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EVALUATION REPORT

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ER-4976

Reissued November 1, 1999

Filing Category: FIRE-RESISTIVE CONSTRUCTION—Other Fire-resistive Construction (080)

**SPECSEAL FIRE STOP PENETRATION SYSTEMS
SPECIFIED TECHNOLOGIES, INC.
200 EVANS WAY, SUITE 2
SOMERVILLE, NEW JERSEY 08876**

1.0 SUBJECT

SpecSeal Fire Stop Penetration Systems.

2.0 DESCRIPTION

2.1 General:

SpecSeal Fire Stop Penetration Systems are designed to seal penetrations in fire-resistive walls and floors. The systems described in Figures 1 through 14 are installed either in wood- or steel-stud gypsum wallboard partitions, concrete walls, concrete floors or concrete masonry walls. F- and T-ratings are noted therein, as required by Sections 709.6, 710.2.3 and 714 of the UBC.

2.2 Materials:

2.2.1 SpecSeal BLU Series Wrap Strip: The SpecSeal BLU Series Wrap Strip is a flexible, elastomeric strip measuring $3/16$ inch (4.8 mm) (thickness) by 2 inches (51 mm) (width) by 12 feet (3658 mm) (length).

2.2.2 SpecSeal Collars: SpecSeal Collars are prefabricated and contain an intumescent compound designed to retain 2-, 3-, or 4-inch-diameter (51, 76 or 102 mm) plastic plumbing pipe or plastic electrical conduit. The collars are anchored to concrete or concrete masonry elements using concrete or masonry anchors approved for such use.

2.2.3 SpecSeal Elastomeric Sealant: The SpecSeal Elastomeric Sealant is a non-halogenated, latex-based elastomeric caulk used in fire-protected construction joints designed for movement. When applied as specified, in the assemblies in this evaluation report, the sealant has a movement range of ± 15 percent of the nominal joint width.

2.2.4 SpecSeal Elastomeric Spray: The SpecSeal Elastomeric Spray is a non-halogenated, latex-based, elastomeric coating used in static construction joints and through-penetration fire-stop assemblies. The material is applied, to a wet-film thickness of $1/8$ to $3/16$ inch (3.2 to 4.8 mm), using spray equipment recommended by Specified Technologies, Inc. Recommended application temperature is 60°F to 90°F (15.6°C to 32.2°C).

2.2.5 SpecSeal Firestop Pillows: The SpecSeal Firestop Pillows are through-penetration firestop materials resembling small cushions or pillows. The pillows consist of a mineral fiber core sealed with a water-resistant intumescent membrane which is heat-sealed in a fire-retardant polyethylene bag. The intumescent pillows are installed in openings by

compressing and stacking them into an opening in a brick-like fashion.

2.2.6 SpecSeal Intumescent Red Wrap Strip: The SpecSeal Intumescent Red Wrap Strip is a flexible, elastomeric strip that is used to fire-stop penetrations in fire-rated wall and floor-ceiling assemblies. It is available in 12-foot-long (3658 mm) rolls. When the installed strip material is exposed to temperatures in excess of 250°F (121°C), the material expands. Its free-expansion volume is 16 to 24 times the pre-expanded volume. Expansion continues up to 1,000°F (538°C).

2.2.7 SpecSeal LC150 Sealant: The SpecSeal LC150 Sealant is a latex, water-based, non-intumescent material, packaged in 10.5-ounce (0.310 L) tubes and 1-, 2- and 5-gallon (3.8, 7.6 and 18.9 L) pails. A minimum 24-hour cure time must be observed.

2.2.8 SpecSeal Mortar: SpecSeal Mortar is a dry cementitious product packaged in 6-gallon (22.8 L) pails and weighing 22 pounds (10 kg). The product is mixed with water at the ratio of 14.3 to 17.5 pounds (6.5 to 7.9 kg) of water to each pail of SpecSeal Mortar. After mixing, the product is suitable for hand troweling or pumping, and can be self-leveling.

2.2.9 SpecSeal Pensil 100 Silicone Sealant: SpecSeal Pensil 100 Silicone Sealant is a neutral-cure silicone sealant, packaged in 10.5-ounce (0.310 L) tubes and 2- and 5-gallon (7.6 and 18.9 L) pails. A 3- to 5-hour cure time must be observed.

2.2.10 SpecSeal Pensil 200 Silicone Foam: SpecSeal Pensil 200 Silicone Foam is a two-component silicone foam, packaged separately in 50-pound (23.6 kg) containers of component "A" and 50-pound (23.6 kg) containers of component "B." The two parts are first individually stirred, and are then blended at a 1:1 ratio by volume for approximately 30 seconds, using a mechanical mixer. After placement (in $13/4$ to 5 minutes), the foam will expand to a density of 14 to 18 pcf (224 to 288 kg/m³).

2.2.11 SpecSeal Pensil 300 Silicone Sealant: SpecSeal Pensil 300 Silicone Sealant is a neutral-cure silicone sealant, packaged in 10.5-ounce (0.310 L) tubes and 2- and 5-gallon (7.6 and 18.9 L) pails. A 3- to 5-hour cure time must be observed. The sealant is available in nonslump (PEN300) and self-leveling (PEN300SL) grades.

2.2.12 SpecSeal Putty: SpecSeal Putty is a nonhardening intumescent material packaged in 36-cubic-inch (0.590 L) tubes.

2.2.13 SpecSeal Sealant: SpecSeal Sealant is a water-based, intumescent material. The SpecSeal sealant is available as SpecSeal 100, packaged in 10.5-ounce (0.310 L) tubes; SpecSeal 101, packaged in 1-gallon (3.8 L) pails; SpecSeal 102, packaged in 2-gallon (7.6 L) pails; and SpecSeal 105, packaged in 5-gallon (18.9 L) pails.

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2.2.14 SpecSeal Wrap Strip: The SpecSeal Wrap Strip is a flexible, elastomeric strip that is $\frac{1}{4}$ inch (6.4 mm) thick, 2 inches (51 mm) wide and 12 feet (3658 mm) long.

2.3 Application:

Penetration surfaces must be cleaned, free of all dirt, oil, grease, moisture and old caulking before application. See Figures 1 through 14 for fire-resistive ratings and specific details. Systems are designed for interior applications only. Table 1 specifies environmental conditions for shelf life and for application and storage.

Installations subject to continuous or intermittent vibrations are not permitted. Installations must comply with Section 709.6 of the UBC, for walls and partitions; and with Section 710.2.3 of the UBC, for floor-ceilings and roof-ceilings. The openings must comply with the opening limitations of Section 302.3 of the UBC, for occupancy separations; and of Section 504.6.2 of the UBC, for area-separation walls.

Wall joint assemblies described in Figures 9 and 10 of this report are limited to a maximum compression and extension movement of 15 percent of the installed joint width.

2.4 Identification:

Each container bears a label with the product name,

manufacturer's name (Specified Technologies, Inc.) and address, date of manufacture and expiration date.

