

COMMON SYSTEMS
THROUGH-PENETRATION FIRESTOPPING REQUIREMENTS

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1. GENERAL

1.01 This section provides the guidelines and requirements for firestopping floor and wall penetrations commonly used for network equipment power and interconnecting cable runs in network facilities, and for protecting cable runs in non-equipment areas. Waterproofing and smoke stopping requirements are included in this section because they are integral components of firestops. Unless otherwise indicated, this section does not cover the firestopping of through-penetrations used for building service type apparatus such as water pipes, building electrical apparatus and raceways, or heating and ventilation ducts.

1.02 Refer to part 7 for reasons for reissue.

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1.03 The mineral wool firestopping requirements contained in this section are based on pre-divestiture AT&T Bell Laboratories testing to the 2-hour fire testing conditions of ASTM E-119 *Method for Fire Tests of Building Constructions and Materials*. The intumescent and expandable foam firestopping requirements contained in this section are based on product manufacturer testing to the fire testing conditions of ASTM E-814 *Methods for Fire Tests of Through-Penetration Fire Stops* and/or Underwriters Laboratories (UL) standard UL 1479 *Fire Tests of Through-Penetration Firestops*.

- ASTM E-119 covers fire protection testing for other than through-penetration firestops. UL standard UL-263 is an acceptable testing standard that may be used to verify compliance with ASTM E-119.
- ASTM E-814 covers fire protection testing for through-penetration firestop systems. UL standard UL-1479 is an acceptable testing standard that may be used to verify compliance with ASTM E-814.

1.04 The installed arrangement of a through-penetration firestop system must maintain the fire resistance integrity of a building's surface (construction) to prevent ignition of combustible materials on the unexposed side of the surface during a fire. Unless otherwise indicated by building construction plans, the fire resistance integrity of building constructions commonly used in network equipment areas are as listed below. "F" ratings refer to the resistance to the passage of flame, and "T" ratings refer to the resistance to the transmission of heat to the unexposed building surface.

- Concrete/masonry and load bearing framed constructions have F and T ratings of 2 hours.
- Constructions of other noncombustible materials such as sheet rock or sheet metal have F and T ratings of 1 hour.

Note: Generally, firestop testing criteria permits a 400° F temperature on the unexposed side of a building surface at through-penetrations. For this reason easily combustible materials shall not be stored within 12 inches of a through-penetration (cable hole).

1.05 Cable hole covers are used in some building applications as a support structure for waveguide or other heavy network related apparatus. For such applications the firestopping requirements and guidelines provided in this section shall be appropriately applied.

Definitions

1.06 The following is a list of terms and their meaning as used throughout this section:

Term	Meaning
Cable hole / opening	Interchangeable terms for through-penetrations for network power and interconnect cable.
Cable	In one form or another is used to reference the item(s) penetrating a cable hole.
Fire rated	A building construction specifically designed and serving to prevent the spread of fire and/or smoke. Fire rated should not to be confused with the fire "rating" of a particular building material.
Raceway	An enclosed channel designed expressly for holding electrical wires and cables as permitted by the National Electrical Code.

A. Waterproofing

1.07 Cable holes in building floors require waterproofing to prevent the natural flow of water or other liquids between floors and to enhance the smoke stopping capability of an installed fire stop system. Waterproofing of cable holes in building floors is the responsibility of the person installing the cable hole sheathing or other apparatus surrounding an opening.

1.08 The sheathing (metal ring) of rectangular cable holes, and the base of equipment frames installed directly over floor penetrations, shall be waterproofed by placing a 1/4- to 1/2-inch bead of non-hardening gasket compound (such as Permatex No. 2) around the perimeter of the opening under the cable hole sheathing or equipment framework as illustrated in Fig. 1. The gasket compound should be applied so that when the sheathing or equipment framework is secured to the floor, excess compound will be forced towards the interior of the cable opening rather than towards the equipment aisle. Additionally, gasket compound shall be applied so it will prevent water or other liquids from seeping into floor anchoring holes.

1.09 When it is necessary to waterproof an existing cable hole, or when it is impractical to install waterproofing under an equipment framework, a 1/4-inch (minimum) bead of a clear non-hardening silicone sealant shall be applied around the exterior of the cable hole sheathing or equipment framework.

B. Cable Hole Covers

1.10 Generally, building surfaces (floors, walls and partitions) are the primary means of preventing the spread of fire from one location to another within a building. Cable holes in network equipment buildings need to be relatively large so that equipment cabling activity can occur in multi-floor and segmented equipment areas on a daily basis if necessary without having to continually plan and coordinate the provisioning of new cable holes. Intumescent sheets and steel cable hole covers are therefore used to effectively extend the building surface around large openings to close proximity of installed cable.

1.11 Unless otherwise indicated for a particular firestopping application, the annular space between cable and building surfaces shall be no more than 1/2-inch ($\pm 1/4$ ") in width so that a minimum of caulk or putty material is required to seal an opening. This 1/2-inch annular space is the distance between installed cable and 1) intumescent cable hole covers, and 2) steel cable hole covers at cable holes using bags as the firestopping medium.

1.12 Intumescent composite sheets can flex if large surface areas are subjected to sufficient vertical loading. A 1/8-inch thick (11 gauge) steel cover shall be used to protect the integrity of the putty seal around the installed cable bundle when the exposed surface area of an intumescent composite sheet measures 8-inches or more in two directions. Steel covers shall be sized per Fig. 2

Cable Slots

1.13 Cable slots are relatively long cable holes usually provided under office distributing frames and between interior building columns to provide horizontal flexibility with the planning and engineering of between floor cable runs. Cable hole sheathings, usually for 1'-0" x 2'-0" cable holes, are used to segment cable slots into smaller more manageable cable openings.

1.14 Occupied portions of cable slots shall be isolated from the unoccupied portion(s) by installing a steel partition between the floor's ceiling surface (ceiling cover plate) and the lower flange of the cable hole sheathing. A steel partition is not required if the occupied portion is firestopped via intumescent composite sheets AND the unoccupied portion is sealed in a manner that will prevent smoke from entering the cable slot from the floor below.

C. Caulks and Putties

1.15 Caulks and putties are considered secondary firestop components because they are used to seal small gaps and spaces between installed cable and building surfaces ensuring an opening is effectively sealed. Except for the expandable foam applications discussed later in this section, only water based 3M Fire Barrier brand intumescent caulk or putty shall be used to seal small spaces and gaps between installed cable and building surfaces, and as a smoke stopping medium.

(a) It is acceptable to use 3M solvent and water based putties in an end-to-end fashion for seals around cable bundles and cable hole covers, however, they shall not be mixed together as a single substance except at their junctions.

1.16 "High-temp" caulks (usually green in color) traditionally used with mineral wool filled bags shall not be installed as new or reapplied in network facility cable holes. Existing installations of non-intumescent caulks and sealants shall be replaced in their entirety when a cable hole is opened for cable installation/removal activity.

D. Smokestops

1.17 Smokestops are used to minimize and prevent if possible the migration of smoke and gaseous vapors through a cable hole. Generally, effective smokestops are only achieved when the interior voids of a tightly bound cable bundle are filled with intumescent putty where the cable bundle enters and/or exits a cable hole.

1.18 Unless otherwise indicated by the firestopping practices provided herein for a particular cable hole arrangement, smokestops are only required on one side of a cable hole, and should be installed on the side providing the greatest ease of installation.

1.19 The following general guidelines shall be followed to achieve an effective smokestop at a cable hole, regardless of the firestopping material used to seal the opening.

Copper and OFNR Cable Constructions

1. Apply approximately 2 linear inches of intumescent putty to each layer of cable during its installation so that all voids and valleys between adjacent cables are effectively filled. To avoid unnecessary buildup of cable bundles, the putty should be applied in rope form approximating the size of interior cable voids. Smokestopping shall extend approximately 1-inch from the exposed side of the opening after cable hole covers are installed.
2. Tightly band cables together with nylon cable ties or twine similar to that illustrated in SK-1 to compress the cable bundle and effectively marry smoke stopping material to form an air tight seal. The cable bundle shall also be tightly banded together at the other side of the opening to minimize the potential for individual cable movement and the disturbance of installed firestopping material. Cable protection practices may require wrapping some cable types with a protective sheeting before they are banded together. The use of nylon ties for this application of cable banding is preferred.

Fiber Optic Interconnection Cable

3. The interior voids of small (± 0.09 dia.) fiber optic cables routed through cable holes in open type raceways as illustrated in Figures 28 and 29 are not smoke stopped in the same way as copper cable constructions because of the relatively small interior voids they create, and the delicate nature of the cable's construction. Smokestopping is achieved by layering 2-inch wide strips of 1/8" thick intumescent putty pads across the cable raceway as shown in SK-2. The SK-2 putty installation arrangement also provides a means of filling a potentially large opening in the cable hole should the polymer jacketed conductors be consumed in a fire.

