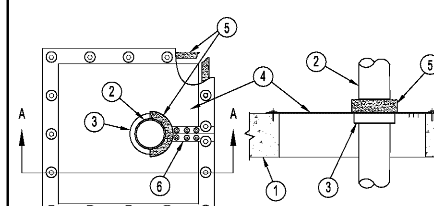
FIRE STOPPING DETAILS

SYSTEM NO. C-AJ-1006

F RATINGS - 1, 2 AND 3 HR (SEE ITEMS 1 AND 3)
T RATING - 0 HR
L RATING AT AMBIENT - 2 CFM/SQ FT
L RATING AR 400 F - LESS THAN 1 CFM/SQ FT



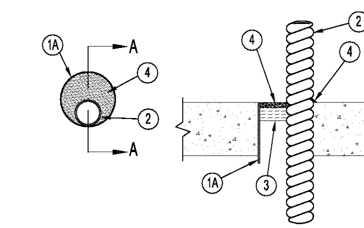
SECTION A-A

1. Floor or Wall Assembly - Lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Min thickness of concrete floor or wall is 2-1/2 in. (64 mm) for 1 hr F Rating and 4-1/2 in. (114 mm) for 2 or 3 hr F Rating. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max area of opening 36 sq ft (3.4 m2) with one dimension of opening being 36 in. (914 mm) or less.
See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Pipe or Conduit - Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe, nom 6 in. (152 mm) diam (or smaller) steel conduit, nom 4 in. (102 mm) diam (or smaller) steel EMT or nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. Min clearance between pipes 1 in. (25 mm) Min clearance between pipe and wall of through opening 1/4 in. (6 mm). When single nom 4 in. (102 mm) diam (or smaller) pipe, conduit or EMT is installed in nom 7 in (178 mm) diam (or smaller) circular through opening, min clearance between pipe, conduit or EMT and wall of through opening is 0 in. (0 mm) (point contact). Pipes and conduits rigidly supported on both sides of floor or wall assembly.
3. Fill, Void or Cavity Materials* - Wrap Strip - Nom 1/4 in. (6 mm) thick intumescent elastomeric material faced on one side with aluminum foil, supplied in strips. Min 2 in. (51 mm) wide strip wrapped around pipe/conduit (foil side exposed) and secured in place with steel wire or aluminum foil tape. Wrap strip to extend approx 7/8 in. (22 mm) beyond each face of the intumescent sheet (Item 4). When nom 6 in. (152 mm) diam (or smaller) pipe, conduit or EMT is installed in through opening, no wrap strip is required on pipe, conduit or EMT for 2 hr F Rating.
3M COMPANY - FS-195+
4. Fill, Void or Cavity Materials* - Intumescent Sheet - Rigid aluminum foil-faced sheet with galv steel sheet backer. Sheet cut to tightly follow the contours of the pipe wrap strip (or individual pipe) and with a min lap of 2 in. (51 mm) on all sides of the through opening. Sheet to be installed with the galv steel sheet backer exposed (aluminum foil facing against floor or wall surface). Sheet secured to top surface of floor and both sides of solid concrete or concrete block wall using min 3/16 in. (5 mm) diam by 1-1/4 in. (32 mm) long steel masonry fasteners with min 1-1/4 in. (32 mm) diam steel washers. Max spacing of fasteners not to exceed 6 in. (152 mm) OC. As an alternate when (1) the max pipe or conduit size is nom 4 in. (102 mm) diam, (2) each pipe or conduit is provided with a layer of wrap strip and (3) no bundled cables or insulated pipes are installed in the through opening, the intumescent sheet may be installed on bottom surface of floor or on only one side of solid concrete wall.
3M COMPANY - CS-195+
5. Fill, Void or Cavity Materials* - Graphite Seal, Caulk, Sealant or Putty - Generous application of caulk or putty to be applied around the base of the wrap strip (or individual pipe) at its egress from the intumescent sheet(s) in addition to completely covering the wrap strip up to the interface(s) with the pipe, pipe insulation and/or cable bundle. One layer of 1/2 in. (13 mm) x 1/16 in. (1.6 mm) adhesive backed graphite intumescent seal positioned under intumescent sheet around entire perimeter of through opening or min 1/4 in. (6 mm) diam continuous bead of caulk or putty applied to edge of intumescent sheet at its interface with surface of floor or wall around entire perimeter of through opening. Prior to installation of the steel strip, slit in intumescent sheet covered with nom 1/4 in. (6 mm) diam bead of caulk (Item 5). Steel cover strip secured to galv steel backer of intumescent sheet with steel sheet-metal screws or steel rivets spaced max 2 in. (51 mm) OC on each side of slit.
3M COMPANY - E-FIS or Ultra GS seals, CP 25WB+ caulk, FB-3000 WT sealant, MP+ Stix putty.
(Note: L Ratings apply only when CP 25WB+ caulk or FB-3000 WT sealant is used.)
6. Steel Cover Strip - Min 2 in. (51 mm) wide strip of min 0.015 in. (0.39 mm) thick (30 gauge) galv steel centered over entire length of slit made in intumescent sheet (Item 4) to permit installation about the pipe/cable bundle. Prior to installation of the steel strip, slit in intumescent sheet covered with nom 1/4 in. (6 mm) diam bead of caulk (Item 5). Steel cover strip secured to galv steel backer of intumescent sheet with steel sheet-metal screws or steel rivets spaced max 2 in. (51 mm) OC on each side of slit.
7. Support Channel (Not Shown) - When area of through opening exceeds 1440 sq in.(9,290 cm2), an intermediate support channel shall be installed flush with top surface of floor or both surfaces of wall. Support channels to be min 1-5/8 in. by 1-5/8 in. (41 mm by 41 mm) and formed of min 0.093 in. (2.36 mm) thick (No. 12 gauge) painted or galv steel. Ends of steel channel bolted or welded to steel angles anchored to inside walls of through opening. When steel support channels are centered beneath butted seams of intumescent sheets, no steel cover strip (Item 6) is required over butted seam. Intumescent sheet secured to steel support channels with steel sheet metal screws in conjunction with min 1-1/4 in. (32 mm) diam steel fender washers. When support channel is used beneath butted seam of intumescent sheets, fasteners spaced max 3 in. (76 mm) OC on each side of butted seam. When support channel is located away from intumescent sheet seam, fasteners spaced max 6 in. (152 mm) OC. Prior to installation of the intumescent sheet(s), a nom 1/4 in. (6 mm) diam continuous bead of caulk or sealant (Item 5) shall be applied as gasket over the steel support channel.

