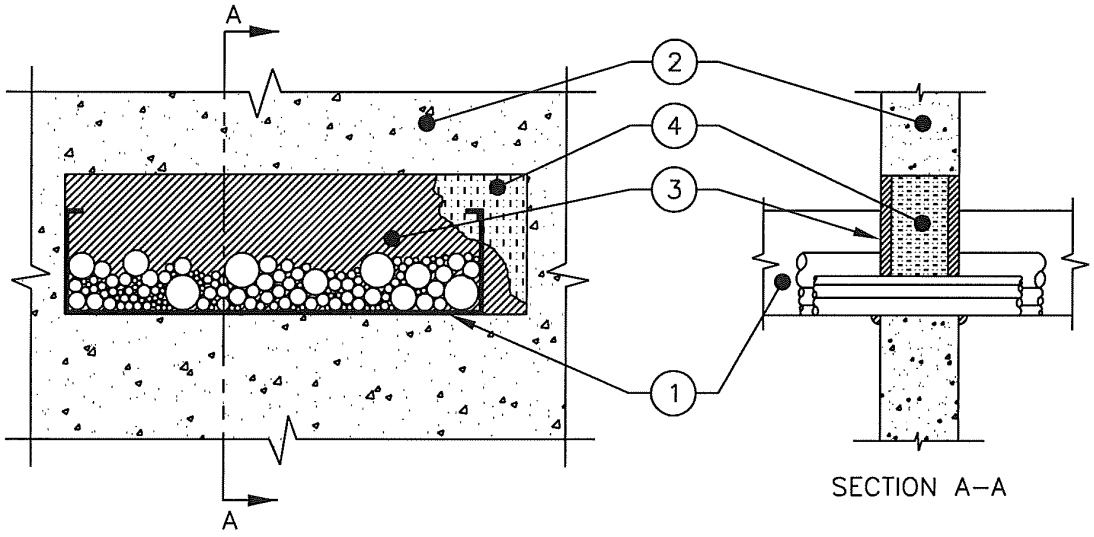
Vertical (walls)

Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11

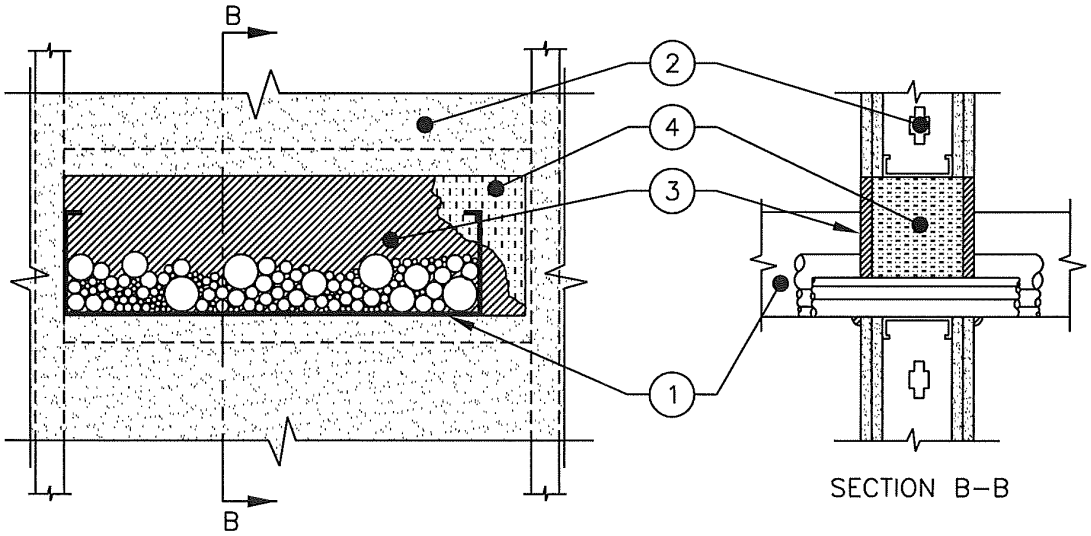
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

Penetrating Material & Size	Annular Space	E814 & UL 1479 Fire "F" Rating	E814 & UL 1479 Temp "T" Rating	CAN/ULC S115 Fire "F" Rating	CAN/ULC S115 Fire/Hose "FH" Rating	CAN/ULC S115 Temp Rating "FTH" Rating
Cable Trays	0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Multple BX/Teck Cable to 3-3/8 OD	0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Loomex/Romex to 1½" OD (PVC/CPVC Jacket)	0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min
Telephone, Cablevision, Fiber Optic Cable to 1" OD (PVC/CPVC Jacket)	0" – 3" (0 – 76 mm)	Up to 2 Hour	15 Min	Up to 2 Hour	Up to 2 Hour	15 Min



SECTION A–A



SECTION B–B

System Design Instructions

1) **Penetrating Item:**
   a. Steel cable tray 4 in. x 36 in. (102 x 914 mm) filled to a maximum of 40% with any of the items in the table above or,
   b. Bundled cables listed in table above installed within the opening such that aggregate cross sectional area of penetrants in the opening is max 40 percent of the cross sectional area of the opening in assembly. The annular space between penetrants and the periphery of the opening are to be min 0 in. (point contact) to max 3 in. (75 mm).
   c. The maximum opening is 294 in^2 (0.19 m^2). All penetrating items must be reliably supported.

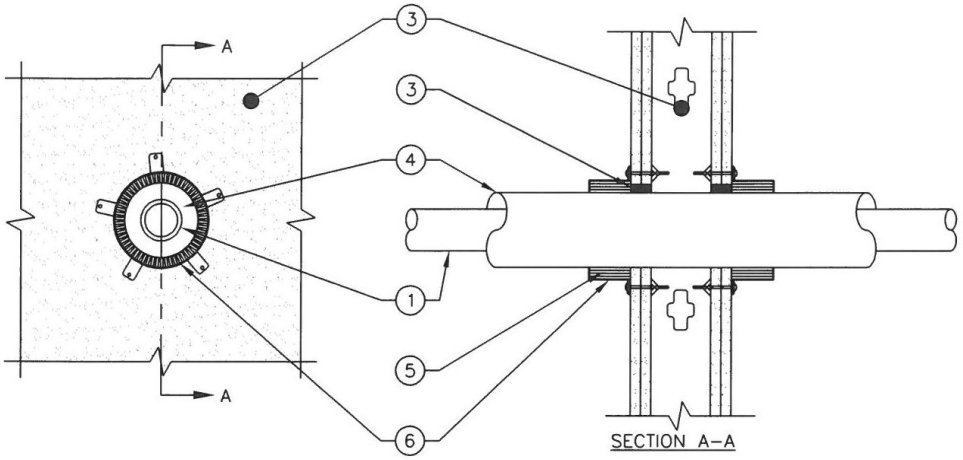
2) **Wall Assemblies:** 1 and 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a. Metal or wood framed gypsum wall board (GWB) wall assemblies with opening within the wall assembly completely framed to form a rectangular box or;
   b. Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;
   c. Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).

3) **Firestop System Component 1:** PFP Partners – Firestop 4100NS* 4800DW* or 3600EX* for vertical application, product to be installed at a minimum wet film thickness of 5/8 in. (16mm) on each side of the wall assembly.

4) **Firestop System Component 2:** Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4-6 PCF (68 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 3-1/2 in. (89 mm) or 4-3/4 in. (121 mm), for 1 and 2 hr rated assemblies, respectively. Recess filler material 5/8 in. (16mm) on each side of the wall for 3600EX*, 4100NS* or 4800DW* sealant placement.

Passive Fire Protection Partners
Design Number PFP/PV 120-22
Single Penetrations – Vertical (Wall) Assembly
3600EX, 4100NS, 4800DW, Wrap Strip WS1, PPC1.5
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115
Test Pressure– 50 Pa (0.2 in. of water) Positive Pressure Differential

Penetration Material & Size	Max Hole Size	Annular Space	ASTM E-814-13a UL 1479-15 "F"	ASTM E-814-13a UL 1479-15 "T"	ULC S115-11 "F"	ULC S115-11 "FT"	ULC S115-11 "FTH"
Aquatherm Fusion Green Pipe Polypropylene SDR 11 63 mm OD (2 in. ID) (or smaller within the SDR 11 range)	89 mm (3-1/2 in.)	0 - 13 mm (0 – 1/2 in.)	2 hours	56 min.	2 hours	56 min.	56 min.



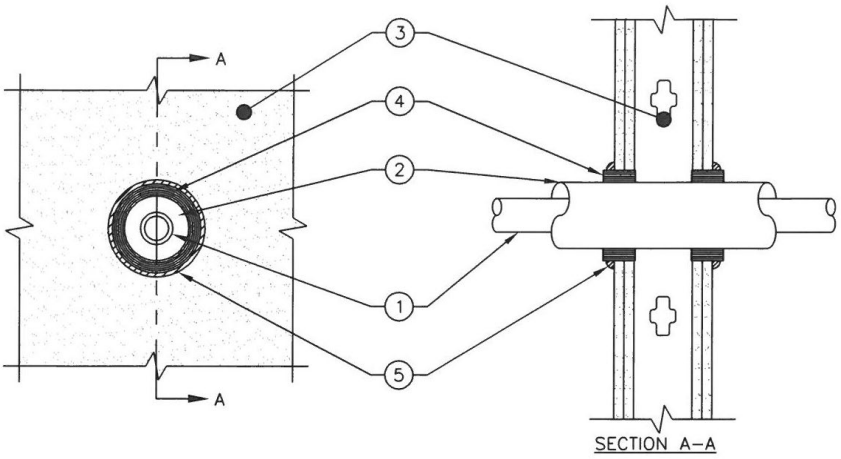
System Design Instructions

1. **Penetrating Item:** S ee table above. Single penetrations only, max.hole size not to exceed table above.
2. **Through Insulation Material:** Max 25 mm (1 in.) thick Owens Corning (ASJ MAX FIBERGLASS™ pipe insulation for Aquatherm® Longitudinal joints sealed with factory-applied self-sealing lap tape. Transverse joints secured with butt tape supplied with the product. **Insulation custom-sized to match the outside dimensions of the metric-sized piping.**
3. **Wall Assembly:** 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a) Metal framed gypsum wall board (GWB) wall assemblies with min 26 GA steel framing and min. two layers of 5/8 in. thick Type X gypsum board on each side of wall assembly; or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 156 mm (6-1/8 in.) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies with min. face shell thickness 32 mm (1-1/4 in.) laid up with mortar having a minimum overall thickness of 156 mm (6-1/8 in.).
4. **Firestop System, Component 1:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min a min 32 mm (1-1/4 in.) thickness of fill material applied within the annulus space, flush with both surfaces of wall. A min 3 mm (1/8 in.) diameter bead of sealant shall be applied at the pipe insulation / gypsum wall interface at point contract locations.
5. **Firestop System; Component 2:** PFP Partners – Wrap Strip WS1* Nom 3mm (1/8 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. Min seven continuous layers of wrap strip to be wrapped around the circumference of the insulated penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips butted tight to both sides of the wall assembly.
6. **Firestop System; Component 3:** Collar fabricated from coils of precut min 0.41 mm (0.016 in.) thick galvanized steel was installed to restrain the wrap strips. The collar had 25 mm (1 in.) wide by 32 mm (1-1/4 in.) long anchor tabs spaced at 102 mm (4 in.) OC for attachment to the wall. In addition, the collar has 13 mm (1/2 in.) wide by 19 mm (3/4 in.) long retainer tabs opposite the anchor tabs. The collars are wrapped over the wrap strips and overlapped a min 25 mm (1 in.). The retainer tabs are folded 90 degrees towards the insulated pipe to retain the wrap strips. Collars are secured to both sides of the gypsum wall assemblies at each anchor tab by means of 4.8 mm (3/16 in.) diameter by 76 mm (3 in.) long toggle bolts in conjunction with 3 mm (1/4 in.) by 32 mm (1-1/4 in.) diameter steel fender washers. Collars are secured to both sides of the concrete wall assemblies at each anchor tab by means of 3 mm (1/4 in.) diameter by 32 mm (1-1/4 in.) long steel masonry anchors in conjunction with 3 mm (1/4 in.) by 32 mm (1-1/4 in.) diameter steel fender washers.

*WH Labeled Component

Passive Fire Protection Partners
Design Number PFP/PV 120-23
Single Penetrations – Vertical (Wall) Assembly
3600EX, 4100NS, 4800DW, Wrap Strip WS1, PPC1.5
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115
Test Pressure– 50 Pa (0.2 in. of water) Positive Pressure Differential

Penetration Material & Size	Number of Wrap Strips	Max Hole Size	Annular Space	ASTM E-814-13a UL 1479-15 "F"	ASTM E-814-13a UL 1479-15 "T"	ULC S115-11 "F"	ULC S115-11 "FT"	ULC S115-11 "FTH"
Aquatherm Fusion Green Pipe Polypropylene SDR 11 50 mm OD (1-1/2" ID) (or smaller within the SDR 11 range)	6	127 mm (5-1/2 in.)	19 mm (3/4 in.)	2 hours	2 hours	2 hours	2 hours	2 hours
Aquatherm Fusion Green Pipe Polypropylene SDR 11 40 mm OD (1-1/4" ID) (or smaller within the SDR 11 range)	5	121 mm (4-3/4 in.)	13 mm (1/2 in.)	2 hours	101 min	2 hours	101 min	101 min



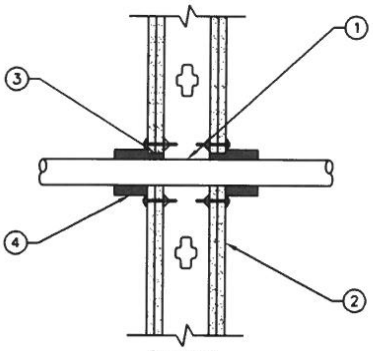
System Design Instructions

1. **Penetrating Item:** Centered in hole, see table above. Single penetrations only, maximum hole size not to exceed table above.
2. **Through Insulation Material:** Max 25 mm (1 in.) thick Owens Corning (ASJ MAX FIBERGLASS™ pipe insulation for Aquatherm® Longitudinal joints sealed with factory-applied self-sealing lap tape. Transverse joints secured with butt tape supplied with the product. **Insulation custom-sized to match the outside dimensions of the metric-sized piping.**
3. **Wall Assembly:** 2 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a) Metal framed gypsum wall board (GWB) wall assemblies with min 26 GA steel framing and min. two layers of 5/8 in. thick Type X gypsum board on each side of wall assembly; or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 156 mm (6-1/8 in.) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies with min. face shell thickness 31.75 mm 1-1/4 in. (31.75 mm) laid up with mortar having a minimum overall thickness of 156 mm (6-1/8 in.).
4. **Firestop System, Component 1:** PFP Partners – Wrap Strip WS1* Nom 3mm (1/8 in.) thick intumescent material supplied in 51 mm (2 in.) wide strips. See chart above for number of continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape on each side of the wall assembly. Butted ends of successive layers may be staggered or aligned. Layers of wrap strips to be slid along the through penetration into the wall openings such that the outer edges of the wrap strips extend approximately 10 mm (3/8 in.) beyond both surfaces of the wall assembly.
5. **Firestop System, Component 2:** PFP Partners – Firestop 3600EX*, 4100NS* or 4800DW*min a min 3 mm (1/8 in.) diameter bead of sealant shall be applied at the wrap strip / gypsum wall interface.
6. **Firestop System; Component 3:** Aluminum Foil Tape – Not Shown – Secure wrap strips layers with one layer of aluminum foil tape, overlapping onto pipe insulation and wall assembly surface, apply to both surfaces of the wall assembly.

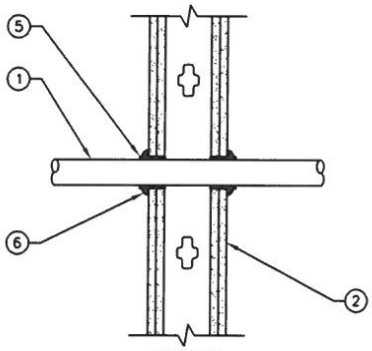
*WH Labeled Component

Passive Fire Protection Partners
Design Number PFP/PV 120-24
Single Penetrations – Vertical (Wall) Assembly
3600EX, 4100NS, 4800DW, Wrap Strip WS1, PPC1.5
Test Standards: ASTM E-814, UL 1479, CAN/ULC S115
Test Pressure– 50 Pa (0.2 in. of water) Positive Pressure Differential

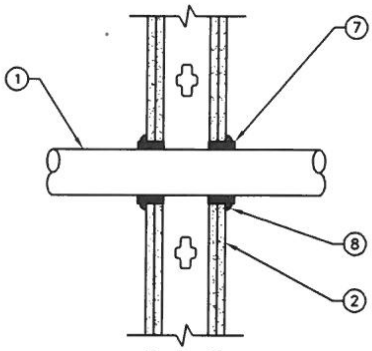
Penetration Material & Size	Design Number	Max Opening Size	Annular Space	ASTM E-814		CAN/ULC S115		
				"F"	"T"	"F"	"FH"	"FT/FTH"
Aquatherm SDR 7.4 and SDR 11 PP up to 1-1/2 in. nominal (ID)	A	2-1/2 in.	0 in. – 1/2 in.	120 min	118 min	120 min	120 min	118 min
Aquatherm SDR 7.4 and SDR 11 PP up to 1-1/2 in. nominal (ID)	B	2-1/2 in.	1/4 in.	120 min	120 min	120 min	120 min	120 min
Aquatherm SDR 7.4 and SDR11 PP up to 3 in. nominal (ID)	C	4-3/4 in.	5/8 in.	120 min	112 min	120 min	120 min	112 min



Design A



Design B



Design C

System Design Instructions

1. **PENETRATING ITEM:** Centred or offset in hole, see table above. Single penetrations only, max. opening size not to exceed table above.
2. **WALL ASSEMBLY:** 2 hour rated ASTM E-119 or CAN/ULC S101 wall assembly, min 26 GA steel stud and min. two layers of 5/8 in. (16 mm) thick Type X gypsum wallboard (GWB) on each side of the wall.

Design A

3. **FIRESTOP SYSTEM, COMPONENT 1:** PFP Partners – Firestop 3600EX*, 4100NS*, 4800DW* fully filling the annulus space to full depth of the membrane. On 0 in. to 1/2 in. (12.7 mm) annular space, min. 1/2 in. (12.7 mm) diameter bead of sealant must be placed around penetration item.
4. **FIRESTOP SYSTEM, COMPONENT 2:** PFP Partners – PPC 1.5* installed and latched around the pipe. In addition to the latch of the collar, a 1/2 in. (12.7 mm) wide stainless steel hose clamp tightly around the collars on both sides of the wall. Collars are secured to both sides of the wall using each anchor tab by 3/16 in. (4.77 mm) diameter x 3 in. (76.2 mm) long toggle bolts in conjunction with 1/4 in. (6.35 mm) x 1-1/4 in. (31.75 mm) diameter steel fender washers.

Design B

5. **FIRESTOP SYSTEM, COMPONENT 1:** PFP Partners – Wrap Strip WS1* nominal 0.1 in. (2.5 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Min. of 2 continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Wrap strips are to be recessed into the opening on both sides of the wall such that the outer edge of the wraps extend approximately 3/8 in. (9.5 mm) beyond both surfaces of the wall assembly.
6. **FIRESTOP SYSTEM, COMPONENT 2:** PFP Partners – Firestop 3600EX*, 4100NS*, 4800DW* bead of 1/8 in. (3.2mm) diameter applied at the wrap strip and gypsum wallboard interface.

Design C

7. **FIRESTOP SYSTEM, COMPONENT 1:** PFP Partners – Wrap Strip WS1* nominal 0.1 in. (2.5 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Min. of 5 continuous layers of wrap strip to be wrapped around the circumference of the penetrant. Wrap strips are individually wrapped around penetrant with ends butted and held in place with aluminum foil tape. Butted ends of successive layers may be staggered or aligned. Wrap strips are to be recessed into the opening on both sides of the wall such that the outer edges of the wrap strips extend approximately 3/8 in. (9.5 mm) beyond both surfaces of the wall assembly.
8. **FIRESTOP SYSTEM, COMPONENT 2:** PFP Partners – Firestop3600EX*, 4100NS*, 4800DW* bead of 1/8 in. (3.2mm) diameter applied at the wrap strip and gypsum wallboard interface.

*WH Labeled Component

Single and Multiple Penetrations

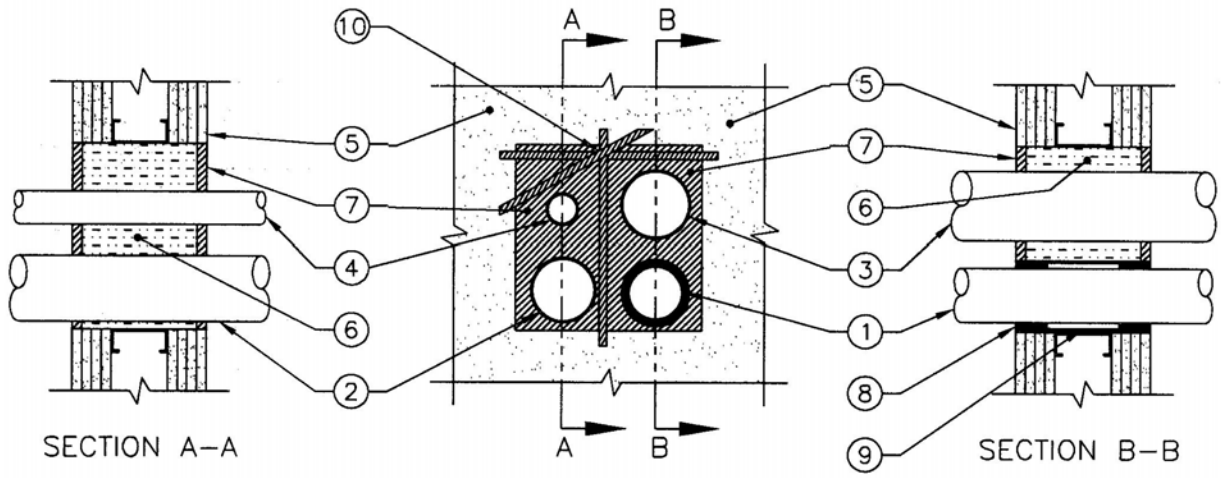
Vertical (walls)

Test Standards: ASTM E-814, UL 1479, CAN/ULC S115-M11**

Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum

CSI Code: 07 84 13 Penetration Firestopping

		E-814 & UL 1479		CAN ULC S115		
Penetrating Material & Size	**Annular Space**	**"F" Rating**	**"T" Rating**	**Fire "F" Rating**	**Fire/Hose "FH" Rating**	**Temperature "FTH" Rating**
1. PVC** or CPVC** Pipe up to 3" (76mm) ID Sch40 (Closed or Open System)	3/4" – 2" (19 – 51mm)	4 Hr	240 min	4 Hr	4 Hr	240 min
2. EMT/Steel Conduit and Pipe Up to 4" (102 mm) ID Sch 40	3/4" – 2" (19 – 51mm)	4 Hr	58 min	4 Hr	4 Hr	58 min
3. Copper Pipe and Tubing Up to 4" (102 mm) ID	3/4" – 2" (19 – 51mm)	4 Hr	23 min	4 Hr	4 Hr	23 min
4. Multiple MC/Teck Cable with or without PVC jacket up to 2" (51 mm) OD	3/4" – 2" (19 – 51mm)	4 Hr	204 min	4 Hr	4 Hr	204 min



System Design Instructions

1 – 4. **Penetrating Items:** 1 – 4 from table, either singly or combination, including all. The annular space between penetrants and to periphery of the opening are to be min 3/4 in. (19 mm) to max 2 in. (50 mm). The maximum opening is 144 in.^{2} (0.09 m^2). All penetrating items must be reliably supported.

5. **Wall Assembly:** 4 hour rated ASTM E-119 or CAN/ULC S101 wall assemblies as follows:
   a) Metal or wood framed gypsum wall board (GWB) wall assemblies with opening within the wall assembly completely framed to form a rectangular box or;
   b) Cast in place concrete wall assemblies having a minimum cross section thickness of 6 in. (150mm) or;
   c) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).
6. **Firestop System Component 1:** Filler Material, mineral rock wool or ceramic fiber insulation with a minimum density of 4 PCF (64 kg/m^3) compressed a minimum of 25% into the annular space at a minimum depth of 7in. (88mm). Recess filler material 5/8 in. (16mm) for sealant placement (Item No. 7).
7. **Firestop System Component 2:** PFP Partners – Firestop 4100NS* (non sag), 4800DW* or 3600EX* each product must be installed at a minimum wet film thickness of 5/8 in. (16mm).