2. INTUMESCENT PRODUCTS

A. General

2.01 Water based Intumescent products are the preferred firestopping material because they require less labor intensive activity during installation and rework to achieve an effective firestop as compared to the traditional mineral wool bag firestopping methods. Additionally, their ability to function as an effective firestopping product over time is not usually compromised by repeated handling and rework.

2.02 Intumescent products are proprietary materials formulated to produce a specific chemical reaction or physical response when exposed to high temperatures. For this reason, the intumescent products of different manufacturers **shall not** be used in the same cable hole and should not be used in the same network equipment building for firestopping cable holes covered by this section (refer to 1.01 and 1.16). This is to ensure that the established performance characteristics of a particular product will not be altered by the introduction of another manufacturer's product in the same cable hole. Because building service type through-penetrations are usually installed under the direction of the real estate organization by non-network equipment installation contractors, it is possible and acceptable that the firestopping products and methods used at building service type cable holes be different than those used with network related cable holes. However, it is not likely or expected that those products will be intermixed.

2.03 Generally, intumescent products will:

Expand from 5 to 10 times their size in volume,
Begin a volumetric expansion when temperatures exceed 250° F,
Release chemically bound water in the form of steam when temperatures exceed 600° F, and
Become fully expanded and form a hard char when temperatures reach 1000° F for 5 minutes.

2.04 Unless otherwise indicated, an intumescent cover is required on both sides of large openings in walls and floors. Intumescent putty is used to fill all voids and spaces between penetrating items and between penetrating items and the building surface. Generally, a single intumescent sheet will stop the spread of flame for a minimum of two hours. However, a second intumescent sheet is required to prevent more than a 325° F rise in ambient temperature on the unexposed side of an opening.

2.05 The following is a description and general application of products referenced throughout this section. Approved for use 3M Company product identifiers are used to aid with the referencing of manufacturer provided product documentation.

- CS-195+ COMPOSITE SHEET - 1/4-inch thick metal faced sheet of intumescent material used for sealing relatively large cable holes.
- MPP MOLDABLE PUTTY PADS - 4" x 8" x 1/8" individual pads of intumescent putty used for sealing relatively small cable holes and areas, and as a smoke stopping medium.
- MPS-2+ MOLDABLE PUTTY STIX - 1-1/2" dia. x 12" long rolls of intumescent putty used for sealing larger annular gaps and spaces.
- CP-25WB+ CAULKS - One part intumescent caulking. Due to its hardness when cured it is used primarily for **permanently** sealing relatively small cable holes and areas between a cable hole and its penetrating items.
- FS-195+ WRAP STRIP - 2" x 24" x 1/4" strips of foil faced intumescent material used for wrapping non-metallic penetrants.
- RC-1 RESTRICTING COLLAR - 4.6 in. x 25 ft roll of 30 gauge galvanized steel sheet precut and drilled used for encapsulating FS-195 wrap strips tightly around non-metallic pipe at cable holes with little or no annular space.

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- **ULTRA PPD PLASTIC PIPE DEVICE** - Manufactured one piece firestop device incorporating ULTRA GS wrap strip and a restricting collar. Available for plastic pipe having inside diameters of 1-1/2, 2, 3, and 4 inches.
- **T-49 TAPE** - Adhesive backed aluminum foil tape used for sealing seams of firestopping products and for the physical protection of certain plastic materials from solvent based intumescent products.
- **FB-2000+ Silicone Sealant** – A flexible sealant having electrical insulation properties after curing. Used as a surface covering for other firestopping products such as mineral wool and ceramic silica.

B. Preparation of Large Floor Openings

2.06 Fig. 3 and Fig. 4 illustrate how large rectangular cable holes in building floors are set up for intumescent firestop products. It is preferred that existing ceiling cover plates be used to support drop-in intumescent cover plates placed at the bottom of an opening. The bulk of an existing ceiling cover plate should be cut away so the ceiling plate provides an approximate 2-inch wide ledge around the inside of the opening at both ends and across the side of the opening opposite the cable bundle as shown in Fig. 3. This continuous support ledge minimizes intumescent cover flexing when putty is placed around the interior of the opening.

2.07 As an alternative to the use of modified steel ceiling plate covers, stirrups similar to those shown in Fig. 4 may be installed within a cable hole to support drop-in covers. Support stirrups shall position the drop-in cover approximately flush with the ceiling line for floors 8-inches or less thick. Drop-in covers need only be installed in an opening to a depth of 8-inches for floor and cable hole constructions deeper than 8 inches. Five stirrups are required inside a standard 1'-0" x 2'-0" cable hole. Support stirrups shall be installed around the interior of the opening approximately 12-inches apart in the preferred or alternate locations shown in Fig. 4.

Note: Figures 3 and 4 assume a minimum of one layer of cable is installed across side A of the cable holes. A support stirrup shall be used to support drop-in covers along side A when the distance between installed cable and either side of a hole is 12-inches or more. This support stirrup shall be removed when it interferes with subsequent cable additions.

C. Repair and Replacement After Activation

2.08 Intumescent products shall be checked for activation if an equipment area or cable hole has been exposed to fire or a temperature in excess of 250° F. The person performing the check should look for product charring and swelling and;

- (a) If it is determined that any part of a composite sheet has been activated, the entire sheet shall be replaced.
- (b) If it is determined that any part of putty installed in rope fashion has been activated, the activated putty shall be replaced to a point 6-inches beyond each side of the activated area.
- (c) If it is determined that any part of putty or caulk installed in void areas surrounding cable in a cable sleeve has been activated, the material shall be replaced in its entirety.
- (d) If it is determined that putty installed at or interior to cable bundles has been activated (and there is no need for cable replacement), only as much as possible of the activated and

adjacent material should be replaced. The term "as much as possible" shall be governed by the ability of a craftsperson to disturb a cable bundle without applying excessive pressure to working network circuits. Only blunt instruments shall be used to remove firestopping material from and around cable bundles.

- 2.09 Activated intumescent material shall be treated as normal refuse during clean up operations. Only inactivated solvent based intumescent material requires incineration or burial in suitable containers in accordance with hazardous waste treatment guidelines.

D. Safety Precautions

- 2.10 Solvent based intumescent products can cause burning of the eyes. Prolonged contact with solvent based products can cause skin irritation and dryness. Use adequate ventilation and avoid contact with eyes, skin and clothing when working with solvent based intumescent products. Wash hands thoroughly after working with all intumescent materials.

3. MINERAL WOOL/CERAMIC FIBER PRODUCTS

A. General

- 3.01 Although the use of intumescent firestop products is preferred, the use of mineral wool batting and pillow type firestop arrangements are acceptable from a fire protection perspective. However, intumescent putty shall be used to fill all void spaces within cable bundles and between the cable bundle and cable hole cover plates.
- 3.02 FR-75/CK5048 mineral wool filled bags may be used for the maintenance of established cable holes already using this method of firestopping. Each bag is approximately 12-inches square, 1-inch thick, blue in color, and weighs about 21 ounces.
- 3.03 Mineral wool or ceramic silica fiber batting may also be used to firestop openings that do not have ceiling plates such as slots and sleeves above a cable vault and under an office distributing frame, and at interior cable slots between building columns. Mineral wool/ceramic fiber products are also used in concert with intumescent products for certain cable hole applications. Batting material should have a minimum density of 6 pounds per cubic foot. See part 5J.

B. Safety Precautions

- 3.04 The use of eye protection and dust masks is mandatory when working with unwrapped (bound or treated) mineral wool and ceramic fiber fire protection products.
- 3.05 Mineral wool and ceramic fiber products shall never be installed in openings above human work spaces or network equipment unless the products have been wrapped with aluminum foil or otherwise treated to minimize product "dusting" conditions. Wrapping of mineral wool/ceramic products shall be performed in an area more than 10 feet from network equipment and people workstations.

4. EXPANDABLE FOAM PRODUCTS

A. General

4.01 Expandable foams are proprietary two-part mixtures of room temperature vulcanizing (RTV) silicone products which cure to a free blown density ranging from 15 to 20 lb./ft³ within a 1 to 3 minute time frame. Expandable foams are acceptable firestopping products for cable holes that do not require repeated entry such as those under office distributing frames and in cable entrance facilities or other outside plant environments. Holes made in cured expandable foam for subsequent cable installation should be no more than ± 1 -inch larger in diameter than the cable to be installed in the opening.

4.02 Fig. 26 illustrates the **permanent** firestopping of cable holes using expandable foam products and the subsequent installation of cable in such openings. Firestopping is accomplished by mixing and applying products according to the instructions provided with the firestopping kits. Sufficient product shall be applied to a cable hole so that after expansion the product completely fills openings up to 7-inches in depth, or is a minimum of 7-inches thick in openings greater than 7-inches in depth. The forming board referenced in Fig. 26 shall be removed after complete cure of the expandable foam product.

B. Safety Precautions

4.03 In all cases and for all chemically reactive products like expandable foams used in network equipment environments, the manufacturer's instructions for the proper handling and use of their product shall be strictly adhered to.