*Bearing the UL Classification Mark

SYSTEM NO. C-AJ-1176

F RATINGS – 2 AND 3 HR (SEE ITEM 2)
T RATING – 0 HR
L RATING AT AMBIENT – LESS THAN 1 CFM/SQ FT
L RATING AT 400° F – LESS THAN 1 CFM/SQ FT

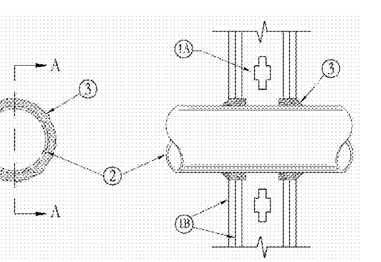


SECTION A-A

1. Floor or Wall Assembly - Min 4-1/2 in. thick lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Diam of circular through opening in floor or wall assembly to be 3/4 in. to 1-1/2 in. larger than diam of flexible metal conduit (Item 2) installed in through opening. Max diam of opening is 6 in.
See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
1A. Steel Sleeve (Optional) - Nom 6 in. diam (or smaller) Schedule 10 (or heavier) steel pipe sleeve cast into concrete floor or wall. Sleeve to be flush with or project max 2 in. from top surface of floor or from both surfaces of wall.
2. Through Penetrating Product* - Nom 4 in. diam (or smaller) aluminum or steel Flexible Metal Conduit#. Max one conduit per through opening. Max annular space between conduit and edge of through opening not to exceed 1-1/2 in. Min annular space between conduit and edge of through opening is zero in. (point contact). When aluminum conduit is used, F Rating is 2 Hr. When steel conduit is used, F Rating is 3 hr. Flexible metal conduit to be rigidly supported on both sides of floor or wall assembly.
AFC CABLE SYSTEMS INC
3. Packing Material - Polyethylene backer rod or min 1 in. thickness of mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed min 1/2 in. from top surface of floor or from both surfaces of wall.
4. Fill, Void or Cavity Material* - Caulk - Applied to fill the annular space around the flexible metal conduit. In floors, a min 1/2 in. depth of fill material to be installed flush with top surface of floor. In walls, a min 1/2 in. depth of fill material to be installed flush with wall surface on both sides of wall assembly. When steel sleeve is not used or is used and installed flush with floor or wall surfaces, a min 1/4 in. diam bead of caulk shall be applied to the floor on wall surface where the through penetrant is installed in point contact with the edge of the through opening.
MINNESOTA MINING & MFG CO - CP 25WB+
*Bearing the UL Classification Marking
#Bearing the UL Listing Mark

SYSTEM NO. W-L-1001

F RATING – 1, 2, 3 AND 4 HR (SEE ITEMS 2 AND 3)
T RATINGS – 0, 1, 2, 3 AND 4 HR (SEE ITEM 3)
L RATING AT AMIBENT – LESS THAT 1 CFM/SQ FT (SEE ITEM 3)
L RATING AT 400 F – LESS THAN 1 CFM/SQ FT (SEE ITEM 3)



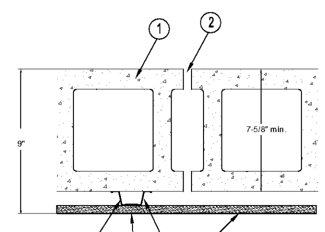
1. **Wall Assembly** - The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
A. **Studs** - Wall framing may consist of either wood studs (max 2 hr fire rated assemblies) 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 with nom 2 by 4 in. (51 by 102 mm) lumber end plates and cross braces. Steel studs to be min 3-5/8 in. (92 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
B. **Gypsum Board*** - Nom 1/2 or 5/8 in. (13 or 16 mm) thick, 4 ft. (122 cm) wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 26 in. (660 mm).
2. **Through Penetrant** - 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 of 0 in. (0 mm) (point contact) to max 2 in. (51 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 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe - Nom 24 in. (610 mm) diam (or smaller) service weight (or heavier) cast iron soil pipe, nom 12 in. (305 mm) diam (or smaller) or Class 50 (or heavier) ductile iron pressure pipe.
C. Conduit - Nom 6 in. (152 mm) diam (or smaller) steel conduit or nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing
D. Copper Tubing - Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing
E. Copper Pipe - Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
F. Through Penetrating Product* - Flexible Metal Piping - The following types of steel flexible metal gas piping may be used:
1. Nom 2 in. (51 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.
OMEGA FLEX INC
2. Nom 1 in. (25 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.
TITEFLEX CORP
A BUNDY CO
3. Nom 1 in. (25 mm) diam (or smaller) steel flexible metal gas piping. Plastic covering on piping may or may not be removed on both sides of floor or wall assembly.
WARD MFG INC
3. Fill, Void or Cavity Material* - Caulk or Sealant - Min 5/8, 1-1/4, 1-7/8 and 2-1/2 in. (16, 32, 48 and 64 mm) thickness of caulk for 1, 2, 3 and 4 hr rated assemblies, respectively, applied within annulus, flush with both surfaces of wall. Min 1/4 in. (6 mm) diam bead of caulk applied to gypsum board/penetrant interface at point contact location on both sides of wall. The hourly F Rating of the firestop system is dependent upon the hourly fire rating of the wall assembly in which it is installed, as shown in the following table. The hourly T Rating of the firestop system is dependent upon the type or size of the pipe or conduit and the hourly fire rating of the wall assembly in which it is installed, as tabulated below:

Max Pipe or Conduit Diam In. (mm)	F Rating Hr	T Rating Hr
1 (25)	1 or 2	0+, 1 or 2
1 (25)	3 or 4	3 or 4
4 (102)	1 or 2	0
6 (152)	3 or 4	0
12 (305)	1 or 2	0

+When copper pipe is used, T Rating is 0 hr.
3M COMPANY - CP 25WB+ caulk or FB-3000 WT sealant.
*Bearing the UL Classification Marking

DESIGN NO. U914

BEARING WALL RATING – 3 HR
NONBEARING WALL RATING – 3 HR

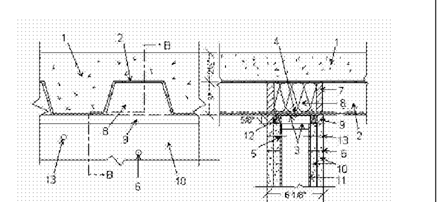


1. **Concrete Blocks*** – Various designs. Classification D-2 (2 hr). See Concrete Blocks category for list of eligible manufacturers.
2. **Mortar** – Blocks laid in full bed of mortar, nom 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.
3. **Furring Channels** – Min 0.019 in. thick (25 gauge) galv steel, 1-3/8 in. wide on top and 2-9/16 in. or 2-3/4 in. or 2-23/32 in. wide at bottom by 7/8 in. deep. Spaced 24 in. OC perpendicular to floor with a channel parallel to and approximately 3 in. above floor and 3 in. below ceiling. Clearance between vertical and horizontal channels 1/2 in.
4. **Channel Fasteners** – 1-1/4 in. long masonry screws with 3/16 in. body and 5/16 in. diameter head. Fasteners spaced 24 in. O.C. with the fasteners staggered on each long leg of the furring channel.
4A. **Steel Framing Members*** – Alternate method used to attach furring channels (Item 3) to concrete blocks (Item 1). Clips spaced 48 in. OC., and secured to blocks with 1/4 in. dia. By 3 in. long concrete expansion anchor (Item 4B) through the center grommet. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #8 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Furring channels are friction fitted into clips. RSIC-1 clip for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clip for use with 2-23/32 in. wide furring channels.
PAC INTERNATIONAL INC – Types RSIC-1, RSIC-1 (2.75).
4B. **Concrete Expansion Anchor** – (Not Shown) – 1/4 in. dia. by 3 in. long carbon steel, pre-assembled, nail drive expansion anchor with mushroom head driven into the web of the concrete block. Min. embedment in concrete block of 1-3/8 in. and evaluated in accordance with ASTM E 488 to have ultimate load capacities of 980 lbs (tension) and 1400 lbs (shear) when used in 2000 psi concrete.
4C. **Steel Framing Members*** – (Not Shown) – Alternate method used to attach furring channels (Item 3) to concrete blocks (Item 1). Clips spaced 24 in. OC., and secured to blocks with 1/4 in. dia. by 3 in. long concrete expansion anchor (Item 4B) through the center hole. Ends of adjoining channels are overlapped 6 in. and secured together with four self-tapping No. 8x1/2 Self Drilling screws (2 per side 1 in. and 4 in. from overlap edge). Furring channels are friction fitted into clips. Side joint furring channels shall be attached to concrete block with RESILMOUNT Sound Isolation Clips - Type A237R located approximately 2 in. from each end of length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 6 in. OC, approximately 1/2 in. from joint edge.
STUDCO BUILDING SYSTEMS – RESILMOUNT Sound Isolation Clips - Type A237R
5. **Gypsum Board*** – 1/2 in. thick, 4 ft wide, secured to furring channels with wallboard fasteners (Item 6). Gypsum plaster not more than 1/16 in. thick may be applied to wallboard in addition to joint treatment.
ACADIA DRYWALL SUPPLIES LTD – Type C.
AMERICAN GYPSUM CO – Types AG-C.
CERTAINTEED GYPSUM INC – Type C.
CGC INC – Types C, IP-X2, IPC-AR.
CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C – Type LGFC-C/A.
GEORGIA-PACIFIC GYPSUM L L C – Types 5, DAPC, TG-C.
NATIONAL GYPSUM CO – Types eXP-C, FSK-C, FSW-C, FSMR-C.
PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM – Type PG-C.
PANEL REY S A – Type PRC
THAI GYPSUM PRODUCTS PCL – Type C.
UNITED STATES GYPSUM CO – Types C, IP-X2, IPC-AR.
USG MEXICO S A DE C V – Types C, IP-X2, IPC-AR.
5A. Gypsum Board* – (As an alternate to Item 5) – 5/8 in. thick. Installed as described in Item 5.
NATIONAL GYPSUM CO – Type FSMR-C.
6. **Wallboard Fasteners** – 1 in. long, self-drilling, self-tapping steel screws with bugle heads. Fasteners attached to each furring channel and spaced 8 in. OC at butt joints and 12 in. OC in the field of the board parallel with furring channels. Clearance between fasteners and edges of wallboard 3/4 in.
7. **Joint System** – (Not shown) – Paper tape embedded in cementitious compound over joints. Paper tape and exposed screw heads covered with two layers of compound. Edges of compound feathered out.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