8. **Firestop System Component 3:** PFP Partners – WS1 Wrap Strip* - Nominal 1/8 in. (3 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips. Min three continuous layers of wrap strip around the circumference of the PVC pipe applied on each side of wall assembly. Use aluminum foil tape installed around the circumference of the outer wrap strip and pipe assembly for securing wrap strips in place.
9. **Firestop System Component 4:** Min 30 gauge sheet metal sleeve to be tightly fitted to the outer wrap strip and pipe assembly. Sheet metal sleeve cut to overlap a min of 1 in. (25 mm), flush with exterior surface of wall assembly. Sleeve secured to wrap strip and pipe assembly be use of two hose clamps located a min of 1 in. (25 mm) from either end of sleeve.
10. **Firestop System Component 5: For use when annular space exceeds 2 in. (51 mm)** - Strips of min 1/2 in. (13 mm) wide strips of min 26 gauge galv. sheet metal strips attached on both sides of the wall, such that the annular space between periphery and strip and/or penetration and strip is max 2 in. (51 mm).

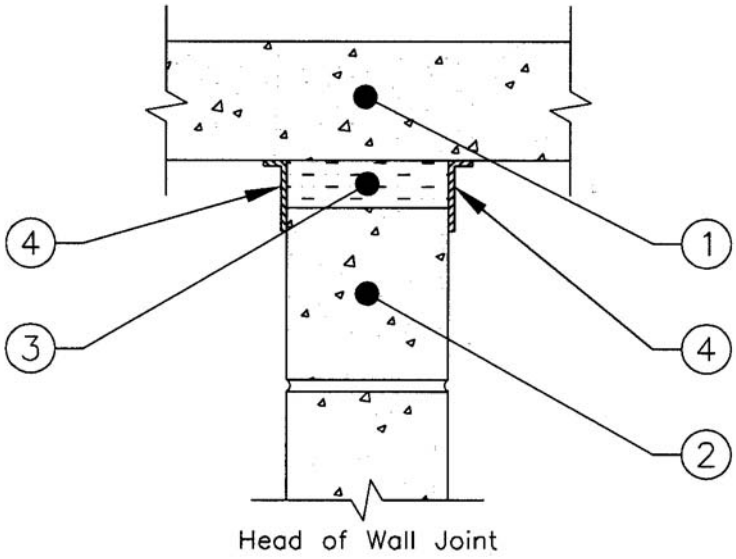
***WH Labeled Component**
****Not tested to 50pa pressure differential as required by Canadian code for combustible DWV (Drain, Waste or Vent) piping systems.**

c US Intertek	**5100SP**	**PFP/PV 240-02**

Concrete Deck to Vertical Wall Assemblies

Test Standards: ASTM E-814, UL 2079, CAN/ULC S115-M11
L-Rating At Ambient < 1 CFM/Lin Ft
L-Rating At 400° F < 1 CFM/Lin Ft
Test Furnace Internal Positive Pressure Differential – 2.5 Pa (0.01 in. of water) Minimum
Max. Joint Movement – 12.5% Compression or Extension
CSI Code: 07 84 43 Fire-Resistance Joint Sealants

		UL 2079		CAN ULC S115	
Construction Joint	**Max Width**	**Assembly Rating**	**Fire "F" Rating**	**Fire/Hose "FH" Rating**	**Temperature "FTH" Rating**
Horizontal Joints	2" (51 mm)	4 Hours	4 Hours	4 Hours	4 Hours



Head of Wall Joint

System Design Instructions

1. **Floor/Ceiling Assemblies:** Cast in place normal or light density concrete floor/ceiling assemblies having a minimum cross section thickness of 5 in. (125 mm)
2. **Wall Assemblies:** ASTM E-119 or CAN/ULC S101 up to 4 hour rated wall assemblies conforming to as follows:
   a) Cast in place concrete wall assemblies having a minimum cross section thickness of 6-3/4 in. (171mm) or;
   b) Hollow or concrete filled unit masonry (concrete block) wall assemblies laid up with mortar having a minimum cross section thickness of 8 in. (200mm).
3. **Firestop System – Component 1 –** Filler material mineral rock wool or ceramic fiber insulation with a min density of 4 PCF (64 kg/m^3) compressed a minimum of 40% into the joint space flush with both sides of wall assembly.
4. **Firestop System – Component 2 –** PFP Partners 5100SP – Minimum dry film thickness 1/16 in. (1.5mm) sprayed or brushed into place completely covering fillet material and overlapping onto all concrete surface a minimum of 1 in. (25mm).

WH Labeled Component

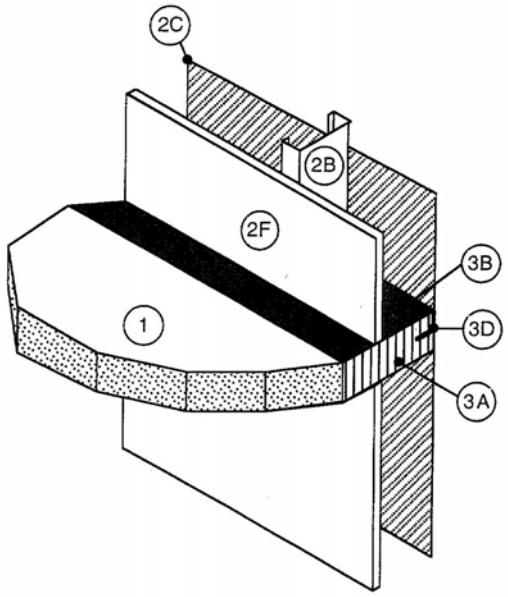
1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

1.800.810.1788 Technical Support
1.800.810.1788 Customer Service
www.firestop.com
email: firestop@firestop.com

Passive Fire Protection Partners
1412 Derwent Way Delta, BC V3M 6H9

	PERIMETER FIRE BARRIER SYSTEM **T-Rating – 1-1/4 hr. F-Rating – 2 hr. L-Rating – N/A** **Rated for ±16.7% movement**	**CEJ 218 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout width may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min 3-5/8 in. by 1-1/4 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing shall not exceed a spacing of 48 in. o.c When required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

   C. Steel Panels: Steel panels shall be installed to curtain wall framing according to the curtain wall manufacturer's guidelines or using self-tapping 1-in. pan head framing screws, spaced nominally 8 in. o.c. Use a min 20 GA sheet steel panel with max. dimensions 48 in. by 144 in.

   D. Impaling Pins: (Not Shown) When curtain wall insulation is used, use impaling pins when required by manufacturer's instructions. The pins shall be located, sized and installed according to the curtain wall manufacturer's guidelines.

   E. Curtain Wall Insulation: (Not Shown – Optional) Mineral wool or fiberglass batt insulation** may be used (**Listed with Omega Point Laboratories). When curtain wall insulation is used, the perimeter joint treatment must be installed before the insulation. Insulation may be butted to top and bottom of perimeter joint treatment but not deform the perimeter joint treatment.

F. Interior Curtain Wall Surface: Framing covered with one layer of 5/8 in. thick, Type X gypsum wallboard on interior face. The face layer of gypsum wallboard fastened to steel studs with min #6 1-1/8 in. long bugle-head phillips drywall screws spaced 12 in. o.c. Joint Tape and Compound – vinyl or casein, dry or premixed joint compound applied to face layers of gypsum wallboard in two coats to all exposed screw heads and gypsum wallboard joints. A min 2-in. wide paper, plastic or fiberglass tape embedded in first layer of compound over joints in gypsum wallboard. A min. wall cavity depth of 3-5/8 in. created from unexposed side of gypsum wallboard to unexposed side of panel. The joint face of the curtain wall covered as shown with one layer of gypsum wallboard.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid is to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. dry film thickness of 1/16 in. and overlap the material a min 1 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

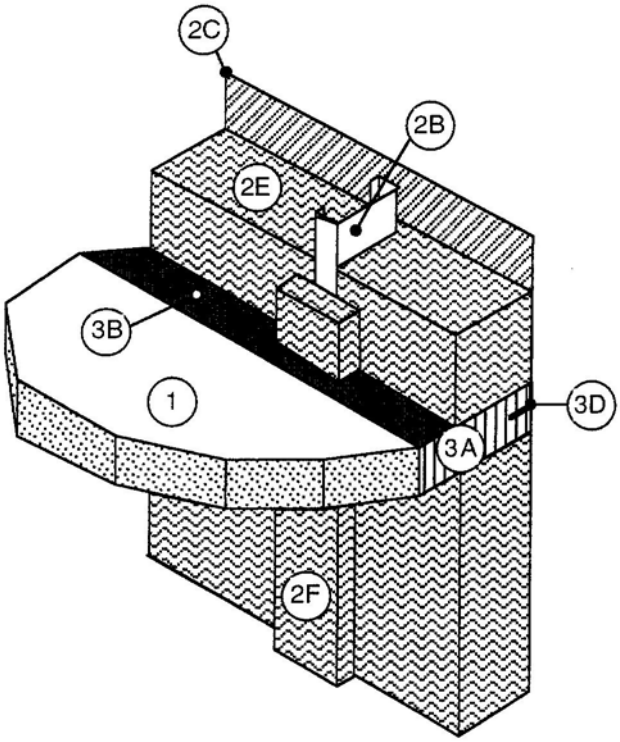
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Support clips are optional but recommended for installations subject to vertical shear movement. Standard Z-shaped clips are 20 GA galvanized steel with the following dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: Horizontally install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the panels and framing at the mid point location of the packing material.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMETER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-Rating – N/A** **Rated for ±16.7% movement**	**CEJ 219 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout width may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected tot the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing shall not exceed a spacing of 48 in. o.c. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

   C. Steel Panels: Steel panels shall be installed to curtain wall framing according to the curtain wall manufacturer's guidelines. Use a min 20 GA sheet steel panel with max. dimensions 48 in. by 144 in.

D. Impaling Pins: (Not Shown) When used with insulation and framing covers, the pins shall be located , sized and installed according to the curtain wall sustem manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA steel pin, attached to a nom 2 in. by 2 in. galvanized sheet steel plate, a nom. 2 by 2 by 2 in. long angle, or directly attached to steel panel using a stud gun. Pins shall be be spaced a max. of 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insultion** faced on one side with aluminum foil scrim (vapor retarder) which s exposed to the room interior. (**Listed with Omega Point Labrotories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Attached a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the steel spandrel panels (2C), the hoizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection. All other horizontal seams in the insulation to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and hrizontal angles and secure with screws placed a max 8 in. oc. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitve aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf, mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder), which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and screwed to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid is to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. dry film thickness of 1/16 in. and overlap the material a min 1 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

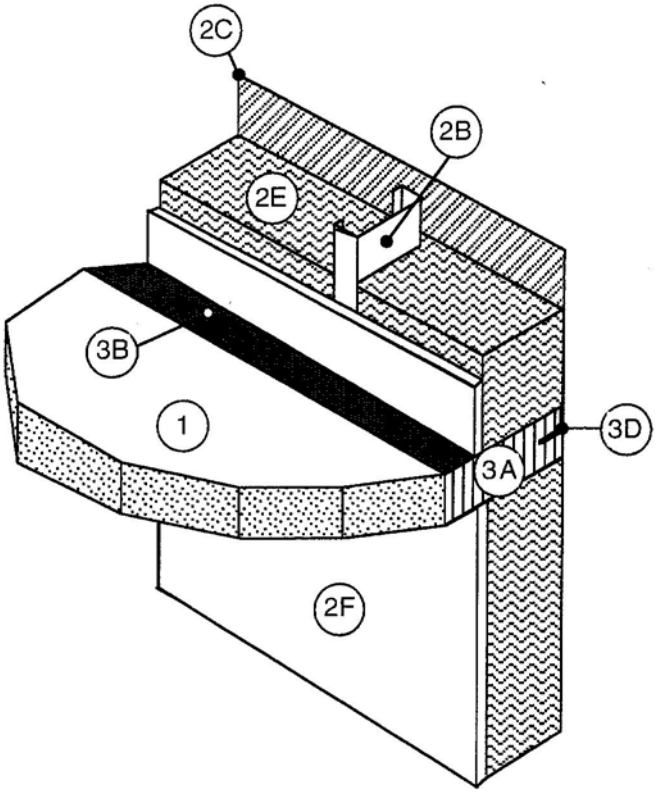
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Support clips are optional but recommended for installations subject to vertical shear movement. Standard Z-shaped clips are 20 GA galvanized steel with the following dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: Horizontally install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the panels and framing at the mid point location of the packing material.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966..

	PERIMETER FIRE BARRIER SYSTEM **T-Rating – 1-1/4 hr. F-Rating – 2 hr. L-Rating – N/A** **Rated for ±16.7% movement**	**CEJ 220 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout width may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min 3-5/8 in. by 1-1/4 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing shall not exceed a spacing of 48 in. o.c. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

   C. Steel Panels: Steel panels shall be installed to curtain wall framing according to the curtain wall manufacturer's guidelines or using self-tapping 1-in. pan head framing screws, spaced nominally 8 in. o.c. Use a min 20 GA sheet steel panel with max. dimensions 48 in. by 144 in.

D. Impaling Pins: (Not Shown) When curtain wall insulation is used, use impaling pins when required by manufacturer's instructions. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.

E. Curtain Wall Insulation: (Optional) Use a nom 4 in. 4 pcf mineral wool board insulation** faced on one side with aluminum foil scrim (vapor retarder) which s exposed to the room interior. (**Listed with Omega Point Laboratories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Attached a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the steel spandrel panels (2C), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection. All other horizontal seams in the insulation re to be at least 6 in. from the top surface of the perimeter joint treatment. Fit boards tightly between vertical and horizontal angles and secure with screws placed a max 8-in. oc. Install the boards flush with the interior face of the curtain wall framing. Install the min. 24-in. wide boards without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with board insulation.

Listed Manufacturer:

Rock Wool Manufacturing Company –
Insulation
Mineral Wool

DELTA ® Mineral Wool Curtain Wall Insulation

F. Interior Curtain Wall Surface: Framing covered with one layer of 5/8 in. thick, Type X gypsum wallboard on interior face. The face layer of gypsum wallboard fastened to steel studs with min. #6 1-1/8 in. long bugle-head phillips drywall screws spaced 12 in. o.c. Joint Tape and Compound – vinyl or casein, dry or premixed joint compound applied to face layers of gypsum wallboard in two coats to all exposed screw heads and gypsum wallboard joints. A min. 2-in. wide paper, plastic or fiberglass tape embedded in first layer of compound over joints in gypsum wallboard. A min. wall cavity depth of 3-5/8 in. created from unexposed side of gypsum wallboard to unexposed side of panel. The joint face of the curtain wall covered as shown with one layer of gypsum wallboard.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

   A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool board insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

   Listed Manufacturer:
   Rock Wool Manufacturing Company –
   Insulation
   Mineral Wool
   DELTA ® Mineral Wool Curtain Wall Insulation

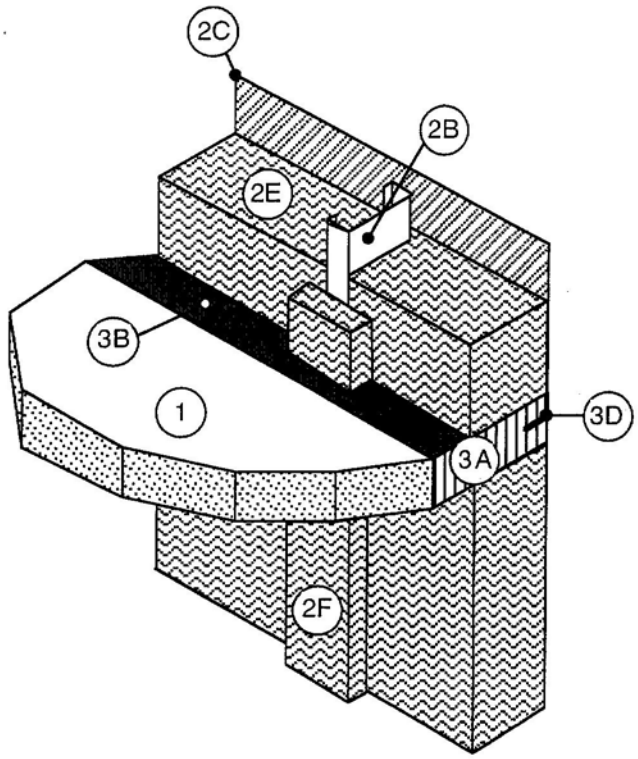
   B. Fill, Void or Cavity Material: Liquid is to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. dry film thickness of 1/16 in. and overlap the material a min 1 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

   Listed Manufacturer:
   Passive Fire Protection Partners
   Joint Sealant
   Spray
   5100 SP™ Sprayable Mastic

   C. Support Clips: (Not shown) Support clips are optional but recommended for installations subject to vertical shear movement. Standard Z-shaped clips are 20 GA galvanized steel with the following dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.
   D. Support Angle: Horizontally install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the panels and framing at the mid point location of the packing material.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMETER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-Rating – N/A** **Rated for ±16.7% movement**	**CEJ 221 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout width may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab, according to the curtain wall manufacturer's instructions. Max. distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing shall not exceed a spacing of 48 in. o.c. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

   C. Steel Panels: Steel panels shall be installed to curtain wall framing according to the curtain wall manufacturer's guidelines or using self-tapping 1-in. pan head framing screws, spaced nominally 8 in. o.c. Use a min 20 GA sheet steel panel with max. dimensions 48 in. by 144 in.

D. Impaling Pins: (Not Shown) When used with insulation and framing covers, the pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA steel pin, attached to a nom 2 in. by 2 in. galvanized sheet steel plate, a nom. 2 by 2 by 2 in. long angle, or directly attached to steel panel using a stud gun. Pins shall be spaced a max. of 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which s exposed to the room interior. (**Listed with Omega Point Laboratories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Attached a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the steel spandrel panels (2C), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection. All other horizontal seams in the insulation to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max 8 in. oc. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf, mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder), which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and screwed to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

Listed Manufacturer:

Rock Wool Manufacturing Company -
Insulation
Mineral Wool

DELTA® Mineral Wool Curtain Wall Insulation

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

   A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool board insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the board insulation into the perimeter joint such that the top surface of the board insulation is flush with the top surface of the concrete floor slab. Install packing material between concrete floor assembly (1) and steel panels (2C). Splices (butt joints) in the lengths of mineral wool board insulation are to be tightly compressed together. Reference the *introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

   Listed Manufacturer:
   Rock Wool Manufacturing Company -
   Insulation
   Mineral Wool
   DELTA® Mineral Wool SAFING BOARD Insulation

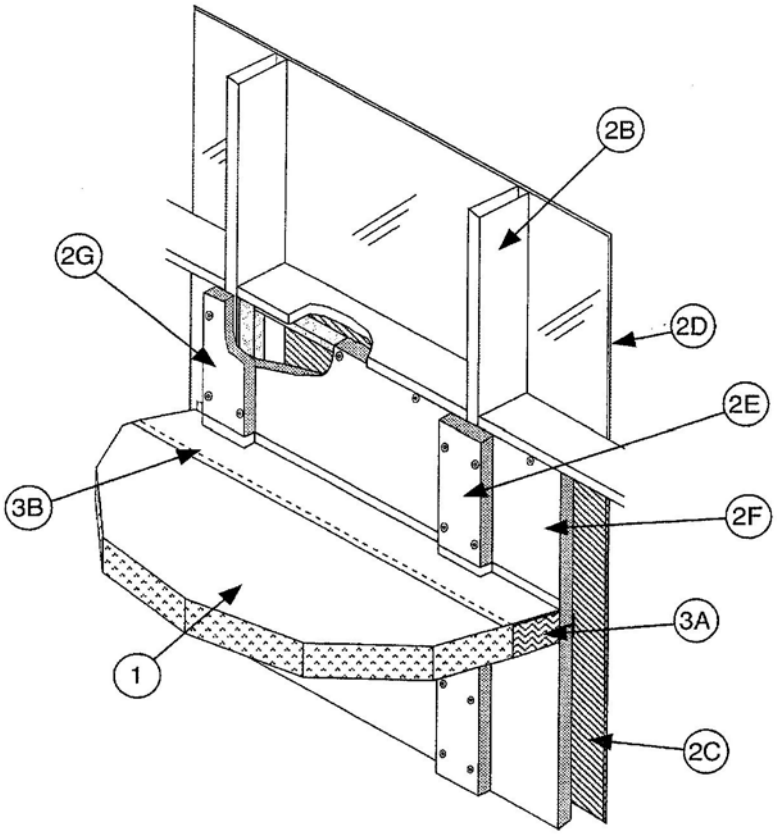
   B. Fill, Void or Cavity Material: Liquid is to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. dry film thickness of 1/16 in. and overlap the material a min 1 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

   Listed Manufacturer:
   Passive Fire Protection Partners
   Joint Sealant
   Spray
   5100 SP™ Sprayable Mastic

   C. Support Clips: (Not shown) Support clips are optional but recommended for installations subject to vertical shear movement. Standard Z-shaped clips are 20 GA galvanized steel with the following dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.
   D. Support Angle: Horizontally install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the panels and framing at the mid point location of the packing material.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMETER FIRE BARRIER SYSTEM **T Rating – 1 hr. F Rating – 2 hr. L-Rating – N/A** **Rated for ±15% movement**	**CEJ 222 P**



1. FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the curtain wall framing to the structural framing is required at each floor. The mounting attachments to the floor slab shall be either to the top surface of the floor slab or the joint face of the floor slab, according to the curtain wall manufacturer's instructions. The distance between mounting attachments shall be min. 60-in. o.c. The mounting attachments shall be made up of steel.

   B. Aluminum Framing: Rectangular aluminum tubing mullions and transoms sized to the curtain wall system manufacturer's guidelines. Min. overall dimensions of framing required is 0.100 in. thick aluminum with a min 5-1/4 in. height and a min. 2-1/2 in. width of the extrusion. Mullions are to be spaced a min. 60-in. o.c. and transoms are to be spaced a min. 72-in. o.c. Transoms are to be located at a height of 33 in above the top surface of the concrete floor assembly (as measured from the bottom of the transom).

C. Glass Spandrel Panels: Glass spandrel panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min 1/4-in. thick, clear tempered glass with a max. Width of 59 in. and height of 71 in. Panels are secured with a thermal break (thermoset rubber extrusion), pressure bar (aluminum extrusion), 1/4-20 x 5/8-in. long screws, and a snap face (aluminum extrusion). The spandrel panels shall be insulated according to 2F.

D. Glass Vision Panels: Glass vision panels shall be at least 35-1/2 in. above the top surface of the floor assembly and installed to curtain wall framing according tot he curtain wall system manufacturer's guidelines. Same min. requirements as in 2C.

E. Impaling Pins: When pins are used instead of screws, they shall be located in the same manner as the screws in 2F, sized and installed according to the curtain wall manufacturer's guidelines, or be a min 4-1/2 in. long, 12 GA steel pin attached to a nom 2 in. by 2 in. galvanized sheet steel plate, a nom. 2 by 2 by 2 in. long angle, or directly attached to the framing using a stud gun. Pins shall be spaced a max. of 12 in. o.c. and installed around the periphery so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

F. Curtain Wall Insulation: All spandrel glass panels shall be installed with a min. 2 in. thick, 8 pcf, mineral wool batt insulation** faced on one side with aluminum foil scrim (vapour retarder) which is exposed to the room interior. (** Listed with Omega Point Laboratories) They are fitted tightly between vertical framing members, secured with screws placed a max. 8-in. o.c. attached to a min 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the glass spandrel panels (2C), the horizontal angles are placed back to back to form a "T", which is located at the horizontal centerline of the perimeter joint protection. All other horizontal seams in the insulation ate to be at least 6 in. from the top surface of the perimeter joint treatment. The interior face of the batts is flush with the interior face of the curtain wall framing. A min. 2-in. air space is created between the glass and the insulation. The 36-in. wide batts shall be installed without vertical seams, spanning the full length between the vertical and horizontal curtain wall-framing members, which create the spandrel panel area.