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICBO ES Acceptance Criteria for Joint Systems (AC30), dated April 1997; reports of tests in accordance with UBC Standard 7-5; descriptive literature; and installation instructions.

4.0 FINDINGS

That the SpecSeal Fire Stop Penetration Systems described in this report comply with the 1997 *Uniform Building Code*TM and the 2000 *International Building Code*[®], subject to the following conditions:

- 4.1 Assemblies are installed in accordance with this report and the manufacturer's instructions.
- 4.2 Floor through-penetration fire-stop systems have an F-rating and a T-rating of not less than one-hour, and not less than the required rating of the penetrated floor, unless the floor penetrations contained and located within the cavity of the wall do not require a T-rating.

This report is subject to re-examination in two years.

TABLE 1—STORAGE AND APPLICATION LIMITS FOR SPECSEAL AND SPECSEAL PENSIL PRODUCTS

PRODUCT	ALLOWABLE TEMPERATURE RANGES (°F)			SHELF LIFE
	Application	In-service	Storage	
SpecSeal Sealant and SpecSeal LC150 Sealant	From 35° to 100°	From -10° to 120°	From 40° to 95°	2 years
SpecSeal Putty	From -10° to 120°	From -10° to 120°	Less than 120°	No limit
SpecSeal Mortar	From 32° to 100°	From -10° to 200°	No limits	No limit
SpecSeal Collars, SpecSeal Wrap, and SpecSeal BLU Wrap	Less than 120°	Less than 130°	Less than 120°	No limit
SpecSeal Intumescent Red Wrap Strip	Less than 120°	Less than 130°	Less than 120°	No Limit
SpecSeal Firestop Pillows	Less than 120°	Less than 130°	Less than 120°	No Limit
SpecSeal Elastomeric Sealant	From 40° to 95°	Less than 120°	From 40° to 95°	2 years
SpecSeal Elastomeric Spray	From 60° to 90°	Less than 120°	From 40° to 95°	2 years
Pensil 100 Sealant	From 35° to 140°	From -55° to 200°	Less than 80°	1 year
Pensil 200 Foam	From 50° to 90°	From -35° to 140°	Less than 80°	1 year
Pensil 300 Sealant	From -35° to 240°	From -35° to 350°	—	1 year

For **SI**: °C = (°F - 32) ÷ 1.8.

FOR ALL TABLES

For SI: 1 inch = 25.4 mm, 1 pcf = 16.018 kg/m³, 1 inch² = 645.16 mm², 1 mil = 0.0254 mm.

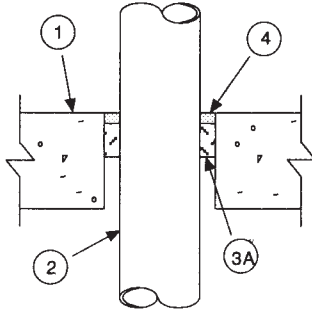


FIGURE 1
F & T ratings (see table below)

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.

2A. **Metallc Pipe**—Nom 6 in. diam. (or smaller) Schedule 10 (or heavier) steel pipe. Nom annular space shall be 11/16 in.

2B. **Metallc Pipe**—Nom 6 in. diam. (or smaller) galvanized steel rigid conduit. Nom annular space shall be 11/16 in.

2C. **Non-Metallc Tubing**—Nom 3/4 in. diam. (or smaller) electrical non-metallc tubing (ENMT) formed from polyvinyl chloride (PVC). Nom annular space shall be 3/8 in.

2D. **Non-Metallc Conduit**—Nom 1-1/2 in. diam. (or smaller) Schedule 40 (or heavier) rigid non-metallc conduit. Nom annulus shall be 5/8 in.

2E. **Steel Tube**—Nom 4 x 4 in. (or smaller) x 0.059 in. thick (or heavier) steel tube. The annulus shall range from 1 in. min to 5 in. max.

2F. **Metallc Pipe**—Nom 12 in. diam. (or smaller) Schedule 10 (or heavier) steel pipe. Annular space shall range from 0 in. (point contact) to 1-7/8 in.

2G. **Metallc Pipe**—Nom 12 in. diam. (or smaller) cast or ductile iron pipe. Annular space shall range from 0 in. (point contact) to 1-7/8 in.

2H. **Metallc Pipe**—Nom 4 in. diam (or smaller) Type L (or heavier) copper tubing. Annular space shall range from 0 in. (point contact) to 1-7/8 in.

2J. **Metallc Pipe**—Nom 24 in. diam. (or smaller) Schedule 10 (or heavier) steel pipe. Annular space shall range from 0 in. (point contact) to 1-7/8 in.

2K. **Metallc Pipe**—Nom 24 in. diam. (or smaller) cast or ductile iron pipe. Annular space shall range from 0 in. (point contact) to 1-7/8 in.

Note: A max of one penetrant shall be centered in through opening and rigidly supported on both sides of floor or wall assembly.

3A. **Forming Material**—Mineral wool batts (min. density 6 pcf) packed within the opening. Forming material shall be recessed a min of 1/2 in. from top surface of floor and both surfaces of wall assembly.

Forming Material, depth	Fill, Void or Cavity Material, depth	Penetrant	F & T ratings
3A, 3 in	4A, 1/2 in.	2H, 2J, 2K	3, 0
3A (optional) none required	4A, 1 in.	2A, 2B	3, 0
	4B, 1 in.	2A, 2B	2, 0
3A (optional)	4A, 1-1/2 in.	2C, 2D	3, 2
3A, 3 in.	4E, 1/2 in.	2F, 2G, 2H	3, 0
3B	4C, 4-1/2 in.	2A, 2B	3, 0
3B	4C, 4-1/2 in.	none	3, 3
3A, 3 in.	4D, 1-1/2 in.	2E	1, 0

3B. **Forming Material**—(Not shown)—Nom 1/2 in. thick plywood sheets cut to fit the contour of the opening to prevent the leakage of fill material while in its liquid state. The sheets may be removed after the fill material cures.

4A. **Fill, Void or Cavity Material**—SpecSeal Sealant applied to fill the through opening. Caulk shall be installed flush with top surface of floor and both surfaces of wall assembly.

4B. **Fill, Void or Cavity Material**—SpecSeal Putty applied to fill the through opening. Putty shall be recessed a nom 1/2 in. from top surface of floor and both surfaces of wall assembly.

4C. **Fill, Void or Cavity Material**—SpecSeal Mortar is mixed at a rate of 1.2 parts dry mix to one part water by weight in accordance with the installation instructions. Mortar shall be a min of 4-1/2 in. thick.

4D. **Fill, Void or Cavity Material**—Pensil 200 Silicone Foam applied to a min depth of 1-1/2 in. flush with top surface of floor or both surfaces of wall.

4E. **Fill, Void or Cavity Material**—SpecSeal LC150 Sealant applied to fill the through opening. Caulk shall be installed flush with top surface of floor and both surfaces of wall assembly.