DESIGN NO. TL/PV 120-01

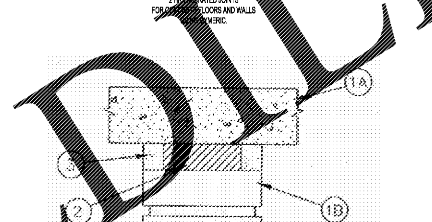
VERTICAL (WALL)
F RATING – 2 HR
T RATING – 2 HR
TEST PRESSURE DIFFERENTIAL – 7.5 Pa (0.03 IN. OF WATER) MINIMUM
METHOD OF FIRESTOPPING FLUTED OPENINGS AND A RELIEF JOINT BELOW A STEEL DECK



1. 2-1/2" thick minimum, normal weight concrete.
2. Verco W3, 18 gauge, steel decking or equivalent.
3. 3-5/8" x 0.036", galvanized steel 'U' runners
4. 1/2" long, #7, self-tapping framing screws, 24" on center.
5. 1/2" long, #7, self-tapping framing screws through lower 'U' runner to studs.
6. 1" drywall screws, 12" on center, to steel studs, starting 2" below 'U' runner.
7. 3.5 pcf mineral wool insulation compressed to 7 pcf, cut and fitted in fluted openings above upper 'U' runner.
8. 1/2" thick, TREMstop Acrylic sealant over insulation, bridging steel deck to relief joint 4 sealant
9. 1/2" deep by 5/8" high by continuous TREMstop Acrylic sealant in relief joint.
10. 5/8" thick, Type x Gypsum Board.
11. 3-5/8" x 0.019" galvanized steel 'C' studs, 24" on center, maximum.
12. 3.5 pcf mineral wool insulation, compressed to 7 pcf, continuous in 3/4" deep by 5/8" high relief area above gypsum board.
13. 1-5/8" drywall screws, 12" on center, to lower 'U' runner.
*Component bearing the Warnock Hersey Certification Mark

DESIGN NO. HWS 1004

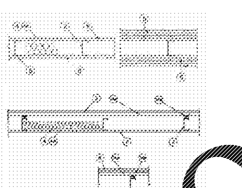
2 HR FIRE RATED JOINTS
FOR CONCRETE FLOORS AND WALLS
USING DYMERIC



1. A. Pre-Rated Concrete Floor: Min. 4 1/2 in. thickness
B. Pre-Rated Concrete or Block Wall: Min. 4 1/2 in. thickness. Max. joint width = 3 in.
2. Packing Material - Min. 3 1/2 in. mineral wool insulation (min. 5.0 pcf) firmly packed into opening as a permanent form.
3. DYMERIC - Min. 1/2 in. thickness of sealant applied within opening, flush with both surface of the wall assembly.

DESIGN NO. U419

NON-BEARING WALL RATINGS - 1, 2, 3 OR 4 (SEE ITEMS 4 AND 5)



1. Floor and Ceiling Runners – (Not shown) – For use with Item 2 - Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth to accommodate stud size, with min 1-1/4 in. long legs, attached to floor and ceiling with fasteners 24 in. OC max.
1A. Framing Members* - Floor and Ceiling Runner – Not shown - In lieu of Item 1 – For use with Item 2B, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.
CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper25™ Track
CRACO MFG INC – SmartTrack25™
MARINO/WARE, DIV OF WARE INDUSTRIES INC – Viper25™ Track
PHILLIPS MFG CO L L C – Viper25™ Track
1B. Framing Members* - Floor and Ceiling Runner – Not shown - In lieu of Item 1 – For use with Item 2C, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
CALIFORNIA EXPANDED METAL PRODUCTS CO – Viper20™ Track
MARINO/WARE, DIV OF WARE INDUSTRIES INC – Viper20™ Track
PHILLIPS MFG CO L L C – Viper20™ Track
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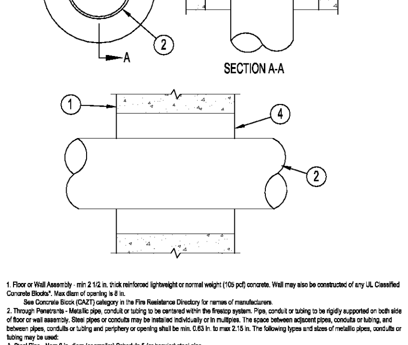
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

SYSTEM NO. C-AJ-1018

F RATINGS – 2 HR
T RATINGS – 0, 1/4, 1/2 AND 3/4 HR (SEE ITEM 2)



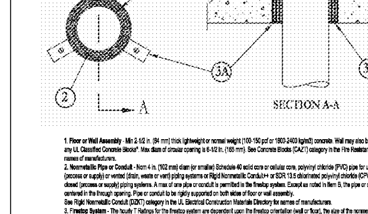
1. Floor or Wall Assembly - min 2 1/2 in. thick reinforced lightweight or normal weight (105 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 8 in.
See Concrete Block (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrants - Metallic pipe, conduit or tubing to be centered within the firestop system. Pipe, conduit or tubing to be rigidly supported on both side of floor or wall assembly. Steel pipes or conduits may be installed individually or in multiples. The space between adjacent pipes, conduits or tubing, and between pipes, conduits or tubing and periphery or opening shall be min. 0.63 in. to max 2.15 in. The following types and sizes of metallic pipes, conduits or tubing may be used:
A. Steel Pipe - Nom 6 in. diam (or smaller) Schedule 5 (or heavier) steel pipe.
B. Conduit - Nom 4 in. diam (or smaller) electrical metallic tubing
C. Conduit - Nom 5 in. diam (or smaller) rigid galv steel conduit.
The T Ratings are dependent upon the concrete slab thickness and size of steel pipe, conduit or tubing as shown in the following table:

Min. Concrete Thickness	Max. Diam. of Steel Pipe or Conduit (in.)	T Rating (Hr)
2 1/2 in.	6	0
2 1/2 in.	3 1/2	1/4
2 1/2 in.	1 1/4 (?)	1/4
2 1/2 in.	1/2	1/2
3 1/4 in.	1/2	3/4

3. Forms - (not shown) - Used as a form to prevent leakage of fill material during installation. Forms to be a rigid sheet material, cut to fit the contour of the penetrating item and friction fitted within opening to accommodate required thickness of fill material. Forms to be removed after fill material has cured.
4. Fill, Void or Cavity Materials - Mortar - Min 2 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. In walls the total depth within the opening can be completely filled with the fill material, or the fill material can be installed symmetrically to a min depth of 2 1/2 in. on each side of the wall.
*Bearing the UL Classification Marking

SYSTEM NO. C-AJ-2002

F RATINGS – 2 HR
T RATINGS – 0 AND 2 HR (SEE ITEM 3)
L RATING AT AMBIENT – 7 CFM/SQ FT (SEE ITEM 3C)
L RATING AT 400° F – LESS THAN 1 CFM/SQ FT (SEE ITEM 3C)



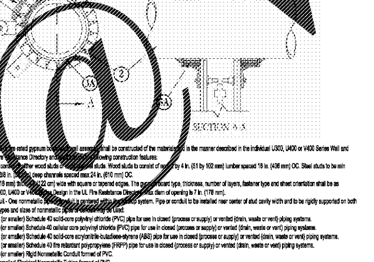
1. Floor or Wall Assembly - Min 2-1/2 in. (64 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of circular opening is 6-1/2 in. (165 mm). See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Nonmetallic Pipe or Conduit - Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid core or cellular core, polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems or Rigid Nonmetallic Conduit++ or SDR 13.5 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems. A max of one pipe or conduit is permitted in the firestop system. Except as noted in Item B, the pipe or conduit shall be centered in the through opening. Pipe or conduit to be rigidly supported on both sides of floor or wall assembly.
See Rigid Nonmetallic Conduit (DZKT) category in the UL Electrical Construction Materials Directory for names of manufacturers.
3. Firestop System - The hourly T Ratings for the firestop system are dependent upon the firestop orientation (wall or floor), the size of the nonmetallic pipe or conduit, and the floor thickness, as tabulated below:

Orientation (a)	Nom Pipe Diam In. (mm)	Annular Gap	F Rating Hr	T Rating Hr
F(b)	1/2-2 (13-51mm)	1/4-1 (6-25mm)	2	[illegible]
F(b)	[illegible]	[illegible]	[illegible]	[illegible]
W,F	[illegible]	[illegible]	[illegible]	[illegible]
W,F	[illegible]	[illegible]	[illegible]	2
W,F	[illegible]	[illegible]	[illegible]	2

(a) W = wall, F = floor
(b) Min concrete [illegible] (64 mm).
The details of the firestop system [illegible] follows:
A. [illegible] Support Clips - Nom 1 in. [illegible] by nom 0.019 in. [illegible] thick (28 gauge) galv steel [illegible] field-formed [illegible] with height of Z-shape equal [illegible] thickness and with width [illegible] installed) leg of [illegible] to span annular [illegible] installed) leg of Z-shape to be min 2 in. (51 mm) [illegible] may not be secured to [illegible] of floor with masonry [illegible] as an alternate [illegible] galv steel strips may be formed into "L"-[illegible] height equal to 2 in. (51 [illegible] with bottom (as installed) [illegible] length to [illegible]. Clips secured to outermost wrap strip layer with [illegible] prior to insertion in [illegible] opening. Min of three steel support [illegible] be used, symmetrically located, with bottom leg of clips flush with bottom plane of [illegible] annular space [illegible] nom 1/2 in. to 2 in. (13 mm to 51 mm) [illegible] floor assembly is 1/4 in. to 3/8 in. (6 mm to 10 mm), steel support clips are not required. [illegible] Cavity Materials* - Wrap Strip - Nom 1/4 in. (6 mm) [illegible] intumescent elastomeric material faced on one side with aluminum foil, supplied in 2 in. [illegible] strips. Nom 2 in. (51 mm) wide strips tightly wrapped [illegible] nonmetallic pipe (foil side exposed) to fill annular space around pipe. A min of one layer [illegible] is required for nom 1/2 in. to 2 in. (13 mm to 51 mm) diam pipes. A min of two layers of wrap strip is required for nom 2-1/2 in. and 3 in. (64 mm and 76 mm) [illegible]. A min of three layers of wrap strip is required for nom 3-1/2 in. and 4 in. (89 mm and 102 mm) diam pipes. Each layer of wrap strip to be installed with butted [illegible] butted seams in successive layers staggered. Wrap strip layers securely bound with steel wire or aluminum foil tape and slid into through opening such that [illegible] edges are flush with the bottom plane of the floor and are resting on the steel support clip legs. When nom 2 in. to 4 in. (51 mm to 102 mm) diam PVC pipe [illegible] 4-1/2 in. (114 mm) thick concrete floor, the pipe may be installed eccentrically in the through opening (min zero clearance at point contact location) provided [illegible] diam of the through opening is 1.3 to 1.5 times larger than the outside diam of the pipe, (2) the annular space between the pipe and the sides [illegible] at the bottom 2 in. (51 mm) of the through opening is completely filled with wrap strip layers installed following the contour of the pipe and (3) the [illegible] edges of the wrap strip layers are reliably supported by "Z"-shaped steel support clips anchored to the top surface of the concrete floor. In wall assemblies, the wrap strip layers on the nonmetallic pipe are to be installed in the same manner used for floor assemblies, but shall be installed symmetrically on both sides of the wall with the exposed edges of the wrap strip layers flush with the wall surfaces.
3M COMPANY - FS-195+
C. Fill, Void or Cavity Materials* - Caulk or Sealant - Min 1/4 in. (6 mm) diam continuous bead applied to inside walls of through opening prior to installation of steel support clips and/or wrap strip. Caulk bead to be recessed 1 in. (25 mm) from the bottom plane or floor. In wall assemblies, caulk bead to be recessed 1 in. (25 mm) from wall surface on both sides of wall. In floor assemblies, a nom 1/2 in. (13 mm) thick coating of caulk is to be applied to the top edges of the wrap strip layers and to fill all gaps at the wrap strip/concrete interface. In wall assemblies, the exposed edges of the wrap strip layers and all gaps at the wrap strip/concrete interface on both sides of the wall to be coated with thin layer of caulk.
3M COMPANY - CP 25WB+, IC 15WB+ caulk or FB-3000 WT sealant.
(Note: W Rating applies only when FB-3000 WT sealant is used. CP 25WB+ not suitable for use with CPVC pipes.)
*Bearing the UL Classification Marking
++Bearing UL Listing Mark