5. FIRESTOPPING CABLE HOLES

A. General

5.01 This part provides the guidelines and requirements for firestopping network related through-penetration arrangements normally encountered in network equipment buildings. A copy of the Request For Technical Assistance form included with this section should be used to obtain technical assistance for cable hole arrangements that are not the same or very similar to those described in this section.

5.02 A relatively air tight seal shall be provided between the building surface and any cover plate installed over a cable hole in a fire rated building surface. To accomplish this, a 1/4-inch (minimum size) bead of intumescent putty or approved sealant shall be applied to the perimeter of cable hole sheathings at cable holes in building floors, and at both sides of cable holes in building walls and partitions **before** cable hole covers are installed. For drop-in cover applications illustrated in Fig. 6 and Fig. 7, a 1/2-inch (minimum size) bead of intumescent **putty** shall be applied to the top surface of the drop-in cover at the interior perimeter of the opening.

5.03 As illustrated in Fig. 6, a continuous wedge shaped dome of intumescent putty having a minimum thickness of 1/2-inch shall be applied to the perimeter of all cable bundles where they interface with a CS-195 composite sheet or a steel cable hole cover.

B. Large Openings

Intumescent Method

5.04 Large cable holes in floors and walls shall be firestopped with intumescent products as shown in Fig. 3 through 7, 28 and Fig. 29.

Wall Covers

- 5.05 Intumescent covers for cable holes in walls shall be installed with their **foil side** facing into the opening and fastened directly to the building surface with fender washers and 1/4-inch diameter fasteners appropriate to the wall's construction. 1-1/2-inch long wood screws shall be used with wood framed wall constructions. Wall covers shall extend a minimum of 2-inches beyond each side of the opening. All cable hole cover cutting operations shall be done in an area more than 10 feet from network equipment.
- 5.06 Cover fastening hardware shall be spaced no more than 6-inches apart with a fastener located as near each corner of the opening as possible. Additionally, the intumescent material of the cover shall completely surround the cover's mounting hardware.
- 5.07 As shown in Fig. 5, wall openings shall have 2-piece covers. The bottom section of covers shall be sized so the joint between the top and bottom pieces is approximately 1/2-inch above the height of the initial cable pileup. The purpose of this cover arrangement is to cause as much of the lower (fixed) cover to remain in place and undisturbed when a wall opening is subsequently entered to add or remove cable.

Floor Covers

- 5.08 A **single piece** drop-in composite sheet shall be placed at the bottom of cable holes in building floors. Drop-in covers shall be installed with their **foil side facing UP** into the interior of the opening, and shall be cut so there is no more than a 1/4-inch gap between the cover and the sides of the cable hole to enable easy cover removal and installation. The use of snug fitting drop-in covers shall be avoided in all cases. Drop-in covers shall be fastened to their support apparatus with 1/4-inch diameter sheet metal screws and fender washers.
- 5.09 Composite sheet top covers shall be installed with their **foil side facing DOWN** into the cable hole, and shall be cut to a size that is equal to or slightly smaller than the cable hole's steel cover plate or sheathing. It is acceptable to fabricate the top covers from more than one piece of composite sheet to avoid product waste. Multi-piece top covers are fabricated in the same manner as the multi-piece wall covers illustrated in Fig. 5 except that sheet metal screws used to fasten adjacent pieces together shall not interfere with the flat installation of the cover itself or a steel plate placed over it.
- 5.10 Except when used with steel cover plates, intumescent cover fastening hardware shall be spaced no more than 6-inches apart with a fastener located as near each corner of the opening as possible. When steel cover plates are also used at floor openings, cover fasteners may be spaced up to 9-1/2-inches apart. Additionally, the intumescent material of the composite sheet shall completely surround the cover's mounting hardware.

Mineral Wool Method

- 5.11 Maintenance of mineral wool firestops shall be accomplished as illustrated in Fig. 8, Fig. 9, and Fig. 10. Mineral wool filled bags shall be deliberately placed in overlapping fashion the full depth of cable holes and packed into all voids around the cable bundle. Additionally, the cable hole shall be overfilled by a minimum of one layer of bags and firmly packed into the opening. The opening shall then be sealed with a 1/8-inch thick steel cover plate, and intumescent putty as discussed in 1.11, 1.12 and 5.02. Covers shall be installed using all fastening holes provided in the cover.

5.12 Fig. 11 illustrates the firestopping of continuous slots not having ceiling plates such as those sometimes used above cable vaults under office distributing frames. For such applications mineral wool batting is tightly packed into the slot the full depth of the floor, or to a depth of 12-inches for building slot constructions deeper than 12-inches. Cable slot packing material shall be placed in the slot(s) in over lapping fashion so there are no vertical seams or joints between layers of packing material. For such applications the cable bundles are tightly bound at both sides of the cable slot and smokestopping is applied to cables where they pass through the steel cable hole cover plate.

C. Small Rectangular Openings

5.13 Fig. 12 illustrates the firestopping of small rectangular openings up to 4 x 10 inches in size such as those used above cable vaults under office distributing frames in concrete floors 12-inches or more in depth, and in concrete/masonry walls 8-inches or more thick where a limited amount of cabling is being provided for. For such applications smokestopping is applied to the cable bundle at both sides of the opening as a firestopping attribute. The interior void space between the cable bundle and the building surface is tightly packed with mineral wool or ceramic fiber batting material. A 1-inch minimum depth of intumescent putty shall be applied to the annular space between the cable bundle and the building surface at the floor line of floor penetrations, and on both sides of wall penetrations.

D. Circular Openings

Cable

5.14 Figures 13 thru 17 illustrate the various methods of firestopping the common circular opening or cable sleeve arrangements encountered in network facilities. The cable sleeve arrangements illustrated do not depict caps or insulating bushings that may be affixed to the cable sleeves for cable protection purposes. Cables shall be rigidly supported on both sides of circular openings to minimize cable movement and the potential disturbance of installed firestopping components.

5.15 Fig. 17 illustrates the method of firestopping circular openings added in a framed wall during the course of an equipment growth or rearrangement job to accommodate small amounts of cable. For such applications, 4-inch diameter EMT conduit or 28 gauge galvanized sheet steel may be used to form a cable hole sleeve. The metallic sleeve shall extend a minimum of 1/2-inch beyond the exposed surfaces of the wall and shall not be closer than 3 inches to a wall stud. The maximum hole size permitted for Fig. 17 applications is nominally 4-inches. Should it be necessary to add an additional sleeve adjacent to an existing Fig. 17 assembly during the life of an office, the new sleeve shall be located a minimum of 2-inches from any existing sleeve.

Non-Metallic Raceways

5.16 A combination of intumescent wrap strips and intumescent putty or firestop device assemblies is used to firestop circular openings containing non-metallic raceways. Wrap strip material is tightly layered around the raceway and intumescent putty is then used to seal all gaps and spaces between layers of wrap strip and between the raceway and the building surface. Firestopping material shall be applied to non-metallic raceways at both sides of wall openings.

5.17 The ends of each layer of wrap strip shall be butted together and temporarily held in place with foil faced tape, steel wire, or equivalent products. The butted seams of multiple wrap strip layers shall be offset from each other approximately 1-inch as shown in Fig. 25(C). The layered wrap strip assembly is moved into its final position on the raceway after the required number of wrap strip layers are applied to the raceway. Two stacks of layered wrap strip butted end-to-end are required with non-metallic raceways larger than 4-inches. Refer to Table 1 for wrap strip layer application requirements. Those who determine firestop material requirements for through penetration applications should consider the use of plastic pipe devices (ULTRA PPD's) in place of wrap strips and restricting collars to facilitate material ordering and installation (see 2.05).

Table 1

Application Of 3M FS-195 Wrap Strip To Non-Metallic Raceways			
Raceway Size			No. Of Wrap Strip
PVC	ENT	Sq. or Rectangle	Layers
1/2 to 2"	≤ 1-1/4"	≤ 3 sq. in.	1
2-1/2 to 3"	1-1/2 to 2"	3 to 7 sq. in.	2
3-1/4 to 4"	Bundles of ≤ 2" (7 max.)	>7 to 12-1/2 sq. in.	3
6"		13 to 28 sq. in.	2 stacks of 3
8"		> 28 sq. in.	2 stacks of 4

5.18 Although circular raceways are used in the examples provided in this section, the firestopping methods are also applicable to square and rectangular non-metallic raceways used for ac electrical conductors. To minimize firestop disturbance for ac electrical conductor applications, that portion of square and rectangular raceways installed in a cable hole shall be equipped with a section of the detachable cover normally used with the raceway system. That section of the raceway cover installed in the cable hole shall extend out from the building surface a minimum of 1/2-inch for composite sheet applications and 2-inches for wrap strip applications. Intumescent putty shall be applied to the junctions of raceway covers at the cable opening.