G. Framing Covers: Strips made of min 1 in. thick be 4 in. wide, 8 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) with is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and secured to the members with impaling pins and clips spaced at least 12 in. o.c. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment. The sides of the mullion covers are sealed with aluminum foil tape.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

   A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

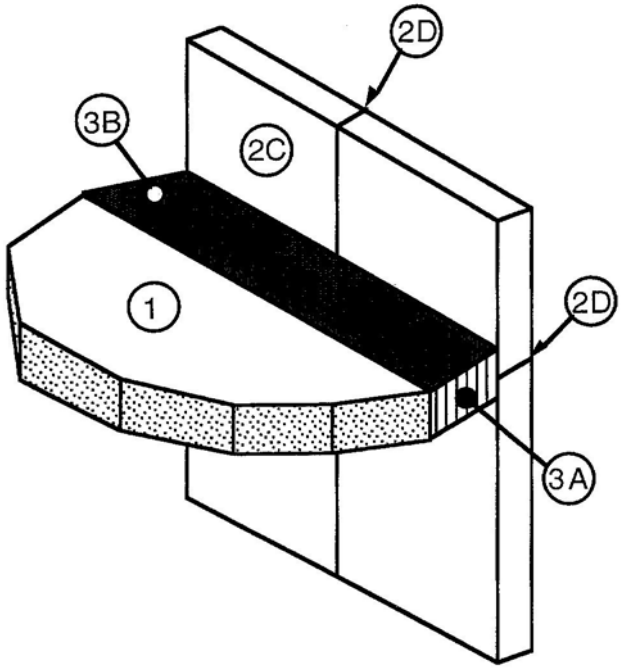
   B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16-in. dry film and overlap the material a min 1/2-in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

   Listed Manufacturer:
   Passive Fire Protection Partners
   Joint Sealant
   Spray
   5100 SP™ Sprayable Mastic

   C. Support Clips: (Not shown) Support clips are optional but recommended for installations subject to vertical shear movement. Standard Z-shaped clips are 20 GA galvanized steel with the following dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±15% movement**	**CEJ 223 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Panel Mounting Attachment: (Not Shown) Attachment of the concrete tilt-up panels to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.
   B. Structural Framing: (Not Shown) Structural framing members shall be according to the curtain wall system manufacturer's guidelines. Aluminum structural must be completely covered by the concrete panels.
   C. Tilt-up Panels: Tilt-up concrete wall panels, min. 2-1/2 in. thick, reinforced lightweight or normal weight (100 – 150 pcf). Install panels to structural framing according to the curtain wall system manufacturer's requirements.
   D. Concrete Panel Joint: Vertical and horizontal concrete panel butt joints can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges at butt joints must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.

E. Curtain Wall Insulation: (Optional) When curtain wall insulation is used, the perimeter joint treatment must be installed before the insulation. Insulation may be butted to top and bottom of perimeter joint treatment but not deform the perimeter joint treatment. Either mineral wool ** or fiberglass batt insulation** may be used. (**Listed with Omega Point Laboratories).

F. Impaling Pins: (Not Shown) When curtain wall insulation is used, use impaling pins when required by manufacturer's instructions. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut with of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16-in. dry film and overlap the material a min 1/2-in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

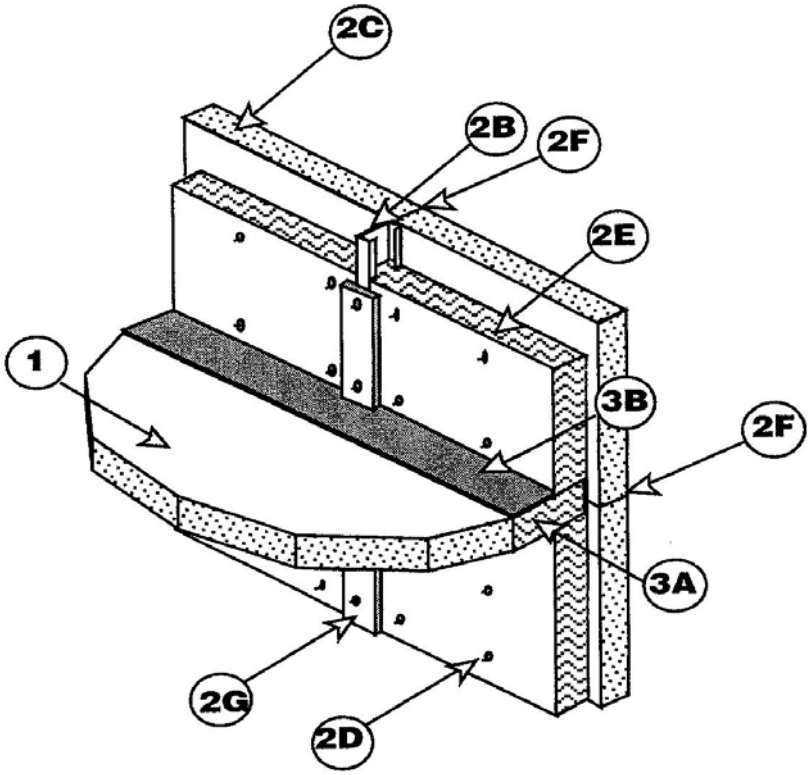
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not Shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not Shown) Horizontally install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±15% movement**	**CEJ 224 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 60 in. o.c. and shall be completely covered by the concrete panels. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

C. Concrete Panels: Any non-combustible exterior concrete based panel. Panels shall not be less than 2-1/2 in. thick, 12 in. high or 12 in. long. Attachment to the framing shall be according to the curtain wall system manufacturer's guidelines.

D. Impaling Pins: When required by insulation manufacturer, use with insulation. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.

E. Curtain Wall Insulation: (Optional) When curtain wall insulation is used, the perimeter joint treatment must be installed before the insulation. Insulation may be butted to top and bottom of perimeter joint treatment but not deform the perimeter joint treatment. Either mineral wool ** or fiberglass batt insulation** may be used. (**Listed with Omega Point Laboratories).

F. Concrete Panel Joint: Vertical and horizontal concrete panel joints created between panels can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.

G. Framing Covers: Framing covers used over the mullions and transoms are optional. When used, the framing covers shall be located, sized and installed according to the curtain wall system manufacturer's guidelines. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment without deforming it. Either mineral wool** or fiberglass insulation ** may be used. (**Listed with Omega Point Laboratories).

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

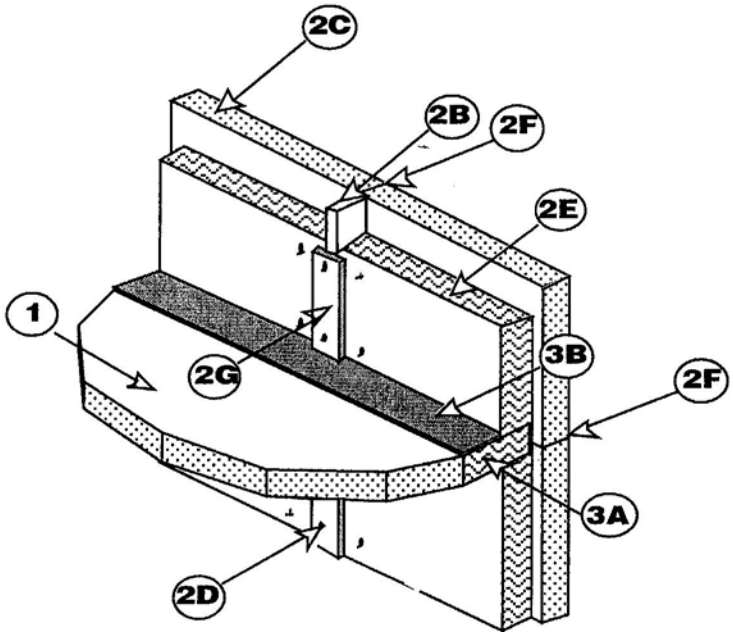
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not Shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not Shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±15% movement**	**CEJ 225 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Aluminum Framing: Vertical framing members shall be min 2-1/2 in. wide by 4 in. deep, 0.100 in. thick rectangular aluminum tubing members. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 60 in. o.c. and shall be completely covered by the concrete panels. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

   C. Concrete Panels: Any non-combustible exterior concrete based panel. Panels shall not be less than 2-1/2 in. thick, 12 in. high or 12 in. long. Attachment to the framing shall be according to the curtain wall system manufacturer's guidelines.

   D. Impaling Pins: When used with insulation and framing covers, the pins (aluminum for framing attachment and steel for panel attachments) shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA pin attached to nom. 2 in. by 2 in. plate, or nom 2 by 2 by 2 in long angle, and can be directly attached to the framing using a stud gun. Pins shall be spaced a max. 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which s exposed to the room interior. (**Listed with Omega Point Laboratories) In lieu of filling the full depth of the stud cavity with 4-pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Locate a support angle (3D) at the horizontal centerline of the perimeter joint protection (3), which is installed between the concrete floor assembly (1) and the panels (2C). Then butt the insulation to each side of the support angle. All other horizontal seams in the insulation are to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal framing and secure with screws placed a max. 8 in. o.c. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Concrete Panel Joint: Vertical and horizontal concrete panel joints created between panels can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.

G. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and secured to the member with impaling pins and clips spaced at least 12-in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid id to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

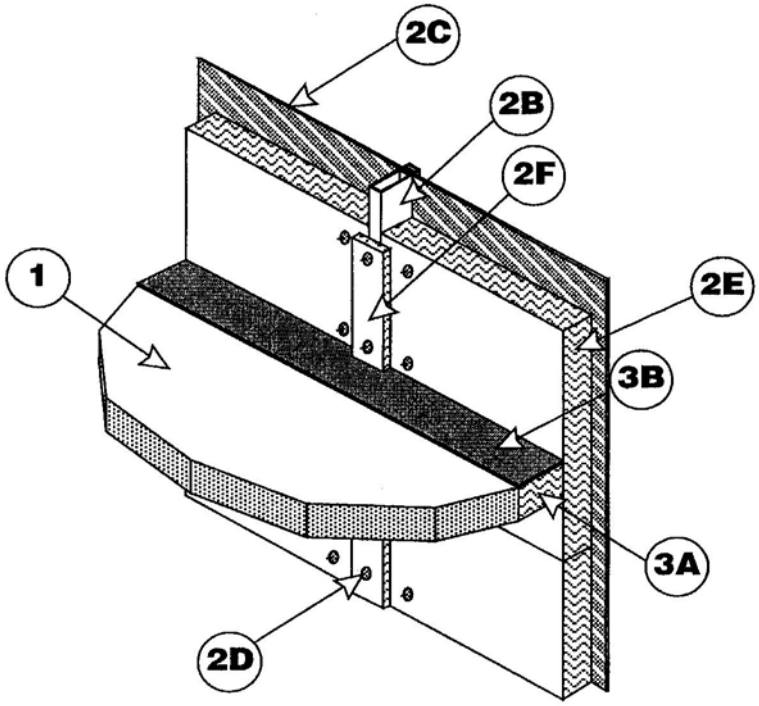
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not Shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not Shown) Install a min 1.5 in. x1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 226 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Aluminum Framing: Rectangular aluminum tubing mullions and transoms, sized according to the curtain wall system manufacturer's guidelines. Min. overall dimensions of framing required is 0.100 in. thick aluminum with a min. 6-1/2. Height and a min. of 2-1/2 in. width of the extrusion. Mullions are to be spaced a min. 60 in. o.c. and transoms are to be spaced a min. 72 in. o.c. Transoms are to be located at a height of 33 in. above the top surface of the concrete floor assembly (as measured from the bottom of the transom).

   C. Steel Panels: Steel panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 20 GA sheet steel panel with max. dimensions of 60 in. by 72 in.

D. Impaling Pins: When used with insulation and framing covers, the pins (aluminum for framing attachment and steel for panel attachments) shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA pin pin attached to nom. 2 in. by 2 in. plate, or nom 2 by 2 by 2 in long angle, and can be directly attached to the framing using a stud gun. Pins shall be spaced a max. 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulaton is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insultion** faced on one side with aluminum foil scrim (vapor retarder) which s exposed to the room interior. (**Listed with Omega Point Labrotories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Locate a support angle (3D) at the horizontal centerline of the perimeter joint protection installed between the concrete floor assembly (1) and the panels (2C). Then butt the insulation to each side of the support angle. All other horizontal seams in the insulation to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and hrizontal angles and secure with screws placed a max 8 in. oc. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitve aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Labroratories) Framing covers are centered over each vertical framing member and secured to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

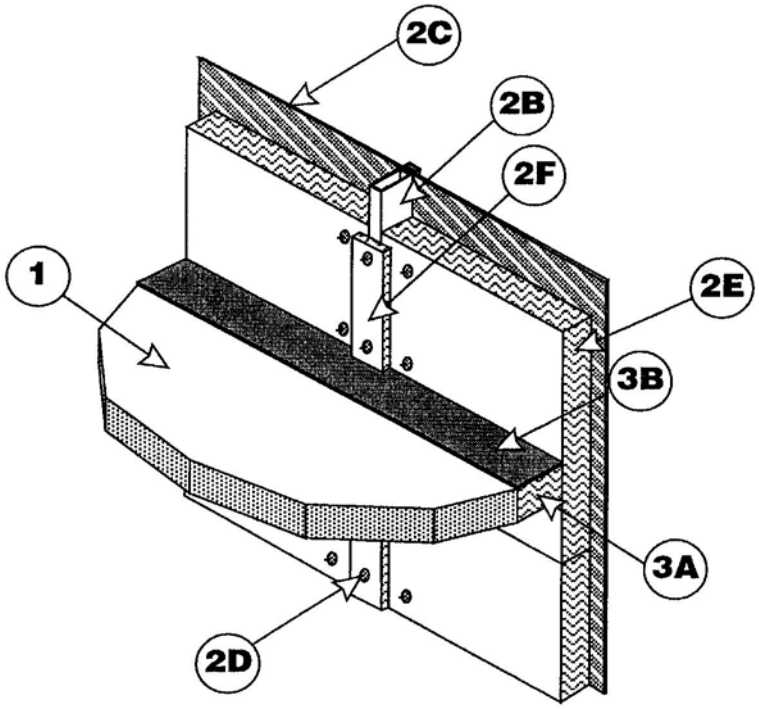
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 227 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Aluminum Framing: Rectangular aluminum tubing mullions and transoms, sized according to the curtain wall system manufacturer's guidelines. Min. overall dimensions of framing required is 0.100 in. thick aluminum with a min. 6-1/2 in. height and a min. of 2-1/2 in. width of the extrusion. Mullions are to be spaced a min. 60 in. o.c. and transoms are to be spaced a min. 72 in. o.c. Transoms are to be located at a height of 33 in. above the top surface of the concrete floor assembly (as measured from the bottom of the transom).

   C. Aluminum Panels: Aluminum panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/8 in. sheet aluminum panel with max. dimensions of 60 in. by 72 in.

D. Impaling Pins: When used with insulation and framing covers, the pins (aluminum for framing attachment and steel for panel attachments) shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA pin pin attached to nom. 2 in. by 2 in. plate, or nom 2 by 2 by 2 in long angle, and can be directly attached to the framing using a stud gun. Pins shall be spaced a max. 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Locate a support angle (3D) at the horizontal centerline of the perimeter joint protection installed between the concrete floor assembly (1) and the panels (2C). Then butt the insulation to each side of the support angle. All other horizontal seams in the insulation to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max 8 in. oc. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and secured to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid id to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

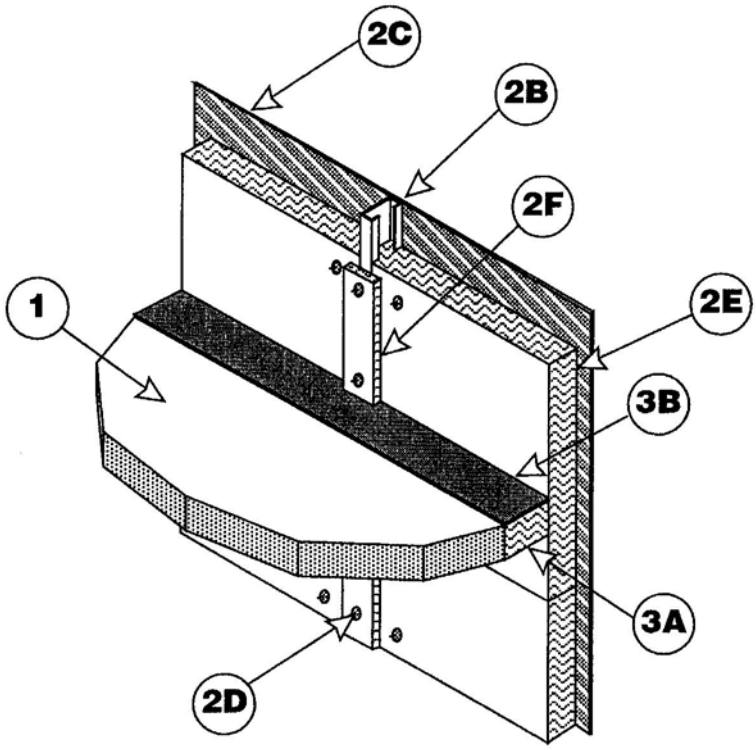
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 228 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may increase to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical framing members shall be min. 5-1/2 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 48 in. o.c. Horizontal framing members not to exceed 72 in. o.c. Transoms are to be located at a height of 33 in. above the top surface of the concrete floor assembly (as measured from the bottom of the transom).

   C. Glass Panels: Glass spandrel panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4 in. sheet aluminum panel with max. width of 59 in. and height of 71 in. Panels are secured with a thermal break (thermoset rubber extrusion), pressure bar, 1/4 - 20 x 5/8 in. long screws, and a snap face. The spandrel panels shall be insulated according to 2E.

D. Impaling Pins: When used with insulation and framing covers, the pins (aluminum for framing attachment and steel for panel attachment) shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA pin pin attached to nom. 2 in. by 2 in. plate, or nom 2 by 2 by 2 in long angle, and can be directly attached to the framing using a stud gun. Pins shall be spaced a max. 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom 4 in. 4 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) In lieu of filling the full depth of the stud cavity with 4 pcf mineral wool, the use of nom 2 in. 8 pcf mineral wool is allowed. Attach a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the glass spandrel panels (2C), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection. All other horizontal seams in the insulation are to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max. 8 in. o.c. Install the batts flush with the interior face of the curtain wall framing. Create a min. 1-1/4 in. air space between the glass and the insulation. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C"-shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4-in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing Covers: Strips made of min 1 in. thick by 4 in. wide, 8 pcf mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing covers are centered over each vertical framing member and secured to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

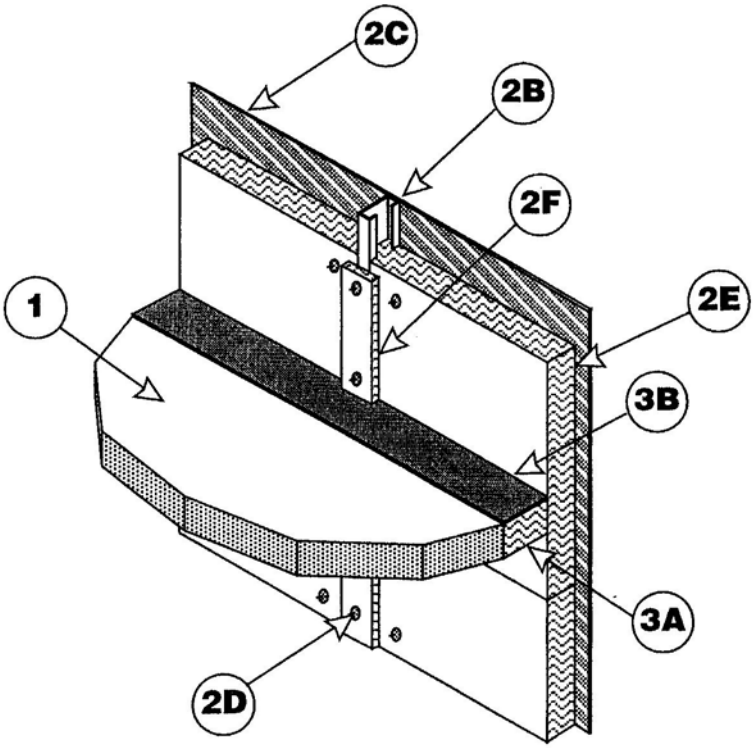
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 229 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the concrete tilt-up panels to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical-framing members shall be min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 48 in. o.c. and shall be completely covered by the panels. If required, horizontal-framing members shall be installed according to the curtain wall system manufacturer's guidelines.

C. Aluminum Panels: Aluminum panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/8-in. sheet aluminum panel with max. dimensions of 48 in. by 144 in.

D. Impaling pins: (Not Shown) When used with insulation and framing covers, the aluminum pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA pin attached to a nom. 2 in. by 2 in. plate, a nom. 2 by 2 by 2 in. long angle, or directly attached to panel using a stud gun. Pins shall be spaced a max. of 12 in. o/c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

E. Curtain Wall Insulation: Use a nom. 4 in. 4 pcf mineral wool batt insulation** with or without aluminum foil scrim. (** Listed with Omega Laboratories) In lieu of filling the full depth of the stud cavity with 4-pcf mineral wool, the use of nom. 2 in. 8 pcf mineral wool is allowed. Attach a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the aluminum spandrel panels (3D), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection (3), which is installed between the concrete floor assembly (1) and the panels (2C). All other horizontal seams in the insulation are to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max. 8 in. o.c. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24 in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C" shaped studs with batt insulation. All meeting edges of insulation are sealed with nom. 4 in. wide pressure sensitive aluminum foil faced tape centered over the junction so that approx. 2 in. of tape covers each edge of the adjacent insulation.

F. Framing covers: Strips made of min. 1in thick by 4 in. wide, 8 pcf, mineral wool batt insulation** faced on one side with aluminum foil scrim (vapor retarder) which is exposed to the room interior. (**Listed with Omega Point Laboratories) Framing cover are centered over each vertical framing member and secured to the member with impaling pins and clips spaced at least 12 in. o.c. and attached in accord with 2D. Framing covers do not pass through the perimeter joint treatment. They are butted to the top and bottom surfaces of the perimeter joint treatment.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

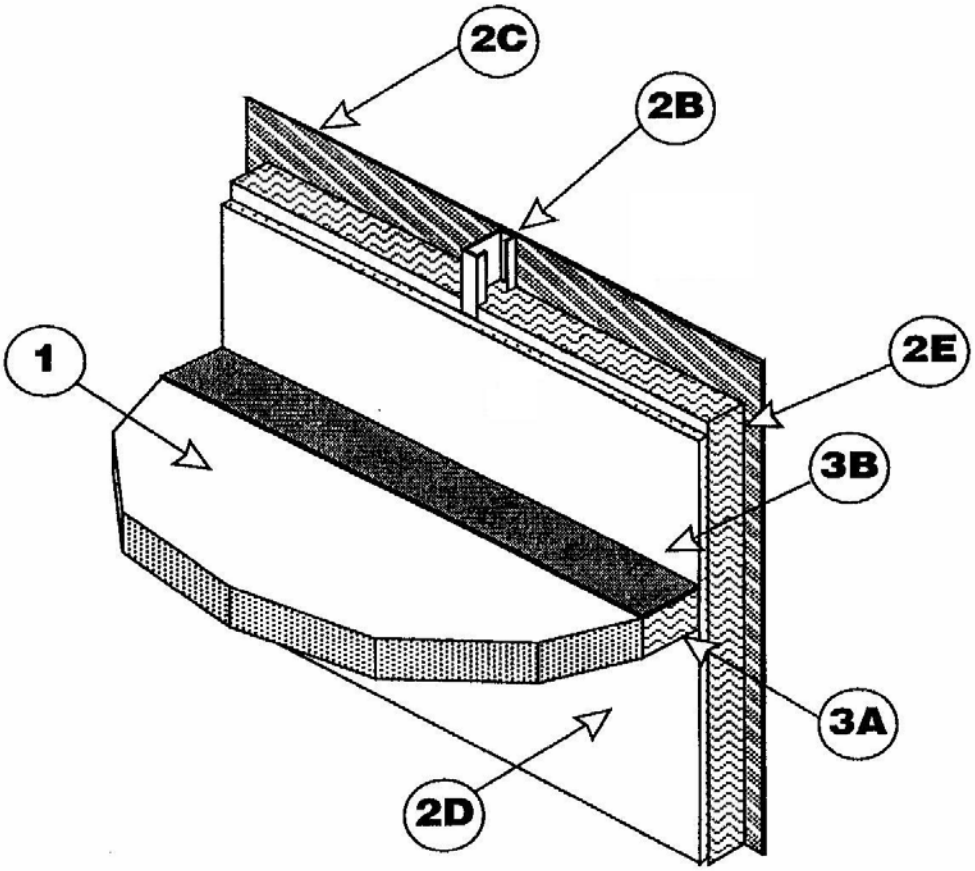
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 230 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (Not Shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical-framing members shall be min. 5-1/2 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 48 in. o/c.. Horizontal framing members not to exceed 72 in. o.c. Transoms are to be located at a height of 33 in. above the top surface of the concrete floor assembly (as measured from the bottom of the transom).

C. Glass Panels: Glass spandrel panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/4-in. thick, clear tempered glass with a max. width of 59 in. and height of 71 in. Panels are secured with a thermal break (thermoset rubber extrusion), pressure bar, 1/4-20 x 5/8 in. long screws and a snap face. The spandrel panels shall be insulated according to 2E.

D. Interior Curtain Wall Surface: Framing covered with one layer of 5/8 in. thick, Type X gypsum wallboard on interior face. The face layer of gypsum wallboard fastened to steel studs with min. #6 x 1-1/8 in. long bugle-head phillips drywall screws spaced 12 in. o.c. Joint Tape and Compound – vinyl or casein, dry or premixed joint compound applied to face layers of gypsum wallboard in two coats to all exposed screw heads and gypsum wallboard joints. A min. 2-in. wide paper, plastic or fiberglass tape embedded in first layer of compound over joints in gypsum wallboard. A min. wall cavity depth of 3-5/8 in. created from unexposed side of gypsum wallboard to unexposed side of panel. The joint of the curtain wall covered as shown with one layer of gypsum wallboard.