FIGURE 1 (see previous system)
F rating = 3 hours, T rating = 0 hour

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.

2A. **Metallc Pipe**—Nom 2 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.

2B. **Metallc Pipe**—Nom 2 in. diam. (or smaller) EMT or rigid steel conduit.

Note: A max of three pipes, conduits or tubing may be installed within the opening. The space between the penetrants shall be a nom 1 in. The space between the penetrants and the periphery of the opening shall range from a min of 5/8 in. to a max of 2-5/8 in.

3. **Forming Material**—Min 4 in. thickness of mineral wool batts (min. density 4.8 pcf) packed within the opening. Forming material shall be recessed a min of 1/2 in. from top surface of floor and both surfaces of wall assembly.

4. **Fill, Void or Cavity Material**—Pensil 100 Silicone Sealant applied to fill the through opening a min depth of 1/2 in. flush with top surface of floor or both surfaces of wall.

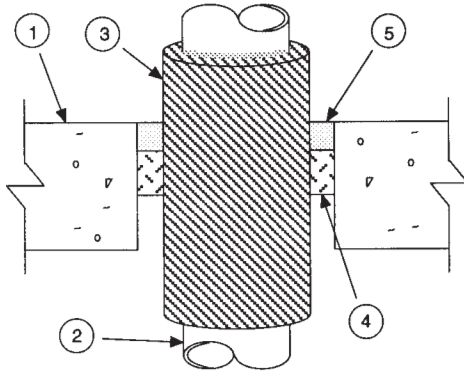


FIGURE 2
F rating = 3 hours, T rating = 0 hour

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.
2. **Metallic Pipe**—Nom 3 in. diam. (or smaller) Type L (or heavier) trade size copper pipe. One pipe shall be centered in through opening and rigidly supported on both sides of floor or wall assembly.
3. **Pipe Covering Material**—Nom 1/2 in. thick hollow cylindrical heavy density (min. 3.5 pcf) glass fiber units jacketed on the outside with foil-scrim-kraft. Longitudinal joints sealed with mechanical fasteners or factory-applied SSL. Transverse joints secured with butt strips tape supplied with pipe covering. Annular space between insulated pipe and periphery of opening shall be 15/16 in. The material must have a flame spread index of 25 or less and a smoke-developed index of 50 or less.
4. **Forming Material**—Min. 1-1/2 in. thickness of mineral wool batts, nom 6 pcf, firmly packed within the opening. Forming material shall be recessed a min of 1 in. from top surface of floor and both surfaces of wall assembly.
5. **Fill, Void or Cavity Material**—SpecSeal Sealant applied to fill the through opening to a min depth of 1 in. Caulk shall be installed flush with top surface of floor and both surfaces of wall assembly.

FIGURE 2 (see previous system)
F rating = 3 hours, T ratings = 0 & 1 hour (see table below)

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.
- 2A. **Metallic Pipe**—Nom 2 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.
- 2B. **Metallic Pipe**—Nom 2 in. diam. (or smaller) cast or ductile iron pipe.
- 2C. **Metallic Pipe**—Nom 2 in. diam. (or smaller) Type L (or heavier) copper tubing.
- 2D. **Metallic Pipe**—Nom 2 in. diam. (or smaller) Regular (or heavier) copper pipe.
- 2E. **Metallic Pipe**—Nom 3 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.
- 2F. **Metallic Pipe**—Nom 3 in. diam (or smaller) cast or ductile iron pipe.
- 2G. **Metallic Pipe**—Nom 3 in. diam (or smaller) EMT or steel conduit.

Note: Pipe, tubing or conduit shall be rigidly supported on both sides of the assembly. Spacing between penetrants shall be a nom 2-3/4 in.

- 3A. **Pipe Covering Material**—Nom 1 in. thick hollow cylindrical heavy density (min. 3.5 pcf) glass fiber units jacketed on the outside with foil-scrim-kraft. Longitudinal joints sealed with mechanical fasteners or factory-applied SSL. Transverse joints secured with butt strip tape supplied with pipe covering. The material must have a flame spread index of 25 or less and a smoke-developed index of 50 or less. Spacing between insulation and edge of opening shall range from 1 in. min to 2-1/4 in. max.
- 3B. **Pipe Covering Material**—Nom 3/4 in. thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. Spacing between insulation and edge of opening shall range from 1-1/4 in. min to 2-1/4 in. max.
- 4A. **Packing Material**—Min 1-1/2 in. thickness of min 6 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.
- 4B. **Packing Material**—(Not shown)—Rigid sheet material, cut to fit the contour of the penetrating item and fastened to the underside of the floor or both sides of wall. Forms to be removed after fill material has cured.
- 5A. **Fill, Void or Cavity Material**—(Not shown)—SpecSeal Wrap Strip, nom 1/4 in. by 2 in. wide intumescent material. Wrap strip is wrapped around each insulated pipe or tube with ends butted and held in place with min 18 SWG steel wire. When used in conjunction with item 5B, recess wrap strip 1/2 in. from the topside of a floor assembly or both sides of a wall. When used in conjunction with item 5C, position bottom edge of the wrap strip flush with the ceiling of the floor or both sides of a wall.

5B. **Fill, Void or Cavity Material**—SpecSeal Sealant applied to a min 1 in. depth flush with top surface of floor or both surfaces of wall.

5C. **Fill, Void or Cavity Material**—SpecSeal Mortar applied to a min 4-1/2 in. depth around wrap strip flush with both surfaces of floor or wall. Mix product at a rate of 1.5 parts dry mixture to one part water by weight.

Forming Material	Fill, Void or Cavity Material	Penetrants	F & T ratings
4A 4B	5A & 5B 5A & 5C	2A, 2B, 2C, 2D all	3, 1* 3, 0+

*Note: A max of two pipes or tubes may be installed within the opening. Pipe covering (item 3A or 3B) must be applied to each penetrant. Opening shall not exceed 128 sq. in. with max dimension of 16 in. T rating shall be 1 hour if item 3A is used on both penetrants. T rating shall be 0 hour if item 3B is used on one or both penetrants.

+Note: A max of three pipes, conduits or tubes may be installed within the opening. Only one penetrant may be greater than 2 in. trade size. A max of two penetrants may be insulated (see items 3A & 3B).

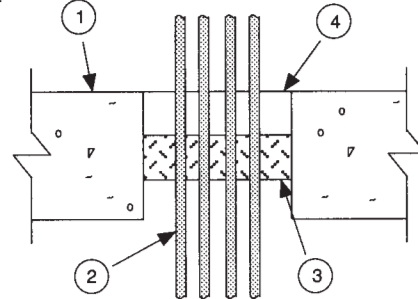


FIGURE 3
F rating = 3 hours, T rating = 0 hour

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.
2. **Cables**—Max 20% fill of 100 pair No. 24 AWG (or smaller) PVC insulated and jacketed cables. Annular space between cables and periphery of opening shall be 1-1/2 in. Cables to be rigidly supported on both sides of floor or wall assembly.
3. **Forming Material**—Min. 1-1/2 in. thickness of mineral wool batts having a min. density of 6 pcf firmly packed within the opening. Forming material shall be recessed a min of 1 in. from top surface of floor or both surfaces of wall assembly.
4. **Fill, Void or Cavity Material**—SpecSeal Sealant applied to fill the through opening to a min depth of 1 in. Caulk shall be installed flush with top surface of floor or both surfaces of wall assembly.