SYSTEM NO. W-L-2002

F RATING – 1, 1 1/2, AND 2 HR (SEE ITEM 3)
T RATINGS – 3/4, 1, 1 1/2 AND 2 HR (SEE ITEM 3)
L RATING AT AMIBENT – 7 CFM/SQ FT (SEE ITEM 3C)
L RATING AT 400 F – 1 CFM/SQ FT (SEE ITEM 3C)



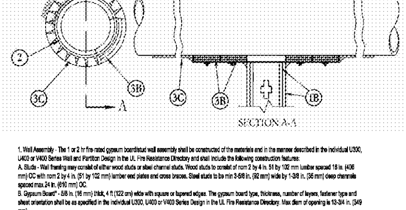
1. Wall Assembly - The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
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 by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
B. Gypsum Board* - 5/8 in. (16 mm) thick, 4 ft (122 cm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 7 in. (178 mm).
2. Nonmetallic Pipe or Conduit - One nonmetallic pipe or conduit is centered within the firestop system. Pipe or conduit to be installed near center of stud cavity width and to be rigidly supported on both sides of wall. The following types and sizes of nonmetallic pipes or conduits may be used:
A. Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid-core polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
B. Nom 4 in. (102 mm) diam (or smaller) Schedule 40 cellular core polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
C. Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid-core acrylonitrile-butadiene-styrene (ABS) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
D. Nom 4 in. (102 mm) diam (or smaller) Schedule 40 fire retardant polypropylene (FRPP) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
E. Nom 4 in. (102 mm) diam (or smaller) Rigid Nonmetallic Conduit formed of PVC.
F. Nom 1 in. (25 mm) diam (smaller) Electrical Nonmetallic Tubing formed of PVC.
G. Nom 6 in. (152 mm) diam (or smaller) SDR13.5 chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems. See Rigid Nonmetallic Conduit (DZKT) and Electrical Nonmetallic Tubing (FKHU) categories in UL Electrical Construction Materials Directory for names of manufacturers.
3. Firestop System - Installed symmetrically on both sides of wall assembly. The hourly F and T Ratings for the firestop system are dependent upon the type and size of nonmetallic pipe or conduit, the piping system type (closed systems such as process or supply piping or vented systems such as drain, waste or vent piping) and the hourly fire rating of the wall assembly in which it is installed, as shown in the following table.

Pipe or Conduit Type	Nom Pipe Diam In. (mm)	Annular Space In. (mm)	Piping System (a)	Wall Fire Rating Hr	F Rating Hr	T Rating Hr
FRPP	1/2 to 2 (13 to 51)	[illegible]	V	1	1-1/2	1-1/2
FRPP, PP	1/2 to 2 (13 to 51)	[illegible]	V	2	2	2
ABS	1/2 to 4 (13 to 102)	[illegible]	C/V	1	1	3/4
ABS	1/2 to 4 (13 to 102)	[illegible]	C/V	2	1-1/2	1-1/2
PVC	1/2 to 4 (13 to 102)	[illegible]	C/V	1	1	1
PVC	1/2 to 4 (13 to 102)	[illegible]	C/V	2	2	2
FRPP	1/2 to 4 (13 to 102)	[illegible]	C/V	1	1	1
PVC	5-6 (127-152)	[illegible]	C/V	2	1-1/2	1-1/2