E. Curtain Wall Insulation: Use a nom. 4 in. 4 pcf mineral wool batt insulation** with or without aluminum foil scrim. (** Listed with Omega Laboratories) In lieu of filling the full depth of the stud cavity with 4-pcf mineral wool, the use of nom. 2 in. 8 pcf mineral wool is allowed. Attach a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the glass spandrel panels (2C), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection (3), which is installed between the concrete floor assembly (1) and the panels (2C). All other horizontal seams in the insulation are to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max. 8 in. o.c. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C" shaped studs with batt insulation.

F. Impaling pins: (Not Shown) When used with insulation and framing covers, the pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA steel pin attached to nom. 2 in. by 2 in. galvanized sheet steel plate or a nom. 2 by 2 in. long angle using a stud gun. Pins shall be spaced a max. of 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

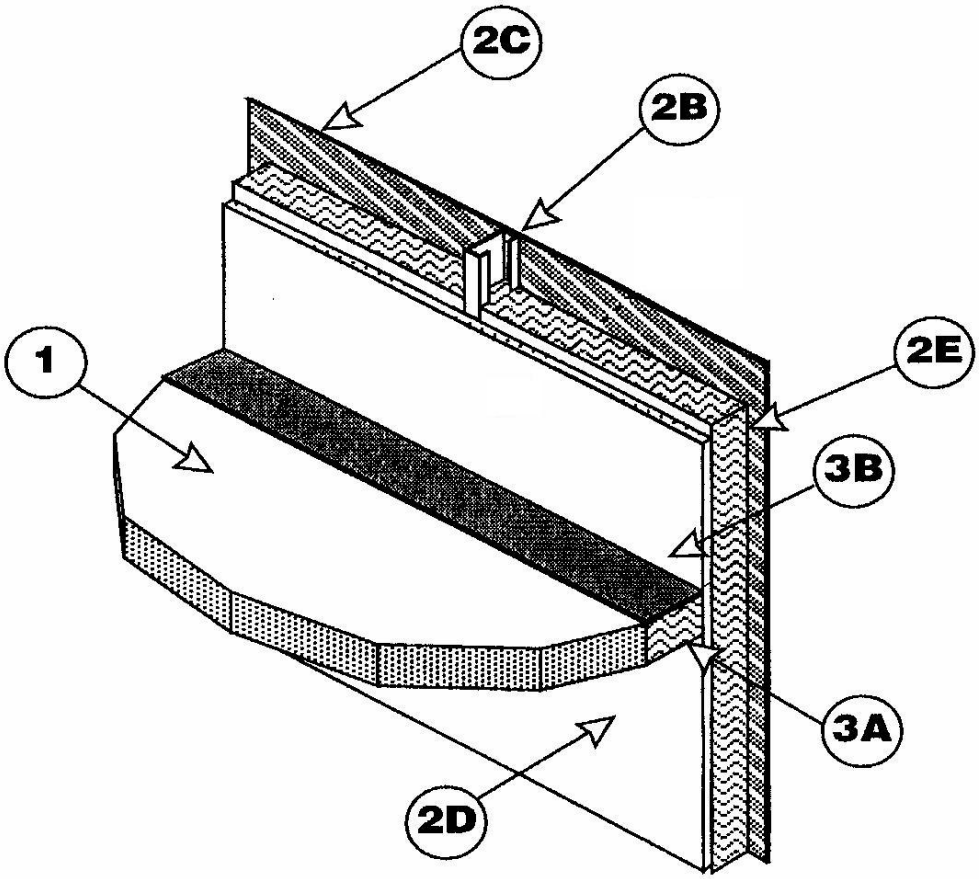
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 3/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±16.7% movement**	**CEJ 231 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Mounting Attachment: (not shown) Attachment of the curtain wall framing to the structural framing shall be according to the curtain wall manufacturer's instructions. When required, the mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.

   B. Steel-Stud Framing: Vertical-framing members shall be min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs. Attachment shall be according to the curtain wall system manufacturer's guidelines. Vertical framing not to exceed a spacing of 48 in. o.c. and shall be completely covered by the panels. If required, horizontal framing members shall be installed according to the curtain wall system manufacturer's guidelines.

C. Aluminum Panels: Aluminum panels shall be installed to curtain wall framing according to the curtain wall system manufacturer's guidelines. Use a min. 1/8-in. sheet aluminum panel with max. dimensions of 48 in. by 144 in.

D. Interior Curtain Wall Surface: Framing covered with one layer of 5/8 in. thick, Type X gypsum wallboard on interior face. The face layer of gypsum wallboard fastened to steel studs with min. #6 x 1-1/8 in. long bugle-head phillips drywall screws spaced 12 in. o.c. Joint Tape and Compound – vinyl or casein, dry or premixed joint compound applied to face layers of gypsum wallboard in two coats to all exposed screw heads and gypsum wallboard joints. A min. 2-in. wide paper, plastic or fiberglass tape embedded in first layer of compound over joints in gypsum wallboard. A min. wall cavity depth of 3-5/8 in. created from unexposed side of gypsum wallboard to unexposed side of panel. The joint of the curtain wall covered as shown with one layer of gypsum wallboard.

E. Curtain Wall Insulation: Use a nom. 4 in. 4 pcf mineral wool batt insulation** with or without aluminum foil scrim. (** Listed with Omega Laboratories) In lieu of filling the full depth of the stud cavity with 4-pcf mineral wool, the use of nom. 2 in. 8 pcf mineral wool is allowed. Attach a min. 16 GA angle around the entire perimeter of each batt. The vertical 16 GA angles are attached to the mullions with screws. At the horizontal butt joints of the insulation in the field of the glass spandrel panels (2C), the horizontal angles are placed back to back to form a "T", the first of which is located at the horizontal centerline of the perimeter joint protection (3), which is installed between the concrete floor assembly (1) and the panels (2C). All other horizontal seams in the insulation are to be at least 6 in. from the top surface of the perimeter joint treatment. Fit batts tightly between vertical and horizontal angles and secure with screws placed a max. 8 in. o.c. Install the batts flush with the interior face of the curtain wall framing. Install the min. 24-in. wide batts without vertical seams. Fill the spandrel panel area completely. Fill the cavity of all "C" shaped studs with batt insulation.

F. Impaling pins: (Not Shown) When used with insulation and framing covers, the pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines, or be a min. 4-1/2 in. long, 12 GA steel pin attached to nom. 2 in. by 2 in. galvanized sheet steel plate or a nom. 2 by 2 by 2 in. long angle using a stud gun. Pins shall be spaced a max. of 12 in. o.c. and installed around the periphery (min.) so that the interior face of the curtain wall insulation is flush with the interior face of the framing.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 33.34% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

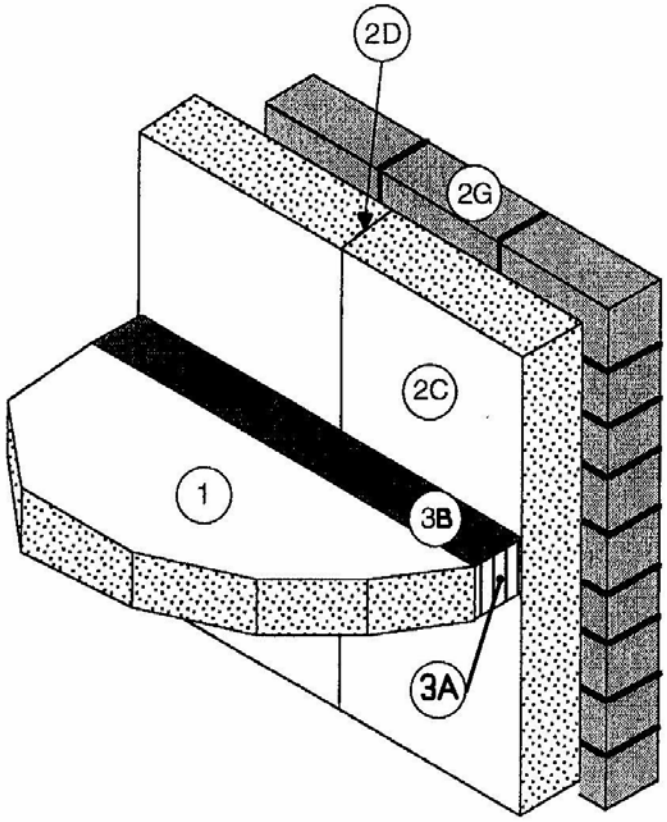
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±15% movement**	**CEJ 232 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Panel Mounting Attachment: (Not Shown) Attachment of the concrete tilt-up panels to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.
   B. Structural Framing: (Not Shown) Structural framing members shall be according to the curtain wall system manufacturer's guidelines. Aluminum structural must be completely covered by the concrete panels.

C. Tilt-up Panels: Tilt-up concrete wall panels, min. 2-1/2 in. thick, reinforced lightweight or normal weight (100 – 150 pcf). Install panels to structural framing according to the curtain wall system manufacturer's requirements.

D. Concrete Panel Joint: Vertical and horizontal concrete panel butt joints can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges at butt joints must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.

E. Curtain Wall Insulation: (Not Shown - Optional) When curtain wall insulation is used, the perimeter joint treatment must be installed before the insulation. Insulation may be butted to top and bottom of perimeter joint treatment, but not deform the perimeter joint treatment. Either mineral wool ** or fiberglass batt insulation** may be used. (**Listed with Omega Point Laboratories).

F. Impaling pins: (Not Shown) When curtain wall insulation is used, use impaling pins when required by manufacturer's instructions. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.

G. Exterior Curtain Wall Surface: Use a min. 4-inch thick stone veneer.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

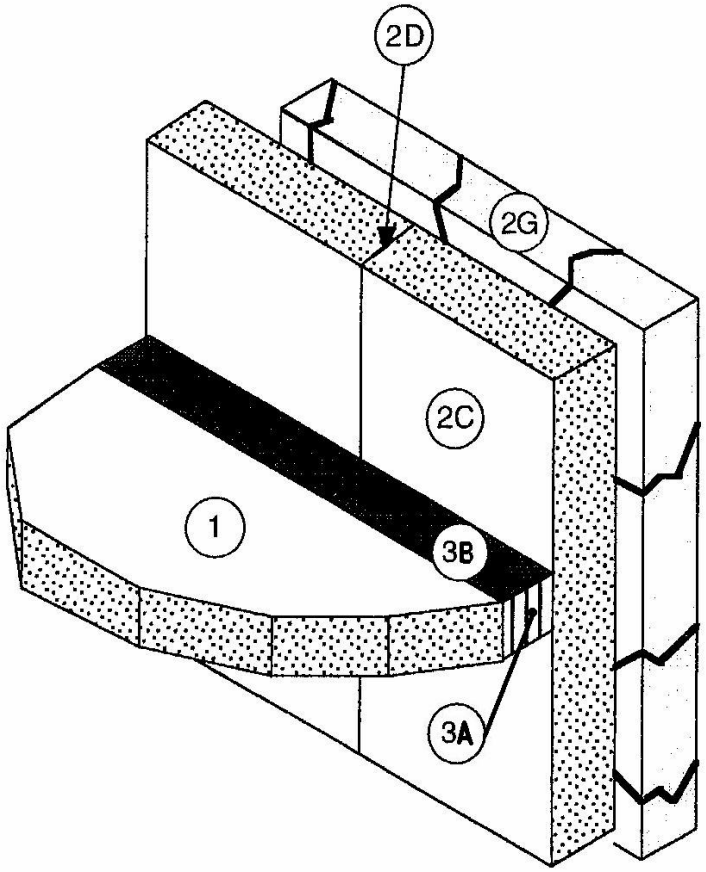
Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not Shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. Dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not Shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

	PERIMERTER FIRE BARRIER SYSTEM **T-Rating – 1/4 hr. F-Rating – 2 hr. L-rating – N/A** **Rating for ±15% movement**	**CEJ 233 P**



1. CONCRETE FLOOR ASSEMBLY: Two-hour rated concrete floor assembly made from either lightweight or normal weight concrete with a density of 100-150 pcf, with a min. thickness of 4-1/2 in. at the joint face. Overall slab thickness may vary to accommodate various blockout depths (longitudinal recesses) formed in the concrete, to house an architectural cover plate. The blockout with may also vary without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly shall incorporate the following construction features:

   A. Panel Mounting Attachment: (Not Shown) Attachment of the concrete tilt-up panels to the structural framing shall be according to the curtain wall manufacturer's instructions. If required, mounting attachments to the floor slab shall be connected to the joint face of the floor slab. Max distance between mounting attachments shall be 10 feet.
   B. Structural Framing: (Not Shown) Structural framing members shall be according to the curtain wall system manufacturer's guidelines. Aluminum structural must be completely covered by the concrete panels.

C. Tilt-up Panels: Tilt-up concrete wall panels, min. 2-1/2 in. thick, reinforced lightweight or normal weight (100 – 150 pcf). Install panels to structural framing according to the curtain wall system manufacturer's requirements.

D. Concrete Panel Joint: Vertical and horizontal concrete panel butt joints can be either flush type (butt joint) or key way type (tongue and groove). Concrete panel edges at butt joints must be in contact with each other. If required, the surface of the panel joints can be sealed with gaskets or sealants.

E. Curtain Wall Insulation: (Not Shown - Optional) When curtain wall insulation is used, the perimeter joint treatment must be installed before the insulation. Insulation may be butted to top and bottom of perimeter joint treatment, but not deform the perimeter joint treatment. Either mineral wool ** or fiberglass batt insulation** may be used. (**Listed with Omega Point Laboratories).

F. Impaling pins: (Not Shown) When curtain wall insulation is used, use impaling pins when required by manufacturer's instructions. The pins shall be located, sized and installed according to the curtain wall system manufacturer's guidelines.

G. Exterior Curtain Wall Surface: Use a min. 2-inch thick stone veneer.

3. PERIMETER JOINT PROTECTION: The perimeter joint (linear opening) shall not exceed an 8 in. nom. joint width (joint width at installation) and the perimeter joint treatment shall incorporate the following constructions features:

A. Packing Material: Use a min. 4 in. thick, 4 pcf density, mineral wool batt insulation** installed with the fibers running parallel to the slab edge and curtain wall. (**Listed with Omega Point Laboratories) The packing material shall be compressed 50% in the nominal joint width. Compress the batt insulation into the perimeter joint such that the top surface of the batt insulation is flush with the top surface of the concrete floor slab. Splices (butt joints) in the lengths of mineral wool batt insulation are to be tightly compressed together. Reference the *Introduction to Fire Resistive Joint Systems* Section of this Directory for more details on how to determine the cut width of the insulation to be installed in the nominal joint width, and how to determine the compressed percentage of a known insulation width in a known nominal joint width.

B. Fill, Void or Cavity Material: Liquid to be applied, (sprayed, brushed or painted) to cover the exposed surface of the mineral wool installed in the perimeter joint. Apply a min. 1/16 in. dry film thickness and overlap the material a min 1/2 in. onto the adjacent curtain wall assembly and concrete floor assembly. If the spraying process is stopped and the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured material at least 1/8 in. with the spray. Reference Product Section of this Directory for more details about the Listed product.

Listed Manufacturer:
Passive Fire Protection Partners
Joint Sealant
Spray
5100 SP™ Sprayable Mastic

C. Support Clips: (Not shown) Required when using 24 GA Support Angle (3D), use standard Z-shaped clips that are min. 20 GA galvanized steel with the following nom. dimensions: 1 in. wide by 3 in. high with a 2 in. upper leg and 3 in. lower leg.

D. Support Angle: (Not shown) Install a min 1.5 in. x 1.5 in. 24 GA steel angle mechanically fastened to the interior of the concrete panels at the mid point location of the packing material. When 16 GA support angles are used Z-clips (3C) are not required.

**Cycling: Before testing, the spliced, test specimen was cycled 500 times at 30 cpm in accordance with ICBO, ES AC (Jan. 1997) and ASTM E 1966.

Design Number: PFP/JS 120-01

PERIMETER JOINT PROTECTION

Passive Fire Protection Partners

5100SP™ Spray Mastic

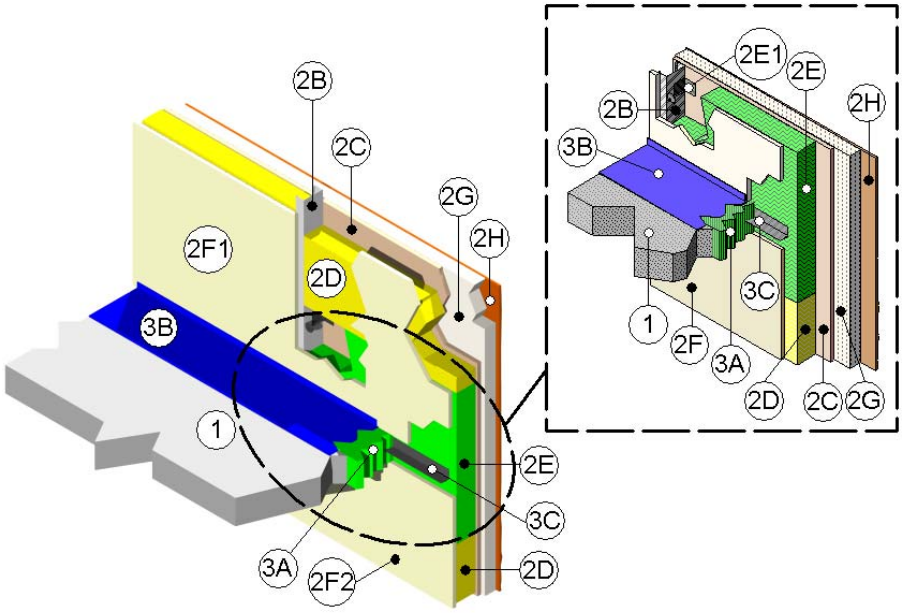
ASTM E 2307

T-Rating – 1 hr.

F-Rating – 2 hr.

ASTM E 1966-Cycling

CYCLING TYPE IV: ± 16.7% Horizontal Movement @ 33% Compression (Reference Item 3A)



1. FLOOR ASSEMBLY – The floor assembly consists of the following construction features:

   A. Two-hour rated reinforced concrete slab using either nominal density 100 pcf lightweight or nominal density 150 pcf normal weight concrete with a minimum thickness of 4-1/2-inches.

   B. When required to accommodate the installation of an architectural joint system, increase overall concrete slab (Item 1A) thickness. Maintain minimum 4-1/2-inch thickness below blockout (longitudinal recesses) formed in the concrete slab (Item 1A) to accommodate the architectural joint system. Vary blockout width without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly incorporates the following construction features:

   A. Mounting Attachment: (Not Shown) Attach sandwiched wall surface (Item 2C) to the steel studs (Item 2B) according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the joint face of the

floor assembly (Item 1), according to the curtain wall manufacturer's instructions. Maximum 10-foot distance between mounting attachments.

B. Steel-Stud Framing: Erect vertical framing members using a minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs. Erect vertical framing, and when required install horizontal framing members, according to the curtain wall system manufacturer's guidelines. Maximum 24 inches on center vertical framing spacing.

C. Sandwiched Wall Surface: Use a minimum 1/2-inch thick, 48-inch wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), placed over and secured to framing with minimum 1-1/4 inch long Type S drywall screws spaced 8 inches on center.

D. Curtain Wall Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 48-inch tall by 4-inch thick faced or un-faced fiberglass insulation (batt) in each stud cavity in the steel stud framing (Item 2B). Completely fill the recess of the minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs with curtain wall insulation, except locations where the barrier insulation (Item 2E) in the steel stud framing (Item 2B) is installed.

E. Barrier Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 24-inch tall by 4-inch thick minimum 4 pcf un-faced mineral wool insulation (batt) in each stud cavity in the steel stud framing (Item 2B) at the floor assembly (Item 1) elevation so that nominal 12-inches of un-faced mineral wool insulation is above the surface of the perimeter joint protection (Item 3). Use a minimum un-faced mineral wool insulation (batt) length of 24-inches and fitted tightly between vertical framing members of the steel stud framing (Item 2B). Mechanically fasten the un-faced mineral wool insulation (batt) with minimum 2 x 2 inch, 20 GA steel clips (Item 2E1) with a minimum 5 inch copper coated steel pin extending from the center of the side of the clip installed parallel with the sandwiched wall surface (Item 2C). Locate the steel clips (Item 2E1) within each stud cavity in the steel stud framing (Item 2B). Locate one steel clip (Item 2E1) within 1-inch of each corner of each piece of un-faced mineral wool insulation (batt) and not less than 12-inch on center. The un-faced mineral wool insulation (batt) shall completely fill the recess of the min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs of the steel-stud framing (Item 2B).

F. Interior Curtain Wall Surface: Install perimeter joint treatment (Item 3) before this material. Cover interior face of steel-stud framing (Item 2B) with one layer of minimum 1/2 inch thick, Type X gypsum board (ASTM C 36). The joint face of the curtain wall assembly (Item 2) is not covered as shown with the 1/2 inch thick, Type X gypsum board (ASTM C 36). Fasten 1/2 inch thick, Type X gypsum board (ASTM C 36) to steel-stud framing (Item 2B) with minimum #6 1-1/8 inch long bugle-head phillips drywall screws spaced 12 inches on center. Continuously place gypsum wallboard (2F) a minimum 72 inches above surface of perimeter joint protection (Item 3). Optional gypsum wallboard (2F2) below the floor assembly (Item 1).

1. Joint Tape and Compound – Apply vinyl or casein, dry or premixed joint compound to interior curtain wall surface (Item 2F) in two coats to all exposed screw heads and gypsum butt

joints. A minimum 2-inch wide paper, plastic or fiberglass tape embedded the joint compound over the butt joint of the first layer of gypsum board (Item 2F).

2. Create a minimum 3-5/8 inch cavity between unexposed side of sandwiched wall surface (Item 2C) to unexposed side of interior curtain wall surface (Item 2F).

G. Exterior Curtain Wall Insulation: Create an Exterior Insulation Finish System (EIFS) composed of expanded polystyrene foam (EPS) insulation, and an Exterior Curtain Wall Finish (Item 2H). Use a monolithic assembly without expansion or control joints as the EIFS system. Use EPS foam boards measuring nominal 24-inches wide by 48-inches long by 4-inches thick with a nominal density of 1 pcf. Attach the EPS foam to the sandwiched wall surface (Item 2C) using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface (Item 2C) joints. Apply pressure to the EPS boards to assist in the bonding process. Butt all EPS boards together with no gaps or voids between them. Allow a minimum of 12 hours before continuing the application process when using adhesive. Rasp the EPS boards to remove all irregular seams and establish a continuous flat surface.

H. Exterior Curtain Wall Finish: Apply the cementious base coat and reinforcing mesh over the Exterior Curtain Wall Insulation (Item 2G). Precut the mesh, which is a woven fiberglass reinforcement fabric that is compatible with the cementious base coat and finish coat materials. Apply 1/16 to 1/8-inch thick cementious base coat to the exposed surface of the EPS foam. Apply the mesh; embed the mesh into the cementious base coat using a trowel. Start at the middle and work outwards towards edges. Establish a final thickness of approximately 1/16 inch of the cementious base coat with the mesh embedded. Let the cementious base coat dry completely before applying the cementious finish coat, which is a cement-based wall coating which may contain silica sand or marble aggregates. Apply the cementious finish coat using a trowel in the same manner as the cementious base coat.

3. PERIMETER JOINT PROTECTION – Maximum 8 inch nominal joint width (joint width at installation) of perimeter joint (linear opening). Perimeter joint protection incorporates the following construction features:

A. Packing Material: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Use a minimum 4 inch thick, 4 pcf density, mineral wool batt insulation installed to fill all openings with the fibers running parallel to the concrete slab (Item 1A) edge and curtain wall assembly (Item 2). Compress packing material 33% in the nominal joint width. Install top of packing material flush with the top surface of the concrete slab (Item 1A). Tightly compress together splices (butt joints) in the lengths of packing material, minimum compression 0.25-inch per piece. Notch packing material to receive support angle (Item 3C) so that packing material is in contact with sandwich wall surface (Item 2C).

B. CERTIFIED MANUFACTURER:
Passive Fire Protection Partners

CERTIFIED PRODUCT: Joint spray or sealant
MODEL: 5100SP™Spray Mastic

Fill, Void or Cavity Material: Apply sealant, (sprayed, brushed, or painted), to cover the top exposed surface of the packing material (Item 3A) compressed in the perimeter joint. Apply a minimum dry film thickness of 1/16 inch and overlap sealant a minimum 1 inch onto the adjacent curtain wall assembly (Item 2) and floor assembly (Item 1). After stopping the application process, and when the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured sealant at least 1/8 inch with the new sealant being applied.