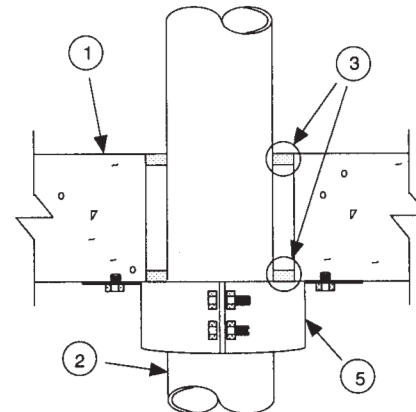


FIGURE 4
F ratings = 2 & 3 hours, T ratings = 0 & 3 hours (see Items 5A & 5B)

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.
- 2A. **Non-Metallic Pipe**—Nom 4 in. diam. (or smaller) Schedule 40 (or heavier) polyvinyl chloride (PVC) pipe for use in vented (DWV) or closed (process or supply) piping systems.
- 2B. **Non-Metallic Pipe**—Nom 4 in. diam. (or smaller) SDR 13.5 (or heavier) chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems.
- 2C. **Non-Metallic Conduit**—Nom 4 in. diam. (or smaller) rigid non-metallic conduit formed from PVC.
- 2D. **Non-Metallic Pipe**—Nom 8 in. diam. (or smaller) Schedule 40 (or heavier) polyvinyl chloride (PVC) pipe for use in vented (DWV) or closed (process or supply) piping systems.
- 2E. **Non-Metallic Pipe**—Nom 8 in. diam. (or smaller) Schedule 40 (or heavier) FR Polypro-

pylene pipe for use in vented (DWV) or closed (process or supply) piping systems.

Note: One through penetrant shall be centered in the through-opening and rigidly supported on both sides of wall or floor assembly. Nominal diam. of the opening shall be 1/2 in. larger than the O.D. of the through-penetrant.

3. **Fill, Void or Cavity Material**—When used with item 5A, install a 1/4 in. bead of SpecSeal Sealant flush with both surfaces of wall or floor opening. When used with item 5B, install a 1/2 in. bead of SpecSeal Sealant flush with top surface of floor or both surfaces of wall.

4. **Aluminum Foil Tape**—(Not shown)—Prior to the installation of the device (Item 5A or 5B), a single layer of 2 inch wide by 3 mil thick pressure-sensitive aluminum foil tape shall be wrapped around the through penetrant. When used with item 5A, two inches of foil tape shall be positioned 1/2 in. below bottom surface of floor or both surfaces of wall assembly. When used with item 5B, one layer shall abut the bottom surface of the floor or both surfaces of the wall and extend a minimum of five inches along the pipe or conduit.

5A. **Firestop Device**—SpecSeal Firestop Collar shall be installed around through-penetrant (item 2A, 2B or 2C only) in accordance with the accompanying installation instructions. Device incorporates four anchor tabs for securement to the bottom surface of floor assembly or both surfaces of wall assembly by means of 1/4 in. by 1-1/4 in. fender washers and 1/4 in. diam. by 1-3/4 in. long steel concrete anchors. F & T ratings when using this device shall be 3 hours each.

5B. **Fill, Void or Cavity Material**—(Not shown)—SpecSeal BLU Series Wrap Strip shall be wrapped around through-penetrant (item 2D or 2E only) to form two stacks with four layers each. The ends of each layer shall butt together and be held in place with masking tape. After installation of all eight layers of wrap strip, enclose with precut 0.029 in. thick (No. 22 MSG) galv sheet metal steel available from the manufacturer. Collar shell shall be a nom 4 in. deep with a min six mounting tabs. Collar shell must overlap a min 1 in. along its seam and shall be secured together with two nom 1/2 in. wide by 0.028 in. thick stainless steel hose clamps spaced 2 in. O.C. Collars must be fastened to ceiling of floor-ceiling assembly and both sides of wall with a min of six steel masonry expanding anchors and 1/4 in. by 1-1/4 in. fender washers. F & T ratings when using this device shall be 2 and 0 hours respectively.

6. **Packing Material**—(Not shown)—Min 3-1/2 in. thickness of mineral wool batt, nominal 4 pcf, packed into annulus above collar. Note: Mineral wool is not required when using item 5A.

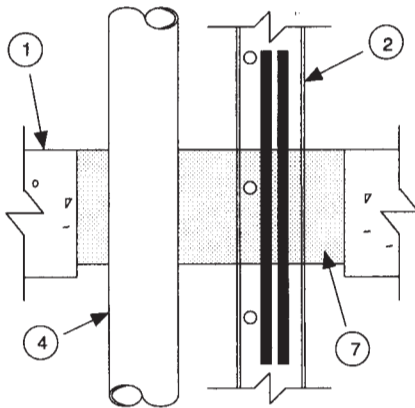


FIGURE 5
F rating = 3 hours, T rating = 0 hour

1. **Concrete Floors & Walls**—Min 4-1/2 in. thick lightweight or normal weight concrete (100-150 pcf) floor or wall. Wall may also be constructed of any solidly grouted concrete masonry units complying with U.B.C. Standard No. 21-4.

2A. **Cable Tray**—Max 18 in. wide by 5 in. deep open ladder cable tray formed of min 0.060 in. thick (No. 16 MSG) galvanized steel with nom 1 in. diam. rungs spaced 9 in. O.C.

2B. **Cable Tray**—Max 18 in. wide by 5 in. deep open ladder aluminum cable tray formed of min 0.080 in. thick aluminum with 1 in. diam. rungs spaced 9 in. O.C.

Note: A max of two cables trays (max 3-3/4 in. loading depth) may be installed within the opening. Annular space between cable tray and periphery of opening may range from a min of 2 in. to a max of 18 in. Cable trays shall be spaced 6 in. apart and rigidly supported on both sides of the floor or wall assembly.

3A. **Cables**—1/C—350 kcmil with polyvinyl chloride (PVC) or cross-linked polyethylene (XLPE) insulation and PVC jacket.

3B. **Cables**—7/C—No.12 AWG with PVC or XLPE insulation & PVC jacket.

3C. **Cables**—2/C—No.16 AWG with PVC or XLPE insulation & PVC jacket.

Note: Max fill area shall be 22% (14.9 sq. in. cross-sectional areas).

4A. **Metallic Pipe**—Nom 4 in. diam. (or smaller) galvanized steel conduit.

4B. **Metallic Pipe**—Nom 4 in. diam. (or smaller) electrical metallic tubing.