A. Fill, Void or Cavity Materials* - Wrap Strip - Nom 1/4 in. (6 mm) thick intumescent elastomeric material faced on one side with aluminum foil, supplied in 2 in. (51 mm) wide strips. Nom 2 in. (51 mm) wide strips tightly wrapped around nonmetallic pipe or conduit (foil side exposed) with the edges butted against the surface of the wall. Sufficient layers of wrap strip shall be installed to lap a min of 3/16 in. (5 mm) on the wall surface around the entire perimeter of the circular through opening. For nom 1/2 in. (13 mm) to nom 2 in. (51 mm) diam pipes or conduits, a min of one layer of wrap strip is required. For nom 2-1/2 in. (64 mm) and nom 3 in. (76 mm) diam pipes, a min of two layers of wrap strip is required. For nom 3-1/2 in. (89 mm) and nom 4 in. (102 mm) diam pipes, a min of three layers of wrap strip is required. For nom 5 and 6 in. (127 and 152 mm) diam, two tiers (4 in. (102 mm) overall length) of three layers of wrap strip is required, with adjoining wrap strip edges between tiers tightly butted. Each layer of wrap strip to be installed with butted seam, with the butted seams in successive layers staggered. Wrap strip layers temporarily held in position using aluminum foil tape, steel wire tie or equivalent.
3M COMPANY - Type FS-195+
B. Steel Collar - Nom 2 or 4 in. (51 or 102 mm) deep collar with 1-1/4 in. (32 mm) wide by 2 in. (51 mm) long anchor tabs and min 3/4 in. (19 mm) long tabs to retain wrap strip layers. Coils of precut 0.016 in. (0.41 mm) thick (No. 30 28 gauge) galv sheet steel available from wrap strip manufacturer. As an alternate, collar may be field-fabricated from min 0.016 in. (0.41 mm) thick (No. 30 28 gauge) galv sheet steel in accordance with instruction sheet supplied by wrap strip manufacturer.
Steel collar, with anchor tabs bent outward 90 deg, wrapped tightly around wrap strip layers with min 1 in. (25 mm) overlap at the seam. With steel collar anchor tabs pressed tightly against wall surface, compress collar around wrap strip layers using a min 1/2 in. (13 mm) wide by 0.028 in. (0.71 mm) thick stainless steel band clamp with worm drive tightening mechanism at the collar midheight. As an alternate to the stainless steel band clamp, the steel collar may be compressed around nom 4 in. diam (or smaller nonmetallic pipes using two min 18 SWG (0.0625 in. (0.016 mm) diam) steel wires secured with multiple twists. As an alternate to the band clamps or steel wires, collars may be secured by a nom No. 10 by 1/2 in. (13 mm) long sheet metal screws installed in the vertical axis at the center of the 1 in. (25 mm) overlap along the perimeter joint of the collar. A min of three screws is required. Secure collar to wall surface with 3/16 in. (5 mm) diam steel toggle bolts in conjunction with min 1-1/2 in. (38 mm) diam steel washers.
Three bolts, symmetrically located, required for 2 in. (51 mm) deep steel collar for nom 1/2 in. (13 mm) to nom 3 in. (76 mm) diam pipes. Four bolts, symmetrically located, required for 2 in. (51 mm) deep steel collar for nom 3-1/2 and 4 in. (89 and 102 mm) diam pipes. Five to seven bolts (every other anchor tab) required for 4 in. (102 mm) deep steel collar for nom 5 and 6 in. (127 and 152 mm) diam pipes. As a final step, bend retainer tabs 90 deg toward pipe to lock wrap strip layers in position.
C. Fill, Void or Cavity Materials* - Caulk, Sealant or Putty - Generous bead of caulk applied to outer perimeter of wrap strip at interface with wall surface and to perimeter of pipe or conduit at its egress from the wrap strip layers.
3M COMPANY - CP 25WB+ caulk and MP+ Stix putty, IC 15WB+ caulk, FireDam 150+ caulk, or FB-3000 WT sealant. (Note: L Ratings apply only when CP 25WB+ caulk or FB-3000 WT sealant is used. CP 25WB+ and FireDam 150+ not suitable for use with CPVC pipes.)
D. Pipe Covering* - (Not Shown) - Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. When required (see table), min 6 in. (152 mm) length of pipe covering installed around PVC pipe at its egress from steel collar on both sides of wall. Pipe covering secured to pipe with steel wire ties spaced max 4 in. (102 mm) OC. Edge of pipe covering abutting steel collar to be sealed with a min 1/4 in (6 mm). diam bead of caulk (Item C).
See Pipe and Equipment Covering - Materials (BRGU) category in 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.
E. Firestop Device* - (Not shown) - As an alternate to Items A, B and C for nom 1-1/2, 2, 3 or 4 in. (38, 51, 76 or 102 mm) diam nonmetallic pipes, a firestop device consisting of a sheet steel split collar lined with intumescent material and provided with steel clips for attachment may be used. Firestop device to be installed on both sides of wall in accordance with the accompanying installation instructions.
3M COMPANY - Types PPD 150, PPD 200, PPD 300, PPD 400
*Bearing the UL Classification Mark

SYSTEM NO. W-L-2005

F RATING – 1 AND 2 HR
T RATINGS – 0, 3/4, 1, 1 1/2 AND 2 HR
L RATING AT AMIBENT – 7 CFM/SQ FT (SEE ITEM 3D)
L RATING AT 400 F – LESS THAN 1 CFM/SQ FT (SEE ITEM 3D)



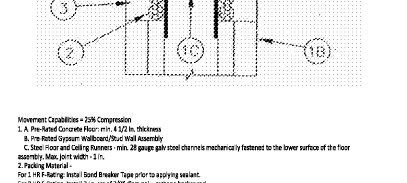
1. Wall Assembly - The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
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 with nom 2 by 4 in. (51 by 102 mm) lumber end plates and cross braces. Steel studs to be min 3-5/8 in. (92 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
B. Gypsum Board* - 5/8 in. (16 mm) thick, 4 ft (122 cm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 13-3/4 in. (349 mm).
2. Nonmetallic Pipe - Nom 6, 8 or 10 in. (152, 203 or 254 mm) diam Schedule 40 polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste of vent) piping systems. One pipe to be centered in the firestop system. Pipe to be installed near center of stud cavity width and to be rigidly supported on both sides of wall.
3. Firestop System - Installed symmetrically on both sides of wall assembly. The hourly F and T Ratings for the firestop system are dependent upon the size of nonmetallic pipe and the hourly fire rating of the wall assembly in which it is installed, as tabulated below:

Nom Pipe Diam In. (mm)	Annular Space In. (mm)	Wall Fire Rating Hr	F Rating Hr	T Rating Hr
6 (152)	3/4 (19)	1	1	1
6 (152)	3/4 (19)	2	2	2
8 (203)	1 (25)	1	1	3/4
8 (203)	1 (25)	2	2	1-1/2
10 (254)	1-1/2 (38)	1	1	3/4
10 (254)	1-1/2 (38)	2	1	3/4