5.19 Fig. 18 thru Fig. 20 illustrate the firestopping of circular openings containing single runs of continuous PVC or ABS type non-metallic raceways. Fig. 18 is applicable to 1/4-inch annular space openings in framed walls and in concrete/masonry floors and walls. Fig. 19 is applicable to openings in concrete/masonry floors and walls having an annular space between 1/4- and 1-inch. For framed wall constructions, Fig. 19 shall be used in conjunction with a Fig. 17 metallic sleeve. Fig. 20 illustrates the firestopping of an opening when the annular space between the raceway and the building surface is between 1-inch and up to a maximum of 3-inches, is applicable to all types of building construction, and cable hole shapes up to 64 square inches in size. For Fig. 20 applications the length of any one side of the cable opening shall not exceed 8-inches.

Note: Steel wrap strip supports shown in Fig. 19 are not required with raceways ≤ 2-inches in diameter with ≤ 3/8-inch annular space in the opening. For such assemblies, the wrap strip is placed into the opening with the annular space filled with a 2-inch minimum depth of intumescent putty.

5.20 Fig. 21 illustrates the firestopping of circular opening in a framed wall containing a 2-inch maximum diameter non-metallic raceway with a maximum annular space of 3/8 of an inch. The Fig. 18 wrap strip firestopping method shall be used to firestop non-metallic raceways greater than 2 inches in diameter in framed wall openings.

Metallic Raceways

5.21 Fig. 22 illustrates the method of firestopping a circular opening containing a single continuous run of metallic raceway in concrete/masonry floors and walls. The use of intumescent putty as the only fire protection material is acceptable only when the annular space between the conduit and the building surface is less than 3/4 inches. Mineral wool material shall be tightly packed into the opening when the annular space is between 3/4- and 1-inch (maximum permitted size of the annular space for Fig. 22 applications).

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5.22 Fig. 23 illustrates the method of firestopping a circular opening containing a single continuous run of metallic raceway in framed wall constructions. Multiple raceways can be installed in a single framed wall opening incorporating the Fig. 17 steel sleeve method of firestopping. For such applications a smokestop shall be installed at both sides of the opening.

5.23 Cable holes containing square or rectangular metallic raceways are firestopped using the methods illustrated herein for round metallic raceways. Refer to 5.18 for information regarding raceway covers.

E. Flexible Non-Metallic Tubing

5.24 Flexible non-metallic tubing products commonly used in network facilities are Electrical Non-metallic Tubing (ENT) and inner duct type raceways used for the physical protection of fiber optic cables. Flexible non-metallic tubing must be rigidly supported (held in place) and wrapped with intumescent wrap strip material where it passes through a cable hole. Refer to Table 1 and Figures 24 and 25 for additional wrap strip application information.

5.25 Fig. 24 applies to large cable holes having intumescent sheet covers. Two separate bands of tightly wound steel wire is used to hold the intumescent wrap strips in place for Fig. 24 applications. Fig. 25 firestopping methods shall be used at circular openings in floors and walls. For such applications and depending on the construction of the opening, the wrap strip assembly shall be supported at the opening using the steel collar or support stirrup methods referenced in Fig. 18 and in Fig. 19.

F. Bus Ducts

5.26 Generally, cable holes equipped with an electrical busway or bus duct are firestopped using methods provided for large openings. The Request For Technical Assistance form provided with this section should be used to obtain specific firestopping requirements for bus duct arrangements that are not a straight forward application of intumescent covers and putty. It is a must that a complete dimensional description of the bus duct including the manufacturer's part numbers be included in the Penetrating Apparatus portion of the request for assistance form.

G. Void Cable Holes

5.27 Except as indicated below and in Fig. 27, cable holes that are void of penetrating items initially or as a result of cable mining activity shall be firestopped in the same manner as provided for occupied cable hole arrangements.

- a) Rectangular openings in floors shall be equipped with drop-in cover support around the entire periphery of the opening. Refer to 2.06 and 2.07.

H. Fiber Optic Cable Raceways

5.28 Fig. 28 and 29 illustrate the preferred method of firestopping rectangular openings containing fiber optic raceways and cable. Primarily, the difference between firestopping at a fiber optic raceway and traditional ladder type cable racks is the application of putty to installed cable build up. Figures 28, 29 and SK-2 apply to non-metallic raceway assemblies as well as the PBSD-ED-6002 metallic raceway assembly illustrated. Because of their construction and relatively small size, fiber optic raceways must be rigidly fastened to the building surface or other structural members immediately above and below cable holes in building floors to prevent raceway flexing and the disturbance of installed intumescent putty. The raceway support method shown in Fig. 29 is for informational purposes only. The physical positioning and supporting of fiber optic raceways in or at cable openings, and their relationship to other penetrating items is determined via cable rack/raceway engineering.

J. Cable Slots

5.29 The unoccupied portion of cable slots shall be firestopped by the methods used for occupied openings or by the use of two overlapping layers of batting. Batting shall be cut to a size 2-inches larger than the opening (minimum) to ensure a tight fit within the opening and overlapped to prevent vertical seams (air paths). When an unoccupied portion of a cable slot is activated, the batting may be removed or compressed into the remaining unoccupied portion of the opening.

6. PROTECTION OF CABLE RUNS

6.01 When the occupancy of an equipment space changes to one of an office or storage space, all network cable remaining in the space shall be appropriately protected from exposure to fire if a substantial amount of combustible material is expected to be in the converted area. Areas such as corridors, vestibules, break rooms, and restrooms would not normally require the use of cable run protection due to the expected absence of significant amounts of combustible materials.

6.02 Protection from exposure to fire should be accomplished by the use of early warning fire detection and alarm systems in converted equipment spaces. In those spaces where a fire detection system is not provided, protection for network cable may be achieved by enclosing open racks and raceways with a noncombustible material. Such enclosures must be custom designed and built according to the environment and the complexity of the cable runs being protected. It should be recognized that under this cable run protection arrangement there is usually no protection afforded the cables from a fire originating within the cable run enclosure unless it is explicitly engineered into the method of cable protection.

6.03 Requests for technical assistance with the design and construction of office cable rack enclosures should be communicated to:

Primary Contact
Manager - Common Systems Firestopping
Ph. (775) 324-5405 FAX (775) 333-4089

Alternate Contact
Director - Common Systems M&P
(925) 823-3717

7. Reasons For Reissue

This section was reissued to incorporate the following:

- 1.10, 1.11, 1.12, 1.14, 1.15, 5.01 - editorial
- 1.12 - Delete ref. to steel angle and add 8" ref.
- 1.15 (a) added
- 1.18 - "ease of installation" added
- 1.19(1), (2) – preferred M&P added
- 2.05 - change description of MPP and FS-195 products; Delete reference to FS-195-AA Wrap Strip; add ref. to FB-2000 product
- 2.06 - change support ledge size from 1" to 2"
- 2.07 – "similar" stirrup qualifier and Note added
- 3.02 – qualifier for continued use added
- 3.05 – "human work space" ref. added
- 5.02 – "approved sealant" ref. Added
- 5.03 – 1/2" ref. Added
- 5.06 – ref. to corners of openings added
- 5.07 – expected cable pileup ref. removed
- 5.08 – "fender washers" requirement added
- 5.09 and 5.10 – combined text
- 5.10 – added
- 5.11 – "all holes provided" requirement added
- 5.17 – reference to ULTRA PPD added
- 5.18 – reference to composite sheet and wrap strip applications added
- 5.26 – intumescent ref. added
- 5.27(a) – added
- 5.29 - added
- 6.03 – primary contact ref. added
- RFTA form revised
- SK-1 - add description; change location of bands; add smokestopping putty reference
- Fig. 2 - delete steel angle ref. and add min/max. reference
- Fig. 3 - change support ledge size and screw size; add Side A ref.
- Fig. 4 – change screw size; add Side A and S/MS005-160 ref.
- Fig. 5 – add S/MS05-160 and approved sealant reference; adjust fastener locations
- Fig. 6 – moved smokestop to top of opening; removed 1" putty ref.; added 1/2" putty ref.; added "along face of opening" ref. behind cable bundle.
- Fig. 7 – moved smokestop to top of opening and added mineral wool
- Fig. 8 – add approved sealant ref.; removed putty dimensions
- Fig. 9 – add approved sealant ref.; moved smokestop to top of opening
- Fig. 10 – deleted smokestop reference
- Fig. 11 – removed smokestop at ceiling and reduced mineral wool thickness requirement
- Fig. 12 – deleted smokestop at ceiling line of opening
- Fig. 13 – added mineral dam to closure
- Fig. 14 – remove closure at ceiling; add mineral wool dam; clarify location of firestop
- Fig. 15 – moved closure into opening at ceiling line; added mineral wool dam
- Fig. 16 – add "both sides of wall" and 6" sleeve extension reference
- Fig. 18 – add reference to ULTRA PPD for pipes 4" and smaller in diameter.
- Fig. 20 – closure moved to floor line; reference to Fig. 24 added in title
- Fig. 22 – removed reference to optional sleeve in opening; added 1-1/2" annular space reference
- Fig. 24 – added wrap strip closure to floor line of opening; removed closure at ceiling
- Fig. 27(a) – sleeve application clarified
- Fig. 27(b) – putty changed to caulk and mineral wool backing added

Change cable rack to solid construction and added UL design references throughout.