4C. **Metallic Pipe**—Nom 4 in. diam. (or smaller) Type L (or heavier) trade-size copper pipe.

4D. **Metallic Pipe**—Nom 4 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.

Note: A max of two pipes, tubes or conduits shall be installed within the opening. The annular

space between the pipes, conduits or tubes and the periphery of the opening shall range from a min of 2 in. to a max of 18 in. The conduit, tubing or pipes shall be spaced 5 in. apart and a min of 4 in. from the cable trays (Item 2). The penetrants shall be rigidly supported on both sides of the floor or wall assembly.

5. **Forming Material**—(Not shown)—Nom 1/2 in. thick plywood cut to fit the contour of the opening to prevent the leakage of the fill material while in its liquid state. The sheets may be removed after fill material cures.

6. **Packing Material**—(Not shown)—Pieces of mineral wool batts firmly packed between the pipes, tubes, conduits, cables or cable trays and the forming material to prevent the leakage of the fill material while in its liquid state. The batts may be removed after fill material cures.

7. **Fill, Void or Cavity Material**—SpecSeal Mortar is mixed at a rate of 1.2 parts dry mix to one part water by weight in accordance with the accompanying installation instructions. Install to a min 4-1/2 in. thickness.

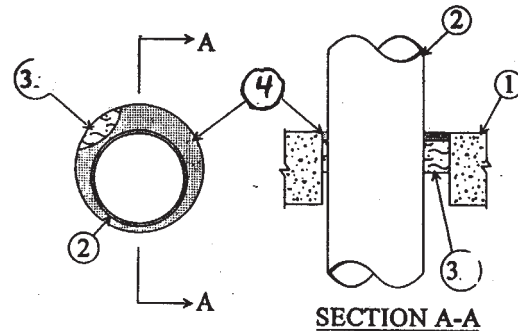


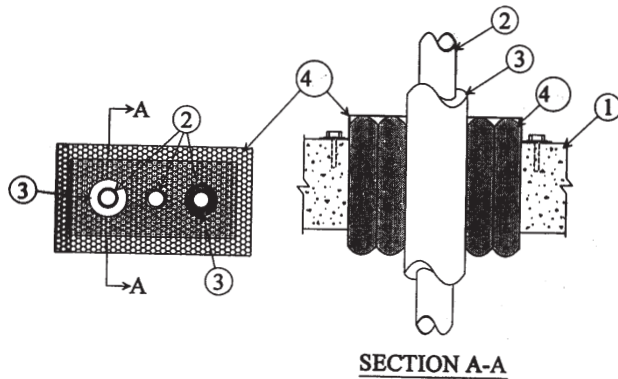
FIGURE 6
F-Rating—Two Hours
T-Rating—Zero Hour

1. **Floor or Wall Assembly**: Lightweight or normal-weight concrete floor or wall having a minimum thickness of 4 1/2 inches. Walls may also be constructed with concrete masonry units having a thickness complying with UBC Table 7-B. Maximum opening in the floor or wall assembly is a circular hole having an 8-inch diameter.

2. **Steel Duct**: Six-inch-diameter (or smaller), No. 28 gage (0.016 inch) (or heavier) steel duct. Only one steel duct is permitted to be installed in the through-penetration opening. The annular space between the duct and the periphery of the opening is a minimum of 1/4 inch and a maximum of 1 3/4 inches. The steel duct must be rigidly supported on both sides of the floor or wall assembly.

3. **Packing Material**: Minimum 4-inch-thick mineral wool batt insulation, having a minimum-4-pcf density, is friction-fitted into the opening to act as a form for the fill material. Packing material must be recessed from the top surface of the floor or from both surfaces of the wall, as required to accommodate the required thickness of fill material.

4. **Fill Material**: SpecSeal 100, 101, 102, or 105 sealant is installed to a minimum dry thickness of 1/2 inch within the annulus, flush with the top surface of the floor and both surfaces of the wall.



SECTION A-A

FIGURE 7

F-Rating—Two Hours

T-Rating—Zero Hour

1. Floor or Wall Assembly: Lightweight or normal-weight concrete floor or wall having a minimum thickness of 4 1/2 inches. Walls may also be constructed with concrete masonry units with thickness complying with UBC Table 7-B. Maximum opening size in the floor or wall assembly is 144 square inches, with a maximum dimension of 18 inches.

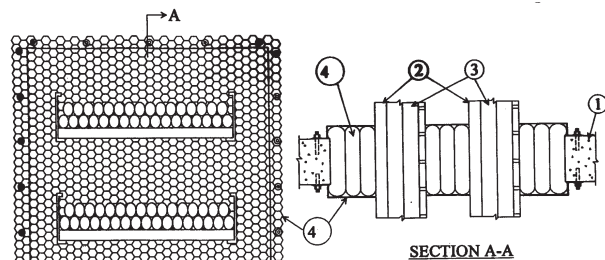
2. Through-penetrants: One or more pipes, conduits, or tubing are permitted to be installed within the opening. The space between pipes, conduits, or tubing and the periphery of the opening must be a minimum of 2 inches and a maximum of 3 inches. The space between the pipes, conduits, or tubing must be 2 inches. Pipes, conduits, and tubing must be rigidly supported on both sides of the floor or wall construction. The following types and sizes of pipes, conduits, and tubing are permitted to be installed:

- A. Steel pipe: Nominal-2-inch-diameter (or smaller), schedule 5 (or heavier) steel pipe.
- B. Iron pipe: Nominal-2-inch-diameter (or smaller) cast or ductile iron pipe.
- C. Conduit: Nominal-2-inch-diameter (or smaller) steel electrical metallic tubing or nominal-2-inch or smaller steel conduit.
- D. Copper tubing: Nominal-2-inch-diameter (or smaller) Type L (or heavier) copper tubing.
- E. Copper Pipe: Nominal-2-inch-diameter (or smaller) Regular (or heavier) copper pipe.

3. Pipe Covering: Pipe coverings are permitted to be installed on one or more of the through-penetrants. The annular space between the insulated pipes or tubings and the periphery of the opening must be a minimum of 2 inches and a maximum of 2 3/16 inches. The annular space between the insulated through-penetrant and the uninsulated pipes or tubings must be 2 inches. The following types of pipe covering materials are permitted:

- A. Nominal-2-inch-thick, hollow, cylindrical, heavy-density, minimum-3.5-pcf, glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints must be sealed using metal fasteners or factory-applied self-sealing tape. Transverse joints must be fastened using metal fasteners or using butt-tape supplied with the product.
- B. Nominal-2-inch-thick unfaced mineral-fiber pipe insulation having a nominal density of 3.5 pcf (or heavier), sized to fit the outside diameter of the pipe or tube. The pipe insulation must be fastened with minimum No. 8 AWG steel wire spaced a maximum of 12 inches on center. A foil-scrim-kraft or all-service-jacket material may be used when wrapped around the outer circumference of the pipe insulation with the kraft side exposed.
- C. Nominal-3/4-inch-thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam, sized to fit the penetrating item.