The details of the firestop system shall be as follows.
A. Steel Sleeve - Cylindrical sleeve fabricated from min 0.016 in. (0.41 mm) thick (28 gauge) galv sheet steel and having a min 1 in. (25 mm) lap along the longitudinal seam. Length of steel sleeve shall be equal to thickness of wall plus 9-1/2 in. (241 mm), 10 in. (254 mm) or 11 in. (279 mm) for the 6, 8 and 10 in. (152, 203 and 254 mm) diam pipe sizes, respectively. Inside diam of steel sleeve and diam of through opening in the gypsum wallboard layers to be equal to outside diam of wrap strip (Item B) layers on pipe. Cylindrical sleeve inserted in annular space around nonmetallic pipe and centered in wall. After installation of wrap strip (Item B) layers, min 1/2 in. (13 mm) wide by min 0.028 in. (0.71 mm) thick stainless steel band clamps installed around steel collar on both sides of wall assembly with one band clamp located near the wall surface and another located approx 1 in. (25 mm) from the outer edge of the wrap strip layers. Edges of steel sleeve to be slit approx 1 in. (25 mm) OC around circumference of sleeve on both sides of wall, with length of slits approximately equal to thickness of mat wrap layers, to form retainer tabs. Retainer tabs bent 90 deg toward pipe to lock wrap strip layer(s) in position.
B. Fill, Void or Cavity Materials* - Wrap Strip - Nom 1/4 in. (6 mm) thick intumescent elastomeric material faced on one side with aluminum foil, supplied in 2 in. (51 mm) wide by 24 in. (610 mm) long strips. Two stacks of wrap strip (nom 4 in. or 102 mm high stack) tightly-wrapped around nonmetallic pipe on each side of wall and slid into steel sleeve (Item A) such that inner edges are flush with or recessed max 1/4 in. (6 mm) into surface of wall. For nom 6 in. (152 mm) diam pipes, three layers of wrap strip are required in each stack. For nom 8 in. (203 mm) diam pipes, four layers of wrap strip are required in each stack. For nom 10 in. (254 mm) diam pipes, six layers of wrap strip are required in each stack. Each layer of wrap strip to be installed with butted seams, with the butted seams in successive layers staggered. Wrap strips temporarily held in position using aluminum foil tape, filament tape, steel wire tie, or equivalent.
3M COMPANY - Type FS-195+
C. Pipe Covering* - Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. Min 6 in. (152 mm) length of pipe covering installed around PVC pipe at its egress from the wrap strip layers (Item B) on both sides of the wall. Pipe covering secured to pipe with steel wire ties spaced max 4 in. (102 mm) OC. Edge of pipe covering abutting wrap strip to be sealed with a min 1/4 in. (6 mm) diam bead of caulk (Item D). 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.
D. Fill, Void or Cavity Materials* - Caulk or Sealant - Generous bead of caulk to be applied to outer perimeter of steel sleeve at interface with wall surfaces and to perimeter of pipe covering material wrap at its interface with the wrap strip layers. 3M COMPANY - CP 25WB+, IC 15WB+, FireDam 150+ caulk or FB-3000 WT sealant
*Bearing the UL Classification Mark

SYSTEM NO. HWD0016

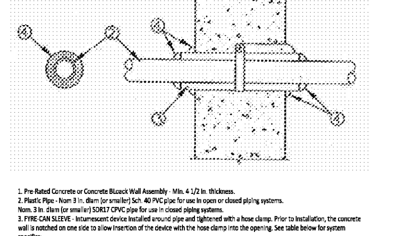
1 OR 2 HR FIRE RATED JOINTS
FOR CONCRETE FLOORS AND GYPSUM WALLS
USING TREMSTOP ACRYLIC



Movement Capabilities = 25% Compression
1. A. Pre-Rated Concrete Floor: min. 4 1/2 in. thickness
B. Pre-Rated Gypsum Wallboard/Stud Wall Assembly
C. Steel Floor and Ceiling Runners - min. 28 gauge galv steel channels mechanically fastened to the lower surface of the floor assembly. Max. joint width - 1 in.
2. Packing Material -
For 1 HR F-Rating: Install Bond Breaker Tape prior to applying sealant.
For 2 HR F-Rating: Install 2 Layers of 7/8" diam polyurethane backer rod.
3. TREMstop Acrylic - Min. 1/2 in. thickness of sealant applied within opening, flush with both surfaces of the wall assembly.

SYSTEM NO. WJ2017

2 HR FIRE RATED THROUGH PENETRATION
FIRESTOP FOR SINGLE PLASTIC PIPE THROUGH
CONCRETE WALLS USING
FYRE-CAN SLEEVE.
F RATING – 2 HR
T RATING – 1 HR



1. Pre-Rated Concrete or Concrete BLoack Wall Assembly - Min. 4 1/2 in. thickness.
2. Plastic Pipe - Nom 3 in. diam (or smaller) Sch. 40 PVC pipe for use in open or closed piping systems.
Nom. 3 in. diam (or smaller) SDR17 CPVC pipe for use in closed piping systems.
3. FYRE-CAN SLEEVE - Intumescent device installed around pipe and tightened with a hose clamp. Prior to installation, the concrete wall is notched on one side to allow insertion of the device with the hose clamp into the opening. See table below for system specifics:

Nom. Pipe Diam. (in.)	Device Size	Diam of Opening (in.)	Annular Space (in.)
1 1/2	FS1.5	3	9/16
2	FS2	3 1/2	9/16
3	FS3	4 3/4	5/8

4. TREMstop WBM - Min. 1/4 in. bead of sealant applied at the wall/device and pipe device interfaces. Additional sealant is applied to fill the notch created for the hose clamp to a min. depth of 1 in.

1 | FIRE STOPPING DETAILS

SCALE
NTS

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