REQUEST FOR TECHNICAL ASSISTANCE

FIRESTOPPING NON-STANDARD THROUGH-PENETRATION ASSEMBLY

TELECOMMUNICATIONS FACILITIES

Date _____	Job Reference No. _____	Office CLLI _____	Floor _____
Office Address _____		Cable Hole Desig. _____	
Submitted By: _____		Company: _____	
Phone: _____		FAX: _____	
Response Needed By _____			

Provide requested information and **include a dimensioned illustration of the opening as it will be after cable/apparatus installation.**

Building Surface Construction: Floor ____ Wall ____ Thickness ____ F Rating (if known) ____
 Concrete - Normal Weight ____ Light Weight ____ Concrete Block ____ Brick ____
 Framed - Wood Stud ____ Metal Stud ____ Gypsum Wallboard ____ Layers ____ Thickness Each Layer ____
 Size Of Opening ____ Describe Hole Lining/Sheathing (if any) ____
 Other Building/Hole Construction Details:

Use Of Space On Both Sides Of Opening: Side A: _____ Side B: _____

Penetrating Apparatus: Raceway(s): Metallic ____ Non-Metallic ____ Cable ____

Raceway Description(s) Including Conduit Schedule Classification:

Cable: List Cable Type, Quantity, Diameter, Maximum Pairs, and AWG Size For Each Penetrating Item.

Function Of Firestop: Permanent Closing ____ Re-Enterable Closing ____

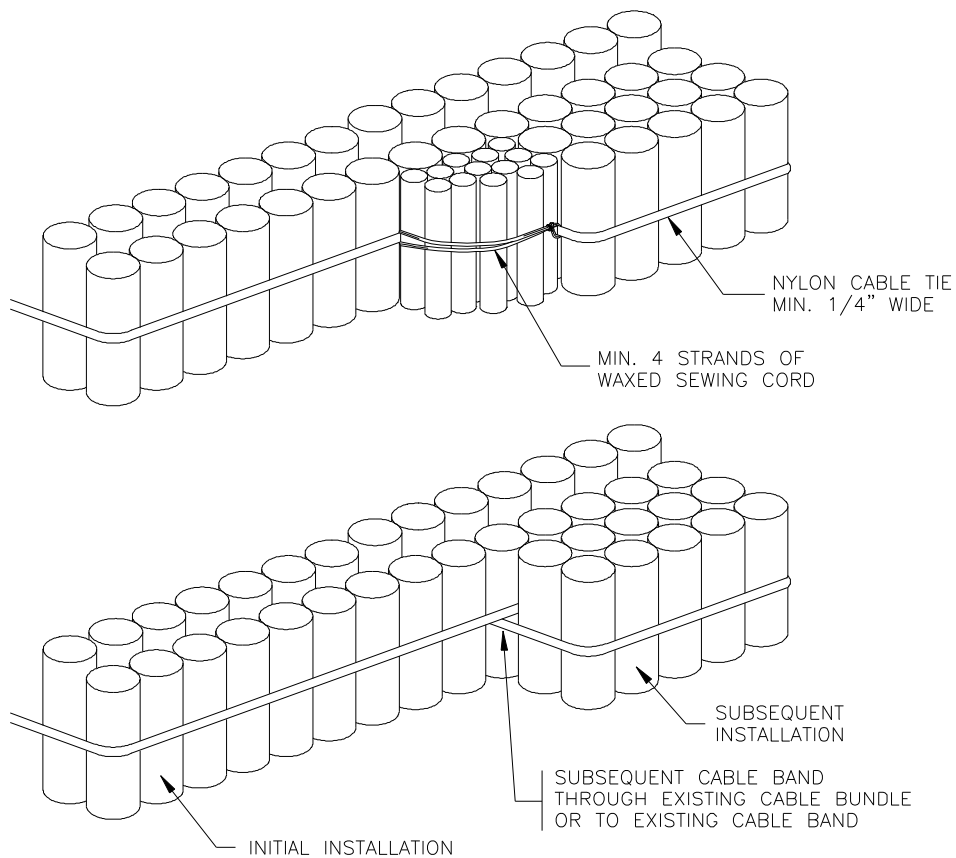
State the problem/situation:

State proposed resolution:

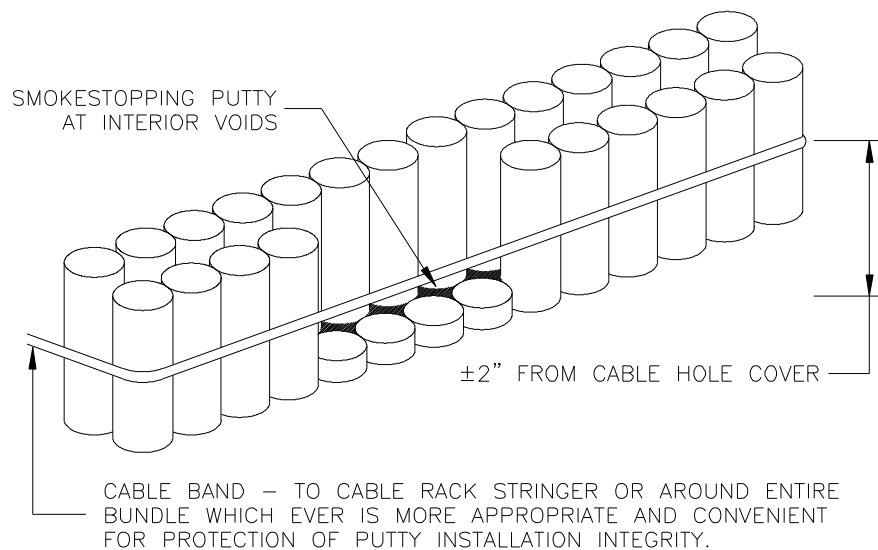
Send requests for assistance to:

Manager - Common Systems Firestopping RM B-120 645 E. Plumb Lane Reno, NV 89502
 Ph: 775-324-5405 FAX 775-333-4089 E-mail bm1924@nvbell.com

Approved ____ Comments _____
 Denied ____ _____



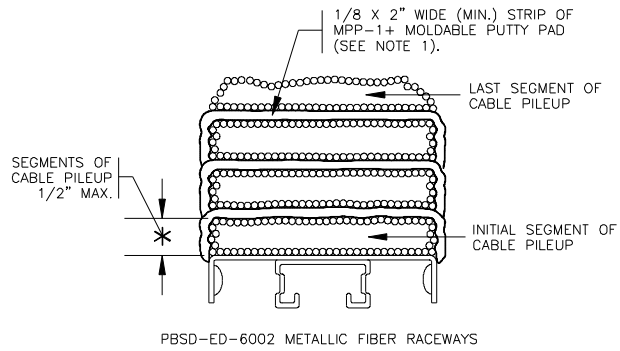
Banding Of Subsequent Cable Installations



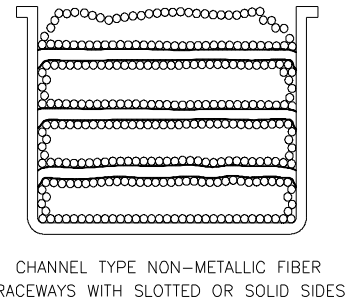
Banding Of Cable For Fire Protection Purposes