4. Fire-stop Material: The fire-stop material must consist of maximum-9-inch-long-by-6-inch-wide-by-3-inch-thick SpecSeal Firestop Pillows. The pillows are permitted to be installed vertically or horizontally within the opening in such a manner that the ends project a minimum of 2 1/2 inches beyond each surface of the floor or wall. Pillows must be tightly packed into the opening to fill the annular space between through-penetrants and between through-penetrants and the periphery of the opening. After the pillows are installed, diamond-shaped wire lath is placed over the opening with a minimum 2-inch lap beyond the periphery of the opening to keep the pillows in place. The wire lath is fabricated from No. 20 AWG galvanized steel wire and has maximum-2-inch openings. The wire lath is attached to the floor or wall construction using minimum-1/4-inch-diameter-by-1 1/4-inch-long concrete screws with washers, spaced 6 inches on center.



SECTION A-A

FIGURE 8

F-Rating—Three Hours

T-Rating—Zero Hour

1. Floor or Wall Assembly: Lightweight or normal-weight concrete floor or wall having a minimum thickness of 4 1/2 inches. Walls may also be constructed with concrete masonry units having thickness complying with UBC Table 7-B. Maximum opening size in the floor or wall assembly is 576 square inches, with a maximum dimension of 24 inches.

2. Cable Tray: Cable trays are a maximum of 18 inches wide and a maximum of 5 inches deep. The trays either are open-ladder type trays with channel-shaped side rails formed from 0.060-inch-thick galvanized steel with nominal 1-inch-diameter rungs spaced 9 inches on center, or the open-ladder type trays have channel-shaped side rails formed from 0.080-inch-thick aluminum with nominal 1-inch-diameter rungs spaced 9 inches on center. The annular space between the cable tray and the periphery of the opening must be a minimum of 3 inches and a maximum of 16 inches. Cable trays must be rigidly supported on both sides of the floor or wall assembly.

3. Cables: Aggregate cross-sectional area of cables in a cable tray is a maximum of 30 percent of the cross-sectional area of the cable tray based on a maximum-4-inch cable-loading depth within the cable tray. Any combination of the following types and sizes of copper conductor cables is permitted to be used:

- A. Maximum 1/C-350 kcmil cable with polyvinyl chloride (PVC) insulation and jacket.
- B. Maximum 3/C-No. 2 AWG cable with PVC insulation and jacket.
- C. Maximum 7/C-No. 12 AWG cable with PVC-nylon insulation and PVC jacket.
- D. Maximum 2/C-No. 16 AWG cable with PVC-nylon insulation and PVC jacket.

4. Fire-stop Materials: The fire-stop material must consist of maximum-9-inch-long-by-6-inch-wide-by-3-inch-thick SpecSeal Firestop Pillows. The pillows are permitted to be installed vertically or horizontally within the opening in such a manner that the ends project a minimum of 2 1/2 inches beyond each surface of the floor or wall. Pillows must be tightly packed into the opening to fill the annular space between through-penetrants and between through-penetrants and the periphery of the opening.

After the installation of the SpecSeal Pillows, a minimum-1/2-inch thickness of SpecSeal Putty must be applied, to seal any voids between the cables and the pillows and between the cable tray and the pillows on both sides of the floor or wall assembly.

After the pillows and putty are installed, diamond-shaped wire lath is placed over the opening with a minimum-2-inch lap beyond the periphery of the opening to keep the pillows in place. The wire lath is fabricated from No. 20 AWG galvanized steel wire and has maximum-2-inch openings. The wire lath is attached to the floor or wall construction using minimum-1/4-inch-diameter-by-1 1/4-inch-long concrete screws with washers, spaced 6 inches on center.

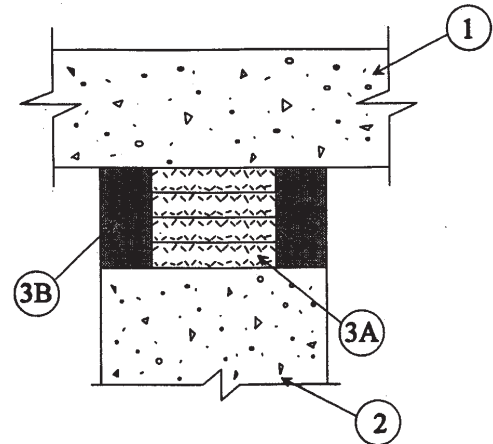


FIGURE 9

Wall-to-floor Fire Joint Rating—Three Hours

Maximum Joint Width—4 Inches

Movement Capabilities—Maximum 15 Percent Compression or Extension

1. Floor Assembly: Lightweight or normal-weight reinforced structural concrete floor assembly with a minimum thickness of 4 1/2 inches.

2. Wall Assembly: Lightweight or normal-weight reinforced structural concrete wall assembly with a minimum thickness of 5 inches. Walls may also be constructed with concrete masonry units of a thickness complying with UBC Table 7-B. Separation between the bottom of the floor and the top of the wall at time of installation of the fire joint system is a maximum of 4 inches.

3. Fire-joint System: The joint system has a maximum compression and extension capacity of 15 percent of the installed width. The cavity between the bottom of the floor and the top of the wall must be filled with the following materials:

- A. Mineral wool batt insulation, having a minimum-4-pcf density, is friction-fitted into the opening to act as a permanent form for the fill material. Pieces of the batt insulation are cut into minimum-4-inch-thick widths and are installed edge-first into the joint opening, parallel with the joint direction, such that the batt insulation thickness is compressed a minimum of 33 percent. The batt insulation must be recessed from the wall surface as required to accommodate the required thickness of fill material. Adjoining lengths of batt insulation must be tightly butted, with the butted seams spaced and staggered a minimum of 24 inches along the length of the joint.
- B. SpecSeal Elastomeric sealant is installed to a minimum dry thickness of 1/2 inch within the joint, flush with the top of both surfaces of the wall.

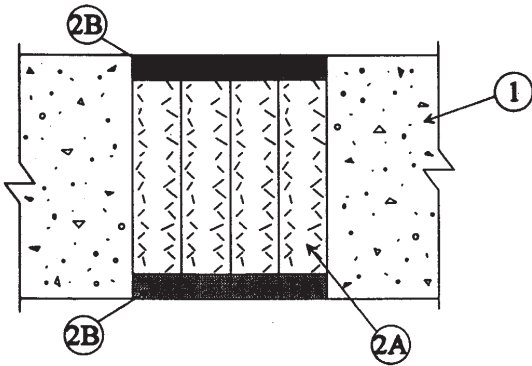


FIGURE 10

Wall-to-wall Fire Joint Rating—Three Hours

Maximum Joint Width—4 Inches

Movement Capabilities—Maximum 15 Percent Compression or Extension

1. **Wall Assembly:** Normal-weight concrete walls having a minimum thickness of 5 inches. Walls may also be constructed with concrete masonry units of a thickness complying with UBC Table 7-B. Separation between the edges of the walls at the joint, at the time of installation of the fire joint system, is a maximum of 4 inches.