C. Support Angle: Horizontally install a minimum 20 GA 2-inch x 2-inch steel angle mechanically fastened to the interior of the steel-stud framing (Item 2B) at the mid point location of the packing material (Item 3A).

D. Support Clips: (Not Shown – Optional) Standard Z-shaped clips consist of 20 GA galvanized steel with the following dimensions: 1-inch wide by 3-inch high with a 2-inch upper leg and 3-inch lower leg.

Design Number: PFP/JS 120-02

PERIMETER JOINT PROTECTION

Passive Fire Protection Partners

5100SP™ Spray Mastic

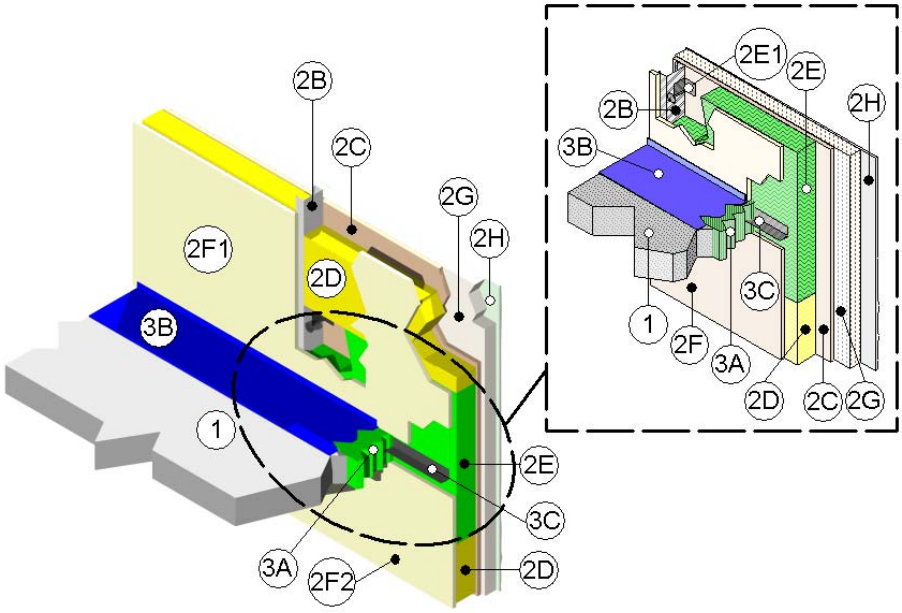
ASTM E 2307

T-Rating – 1 hr.

F-Rating – 2 hr.

ASTM E 1966-Cycling

CYCLING TYPE IV: ± 16.7% Horizontal Movement @ 33% Compression (Reference Item 3A)



1. FLOOR ASSEMBLY – The floor assembly consists of the following construction features:

   A. Two-hour rated reinforced concrete slab using either nominal density 100 pcf lightweight or nominal density 150 pcf normal weight concrete with a minimum thickness of 4-1/2-inches.

   B. When required to accommodate the installation of an architectural joint system, increase overall concrete slab (Item 1A) thickness. Maintain minimum 4-1/2-inch thickness below blockout (longitudinal recesses) formed in the concrete slab (Item 1A) to accommodate the architectural joint system. Vary blockout width without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly incorporates the following construction features:

   A. Mounting Attachment: (Not Shown) Attach sandwiched wall surface (Item 2C) to the steel studs (Item 2B) according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the joint face of the

floor assembly (Item 1), according to the curtain wall manufacturer's instructions. Maximum 10-foot distance between mounting attachments.

B. Steel-Stud Framing: Erect vertical framing members using a minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs. Erect vertical framing, and when required install horizontal framing members, according to the curtain wall system manufacturer's guidelines. Maximum 24 inches on center vertical framing spacing.

C. Sandwiched Wall Surface: Use a minimum 1/2-inch thick, 48-inch wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), placed over and secured to framing with minimum 1-1/4 inch long Type S drywall screws spaced 8 inches on center.

D. Curtain Wall Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 48-inch tall by 4-inch thick faced or un-faced fiberglass insulation (batt) in each stud cavity in the steel stud framing (Item 2B). Completely fill the recess of the minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs with curtain wall insulation, except locations where the barrier insulation (Item 2E) in the steel stud framing (Item 2B) is installed.

E. Barrier Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 24-inch tall by 4-inch thick minimum 4 pcf un-faced mineral wool insulation (batt) in each stud cavity in the steel stud framing (Item 2B) at the floor assembly (Item 1) elevation so that nominal 12-inches of un-faced mineral wool insulation is above the surface of the perimeter joint protection (Item 3). Use a minimum un-faced mineral wool insulation (batt) length of 24-inches and fitted tightly between vertical framing members of the steel stud framing (Item 2B). Mechanically fasten the un-faced mineral wool insulation (batt) with minimum 2 x 2 inch, 20 GA steel clips (Item 2E1) with a minimum 5 inch copper coated steel pin extending from the center of the side of the clip installed parallel with the sandwiched wall surface (Item 2C). Locate the steel clips (Item 2E1) within each stud cavity in the steel stud framing (Item 2B). Locate one steel clip (Item 2E1) within 1-inch of each corner of each piece of un-faced mineral wool insulation (batt) and not less than 12-inch on center. The un-faced mineral wool insulation (batt) shall completely fill the recess of the min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs of the steel-stud framing (Item 2B).

F. Interior Curtain Wall Surface: Install perimeter joint treatment (Item 3) before this material. Cover interior face of steel-stud framing (Item 2B) with one layer of minimum 1/2 inch thick, Type X gypsum board (ASTM C 36). The joint face of the curtain wall assembly (Item 2) is not covered as shown with the 1/2 inch thick, Type X gypsum board (ASTM C 36). Fasten 1/2 inch thick, Type X gypsum board (ASTM C 36) to steel-stud framing (Item 2B) with minimum #6 1-1/8 inch long bugle-head phillips drywall screws spaced 12 inches on center. Continuously place gypsum wallboard (2F) a minimum 72 inches above surface of perimeter joint protection (Item 3). Optional gypsum wallboard (2F2) below the floor assembly (Item 1).

1. Joint Tape and Compound – Apply vinyl or casein, dry or premixed joint compound to interior curtain wall surface (Item 2F) in two coats to all exposed screw heads and gypsum butt

joints. A minimum 2-inch wide paper, plastic or fiberglass tape embedded the joint compound over the butt joint of the first layer of gypsum board (Item 2F).

2. Create a minimum 3-5/8 inch cavity between unexposed side of sandwiched wall surface (Item 2C) to unexposed side of interior curtain wall surface (Item 2F).

G. Exterior Curtain Wall Insulation: Create an Exterior Insulation Finish System (EIFS) composed of expanded polystyrene foam (EPS) insulation, and an Exterior Curtain Wall Finish (Item 2H). Use a monolithic assembly without expansion or control joints as the EIFS system. Use EPS foam boards measuring nominal 24-inches wide by 48-inches long by 4-inches thick with a nominal density of 1 pcf. Attach the EPS foam to the sandwiched wall surface (Item 2C) using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface (Item 2C) joints. Apply pressure to the EPS boards to assist in the bonding process. Butt all EPS boards together with no gaps or voids between them. Allow a minimum of 12 hours before continuing the application process when using adhesive. Rasp the EPS boards to remove all irregular seams and establish a continuous flat surface.

H. Exterior Curtain Wall Finish: Apply the plaster base coat and reinforcing mesh over the Exterior Curtain Wall Insulation (Item 2G). Precut the mesh, which is a woven fiberglass reinforcement fabric that is compatible with the plaster base coat and finish coat materials. Apply 1/16 to 1/8-inch thick plaster base coat to the exposed surface of the EPS foam. Apply the mesh; embed the mesh into the plaster base coat using a trowel. Start at the middle and work outwards towards edges. Establish a final thickness of approximately 1/16 inch of the plaster base coat with the mesh embedded. Let the plaster base coat dry completely before applying the plaster finish coat, which is a cement-based wall coating which may contain silica sand or marble aggregates. Apply the plaster finish coat using a trowel in the same manner as the plaster base coat.

3. PERIMETER JOINT PROTECTION – Maximum 8 inch nominal joint width (joint width at installation) of perimeter joint (linear opening). Perimeter joint protection incorporates the following construction features:

A. Packing Material: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Use a minimum 4 inch thick, 4 pcf density, mineral wool batt insulation installed to fill all openings with the fibers running parallel to the concrete slab (Item 1A) edge and curtain wall assembly (Item 2). Compress packing material 33% in the nominal joint width. Install top of packing material flush with the top surface of the concrete slab (Item 1A). Tightly compress together splices (butt joints) in the lengths of packing material, minimum compression 0.25-inch per piece. Notch packing material to receive support angle (Item 3C) so that packing material is in contact with sandwich wall surface (Item 2C).

B. CERTIFIED MANUFACTURER:
Passive Fire Protection Partners

CERTIFIED PRODUCT: Joint spray or sealant
MODEL: 5100SP™Spray Mastic

Fill, Void or Cavity Material: Apply sealant, (sprayed, brushed, or

painted), to cover the top exposed surface of the packing material (Item 3A) compressed in the perimeter joint. Apply a minimum dry film thickness of 1/16 inch and overlap sealant a minimum 1 inch onto the adjacent curtain wall assembly (Item 2) and floor assembly (Item 1). After stopping the application process, and when the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured sealant at least 1/8 inch with the new sealant being applied.

C. Support Angle: Horizontally install a minimum 20 GA 2-inch x 2-inch steel angle mechanically fastened to the interior of the steel-stud framing (Item 2B) at the mid point location of the packing material (Item 3A).

D. Support Clips: (Not Shown – Optional) Standard Z-shaped clips consist of 20 GA galvanized steel with the following dimensions: 1-inch wide by 3-inch high with a 2-inch upper leg and 3-inch lower leg.

Design Number: PFP/JS 120-03

PERIMETER JOINT PROTECTION

Passive Fire Protection Partners

5100SP™ Spray Mastic

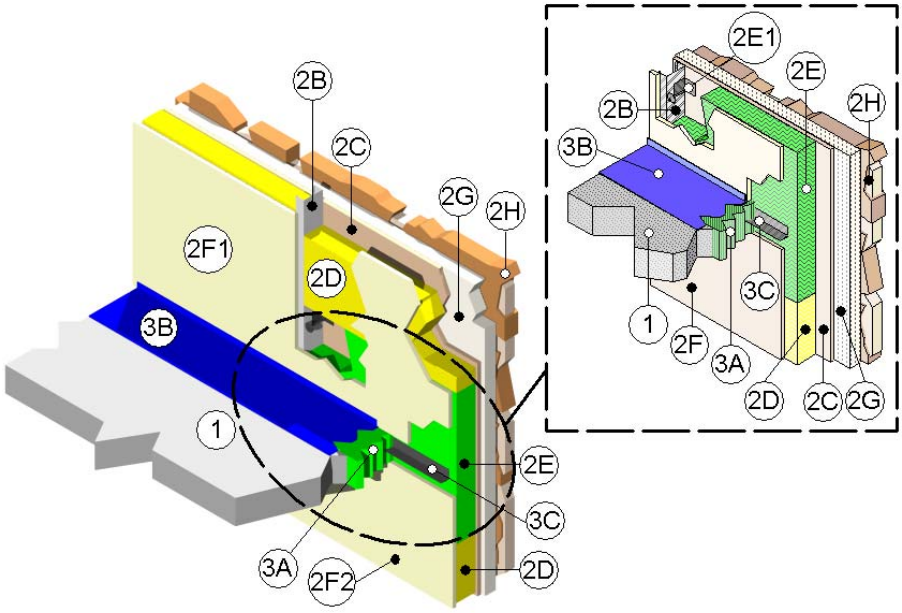
ASTM E 2307

T-Rating – 1 hr.

F-Rating – 2 hr.

ASTM E 1966-Cycling

CYCLING TYPE IV: ± 16.7% Horizontal Movement @ 33% Compression (Reference Item 3A)



1. FLOOR ASSEMBLY – The floor assembly consists of the following construction features:

   A. Two-hour rated reinforced concrete slab using either nominal density 100 pcf lightweight or nominal density 150 pcf normal weight concrete with a minimum thickness of 4-1/2-inches.

   B. When required to accommodate the installation of an architectural joint system, increase overall concrete slab (Item 1A) thickness. Maintain minimum 4-1/2-inch thickness below blockout (longitudinal recesses) formed in the concrete slab (Item 1A) to accommodate the architectural joint system. Vary blockout width without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly incorporates the following construction features:

   A. Mounting Attachment: (Not Shown) Attach sandwiched wall surface (Item 2C) to the steel studs (Item 2B) according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the joint face of the

floor assembly (Item 1), according to the curtain wall manufacturer's instructions. Maximum 10-foot distance between mounting attachments.

B. Steel-Stud Framing: Erect vertical framing members using a minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs. Erect vertical framing, and when required install horizontal framing members, according to the curtain wall system manufacturer's guidelines. Maximum 24 inches on center vertical framing spacing.

C. Sandwiched Wall Surface: Use a minimum 1/2-inch thick, 48-inch wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), placed over and secured to framing with minimum 1-1/4 inch long Type S drywall screws spaced 8 inches on center.

D. Curtain Wall Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 48-inch tall by 4-inch thick faced or un-faced fiberglass insulation (batt) in each stud cavity in the steel stud framing (Item 2B). Completely fill the recess of the minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs with curtain wall insulation, except locations where the barrier insulation (Item 2E) in the steel stud framing (Item 2B) is installed.

E. Barrier Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 24-inch tall by 4-inch thick minimum 4 pcf un-faced mineral wool insulation (batt) in each stud cavity in the steel stud framing (Item 2B) at the floor assembly (Item 1) elevation so that nominal 12-inches of un-faced mineral wool insulation is above the surface of the perimeter joint protection (Item 3). Use a minimum un-faced mineral wool insulation (batt) length of 24-inches and fitted tightly between vertical framing members of the steel stud framing (Item 2B). Mechanically fasten the un-faced mineral wool insulation (batt) with minimum 2 x 2 inch, 20 GA steel clips (Item 2E1) with a minimum 5 inch copper coated steel pin extending from the center of the side of the clip installed parallel with the sandwiched wall surface (Item 2C). Locate the steel clips (Item 2E1) within each stud cavity in the steel stud framing (Item 2B). Locate one steel clip (Item 2E1) within 1-inch of each corner of each piece of un-faced mineral wool insulation (batt) and not less than 12-inch on center. The un-faced mineral wool insulation (batt) shall completely fill the recess of the min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs of the steel-stud framing (Item 2B).

F. Interior Curtain Wall Surface: Install perimeter joint treatment (Item 3) before this material. Cover interior face of steel-stud framing (Item 2B) with one layer of minimum 1/2 inch thick, Type X gypsum board (ASTM C 36). The joint face of the curtain wall assembly (Item 2) is not covered as shown with the 1/2 inch thick, Type X gypsum board (ASTM C 36). Fasten 1/2 inch thick, Type X gypsum board (ASTM C 36) to steel-stud framing (Item 2B) with minimum #6 1-1/8 inch long bugle-head phillips drywall screws spaced 12 inches on center. Continuously place gypsum wallboard (2F) a minimum 72 inches above surface of perimeter joint protection (Item 3). Optional gypsum wallboard (2F2) below the floor assembly (Item 1).

1. Joint Tape and Compound – Apply vinyl or casein, dry or premixed joint compound to interior curtain wall surface (Item 2F) in two coats to all exposed screw heads and gypsum butt

joints. A minimum 2-inch wide paper, plastic or fiberglass tape embedded the joint compound over the butt joint of the first layer of gypsum board (Item 2F).

2. Create a minimum 3-5/8 inch cavity between unexposed side of sandwiched wall surface (Item 2C) to unexposed side of interior curtain wall surface (Item 2F).

G. Exterior Curtain Wall Insulation: Create an Exterior Insulation Finish System (EIFS) composed of expanded polystyrene foam (EPS) insulation, and an Exterior Curtain Wall Finish (Item 2H). Use a monolithic assembly without expansion or control joints as the EIFS system. Use EPS foam boards measuring nominal 24-inches wide by 48-inches long by 4-inches thick with a nominal density of 1 pcf. Attach the EPS foam to the sandwiched wall surface (Item 2C) using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface (Item 2C) joints. Apply pressure to the EPS boards to assist in the bonding process. Butt all EPS boards together with no gaps or voids between them. Allow a minimum of 12 hours before continuing the application process when using adhesive. Rasp the EPS boards to remove all irregular seams and establish a continuous flat surface.

H. Exterior Curtain Wall Finish: Use a minimum 2-inch thick stone veneer applied in accordance with standard construction practices using a cement-based mortar.

3. PERIMETER JOINT PROTECTION – Maximum 8 inch nominal joint width (joint width at installation) of perimeter joint (linear opening). Perimeter joint protection incorporates the following construction features:

A. Packing Material: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Use a minimum 4 inch thick, 4 pcf density, mineral wool batt insulation installed to fill all openings with the fibers running parallel to the concrete slab (Item 1A) edge and curtain wall assembly (Item 2). Compress packing material 33% in the nominal joint width. Install top of packing material flush with the top surface of the concrete slab (Item 1A). Tightly compress together splices (butt joints) in the lengths of packing material, minimum compression 0.25-inch per piece. Notch packing material to receive support angle (Item 3C) so that packing material is in contact with sandwich wall surface (Item 2C).

B. CERTIFIED MANUFACTURER:
Passive Fire Protection Partners

CERTIFIED PRODUCT: Joint spray or sealant
MODEL: 5100SP™Spray Mastic

Fill, Void or Cavity Material: Apply sealant, (sprayed, brushed, or painted), to cover the top exposed surface of the packing material (Item 3A) compressed in the perimeter joint. Apply a minimum dry film thickness of 1/16 inch and overlap sealant a minimum 1 inch onto the adjacent curtain wall assembly (Item 2) and floor assembly (Item 1). After stopping the application process, and when the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured sealant at least 1/8 inch with the new sealant being applied.

C. Support Angle: Horizontally install a minimum 20 GA 2-inch x 2-inch steel angle mechanically fastened to the interior of the steel-stud framing (Item 2B) at the mid point location of the packing material (Item 3A).

D. Support Clips: (Not Shown – Optional) Standard Z-shaped clips consist of 20 GA galvanized steel with the following dimensions: 1-inch wide by 3-inch high with a 2-inch upper leg and 3-inch lower leg.

Design Number: PFP/JS 120-04

PERIMETER JOINT PROTECTION

Passive Fire Protection Partners

5100SP™ Spray Mastic

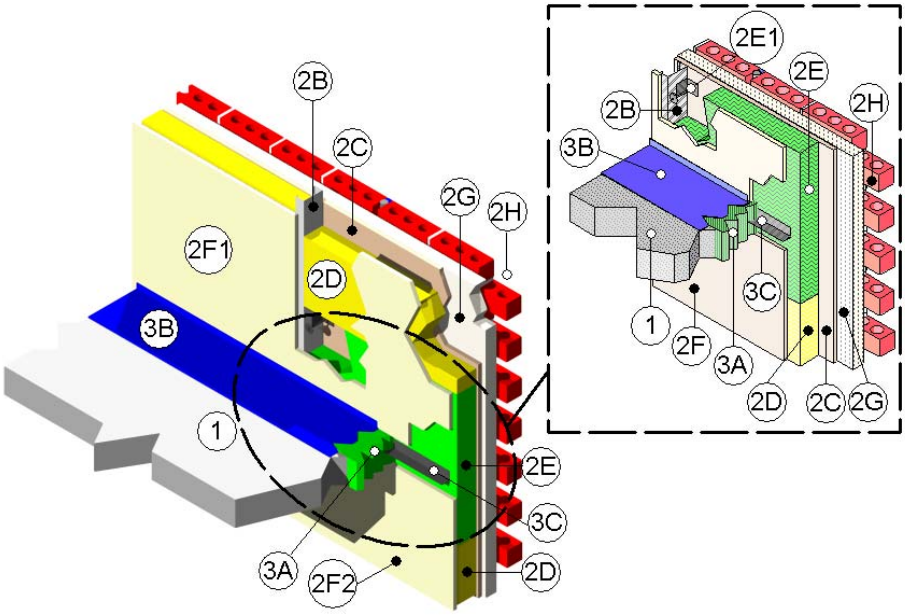
ASTM E 2307

T-Rating – 1 hr.

F-Rating – 2 hr.

ASTM E 1966-Cycling

CYCLING TYPE IV: ± 16.7% Horizontal Movement @ 33% Compression (Reference Item 3A)



1. FLOOR ASSEMBLY – The floor assembly consists of the following construction features:

   A. Two-hour rated reinforced concrete slab using either nominal density 100 pcf lightweight or nominal density 150 pcf normal weight concrete with a minimum thickness of 4-1/2-inches.

   B. When required to accommodate the installation of an architectural joint system, increase overall concrete slab (Item 1A) thickness. Maintain minimum 4-1/2-inch thickness below blockout (longitudinal recesses) formed in the concrete slab (Item 1A) to accommodate the architectural joint system. Vary blockout width without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly incorporates the following construction features:

   A. Mounting Attachment: (Not Shown) Attach sandwiched wall surface (Item 2C) to the steel studs (Item 2B) according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the joint face of the

floor assembly (Item 1), according to the curtain wall manufacturer's instructions. Maximum 10-foot distance between mounting attachments.

B. Steel-Stud Framing: Erect vertical framing members using a minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs. Erect vertical framing, and when required install horizontal framing members, according to the curtain wall system manufacturer's guidelines. Maximum 24 inches on center vertical framing spacing.

C. Sandwiched Wall Surface: Use a minimum 1/2-inch thick, 48-inch wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), placed over and secured to framing with minimum 1-1/4 inch long Type S drywall screws spaced 8 inches on center.

D. Curtain Wall Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 48-inch tall by 4-inch thick faced or un-faced fiberglass insulation (batt) in each stud cavity in the steel stud framing (Item 2B). Completely fill the recess of the minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs with curtain wall insulation, except locations where the barrier insulation (Item 2E) in the steel stud framing (Item 2B) is installed.

E. Barrier Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 24-inch tall by 4-inch thick minimum 4 pcf un-faced mineral wool insulation (batt) in each stud cavity in the steel stud framing (Item 2B) at the floor assembly (Item 1) elevation so that nominal 12-inches of un-faced mineral wool insulation is above the surface of the perimeter joint protection (Item 3). Use a minimum un-faced mineral wool insulation (batt) length of 24-inches and fitted tightly between vertical framing members of the steel stud framing (Item 2B). Mechanically fasten the un-faced mineral wool insulation (batt) with minimum 2 x 2 inch, 20 GA steel clips (Item 2E1) with a minimum 5 inch copper coated steel pin extending from the center of the side of the clip installed parallel with the sandwiched wall surface (Item 2C). Locate the steel clips (Item 2E1) within each stud cavity in the steel stud framing (Item 2B). Locate one steel clip (Item 2E1) within 1-inch of each corner of each piece of un-faced mineral wool insulation (batt) and not less than 12-inch on center. The un-faced mineral wool insulation (batt) shall completely fill the recess of the min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs of the steel-stud framing (Item 2B).

F. Interior Curtain Wall Surface: Install perimeter joint treatment (Item 3) before this material. Cover interior face of steel-stud framing (Item 2B) with one layer of minimum 1/2 inch thick, Type X gypsum board (ASTM C 36). The joint face of the curtain wall assembly (Item 2) is not covered as shown with the 1/2 inch thick, Type X gypsum board (ASTM C 36). Fasten 1/2 inch thick, Type X gypsum board (ASTM C 36) to steel-stud framing (Item 2B) with minimum #6 1-1/8 inch long bugle-head phillips drywall screws spaced 12 inches on center. Continuously place gypsum wallboard (2F) a minimum 72 inches above surface of perimeter joint protection (Item 3). Optional gypsum wallboard (2F2) below the floor assembly (Item 1).

1. Joint Tape and Compound – Apply vinyl or casein, dry or premixed joint compound to interior curtain wall surface (Item 2F) in two coats to all exposed screw heads and gypsum butt

joints. A minimum 2-inch wide paper, plastic or fiberglass tape embedded the joint compound over the butt joint of the first layer of gypsum board (Item 2F).

2. Create a minimum 3-5/8 inch cavity between unexposed side of sandwiched wall surface (Item 2C) to unexposed side of interior curtain wall surface (Item 2F).

G. Exterior Curtain Wall Insulation: Create an Exterior Insulation Finish System (EIFS) composed of expanded polystyrene foam (EPS) insulation, and an Exterior Curtain Wall Finish (Item 2H). Use a monolithic assembly without expansion or control joints as the EIFS system. Use EPS foam boards measuring nominal 24-inches wide by 48-inches long by 4-inches thick with a nominal density of 1 pcf. Attach the EPS foam to the sandwiched wall surface (Item 2C) using mechanical fasteners or an adhesive in accordance with manufacturer's recommendations. Install the EPS boards in a running bond (brick-like) pattern and staggered over sandwiched wall surface (Item 2C) joints. Apply pressure to the EPS boards to assist in the bonding process. Butt all EPS boards together with no gaps or voids between them. Allow a minimum of 12 hours before continuing the application process when using adhesive. Rasp the EPS boards to remove all irregular seams and establish a continuous flat surface.