Application Of Cable Banding For Smokestop Purposes

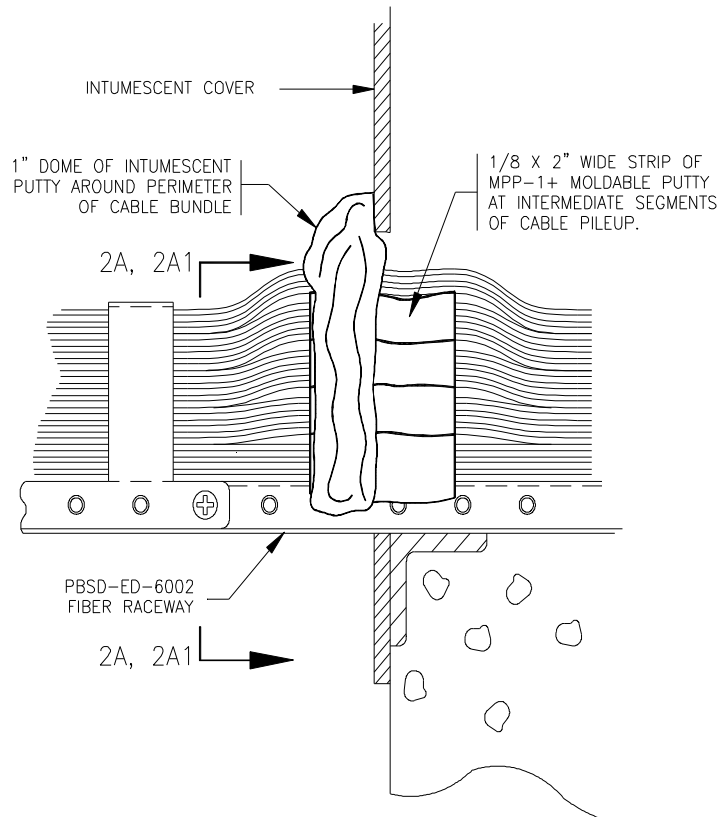
SK - 1



Sect. 2A - 2A



Sect. 2A1 - 2A1



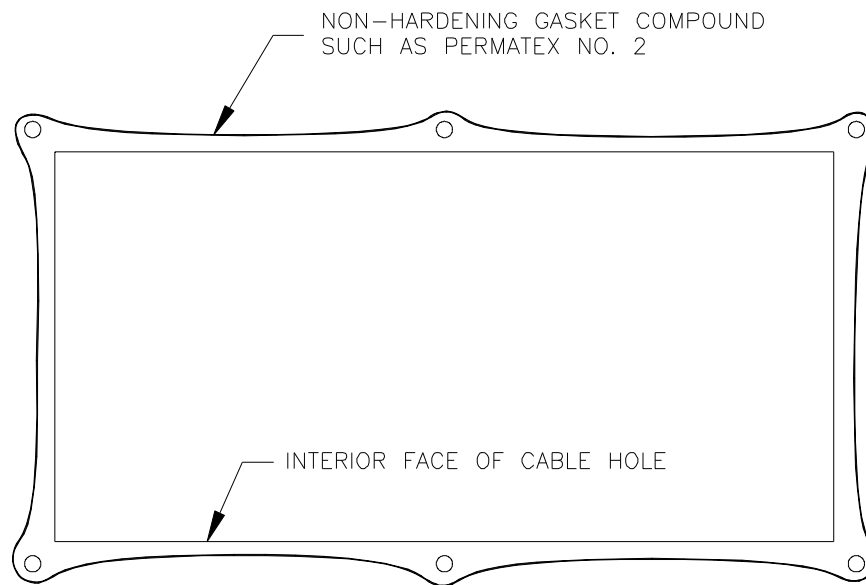
SIDE VIEW

BOTH SIDES OF WALL OPENINGS
CEILING LINE OF FLOOR OPENINGS

Note 1 - 1" nominal dome of intumescent putty used in place of 1/8 x 2" wide strips of putty pads at last cable pileup segment and at initial pileup segment until pileup reaches 1/2" in height.

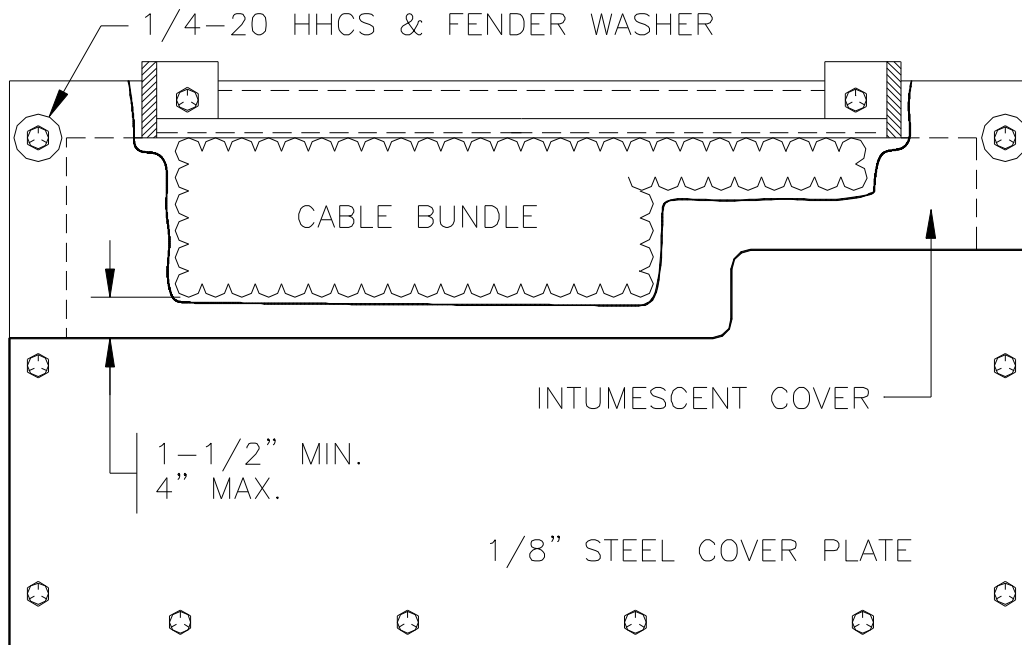
Smokestopping Small Fiber Optic Interconnection Conductors At Cable Holes

SK - 2



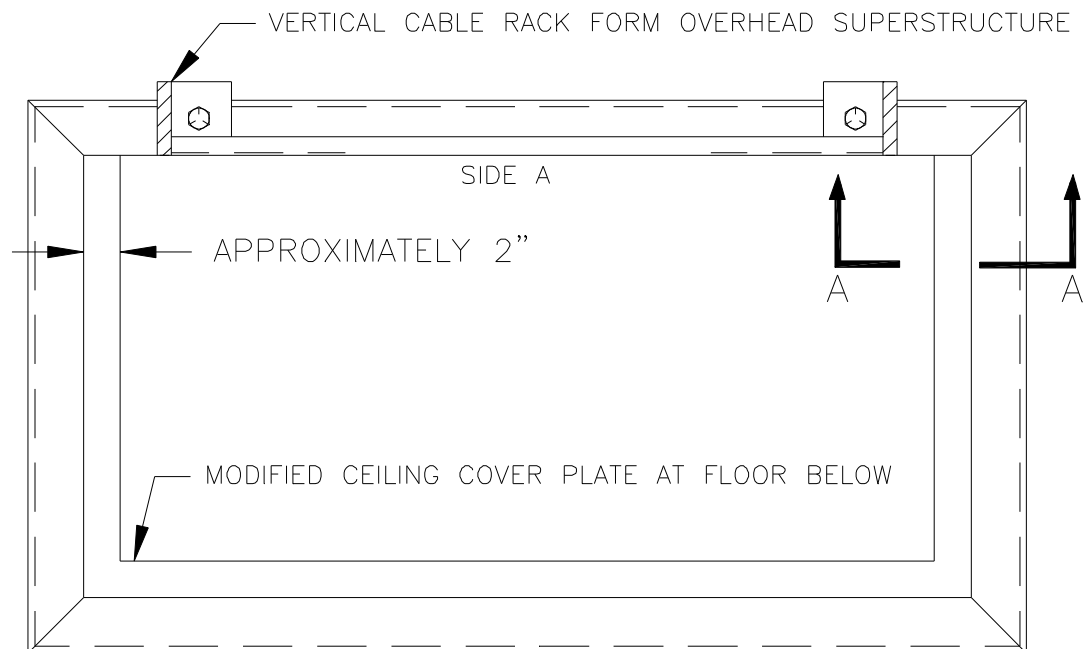
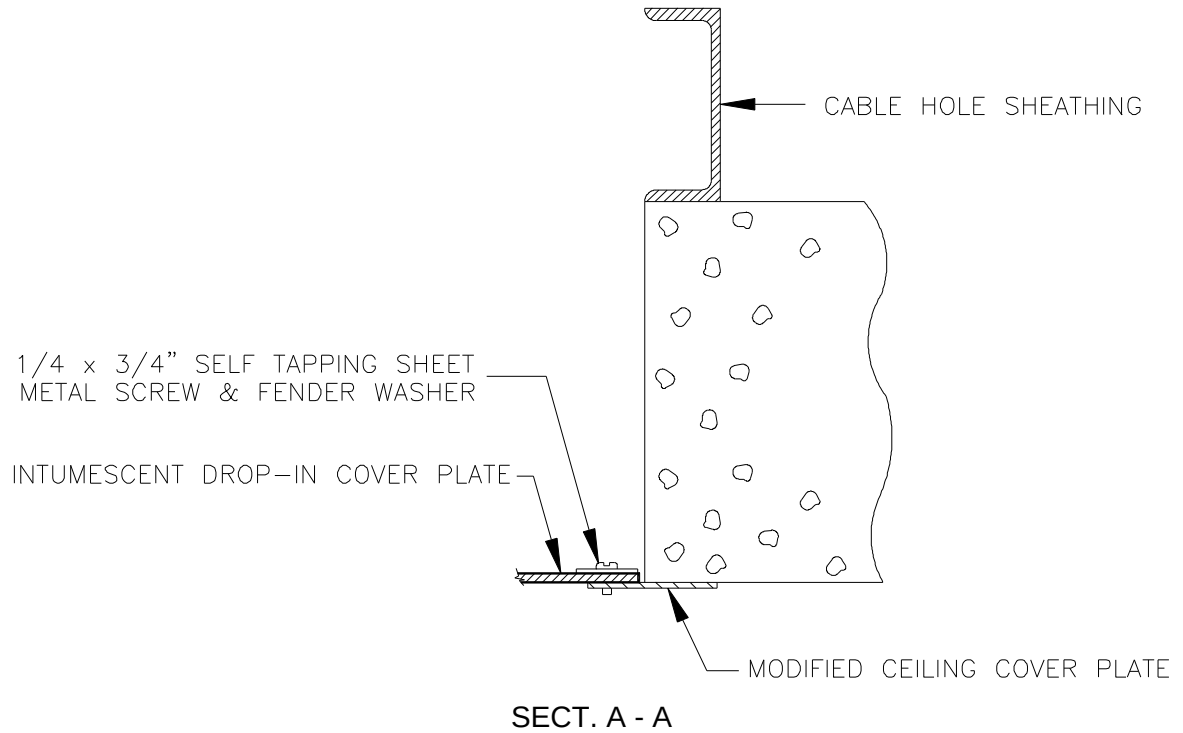
Typical Waterproofing Of Cable Openings