2. **Fire-joint System:** The joint system has a maximum compression and extension capacity of 15 percent of the installed width. The cavity between the walls must be filled with the following materials:

A. Mineral wool batt insulation, having a minimum-4-pcf density, is friction-fitted into the opening to act as a permanent form for the fill material. Pieces of the batt insulation are cut into minimum-4-inch-thick widths and are installed edge-first into the joint opening, parallel with the joint direction, such that the batt insulation thickness is compressed a minimum of 33 percent. The batt insulation must be recessed from the wall surface as required to accommodate the required thickness of fill material. Adjoining lengths of batt insulation must be tightly butted, with the butted seams spaced and staggered a minimum of 24 inches along the length of the joint.

B. SpecSeal Elastomeric sealant is installed to a minimum dry thickness of 1/2 inch within the joint, flush with the top of both surfaces of the wall.

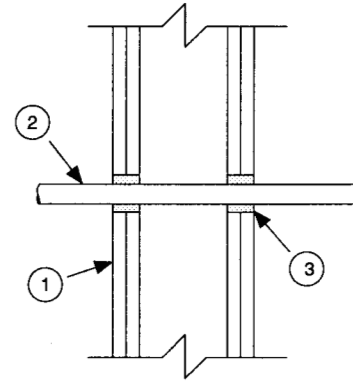


FIGURE 11

F rating = 2 hours, T rating = 0 hour

1. **Gypsum Board Wall—**The 2-hour rated assembly complies with the code and shall include the following construction features:

i. **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 16 in. O.C. Steel studs to be min. 2-1/2 in. wide and spaced max 24 in. O.C.

ii. **Wallboard, Gypsum—**Two layers of nom 5/8 in. thick gypsum wallboard, Type X complying with ASTM C-36.

2A. **Metallc Pipe—**Nom 3 in. diam. (or smaller) copper pipe.

2B. **Metallc Pipe—**Nom 3 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.

2C. **Metallc Conduit—**Nom 3 in. diam. (or smaller) electrical metallc tubing.

2D. **Metallc Conduit—**Nom 3 in. diam. (or smaller) galv. steel rigid conduit.

2E. **Metallc Pipe—**Nom 4 in. diam. (or smaller) Schedule 5 (or heavier) steel pipe.

2F. **Metallc Conduit—**Nom 4 in. diam. (or smaller) electrical metallc tubing.

2G. **Metallc Conduit—**Nom 4 in. diam. (or smaller) galv. steel rigid conduit.

Note: One penetrant shall be centered in the opening and rigidly supported on both sides of assembly. Nom annular space shall be 15/16 in.

3. **Forming Material—**Fiberglass insulation having a min density of 3.5 pcf. The forming material shall be wrapped around the through-penetrant and secured together by means of No. 24 AWG steel-tie wire. Forming material and steel-tie wire shall be centered at mid-depth of opening and recessed a min 3/4 in. from each surface of wall assembly.

4. **Fill, Void or Cavity Material—**SpecSeal Sealant or SpecSeal Putty (see chart below) applied to fill the through opening a min depth of 3/4 in. Additional caulk shall be applied such that a min 1/4 in. thick crown is formed around the circumference of the through-penetrant. Product shall be installed on both surfaces of the wall assembly.

Forming Material, depth	Fill, Void or Cavity Material	Penetrant	F & T ratings
1-3/4 in.	Sealant	2A, 2B, 2C, or 2D	2, 0
1 in.	Sealant	2E, 2F, or 2G	2, 0
1 in.	Putty	2E, 2F, or 2G	2, 0

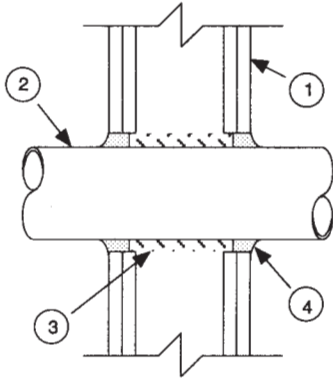


FIGURE 12
F rating = 2 hours, T ratings = 0 and 1 hour (see Item 5)

1. **Gypsum Board Wall**—The 2-hour rated assembly complies with the code and shall include the following construction features:

i. **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 16 in. O.C. Steel studs to be min. 2-1/2 in. wide and spaced max 24 in. O.C.

ii. **Wallboard, Gypsum**—Two layers of nom 5/8 in. thick gypsum wallboard, Type X complying with ASTM C-36.

2A. **Cables**—Max 18% fill of 100 pair No. 24 AWG (or smaller) PVC insulated and jacketed telephone cables. Annular space between cables and periphery of opening may range from a min of 1 in. to a max of 1-1/2 in.

2B. **Cables**—Max 100 pair No. 24 AWG (or smaller) PVC insulated and jacketed telephone cable. Annular space shall be a nom 1/4 in.

3. **Forming Material**—Min 3-1/2 in. thickness of mineral wool batts having a min density of 4 pcf firmly packed between the cables and the periphery of the opening. Forming material shall be centered at mid-depth of opening and recessed a min 3/4 in. from each surface of wall assembly.

4. **Steel Sleeve**—Min 5 in. long steel sleeve with three 1-3/4 in. retaining tabs. Sleeve fabricated from 0.016 in. (No. 30 MSG) galv. sheet steel in accordance with fill material manufacturer's installation instructions. Sleeve secured to both surfaces of wall assembly by means of 1/4 by 3/4 in. long steel screws and 1/4 by 1-1/2 in. diam. steel fender washers.

5. **Fill, Void or Cavity Material**—SpecSeal Sealant or SpecSeal Putty applied to fill the through opening a min depth of 3/4 in. Additional product shall be applied such that a min 1/4 in. thick crown is formed around the circumference of the cable bundle. Material shall be installed on both surfaces of the wall assembly.

*Note: A max of one penetrant shall be rigidly supported on both sides of the assembly. If item 2B is used, items 3 & 4 may be omitted and the T rating is 1 hour. If item 2A is used, the T rating is 0 hour.

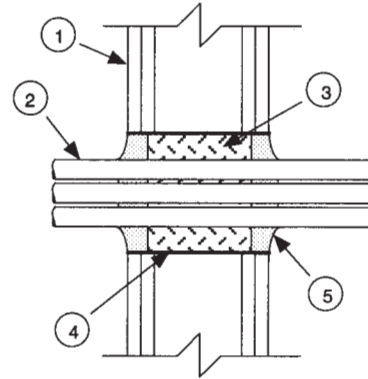


FIGURE 13
F rating = 2 hours, T rating = 2 hours

1. **Gypsum Board Wall**—The 2-hour rated assembly complies with the code and shall include the following construction features:

i. **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 16 in. O.C. Steel studs to be min. 2-1/2 in. wide and spaced max 24 in. O.C.

ii. **Wallboard, Gypsum**—Two layers of nom 5/8 in. thick gypsum wallboard, Type X complying with ASTM C-36.