H. Exterior Curtain Wall Finish: Use brick and mortar of any type. Mortar joints not to exceed 7/8-inches. Secure bricks to curtain wall assembly (Item 2) using conventional acceptable masonry techniques.

3. PERIMETER JOINT PROTECTION – Maximum 8 inch nominal joint width (joint width at installation) of perimeter joint (linear opening). Perimeter joint protection incorporates the following construction features:

A. Packing Material: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Use a minimum 4 inch thick, 4 pcf density, mineral wool batt insulation installed to fill all openings with the fibers running parallel to the concrete slab (Item 1A) edge and curtain wall assembly (Item 2). Compress packing material 33% in the nominal joint width. Install top of packing material flush with the top surface of the concrete slab (Item 1A). Tightly compress together splices (butt joints) in the lengths of packing material, minimum compression 0.25-inch per piece. Notch packing material to receive support angle (Item 3C) so that packing material is in contact with sandwich wall surface (Item 2C).

B. CERTIFIED MANUFACTURER:
Passive Fire Protection Partners

CERTIFIED PRODUCT: Joint spray or sealant
MODEL: 5100SP™Spray Mastic

Fill, Void or Cavity Material: Apply sealant, (sprayed, brushed, or painted), to cover the top exposed surface of the packing material (Item 3A) compressed in the perimeter joint. Apply a minimum dry film thickness of 1/16 inch and overlap sealant a minimum 1 inch onto the adjacent curtain wall assembly (Item 2) and floor assembly (Item 1). After stopping the application process, and when the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured sealant at least 1/8 inch with the new sealant being applied.

C. Support Angle: Horizontally install a minimum 20 GA 2-inch x 2-inch steel angle mechanically fastened to the interior of the steel-stud framing (Item 2B) at the mid point location of the packing material (Item 3A).

D. Support Clips: (Not Shown – Optional) Standard Z-shaped clips consist of 20 GA galvanized steel with the following dimensions: 1-inch wide by 3-inch high with a 2-inch upper leg and 3-inch lower leg.

Design Number: PFP/JS 120-05

PERIMETER JOINT PROTECTION

Passive Fire Protection Partners

5100SP™ Spray Mastic

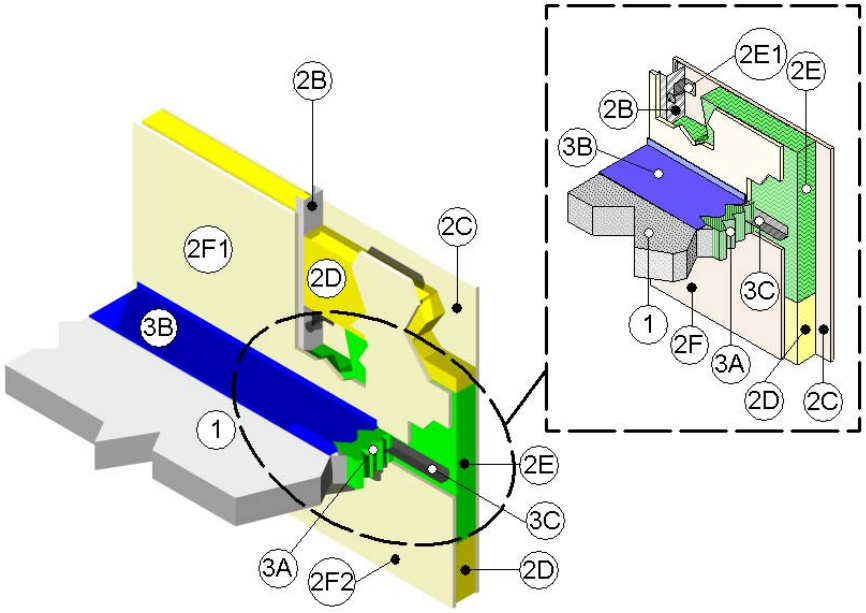
ASTM E 2307

T-Rating – 1 hr.

F-Rating – 2 hr.

ASTM E 1966-Cycling

CYCLING TYPE IV: ± 16.7% Horizontal Movement @ 33% Compression (Reference Item 3A)



1. FLOOR ASSEMBLY – The floor assembly consists of the following construction features:

   A. Two-hour rated reinforced concrete slab using either nominal density 100 pcf lightweight or nominal density 150 pcf normal weight concrete with a minimum thickness of 4-1/2-inches.

   B. When required to accommodate the installation of an architectural joint system, increase overall concrete slab (Item 1A) thickness. Maintain minimum 4-1/2-inch thickness below blockout (longitudinal recesses) formed in the concrete slab (Item 1A) to accommodate the architectural joint system. Vary blockout width without restriction.

2. CURTAIN WALL ASSEMBLY: The curtain wall assembly incorporates the following construction features:

   A. Mounting Attachment: (Not Shown) Attach sandwiched wall surface (Item 2C) to the steel studs (Item 2B) according to the curtain wall manufacturer's instructions. When required, connect the mounting attachments to the joint face of the

floor assembly (Item 1), according to the curtain wall manufacturer's instructions. Maximum 10-foot distance between mounting attachments.

B. Steel-Stud Framing: Erect vertical framing members using a minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs. Erect vertical framing, and when required install horizontal framing members, according to the curtain wall system manufacturer's guidelines. Maximum 24 inches on center vertical framing spacing.

C. Sandwiched Wall Surface: Use a minimum 1/2-inch thick, 48-inch wide by 96 in. long, exterior grade gypsum wallboard (ASTM C 79), placed over and secured to framing with minimum 1-1/4 inch long Type S drywall screws spaced 8 inches on center.

D. Curtain Wall Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 48-inch tall by 4-inch thick faced or un-faced fiberglass insulation (batt) in each stud cavity in the steel stud framing (Item 2B). Completely fill the recess of the minimum 3-5/8 inch by 1-5/8 inch, 18 GA steel "C" studs with curtain wall insulation, except locations where the barrier insulation (Item 2E) in the steel stud framing (Item 2B) is installed.

E. Barrier Insulation: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Install a nominal 24-inch wide by 24-inch tall by 4-inch thick minimum 4 pcf un-faced mineral wool insulation (batt) in each stud cavity in the steel stud framing (Item 2B) at the floor assembly (Item 1) elevation so that nominal 12-inches of un-faced mineral wool insulation is above the surface of the perimeter joint protection (Item 3). Use a minimum un-faced mineral wool insulation (batt) length of 24-inches and fitted tightly between vertical framing members of the steel stud framing (Item 2B). Mechanically fasten the un-faced mineral wool insulation (batt) with minimum 2 x 2 inch, 20 GA steel clips (Item 2E1) with a minimum 5 inch copper coated steel pin extending from the center of the side of the clip installed parallel with the sandwiched wall surface (Item 2C). Locate the steel clips (Item 2E1) within each stud cavity in the steel stud framing (Item 2B). Locate one steel clip (Item 2E1) within 1-inch of each corner of each piece of un-faced mineral wool insulation (batt) and not less than 12-inch on center. The un-faced mineral wool insulation (batt) shall completely fill the recess of the min. 3-5/8 in. by 1-5/8 in., 18 GA steel "C" studs of the steel-stud framing (Item 2B).

F. Interior Curtain Wall Surface: Install perimeter joint treatment (Item 3) before this material. Cover interior face of steel-stud framing (Item 2B) with one layer of minimum 1/2 inch thick, Type X gypsum board (ASTM C 36). The joint face of the curtain wall assembly (Item 2) is not covered as shown with the 1/2 inch thick, Type X gypsum board (ASTM C 36). Fasten 1/2 inch thick, Type X gypsum board (ASTM C 36) to steel-stud framing (Item 2B) with minimum #6 1-1/8 inch long bugle-head phillips drywall screws spaced 12 inches on center. Continuously place gypsum wallboard (2F) a minimum 72 inches above surface of perimeter joint protection (Item 3). Optional gypsum wallboard (2F2) below the floor assembly (Item 1).

1. Joint Tape and Compound – Apply vinyl or casein, dry or premixed joint compound to interior curtain wall surface (Item 2F) in two coats to all exposed screw heads and gypsum butt

joints. A minimum 2-inch wide paper, plastic or fiberglass tape embedded the joint compound over the butt joint of the first layer of gypsum board (Item 2F).

2. Create a minimum 3-5/8 inch cavity between unexposed side of sandwiched wall surface (Item 2C) to unexposed side of interior curtain wall surface (Item 2F).

3. PERIMETER JOINT PROTECTION – Maximum 8 inch nominal joint width (joint width at installation) of perimeter joint (linear opening). Perimeter joint protection incorporates the following construction features:

   A. Packing Material: Use only materials bearing an Intertek Certified Product Label and meeting the following minimum requirements. Use a minimum 4 inch thick, 4 pcf density, mineral wool batt insulation installed to fill all openings with the fibers running parallel to the concrete slab (Item 1A) edge and curtain wall assembly (Item 2). Compress packing material 33% in the nominal joint width. Install top of packing material flush with the top surface of the concrete slab (Item 1A). Tightly compress together splices (butt joints) in the lengths of packing material, minimum compression 0.25-inch per piece. Notch packing material to receive support angle (Item 3C) so that packing material is in contact with sandwich wall surface (Item 2C).

   B. CERTIFIED MANUFACTURER:
   Passive Fire Protection Partners

   CERTIFIED PRODUCT: Joint spray or sealant
   MODEL: 5100SP™Spray Mastic

   Fill, Void or Cavity Material: Apply sealant, (sprayed, brushed, or painted), to cover the top exposed surface of the packing material (Item 3A) compressed in the perimeter joint. Apply a minimum dry film thickness of 1/16 inch and overlap sealant a minimum 1 inch onto the adjacent curtain wall assembly (Item 2) and floor assembly (Item 1). After stopping the application process, and when the applied liquid cures to an elastomeric film before process is restarted, then overlap the edge of the cured sealant at least 1/8 inch with the new sealant being applied.

   C. Support Angle: Horizontally install a minimum 20 GA 2-inch x 2-inch steel angle mechanically fastened to the interior of the steel-stud framing (Item 2B) at the mid point location of the packing material (Item 3A).

   D. Support Clips: (Not Shown – Optional) Standard Z-shaped clips consist of 20 GA galvanized steel with the following dimensions: 1-inch wide by 3-inch high with a 2-inch upper leg and 3-inch lower leg.

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3500SI - SPRAYING INSTALLATION INSTRUCTIONS

INSTALLATION

Introduction

3500SI spray is a latex-based, intumescent spray designed to stop the passage of fire, smoke, and fumes through fire-rated separations. 3500SI spray forms a durable and flexible seal after curing.

3500SI spray becomes an integral component in a complete building system of walls, pipe penetrations, HVAC ducts, joints, and the like.

Applications

When installed correctly within Passive Fire Protection (PFP) Partners' recognized and tested systems, 3500SI spray will help prevent fire, smoke, toxic fumes, and moisture from passing through penetrations of fire rated walls and floors. Some typical applications include:

- Openings with or without penetrations
- Single or bundled cables with or without plastic jacketing
- Cable trays
- Plastic pipes, including PVC, CPVC, ENT, and ABS
- Cross-linked polyethylene
- Rigid metallic conduit
- Metallic pipes, including cast iron, copper, and steel
- Insulated metallic pipes
- Construction joints, including horizontal expansion joints and top-of-wall joints

Advantages

Intumescent. When exposed to high temperatures or fire, 3500SI spray expands in volume close off voids left by melting or burning construction materials.

Simplified Installation. 3500SI spray is installed with standard commercial spraying equipment. Priming of surfaces is not required before use.

Versatility. 3500SI spray adheres easily to dry or damp concrete, wood, metal, and other building material surfaces.

Flexibility. 3500SI spray, when used in joints, accommodates up to 33 percent joint move compression/extension. It remains flexible and fully resistant to water after curing.

Approvals and Regulations

3500SI spray has been tested for hundreds of firestop installations and meets or exceeds the requirements of ASTM E 814, ASTM E 119, UL 1479, UL 2079, CAN/ULC S115, and CAN/ULC S101. Underwriters Laboratories (UL) is a third party, fire endurance testing agency accredited by ICBO, BOCA and SBCCI (National Evaluation Service) in the United States.

Materials and Equipment Needed for Installation

The following items are necessary for proper installation of 3500SI spray:

- ❑ Safety glasses
- ❑ Gloves(plastic, disposable gloves are preferred)
- ❑ Appropriate UL listing for the firestopping system to be installed. This can be determined by referring to the selection charts in the PFP Partner Pocket Guide, identifying the type of system to be installed, and locating the UL approved listing for that system.
- ❑ All items shown in the UL listing. This will include 3500SI spray and mineral wool filler.
- ❑ 3500SI spray, in 5 gal. pails. The amount of spray required can be determined by using the charts and formulas found in the PFP Partners Estimating Information Technical Data Sheet.
- ❑ A low-pressure air spray system with a pressurized pot (2 quart, 2 gallon, or 5 gallon) or a diaphragm pump and air spray gun. Suggested spray equipment is listed in Table 1.
- ❑ Mineral wool (4 lb/ft^3 minimum, 6 lb/ft^3 preferred for ease of use) cut to size per the applicable UL system.
- ❑ As an option, 3500SI spray can be applied with a 3" to 5" wide brush or a 3/8" or medium nap paint roller.
- ❑ Putty knife and/or 2-inch paint brush
- ❑ Other tools, ladders, etc. as required for the specific jobsite.

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Figure 1. Equipment for installation includes safety glasses and gloves

Installation Procedures

All installations must be in accordance with the UL listing for the firestopping system that is being installed and must comply with all applicable firestopping codes. Always refer to the UL listing before, during, installation to ensure that the outlined procedures have been followed exactly. Installation should be by a PFP Partner certified technician.

Areas to be protected must be clean and free of any oil, dust, or dirt, similar to that of any typical painting application. A light dusting with a damp cloth is usually sufficient to prepare the surface.

Recommended installation temperatures should be 40°-90°F (4°-32°C). Preferred temperatures are between 65°-75°F (18°-24°C).

Figure 2. Installing filler material.

- ❑ Put on gloves, safety glasses, and any other required protective equipment.
- ❑ Install any required filler material, per the UL listing, prior to installing the 3500SI spray.
- ❑ Open the 5 gal. pail of 3500SI spray and stir with a mixer or a stirring stick to insure that the spray is of a uniform consistency.

Figure 3. Pressure pot with 3500SI spray ready to beclosed and pressurized.

Pressurized Pot Sprayers

If using a pressurized pot sprayer, fill the pot 1/2 to 3/4 full. If the pot has a liner, use this for easier cleanup, but be sure that the filler hose is not against the liner. This would prevent the spray from flowing into the filler hose.

- ❑ Secure the lid to the pot, using uniform pressure around the lid to ensure no leakage. Attach the hose and spray gun to the pressure pot.
- ❑ Before attaching the inlet pressure hose, make sure all pressure regulators are turned off or set to zero pressure.
- ❑ Attach the hose and gradually pressurize the pot to the desired pressure (40-80 psi). If the desired pressure cannot be attained, the pot is leaking. Set the pressure back to zero, release pressure on the pot, tighten the lid and repeat pot pressurization.

CAUTION: Do not exceed the maximum recommended pressure for the pump and spray gun.

Do not allow pot to turn on its side as this can allow spray material into the valves in the lid. Should this occur, the lid must be cleaned.

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Diaphragm Pump Sprayer

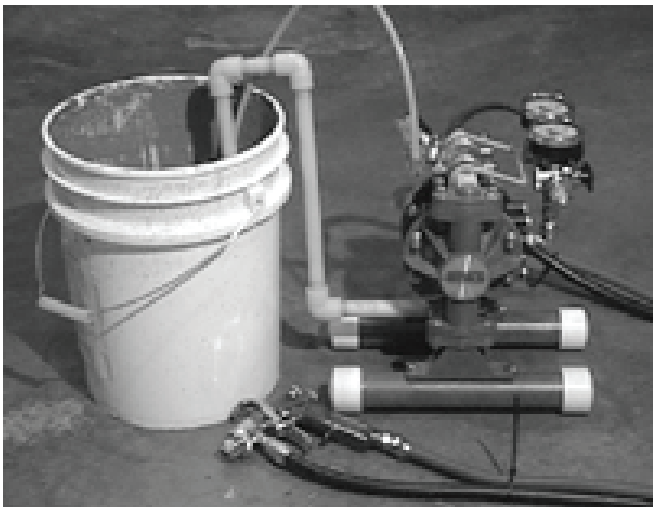

Figure 4. Diaphragm pump with spray gun and 5-gallon pail.

- ❑ If using a diaphragm pump spray, set the pressure regulators to off or zero and attach the hose and spray gun to the pump. Connect the inlet air hose to the diaphragm pump. Place the inlet hose in an empty 5-gallon pail and fill it 1/2 to 3/4 full with 3500SI spray.
- ❑ Set the diaphragm pump regulator to 60-100 psi.

Figure 5. Proper pressure settings insure smooth spraying of 3500SI spray.

- ❑ Remove the spray nozzle from the spray gun allow the pump to fill up the hoses and remove any trapped air. Replace the nozzle.
- ❑ Set the spray gun regulator to 40-80 psi and use the gun adjustments to adjust the spray.

CAUTION: Do not exceed the maximum recommended pressure for the pump and spray gun.

- ❑ Apply the 3500SI spray into the joints or openings, to the thickness specified in the UL listing and related drawing.

Figure 6. 3500SI can be installed by spraying or with a brush or roller.

Cleanup

- ❑ When installation is completed, tools and other surfaces that require cleanup can be easily cleaned with tap water.

Note: Cleanup should be done before the 3500SI spray becomes dry.

Brushes and rollers can be cleaned with tap water and, if necessary, soap, in a manner similar to cleanup of latex paint.

- ❑ If a pressurized pot has been used, turn off the air pressure and bleed off any residual pressure in the pot, using the relief valve. Remove the lid and empty any remaining 3500SI spray into its original container. Replace and secure the lid and turn on the air pressure. Remove the nozzle from the spray gun and use the air pressure to “spray” the remaining 3500SI back into its original container.

  Turn off the air pressure and bleed off any residual pressure in the pot, using the relief valve. Remove the lid and rinse the pot with clean water. Fill the pot one-half full of clean water. Replace and secure the lid and turn on the air pressure. With the nozzle removed from the spray gun, use the air pressure to “spray” the clean water through the hose into a suitable container, for later disposal. Repeat this process until the hose is clean. Wash the spray nozzle with clean water. Allow to air dry.
- ❑ If a diaphragm pump has been used, turn off the air pressure to the spray gun and remove the nozzle. Remove the inlet pump from the holding tank. Turn on the air pump and “spray” the remaining 3500SI into its original container. Pour any 3500SI remaining in the holding tank into its original container.

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Rinse out the holding tank and fill with it one-half full with clean water. Place the diaphragm pump in the holding tank and use air pressure to “spray” clean water through the pump and hoses into a suitable container, for later disposal. Repeat this process until the hose is clean. Wash the spray nozzle with clean water. Allow to air dry.

Binks Model 2001 Spray Gun
- Fluid Nozzle 59B or 59C
- 3/8” Fluid Line

Graco Model 204 Spray Gun
- 1/4 in. or 3/8 in. Nozzles
- 3/8 in. Fluid Line

Table 1. Spray Equipment Recommendation

Figure 7. Typical spray gun and nozzles.

Installation Checklist

Begin inspection with review of the submittal package, which should include:

- ❑ Required firestop ratings
- ❑ UL listing number for the firestop system
- ❑ Copy of the UL listing with installation drawing and instruction details
- ❑ Clearly noted product thickness

Verify that the requirements specified in the submittal documents have been accomplished in the actual installation.

- ❑ Is the construction type the same as that specified in the UL listing?
- ❑ Is the fire rating for the installed fire system equal to or greater than the construction assembly?
- ❑ Do the joints or penetrating items match those specified in the UL listing in both type and size?
- ❑ Does the size of the opening meet the specifications in the UL listing?
- ❑ Does the annular space meet the minimum and maximum specifications in the UL listing?

Inspect the installed UL system. This will typically require a destruction test in which a section of the material is removed from the annular space. After inspection, new material must be reinstalled.

- ❑ Verify the type, density, and thickness of filler material (if used).
- ❑ Verify the type and thickness of the 3500SI spray.
- ❑ Verify that ceiling and wall joints and penetrations are firestopped on both sides. Floors are usually protected from the underside only.

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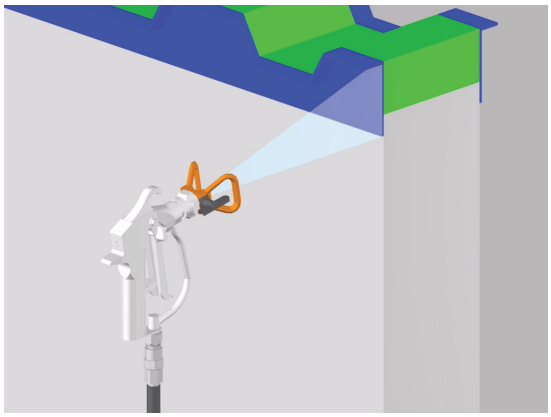
Firestopping Construction Joints 5100SP



Determine the installation requirements. Select the appropriate firestop listing for the application

The installation of the safing material is crucial to the joint firestop system. If the mineral wool safing material is poorly installed several undesirable consequences could happen: (1) normal building movement may cause the firestop materials to fall out; (2) if loosely packed and safing is hit with the pressure from the spray gun, the material may blow out of the joint; (3) loosely packed mineral wool will require more firestop spray material to be applied (the wool fiber will open up and create more voids to be filled with the coating).

Surface preparation: To ensure an effective firestop system, remove excessive dust, dirt, debris, frost, water and oils. Remove any rust from supporting members.

Safing Insulation: Use minimum 4pcf mineral wool fiber (some systems may require 6 or 8 pcf)

- **For horizontal joints in wall assemblies:** Select the appropriate nominal thickness for the joint; cut the mineral wool safing material to fit tightly into the joint and compress it to the density (usually 25% compression) required by the listing. The mineral wool should be installed with the laminations (layers) being in a horizontal orientation (this will allow the wool to compress easier and not break apart).
- **Vertical joints in wall assemblies:** Install as outlined above, except for floor joints the safing laminations (layers) should be installed in a vertical orientation. This allows for maximum compression of the safing material.
- **Floor to floor and floor to wall joints:** Install as outlined above, except for the floor joints the safing material should be installed with the laminations (layers) in a vertical orientation. Larger floor joints may require impaling clips or pins, which help support the mineral wool (manufacturer recommends using clips or pins in joints 4 inches and larger).

Operating Electrical Spray Equipment

For optimum equipment operating and cleaning information, consult the spray pump manufacturer's **Owner's Manual** or their local distributor/representative.

Spraying Elastomeric Firestop Techniques

- An important factor when spray-applying **5100SP** is to achieve an even coating over the entire surface being covered.
- Use even strokes to get the best results.
- As much as possible, keep you arm moving at a constant speed.
- Keep the spray gun at a constant distance from the surface. A good distance is 10-12 inches (25-30cm) between the spray tip and the surface.
- **5100SP** can be applied in a single pass up to 80 mil (5/64") wet thickness.
- Overlap the interfacing surfaces with the correct amount of material [usually 1 inch (25cm)]
- If the coating starts to run when applied to vertical assemblies, more than one thin coat may be necessary. Begin the process by first applying a thin tack coating. After a short time apply the desired coating thickness.

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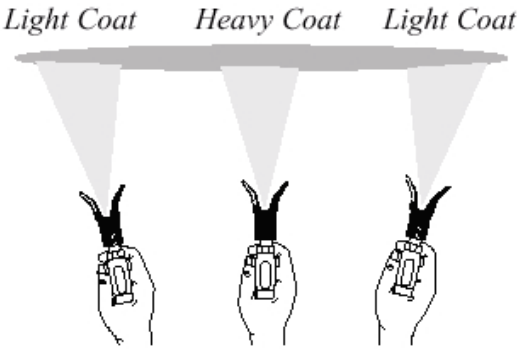
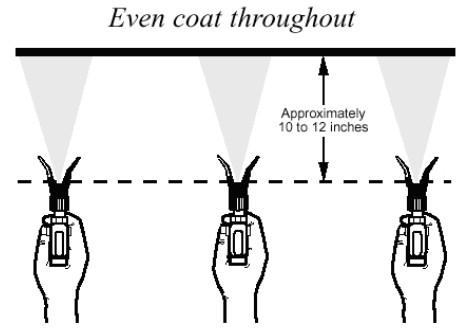


Do not flex wrist while spraying.