Fig. 1



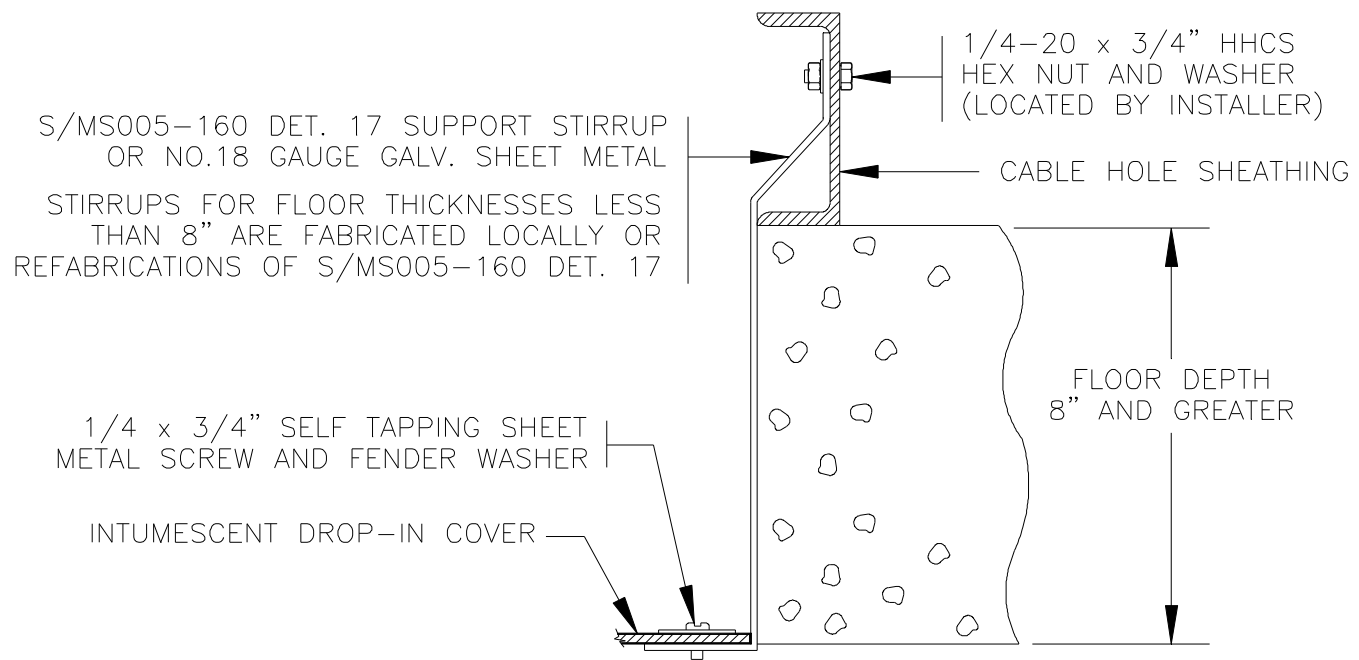
Protection Of Exposed Intumescent Covers At Cable Holes In Floors

FIG. 2

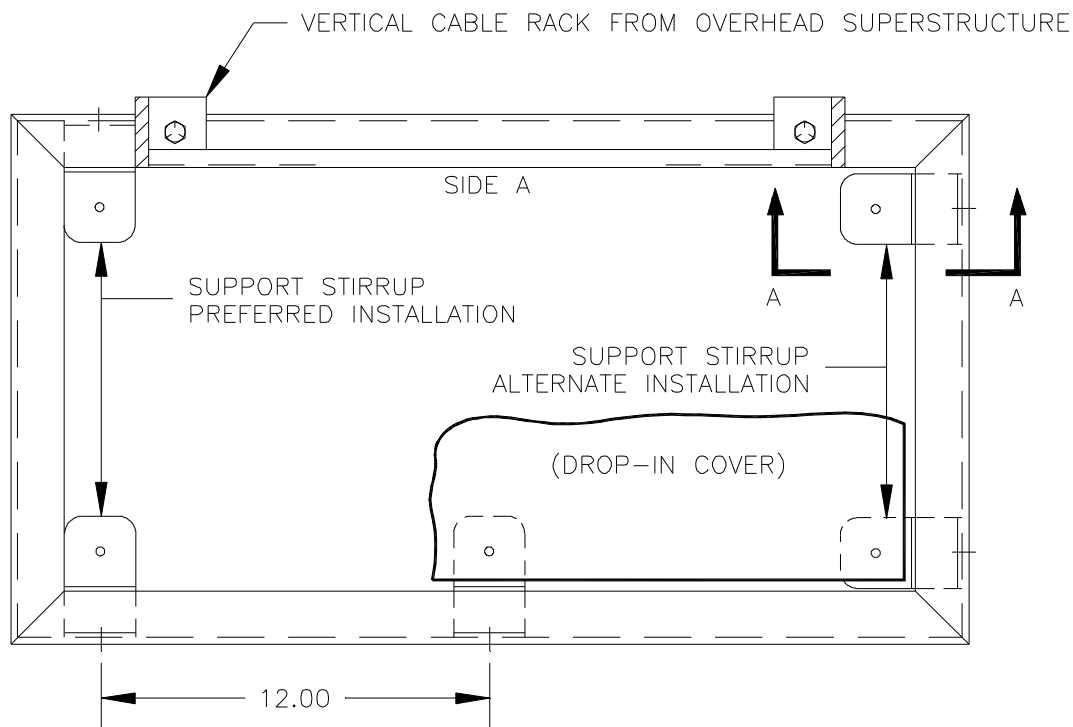


Cable Hole Set-Up For Intumescent Firestop Products Using Existing Steel Cable Hole Ceiling Plate