2A. **Plastic Pipe**—Nom 4 in. diam. (or smaller) Schedule 40 (or heavier) polyvinyl chloride (PVC) pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems.

2B. **Plastic Pipe**—Nom 4 in. diam. (or smaller) SDR 13.5 (or heavier) chlorinated polyvinyl chloride (CPVC) pipe for use in closed (process or supply) piping systems.

Note: One through-penetrant shall be centered in the opening and rigidly supported on both sides of wall assembly. Diameter of the opening shall be 1/2 in. larger than the outside diam. of the through-penetrant.

3. **Fill, Void or Cavity Material**—SpecSeal Sealant forced into annulus to max extent possible. Install caulk flush with both surfaces of wall.

4. **Aluminum Foil Tape**—(Not shown)—Prior to the installation of the device (Item 3C), a single layer of 2 in. wide by 3 mil thick pressure-sensitive aluminum foil tape shall be wrapped around through-penetrant on both surfaces of wall assembly. Foil tape shall be positioned 1/2 in. from both surfaces of the wall assembly.

5. **Firestop Device**—SpecSeal Firestop Collar shall be installed around through-penetrant in accordance with the accompanying installation instructions. Device incorporates four anchor tabs for securement to each surface of the wall assembly by means of 1/8 in. diam. by 1-3/4 in. long anchor bolts in conjunction with 1/4 in. diam. by 1-1/2 in. steel fender washers.

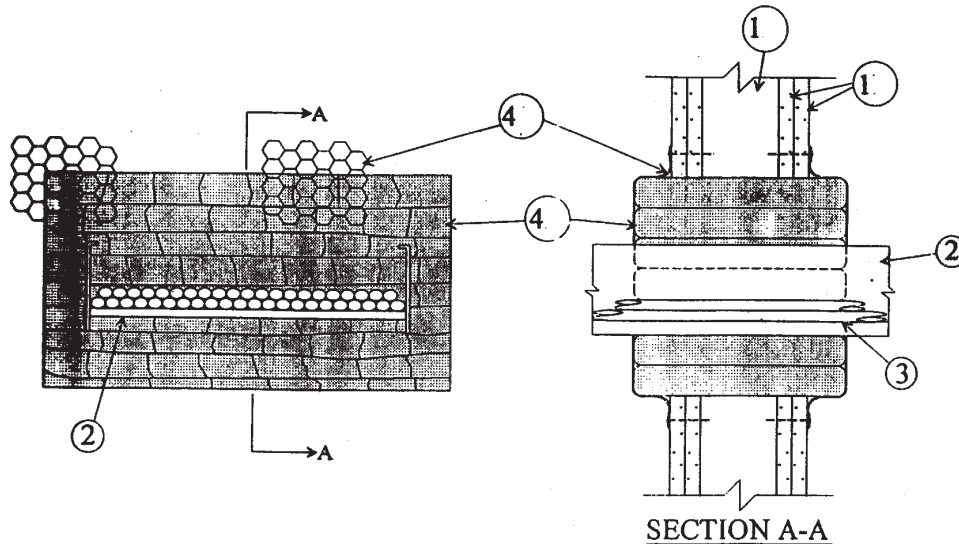


FIGURE 14

F-Rating—Maximum Two Hours (The hourly F-rating of the Fire Stop system is equal to the hourly rating of the wall assembly in which it is installed.)

T-Rating—Zero Hour

1. Wall Assembly: The 1- or 2-hour fire-rated wall assembly must be constructed of materials and in a manner that complies with Table 7-B of the UBC. Framing members may be either wood or steel studs. Wood studs must be minimum 2-by-4 lumber spaced a maximum of 16 inches on center, and steel studs must be minimum- $3\frac{5}{8}$ -inch-deep, C-shaped studs spaced a maximum of 24 inches on center. Additional framing members must be installed in the stud cavity containing the through-penetrating item. Gypsum wallboard must have a minimum $\frac{5}{8}$ -inch thickness. The gypsum wallboard type, number of layers, and method of installation must comply with Table 7-B of the UBC. Maximum opening size in the wall assembly is $27\frac{1}{2}$ inches, with a maximum dimension of $22\frac{5}{8}$ inches for walls having steel studs and $14\frac{1}{2}$ inches for walls having wood studs.

2. Cable Tray: The cable tray is a maximum of 18 inches wide and a maximum of 5 inches deep. The tray either is an open-ladder type tray with channel-shaped side rails formed from 0.060-inch-thick galvanized steel with nominal 1-inch-diameter rungs spaced 9 inches on center, or it is an open-ladder type tray having channel-shaped side rails formed from 0.080-inch-thick aluminum with nominal 1-inch-diameter rungs spaced 9 inches on center. Only one cable tray is permitted in the opening and it must be centered in the opening. The annular space between the cable tray and the top and bottom of the opening must be $3\frac{1}{2}$ inches. The cable tray must be rigidly supported on both sides of the wall assembly.

3. Cables: Aggregate cross-sectional area of cables in a cable tray is a maximum of 30 percent of the cross-sectional area of the cable tray based on a maximum- $3\frac{7}{8}$ -inch cable-loading depth

within the tray. Any combination of the following types and sizes of copper conductor cables is permitted to be used:

- A. Maximum 1/C-350 kcmil cable with polyvinyl chloride (PVC) insulation and jacket.
- B. Maximum 3/C-No. 2 AWG cable with PVC insulation and jacket.
- C. Maximum 7/C-No. 12 AWG cable with PVC-nylon insulation and PVC jacket.
- D. Maximum 2/C-No. 16 AWG cable with PVC-nylon insulation and PVC jacket.

4. Fire-stop Materials: The fire-stop material must consist of maximum-9-inch-long-by-6-inch-wide-by-3-inch-thick SpecSeal Firestop Pillows. The pillows are permitted to be installed vertically or horizontally within the opening in such a manner that the ends project a minimum of $1\frac{3}{8}$ inches beyond each surface of the wall. Pillows must be tightly packed into the opening to fill the annular space between through-penetrants and between through-penetrants and the periphery of the opening.

After the installation of the SpecSeal Firestop Pillows, SpecSeal Putty must be applied to seal any voids between the cables and the pillows and between the cable tray and the pillows on both sides of the floor or wall assembly.

After the pillows and putty are installed, diamond-shaped wire lath is placed over the opening with a minimum-2-inch lap beyond the periphery of the opening, to keep the pillows in place. The wire lath is fabricated from No. 20 AWG galvanized steel wire and has maximum-2-inch openings. The wire lath is attached to the wall construction using minimum- $\frac{1}{4}$ -inch-diameter-by- $2\frac{1}{4}$ -inch-long Type S steel screws with washers, spaced 6 inches on center.