Keep the gun at right angles on the surface. This means moving your entire arm back and forth rather than flexing the wrist.

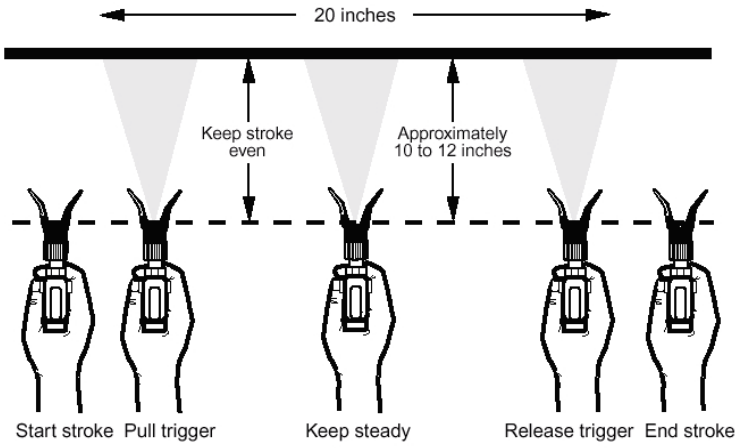


Keep stroke smooth and at an even speed.

Keep the spray gun perpendicular to the surface.

The spray gun should be triggered by turning it on and off with an even stroke.

Proper way to trigger the spray gun



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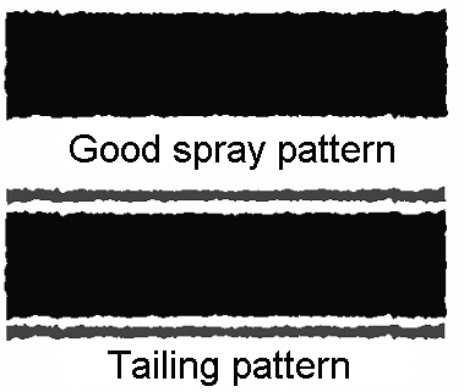
Overlap each stroke by approximately 30%. This will ensure an even coating.



Not Acceptable Spray Pattern

Spray Equipment

Apply 5100SP using airless spray equipment. Recommended specifications:

Heavy to Moderate Duty

Electric motor	1.50 hp
Maximum Working Pressure	3000 psi
Flow Output	1.25 gpm
20 Amp Mode Cord	Min. 12 gauge (recommend 10 gauge)
Hose size	3/8" (9.5mm)
Hose length	Max. 100 ft. (30.5m)
Spray Gun	Mastic Gun
Spray Tips	Reversible 0.019 to 0.031 (recommend 0.021)
Fan width	2" – 12" (50mm-300m)


EP2510

***Note Remove the filter element and filter support attempting to spray. The screen in some applications could be removed.**

Moderate to Heavy Duty

Electric Motor	1.50 hp
Maximum Working Pressure	3000 psi
Flow Output	0.67 gpm
20 Amp Mode Cord	12 gauge
Hose Size	¼" or 3/8 " (6 or 9.5mm)
Hose Length	Max. 100ft. (30.5m)
Spray Gun	Mastic Gun
Spray Tips	Reversible 0.019 to 0.025 (recommend 0.021)
Fan Width	2" – 12" (50-300mm)


EP2305

***Note Remove the filter element and filter support before spraying. The screen (rock) filter could also be removed.**

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Light to Moderate Duty

Electric Motor	1.1 hp
Maximum Working Pressure	3000 psi
Flow Output	0.55 gpm
Amp Mode Cord	12 gauge
Hose Size	¼” (6mm)
Hose Length	Max. 100 ft. (30.5m)
Spray Gun	Mastic Gun
Spray Tips	Reversible 0.019 – 0.023
Fan Width	2” – 12” (50-300mm)

***Note Remove the element filter and filter support before spraying.**

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EQUIPMENT & CAULKING INSTALLATIONS INSTRUCTIONS USING CAULKING APPLICATION GUN

There are different types of caulking applicator guns available. The recommended procedure when using the different styles will be described in Sections A (Tubes), Section B (Bulk Loader) and Section C (Sausages). Section D will then describe the recommended procedures to follow to install the caulk and finish the job.

SECTION A – APPLYING CAULK IN PLASTIC & CARDBOARD FIBER FOIL WRAPPED CARTRIDGES

There are variety of applicator caulking guns available to do firestopping. We recommend using a smooth rod style rather than the less expensive ratchet rod type. When dispensing caulk from a 29 ounce-size cartridge, we recommend a rod type gun with at least a 12:1 thrust ratio. The higher thrust ratio means less hand fatigue since firestopping caulks are usually high viscous caulkings. The higher thrust ratio will also help when the product becomes stiffer in the colder temperatures. (12:1 ration generates approximately 300 pound thrust)

For manual single component cartridge applicator guns.

Select the correct size manual drive frame-style cartridge gun for either the 10-ounce (300ml) or the larger 29-ounce (850ml) plastic or cardboard fiber foil wrapped tube type

Using a utility knife cut off the end of the plastic tip/nozzle to the desired opening size. The cut can be either straight across (90°) or angled (45°). Cutting too small of an opening will restrict the flow of material and a smaller bead size will result. The smaller the opening the higher the trigger action (pressure) required to move the material out of the tube.

NOTE: On the 29 fl. oz. tubes, insert either a screwdriver or other pointed utensil into the plastic nozzle to puncture the membrane; which will allow the caulk material to flow.

Pull back the push rod of the frame-style caulking gun to its full extension and drop the cartridge into the frame insuring that the plastic nozzle of the cartridge is place through the opening in the end plate.

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Repeatedly pull the trigger of the applicator guns until the push rod is advanced to the end of the cartridge. The caulk will begin to flow when some resistance is felt.

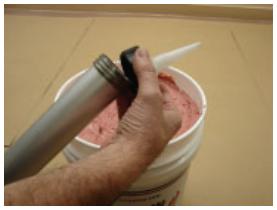
When the desired amount of material has been advanced, stop triggering; release the pressure by pressing the lever (tab) located at the back of the handle with your thumb. This causes the push rod to slip back stopping the flow of material.

REFER TO *SECTION D* TO COMPLETE THE INSTALLATION PROCEDURE.

SECTION B – APPLYING CAULK WITH REFILLABLE BULK LOADING APPLICATOR GUN

The caulking to be used is shipped in 5-gallon (18.9 liter) plastic tapered pails. Ensure that the bulk loader is well maintained; barrel should be clean, piston should be oiled and move freely back and forth when the recoil is depressed.

With a utility knife, cut an opening in the plastic nozzle (cut can be straight across (90°) or angled (45°)). Cutting a smaller opening will restrict the flow of material and produce a smaller bead size. The smaller the opening the higher the trigger action (pressure) required to move the material out of the gun.



Advance the plunger and push the rod all the way forward in the gun so the piston is at the end of the barrel.

To begin the loading process, remove the front cap and nozzle assembly from the gun.

Coat the threads at the end of the barrel with a light solvent (cooking oil, WD-40 or water) to prevent the accumulation of material.

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Immerse the open end of the barrel into the material to a depth of approximately 1 to 2 inches (25 to 50 mm).

Move the immersed gun slightly around so the material will adhere and form an air seal.

Hold the barrel steady, grip the T-pull and slowly pull the push rod back drawing the material into the barrel. Pause every few inches to allow pressures to equalize. Pulling the rod back to quickly may result in air pockets and an incomplete fill.

As the gun fills, slightly sink the barrel deeper into the material to avoid drawing air into the tube. When the barrel is full, remove it from the pail. Clean or scrape off the excess amount that has accumulated on the barrel and wipe the threads clen with a rag. Inverting the gun and tapping the side barrel will help to release any entrapped air.

Replace the front cap and nozzle assembly.

To stop the flow of product, stop triggering and depress the pressure and release the recoil tab.

Now you are ready to install the material.

REFER TO *SECTION D* TO COMPLETE THE INSTALLATION PROCEDURE.

SECTION C – APPLYING CAULK IN A FOIL SAUSAGE PACK (CHUBS OR SACHETS), USING A PRE-CONFIGURED APPLICATOR GUN

Remove the front cap and nozzle assembly. A clean barrel is essential to a successful sausage dispensing. Ensure that the inside of the barrel is clean remove any dried sealant and apply a very light coating of oil to the inside of the barrel.

Depress the pressure release tab while simultaneously gripping the T-pull handle and pull the piston rod to the back of the gun. Load the foil sausage into the barrel of the gun.

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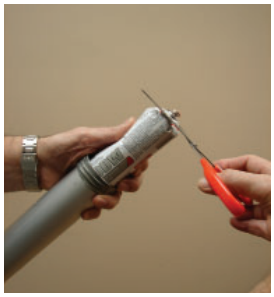

Cut off the crimped end of the sausage with a knife or scissors.

Replace the front cap and nozzle assembly.

Advance the piston rod by repeatedly squeezing the trigger handle, until resistance is experienced and product begins to flow out the nozzle.

If there is difficulty with dispensing the product, check to see if the nozzle is not cut too small or if the foil is obstructing the flow.

Once the product has been completely dispensed, remove the front cap nozzle assembly, pull or eject the empty sausage foil pack and repeat the process with a new sausage pack.

REFER TO *SECTION D* TO COMPLETE THE INSTALLATION PROCEDURE.

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SECTION D – INSTALLING FIRESTOP CAULK

General Information

All firestopping installations must be performed in compliance with a tested and listed firestop system design. The testing laboratories like Underwriters Laboratories (UL) or Intertek (Warnock Hersey) publish these listings.

For the appropriate listing, consult the manufacturer's literature or the testing laboratories' Fire Protection Directories and/or their web sites.

The manufacturer recommends an individual who has been properly trained in the correct procedures should perform all firestop installations. The individual must be able to read and understand a tested firestop listing design.

The applicator should have the following materials and equipment to **correctly and safely** install firestop caulking.

- Safety Glasses
- Gloves
- Utility (box) knife
- Stainless Steel Spatula
- Cleaning rags
- Plastic spray water bottle (quart/liter) with finger pump trigger/nozzle

Areas to be firestopped should be clean, free from: water, excessive dirt, dust, debris and grease. For the best results, the ideal atmospheric temperatures and environment would be:

- Dry, 60°-75°F (15°C -24°C) & R.H. 50 %.

When the damming or fire insulation material is required, the following information should be considered before commencing.

- Backer rod used as a damming or support material should be installed into the opening in a thickness and compressed sufficiently as to not dislodge and fall out under normal building movement. Wrap the backer rod completely around the penetration(s) and recess it to accommodate the required amount of firestop caulk.
- Mineral wool when required, as an insulation material, it should be installed into the opening compressed to a thickness as to not dislodge nor fall out under normal building movement. The mineral wool, usually 4 pcf, should be installed to the compression required by the firestop listing. The orientation of the mineral wool is also very important and maybe the difference of the system being in compliance or not. For construction joints or through penetration in floor (horizontal) rated assemblies, the mineral wool or similar fibrous material should be installed with the lamination in a vertical orientation assemblies. The opposite is the rule of joints and through penetrations in wall (vertical) assemblies. Here the laminations should be placed in a horizontal orientation. Installing the mineral wool in these different lamination directions allows the material to be compressed to the density required for the fire rating and building movement.
- **Do not install mineral wool that is or has become wet i.e. exposure to water, rain, or snow.**

Water base caulks adhere to some construction materials better than others. Applying a light mist of water to these surfaces can in some instances, help the bonding process. Mineral wool is one of these materials, especially when it is in a vertical orientation.

Tooling the installed material can be done in several ways:

- **Dry tooling:** After the material is put in place, using a spatula or other tool that has not been wetted with water, smooth it out.

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- **Wet tooling:** After the material has been put in place, using a spatula or other tool that has been wetted with water, smooth it out.
- **Wet tooling:** After the material has been installed, lightly mist the material with water. Use a plastic water spray bottle, turn the nozzle to a mist spray orifice, hold the bottle approximately 10-12 inches (255-305mm) from the area. **DO NOT APPLY WATER TO THE MATERIAL IN A CONCENTRATED JET SPRAY.** This will apply too much water, causing the material to dilute and run out.

Caulking Penetrations

Install the correct amount of caulk material into the opening (annular space) around the service penetration to the depth/thickness required. Make sure that caulking is in intimate contact with the substrate and the penetrating item. Once the caulk is in place, tool the material with a tooling utensil (spatula) to a smooth finish. This will push the installed material into areas not covered in the initial caulking procedure. It will also help to ensure a better bond with mating construction materials.

Caulking Construction Joints

Some construction joints do not require damming material or mineral wool to be used to affect a firestop system. When filler caulk material is the only component required, the installation must be installed in accordance with the listing being used. This usually requires the filler material to be installed into the gap/joint. Once the caulking has been trowelled or gunned in place, the installed material should be tooled into a smooth finish. Work the material to ensure no voids and air holes are left. This is particularly important when caulking to fireproofing materials. Cured fireproofing is very porous and the caulking must be tooled to it to ensure a tight seal and a secure mating surface system, refer to the procedures described above for the proper installation before applying the filler caulking material.

Note: *All installation procedures of firestop caulk materials outlined in the proceeding information are* ***water-based compounds.***

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INSTALLATION INSTRUCTIONS EBI-60 - ELECTRICAL BOX INSERT

Step # 1 Installation to comply with Article 370-16 of the National Electrical Code (NFPA 70). Prior to installation, consult and select the appropriate third party listed system design.
Note: Manufacturer recommends qualified electricians or equivalent to install the EBI-60.

Step # 2 Clean the surfaces of the penetration and substrates. Remove any water, excess dust, dirt and oil.

Step # 3 Select the correct size of EBI-60 for the size of metallic electrical box.

Step # 4 Peel and remove the protective adhesive backing from the EBI-60. Center the EBI-60 and press firmly against the back of the metallic electrical box. Use only one pad per metallic electrical box.

Step # 5 If the ground screw is located on the inside back panel, make a small cut in the EBI-60 to access and expose the screw.
DO NOT REMOVE MATERIAL FROM THE EBI-60.

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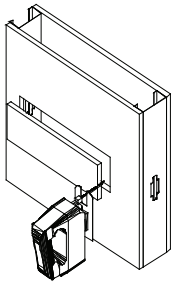
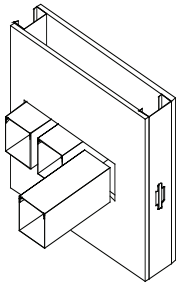
INSTALLATION INSTRUCTIONS FCW-44 - FIRESTOP CABLE WAY

Step # 1 Consult and select the appropriate third party listed system design.

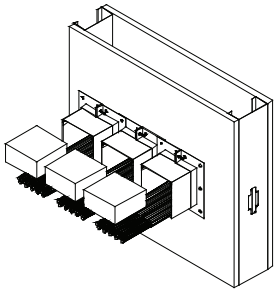
NEW CONSTRUCTION USING THE WALL CLAMP



Step # 2 Cut correct size of opening.

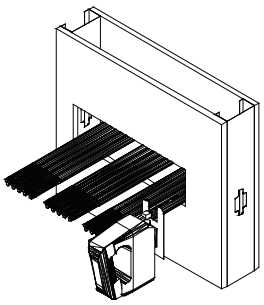


Step # 3 Slide FCW-44s into opening; leaving 28.6 mm (1-1/8 in.) between FCWs.

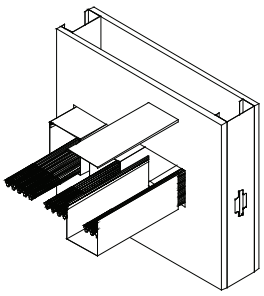


Step # 4 Attach brackets together and then attach brackets to both sides of the wall; install cables & smoke plug.

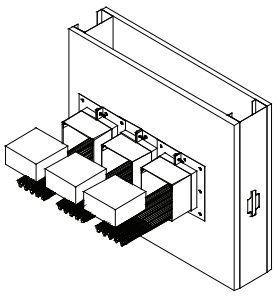
RETRO-CONSTRUCTION USING THE WALL CLAMP



Step # 2a Cut opening to the correct size.

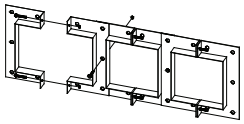


Step # 3a Fit cables into the bottom of the FCW-44; close the lid and slide the FCW-44 into the opening leave 28.6 mm (1-1/8 in.) between FCWs.



Step # 4a Attach brackets together and then attach brackets to both sides of the wall; install cables & smoke plug.

Step # 5 Bolt brackets together using the center hole; then install and bolt the brackets together at the top and bottom of the bracket attaching the brackets to wall using drywall screws of concrete anchors depending on wall.



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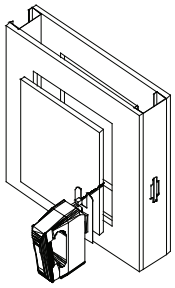
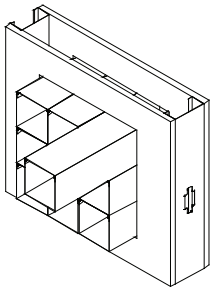
FCW-44 - INSTALLATION INSTRUCTIONS

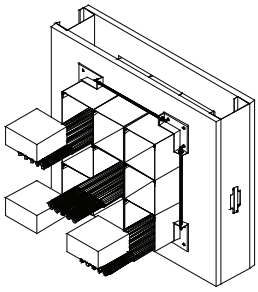
NEW CONSTRUCTION USING THE CORNER BRACKETS



Step # 2 Cut opening to the correct size.

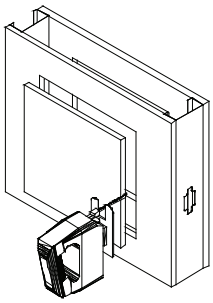


Step # 3 Slide FCW-44s into opening; FCWs to be stack together.

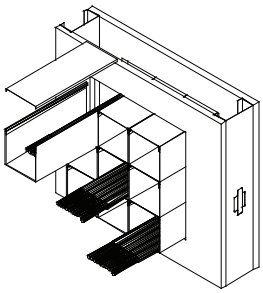


Step # 4 Attach corner brackets and threaded rods to both sides of the wall; install cables & smoke plug.

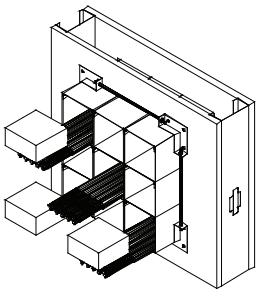
RETRO-CONSTRUCTION USING THE CORNER BRACKETS



Step # 2a Cut opening to the correct size.

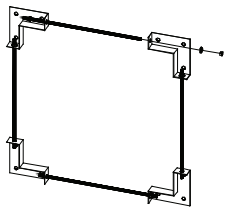


Step # 3a Fit cables into the bottom of the FCW-44; close the lid and slide the FCW-44 into the opening; stacking the FCWs together.



Step # 4a Attach corner brackets and threaded rods to both sides of the wall; install cables & smoke plug.

Step # 5 Bolt corners brackets together using the threaded rod, cut to fit number of FCW44s; then install and bolted corner brackets to to both sides of the wall assembly, secure brackets to wall using drywall screws of concrete anchors depending on wall.



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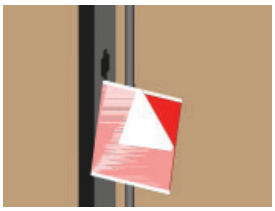
INSTALLATION INSTRUCTIONS MP1 - PUTTY PADS FOR ELECTRICAL BOXES

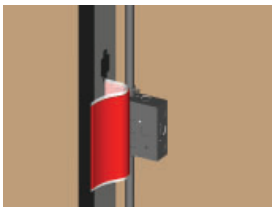
Step # 1 Consult the appropriate third party listed system design.

Step # 2 Remove any water, excess dust, dirt and oil from the electrical outlet boxes.

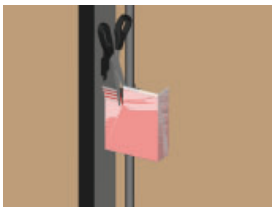
Step # 3 Remove the plastic liner from one side of the putty pad.



Step # 4 Line the pad up with one side of the box and press firmly against all surfaces of the boxes. Overlap the box edges and penetrations with the pad. When the wallboard is installed against the outlet box a tight seal will be created.

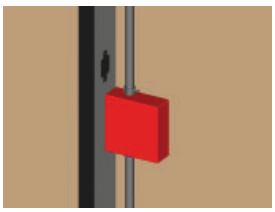


Step # 5 To ensure a proper fit around the penetrations (conduits & cables), cut slits in the pad where appropriate.



Step # 6 Remove the remaining plastic liner and work the putty into a smooth uniform thickness overall surfaces of the box and trim way any excessive material.

Note: Putty pad must be applied to a minimum thickness of 1/8 inch (3.2 mm) (one layer of pad) over all surfaces of the box for both 1 and 2 hour fire rated assemblies.



Step # 7 Excessive putty pad material to be worked into a ball and then packed into the inside of conduit fittings to prevent the passage of smoke and flames through the conduit.

Note: If putty pads have become wet before being installed, they should be discarded.

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INSTALLATION INSTRUCTIONS PILLOW

Step # 1 Consult and select the appropriate third party listed system design.

Step # 2 Remove any dust, dirt and oil from surfaces with dry cloth and remove sharp edge that may snag the pillows during installation and/or removal.

Step # 3 The pillows are installed with the 9 inch (229 mm) dimension projecting through wall or floor assembly.

Step # 4 Start by installing vertical pillows, against the edge of the opening, subsequent pillows are then stacked and compressed (minimum 25 percent) in horizontal rows between the vertical rows.

Step # 5 Any voids between pillows or between pillows and penetrations should be sealed with either PFP Partners 3300PS (recommend for opens that are subject to retrofitting or re-entry) or PFP Partners 3600EX.

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CALCULATION

Measure the horizontal and vertical dimensions of the opening in inches. Divide the vertical dimension by 6 and multiple by 2 gives the number of vertical pillows required. Subtract 2 x 1.5 (compressed vertical pillows) from the overall horizontal dimension and then divided by 6. This gives the number of columns of compressed pillows that will be required. Divide the vertical dimension by 1.5 to get the number of rows required. Multiple the required rows by the required columns and add the number of vertical pillows will give the total number of pillows required for a blank opening.

When a penetrant is present, subtract the number of pillows displaced by the penetrant. Horizontal dimension of the penetrant divided by 6. Vertical dimension of the penetrant multiplied by the percentage of fill then divide by 1.5. Multiple the number of rows by the number of columns gives the number of pillows displaced. Subtract the number of pillows displaced from the total blank opening number will give the total required pillows.

Example:

A concrete wall opening that is 36 in. by 6 in. with a 4 in. by 24 in. cable tray filled to 50 percent.

Number of pillows required for the blank opening:

1. **VP** - Number of vertical pillows: (6 in. / 6) * 2 = 2 FSP692 vertical pillows
2. **NPC** - Number of pillow columns: (36 in. – (2*1.5)) / 6 = 5.5 5 columns of FSP692 and 1 columns of FSP392
3. **NPR** - Number of pillows rows: 6 / 1.5 = 4 rows
4. **TPB** - Total number of pillows for blank opening is: (VP + (NPC*NPR)) = 2 FSP692 + (5 (FSP692)*4 + 1(FSP392) *4) = 22 FSP692 + 4 FSP392

Number of pillows displaced by the cable tray is:

1. **NPCD** - Number of pillow columns displaced: 24 in. / 6 = 4 4 columns of FSP692
2. **NPRD** - Number of pillows rows displaced: 4 in. multiplied by 50 percent (percentage of fill) (4 * .5) / 1.5 = 1.3 rows equals 1 row (compression will be great in cable tray then required)
3. **TPD** - Total number of pillows displaced by cable tray is: (NPCD*NPRD) = (4 (FSP692)*1) = 4 FSP692

Overall number of pillows required:

TPB – **TPD** = 22 (FSP692) – 4 (FSP692) + 4 (FSP392) = 18 (FSP692) and 4 (FSP392)

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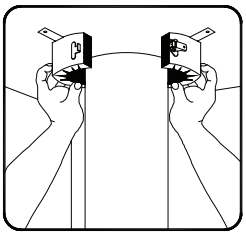
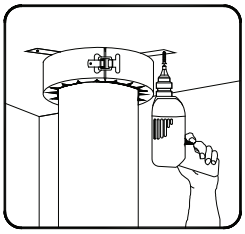
INSTALLATION INSTRUCTIONS PPC - PLASTIC PIPE COLLAR

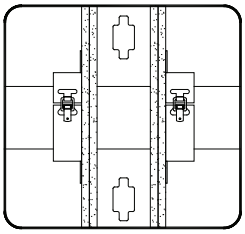
Step # 1 Ensure annular space around pipe is within the limits set by the listed system design. If required, caulk annular space around pipe with 3600EX or 4800DW as prescribed in the listed system design. Select the proper size collar to fit the diameter of the pipe. Slide PPC Collar flush against the underside of the floor assembly or the side of the wall assembly and close the collar around the pipe using the clasp.



Step # 2 Secure the PPC Collar to the floor or wall by mechanically fastening the correct number of anchoring tabs with appropriate type of fastener specified in the listed system design.



Step # 3 When installing PFPP's PPC collar on wall applications, a collar must be installed on each side of the wall



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INSTALLATION INSTRUCTIONS WS1 - WRAP STRIPS

Step # 1 Prior to installation, consult and select the appropriate third party listed system design.

Step # 2 Clean the surfaces of the penetration and substrates. Remove any water, excess dust, dirt and oil.

Step # 3 Place the number of layers WS1 Wrap Strips around the penetrations as required by the third party listed system design. The individual layers may be aligned or offset.

Step # 4 The layers of wrap strips to be recessed into the annular space between penetration and substrate. Reference the specific listed system design for the required depth.

Step # 5 Secure the layers of wraps strips in place by using aluminum foil tape and/or as specified in the listed system design.

Step # 6 If required by the specific listed system design, install a continuous bead of PFP Partners Firestopping Caulking (3600EX, 4100NS or 4800DW) around the interface between the wrap strips and the substrate. Refer to specific listed design for thickness of bead.

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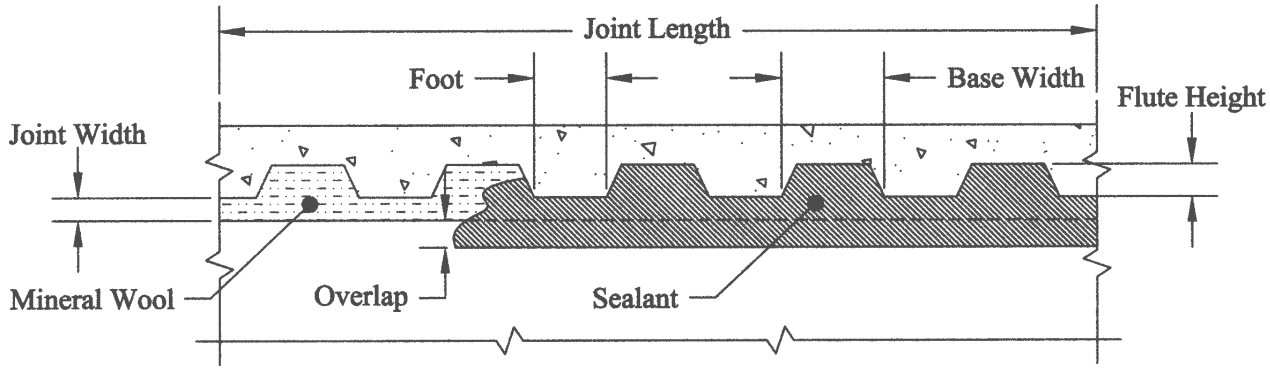
CORRUGATED METAL DECK - MASTIC SPRAY - CALCULATION GUIDE



3500SI or 5100SP Mastic Spray

Sprayable mastic for top of gypsum board wall assemblies cut straight across to fluted metal decks.
Quantity calculations include:

- Both sides of the wall assembly
- Variable flute heights (see chart)
- 3/4 in. construction gap
- 1 in. overlap (1 in. sprayed on deck and 1 in. on the wall assembly)
- 1/16 in. thickness of spray material
- 10% wastage factor

100 LINEAL FEET OF DECKING FLUTE SIZE (inches)			PFP Partners Mastic Spray QUANTITY REQUIRED	
Height	Base Width	Foot	US gallons	Liters
1.5	4.3	1.7	3.09	11.69
3	3.9	2.2	4.04	15.28
3	5.9	2.2	4.05	15.35

Available sizes:

Container Size:	Volume:
5 gallon pail (18.9L)	1155 cu. in.

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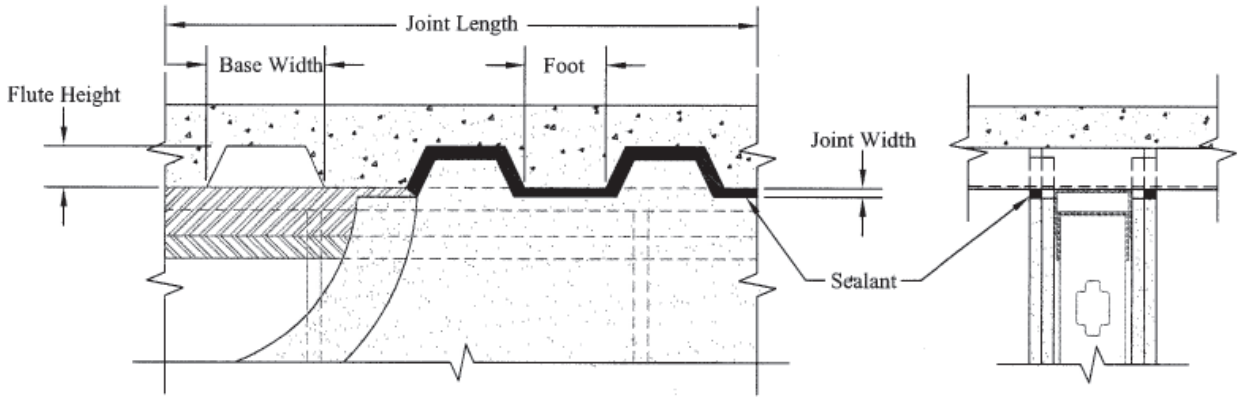
ESTIMATING

CORRUGATED METAL DECK - CALCULATION GUIDE



Firestop Sealant for top of gypsum board wall assemblies cut to the profile of metal decking. Quantity calculations are for both sides of the wall assembly.

100 LINEAL FEET OF DECKING FLUTE SIZE (inches)			GAP SIZE	SEALANT DEPTH	CAULK QUANTITY REQUIRED	
Height	Base Width	Foot	Inches	Inches	US gallons	Liters
1.5	4.3	1.7	0.50	0.625	4.87	18.43
1.5	4.3	1.7	0.75	0.625	7.31	27.65
1.5	4.3	1.7	1.00	0.625	9.74	36.87
1.5	4.3	1.7	0.50	1.250	9.74	36.87
1.5	4.3	1.7	0.75	1.250	14.61	55.31
1.5	4.3	1.7	1.00	1.250	19.48	73.74
3.0	3.9	2.2	0.50	0.625	6.44	24.38
3.0	3.9	2.2	0.75	0.625	9.66	36.57
3.0	3.9	2.2	1.00	0.625	12.88	48.76
3.0	3.9	2.2	0.50	1.250	12.88	48.76
3.0	3.9	2.2	0.75	1.250	19.32	73.14
3.0	3.9	2.2	1.00	1.250	25.76	97.52
3.0	5.9	2.2	0.50	0.625	5.65	21.39
3.0	5.9	2.2	0.75	0.625	8.48	32.09
3.0	5.9	2.2	1.00	0.625	11.30	42.79
3.0	5.9	2.2	0.50	1.250	11.30	42.79
3.0	5.9	2.2	0.75	1.250	16.96	64.18
3.0	5.9	2.2	1.00	1.250	22.61	85.58

Available sizes:

Container Size:	Volume:
10.1fl.oz tube (300ml)	18 cu. in.
20 fl. oz foil pack (600ml)	36 cu. in.
29 fl. oz tube (850ml)	51 cu. in.
5 gallon pail (18.9L)	1155 cu. in.

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THROUGH PENETRATION - CALCULATION GUIDE

Step 1:

For sealant depth of 1 in.

Use this chart to calculate the volume (cu. in.) of PFP Partners sealant required for each penetration.

Diameter of Hole	Nominal Diameter of Penetrating Items (inches)												
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	6.00	8.00	10.00	12.00
	Actual Outside Diameter of Sch 40 Penetrating Items (inches)												
(inches)	0.840	1.050	1.315	1.900	2.375	2.875	3.500	4.000	4.500	6.625	8.625	10.75	12.75
1.00	0.23												
1.50	1.21	0.90	0.41										
2.00	2.59	2.28	1.78	0.31									
2.50	4.35	4.04	3.55	2.07	0.48								
3.00	6.51	6.20	5.71	4.23	2.64	0.58							
3.50	9.07	8.76	8.26	6.79	5.19	3.13							
4.00	12.01	11.70	11.21	9.73	8.14	6.07	2.95						
4.50	15.35	15.04	14.55	13.07	11.47	9.41	6.28	3.34					
5.00	19.08	18.77	18.28	16.80	15.20	13.14	10.01	7.07	3.73				
5.50	23.20	22.89	22.40	20.92	19.33	17.27	14.14	11.19	7.85				
6.00	27.72	27.41	26.92	25.44	23.84	21.78	18.65	15.71	12.37				
6.50	32.63	32.32	31.82	30.35	28.75	26.69	23.56	20.62	17.28				
7.00	37.93	37.62	37.13	35.65	34.05	31.99	28.86	25.92	22.58	4.01			
7.50	43.62	43.31	42.82	41.34	39.75	37.69	34.56	31.61	28.27	9.71			
8.00	49.71	49.40	48.91	47.43	45.84	43.77	40.64	37.70	34.36	15.79			
8.50	56.19	55.88	55.39	53.91	52.31	50.25	47.12	44.18	40.84	22.27			
10.00	77.99	77.67	77.18	75.70	74.11	72.05	68.92	65.97	62.64	44.07	20.11		
12.00	112.54	112.23	111.74	110.26	108.67	106.61	103.48	100.53	97.19	78.63	54.67	22.33	
14.00	153.38	153.07	152.58	151.10	149.51	147.45	144.32	141.37	138.03	119.47	95.51	63.18	26.26

Note: These calculations are for a sealant depth of 1in. only.
For a different sealant depth, go to **Step 2.**
To calculate number of containers required, go to **Step 3.**

Step 2:

For a depth of:	Multiply by:
1/8”	0.13
1/4”	0.25
1/2”	0.50
3/4”	0.75
2”	2.00
3”	3.00
4”	4.00

Step 3:

Container Size:	Volume:
10.1fl.oz tube (300ml)	18 cu. in.
20 fl.oz foil pack (600ml)	36 cu. in.
29 fl.oz tube (850ml)	51 cu. in.
1 gallon pail (3.8L)	231 cu. in.
3 gallon pail (11.4L)	693 cu. in.
5 gallon pail (18.9L)	1155 cu. in.

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CONSTRUCTION JOINTS - CALCULATION GUIDE

Use this chart to calculate:

The lineal feet of coverage per US gallon (3.8L) of PFP Partners Firestop Sealant
For 3500SI or 5100SP mastic sprays use the next larger joint width to allow for 1/2 in. (12.5mm) overlap on both sides of gap.

JOINT WIDTH			DEPTH OF SEALANT							
MM	INCHES		0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000
3.17	1/8”	0.125	1232.0	616.0	410.7	308.0	246.4	205.3	176.0	154.0
6.35	1/4”	0.250	616.0	308.0	205.3	154.0	123.2	102.7	88.0	77.0
9.52	3/8”	0.375	410.7	205.3	136.9	102.7	82.1	68.4	58.7	51.3
12.70	1/2”	0.500	308.0	154.0	102.7	77.0	61.6	51.3	44.0	38.5
15.87	5/8”	0.625	246.4	123.2	82.1	61.6	49.3	41.1	35.2	30.8
19.05	3/4”	0.750	205.3	102.7	68.4	51.3	41.1	34.2	29.3	25.7
22.22	7/8”	0.875	176.0	88.0	58.7	44.0	35.2	29.3	25.1	22.0
25.40	1”	1.000	154.0	77.0	51.3	38.5	30.8	25.7	22.0	19.3
28.57	1-1/8”	1.125	136.9	68.4	45.6	34.2	27.4	22.8	19.6	17.1
31.75	1-1/4”	1.250	123.2	61.6	41.1	30.8	24.6	20.5	17.6	15.4
34.92	1-3/8”	1.375	112.0	56.0	37.3	28.0	22.4	18.7	16.0	14.0
38.10	1-1/2”	1.500	102.7	51.3	34.2	25.7	20.5	17.1	14.7	12.8
41.27	1-5/8”	1.625	94.8	47.4	31.6	23.7	19.0	15.8	13.5	11.8
44.45	1-3/4”	1.750	88.0	44.0	29.3	22.0	17.6	14.7	12.6	11.0
47.62	1-7/8”	1.875	82.1	41.1	27.4	20.5	16.4	13.7	11.7	10.3
50.80	2”	2.000	77.0	38.5	25.7	19.3	15.4	12.8	11.0	9.6
76.20	3”	3.000	51.3	25.7	17.1	12.8	10.3	8.6	7.3	6.4
101.60	4”	4.000	38.5	19.3	12.8	9.6	7.7	6.4	5.5	4.8
127.00	5”	5.000	30.8	15.4	10.3	7.7	6.2	5.1	4.4	3.9
152.40	6”	6.000	25.7	12.8	8.6	6.4	5.1	4.3	3.7	3.2
177.80	7”	7.000	22.0	11.0	7.3	5.5	4.4	3.7	3.1	2.8
203.20	8”	8.000	19.3	9.6	6.4	4.8	3.9	3.2	2.8	2.4
228.60	9”	9.000	17.1	8.6	5.7	4.3	3.4	2.9	2.4	2.1
254.00	10”	10.000	15.4	7.7	5.1	3.9	3.1	2.6	2.2	1.9
279.40	11”	11.000	14.0	7.0	4.7	3.5	2.8	2.3	2.0	1.8
304.80	12”	12.000	12.8	6.4	4.3	3.2	2.6	2.1	1.8	1.6
330.20	13”	13.000	11.8	5.9	3.9	3.0	2.4	2.0	1.7	1.5
			LINEAL FEET PER US GALLON (3.8L)							

Note: 231 cu. in. per US gallon (3.8L)
61 cu. in. per quart (1L)

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GLOSSARY OF TERMS

ABS – Abbreviation for **A**crylonitrile-**B**utadiene-**S**tyrene pipe. Plastic pipe installed usually for drain, waste, vent and sewage.

Annular Space – Is the distance between the penetrating item and the periphery of the opening or the distance between multiple penetrations.

ANSI – Abbreviation for **A**merican **N**ational **S**tandards **I**nstitute.

ASTM – Abbreviation for **A**merican **S**ociety for **T**esting and **M**aterials.

ASTM E-814 – "Standard Method of Fire Tests of Though Penetration Firestops".

ASTM E-84 – "Standard Method for Surface Burning Characteristics pf Building Materials".

AWG – Abbreviation for **A**merican **W**ire **G**auge – Used in combination with a number to identify a particular size wire.

Backer Rod – A round polyurethane or polyethylene foam material installed to support and provides correct depth of caulk or sealant material.

Calcination / Calcined – To heat to a high temperature but without fusing in order to drive off volatile matter or to affect changes (as oxidation).

Ceramic Fiber – High temperature man made fiber (45% alumina, 53% silica) used as insulating material where high service temperatures are required. Design service use 2300ºF (1260ºC) melting 3200ºF (1760ºC) available in 4, 6 and 8 pcf density batts/blankets. Some times used instead of mineral wool for 3 and 4-hour systems.

Closed System – Usually refers to a piping system for water distribution when the pipe is full, under pressure and closed at pipe termination. In some jurisdictions electrical conduit is considered closed.

Collars (Pipe Collars) – A one-piece prefabricated device consisting of intumescent strips and a restricting metal collar. Used on plastic pipes to direct the intumescent expansion.

CMU – Abbreviation for **C**oncrete **M**asonry **U**nit (i.e. a hollow concrete block).

Concentric – Centered, the penetration will be positioned in the center of the opening.

Control Joint – A device or design feature that provides a continuous transition in linear openings within a fire-resistive structure and that does not exceed a maximum joint width of 5/8" (16mm). A control joint system consists of the device or designed construction feature, but does not include the fire resistive structure in which it is installed.**

CPVC Pipe – Abbreviation for **C**hlorinated **P**oly**v**inyl **C**hloride Pipe, a high performance plastic pipe used for hot and cold-water distribution. CPVC pipe is commonly used for sprinkler pipe.

Curtain Wall – A rated or non-rated, non-load bearing exterior wall assembly secured to and supported by the structural members of the building.

DWV – Abbreviation for **D**rain, **W**aste and **V**ent pipe. Also referred to as an **open system.** The pipe is empty, not pressurized.

Eccentric – Offset or off center, the penetration will not be centered in the opening.

Elastomeric material – Rubbery type of material that when stretched directionally will elongate. When the pressure is released will go back to its original shape, size and not lose its properties or characteristics (like an elastic band).

EMT – Abbreviation for **E**lectrical **M**etal **T**ubing; conduit. Thin wall galvanized steel pipe, containing electric cables and wires.

Endothermic – Pertaining to or produced from the absorption of heat. A change that takes place with absorption of heat and requires high temperature for initiation and maintenance.

Exposed Side – The exposed surface of an assembly refers to the surface facing the fire during a test.

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F Rating (in the Untied States) or "FH" Rating (in Canada) – The time in hours that a firestop system will prevent the passage of flames through an opening and not permit the projection of water stream through a fire rated assembly as determined by standard test methods ASTM E-814, UL 1479 or CAN/ULC S115.

F Rating (in Canada) – The time in hours that a firestop system will prevent the passage of flames through an opening in a fire rated assembly as determined by standard test methods CAN/ULC S115.

Fire-Resistive Joint System – Is an assemblage of specific material or products that are designed, tested and fire-resistive in accordance with UL 2079 to resist, for a prescribed period of time, the passage of fire through foints made in or between fire resistance-rated assemblies.

Firestop System – A specific construction consists of any materials or device intended to close off an opening or penetration during a fire and/or materials that fill an opening in a wall or floor assembly where penetration is by cables, cables trays, conduits, ducts, pipes, and any poke through termination device.

Ga – Abbreviation for **Ga**uge.

Galv – Abbreviation for **Galv**anized.

Intumescent – A material that swells or expands when exposed to direct flame or high heat (300ºF, 150ºC). Produced for firestopping materials in several forms; caulks, pipe collars, wrap strips, sticks and pads. Most common usage is to close gaps and voids when plastic pipe has melted.

Joint – The linear opening between adjacent fire resistive assemblies. A joint is a division of a building that allows independent movement of the building, in any plane, which may be caused by thermal, seismic, wind loading or any other loading.*

Joint System – A device or designed construction feature that provides a continuous transition in linear openings between adjacent fire resistive structures. A joint system consists of the device or designed construction feature, but does not include the fire resistive structure in which it is installed.**

Fireblocking – Building material installed to resist the free passage of flame and gases to other areas of the building through small-concealed spaces.*

Fire Separation Wall – A fire-resistive rated assembly of materials having protected openings, which is designed to restrict the spread of fire.

GWB – Abbreviation for **G**ypsum **W**all **B**oard; Type X gypsum wallboard manufactured to provide specific fire-resistive characteristics.
(ex. GWB type X, 5/8" thick has a 30-minute fire resistive rating).

Hose Stream Test – Part of the acceptance criteria of ASTM E119, ASTM E814, CAN4 S115, UL 2079. After the test assembly has passed the furnace burn, a steady stream of water is directed onto the fire exposed side of the assembly through a 2 ½" hose. Water is not permitted to pass through the firestop fill material to the unexposed side. The integrity of the unexposed side must remain intact.

Linear Opening – A discontinuity between or within fire resistive structures.**

L Rating – An ***optional*** test performed to determine the amount of air leakage through a firestop system (in cubic feet per minute per square foot of opening). Tested in conjunction with UL 1479, ULC S115-M95, ASTM E 814 or UL 2079.

Listed System Design – An informational listing by an *Accredited Testing Agency* developed from *Passive Fire Protection Partners* Reports depicting the correct use and installation of firestop materials. These published listings contain drawings depicting geometry, minimum/maximum dimensions for all the individual components tested including penetration item types and size, annular space, insulating materials used, substrate types and thickness, sealant types and thickness, etc.

Maximum Joint Width – The greatest width to which the joint system is designed to extend taking into consideration all axes of movement.**

Membrane Penetration – An opening made through one side (wall, floor or ceiling membrane) of an assembly.*

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GLOSSARY OF TERMS

Mineral Wool – A fire-resistant fibrous material used as a insulation and filler material in a firestop system, capable of withstanding temperatures of 1832ºF (1000ºC). Supplied in loose and blanket board form. The most popular used for firestopping is 4 and 6-lb batts, 24" x 48" (8-lb is fairly rigid and is usually used in larger construction joints).

Minimum Joint Width – The narrowest width the joint system is designed to accommodate.**

Movement Capability – The range of movement that a joint system is designed to accommodate without diminishing its fire resistive performance.**

Non-Sag Caulk – Any compound that does not flow or sag out after application usually installed in a vertical joint or wall penetration.

Open System – A series of designed pipes through which waste materials and liquids are vented to a central system. In some jurisdictions, EMT is considered an open system. Air duct systems have also been seen by some as an open penetration.

Party Wall – A wall jointly owned and jointly used by two parties under easement agreement or by right of law, and erected at or upon a line separating 2 parcels of landeach of which is, or is capable of being, a separate real estate entity.

pcf – Abbreviation for **p**ounds per **c**ubic **f**oot.

Penetration – An opening created in a membrane or assembly to accommodate penetrating items for electrical, mechanical, plumbing, environmental, and communication systems.*

Penetration Firestop System – An assemblage of specific materials or products that are designed, tested and fire-resistive in accordance with UBC 7-5 to resist, for a prescribed period of time, the passage of fire through penetrations.*

Perimeter Fire Containment Systems – A specific construction consisting of a floor with an hourly fire endurance rating, an exterior curtain wall with no hourly fire endurance rating and the fill material installed between the floor and the curtain wall to prevent the vertical spread of fire in the building.

PEX Pipe – Abbreviation for Cross-Link Polyethylene pipes, typically for domestic water distribution and hydronic heating. High temperature and pressure properties.

Point Contact – Penetrating item is touching the side of the substrate or another penetrating item.

Putty Pad – A rectangular or square pad installed on the outside of an electrical outlet box. Material may be intumescent or non-intumescent.

PVC Pipe – Abbreviation for **P**oly**v**inyl **C**hloride pipe, a plastic pipe usually used for water waste distribution. (vented, open system).

Rating – The time period the penetration firestop system limits the passage of fire through the penetration when tested in accordance with ASTM-E814 (UBC 7-5).*

Rated Wall/Floor – Any wall or floor that has a fire-resistive rating tested to ASTM E119 (UBC 7-1).

Safing Material – Insulation material installed in joints and annular spaces to prevent the fire from getting to the unexposed side. Installed before the firestop sealant is applied (usually mineral wool).

Safing Slot – Opening/gap between the exterior wall of a building and the edge of the floor slab.

Splice – The result of a factory or field method of joining or connecting two or more lengths of a fire-resistive joint system into a continuous entity.*

Structure – The fire resistive floor and/or wall segments between which the joint system is installed.**

T Rating – The time period that the penetration firestop system including the penetrating item, limits the maximum temperature rise to 325ºF (163ºC) above its initial temperature through the penetration on the non-fire side, when tested in accordance with ASTME-814 or UBC 7-5.*

Third Party testing Agency – An accredited testing agency approved to perform Fire Endurance Testing.

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Through-Penetration Firestop System – An assemblage of specific materials or products that are designed, tested and fire-resistance rated to resist for a prescribed period of time the spread of fire through penetrations. The F and T rating criteria for penetration firestop systems shall be in accordance with ASTM E 814 (ULC S115-M05).

Top-of-Wall – The gap/joint above the GWB or concrete wall and below the ceiling, metal deck of floor.

Slab Edge – The edge/end of the floor slab.

07840 – "Firestopping and Smoke Protection" section of the architectural specifications guide.

07270 – Firestop Section of the Architecture Specifications Guide, recently changed to 07840.

UL – Abbreviation for **U**nderwriters **L**aboratories, Inc. Non-profit, independent third party testing Laboratory located in Northbrook, Illinois.

Unexposed Side – The unexposed surface of an assembly refers to the surface away from the fire during a test.

I.T.S. (Warnock Hersey) – Independent third party testing laboratory located in Coquitlam, BC and San Antonio, TX for firestop testing. Proper company name is Intertek Testing Services (ITS).

Wrap Strip – A flexible intumescent material approximately 2" wide, 1/16" thick installed around the circumference of a plastic pipe, between the pipe and the substrate.

UL Classification – An identification method used by UL to classify and rate manufacturer's that require Code or Standard Compliance. These products are classified and are subject to the UL "Follow-Up Service." Firestop materials are UL Classified, they are not "approved" nor "listed" products tested to be used in specific applications.

*** Definition from 1997 Uniform Building Code**
**** Definition from UL - Test for Fire Resistance of Building Joint Systems UL 2079**

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UNDERWRITERS LABORATORIES - JOINT SYSTEMS

ITS - OMEGA POINT LABORATORIES - JOINT SYSTEMS

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