Fig. 3

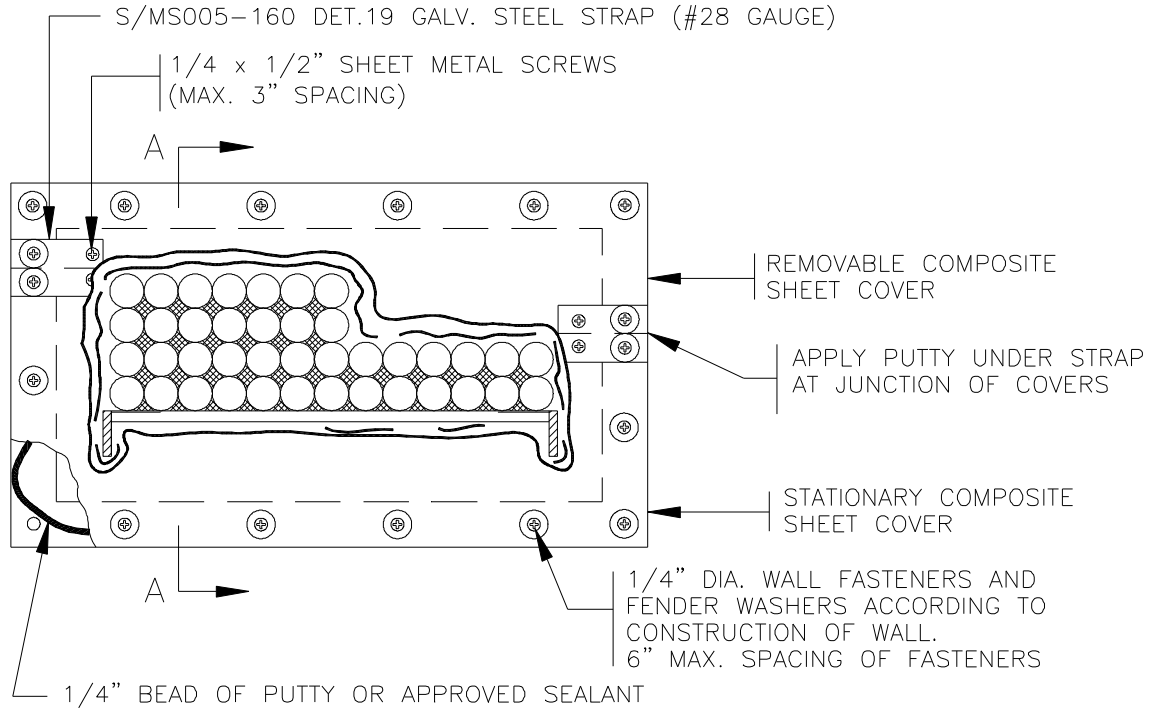
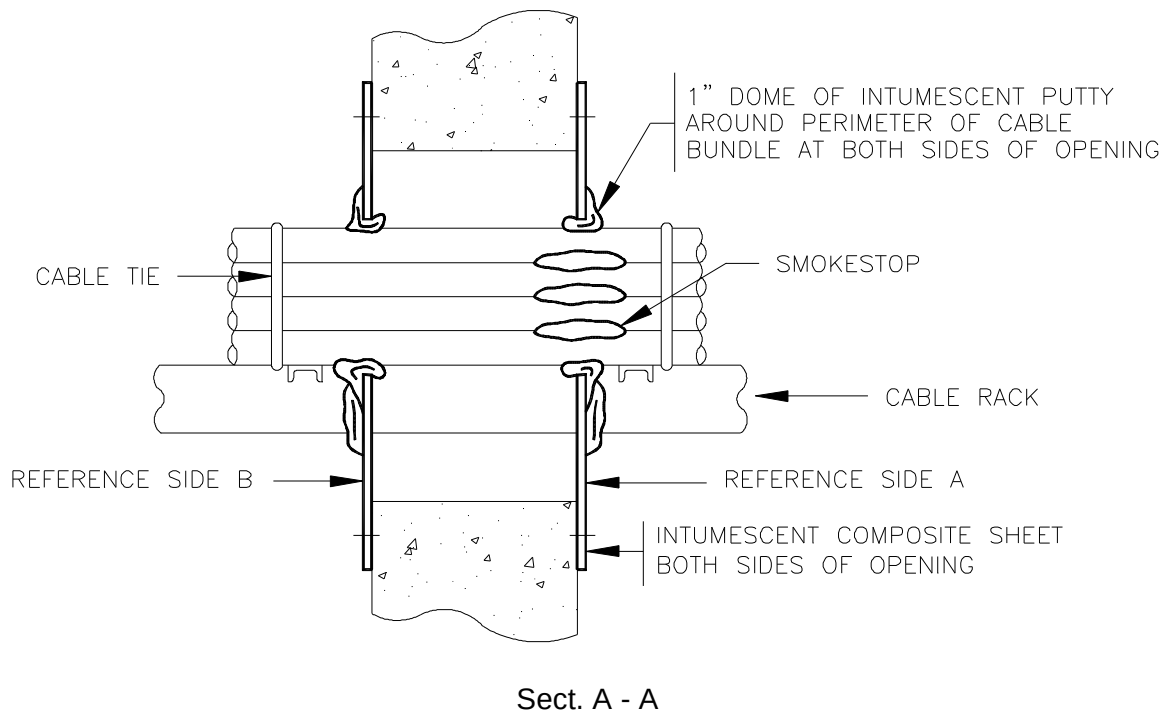


Sect. A - A



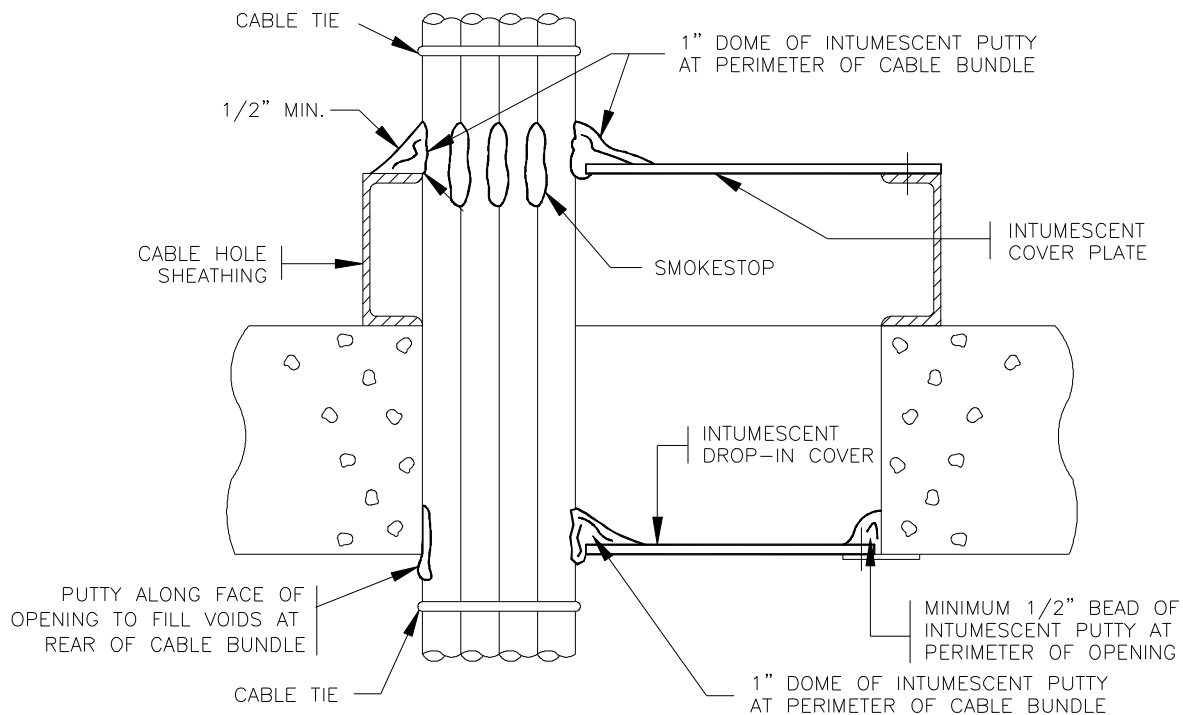
Cable Hole Set-Up For intumescent Firestop Products Using Support Stirrups (Floor Depth 8" Or More Shown) – FB-3004

Fig. 4

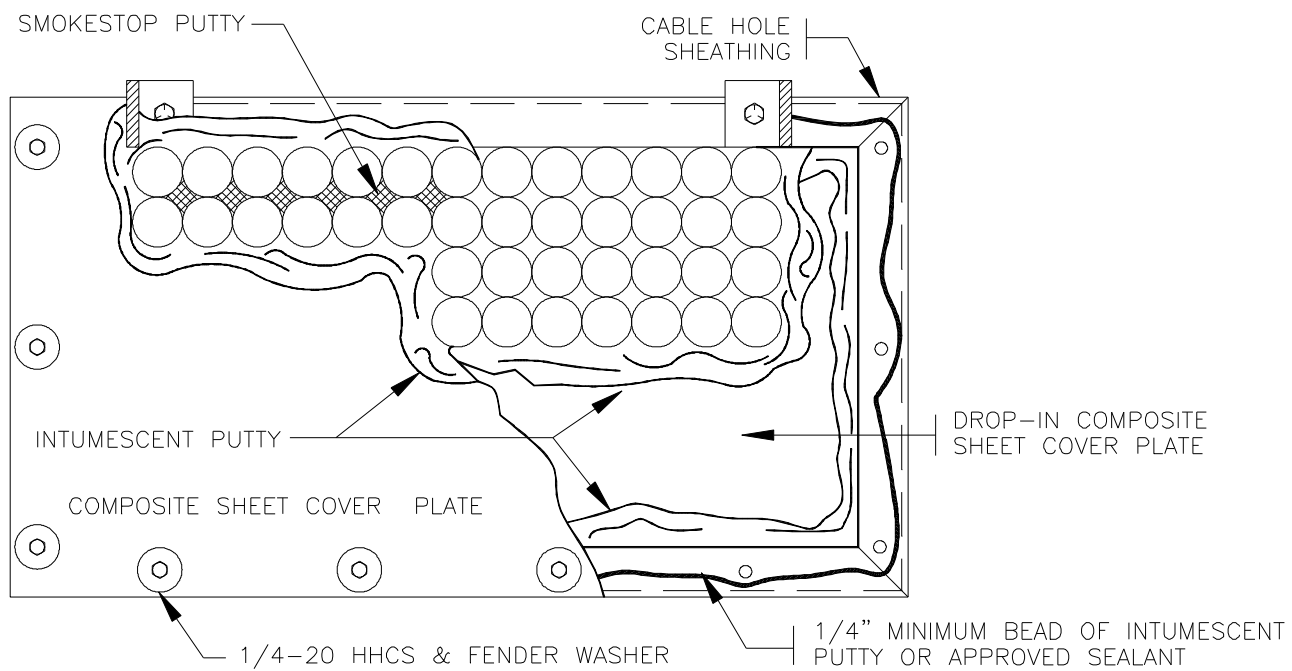


Firestopping Large Wall Openings - All Surface Constructions – CAJ-0004 / FB-3004

Fig. 5

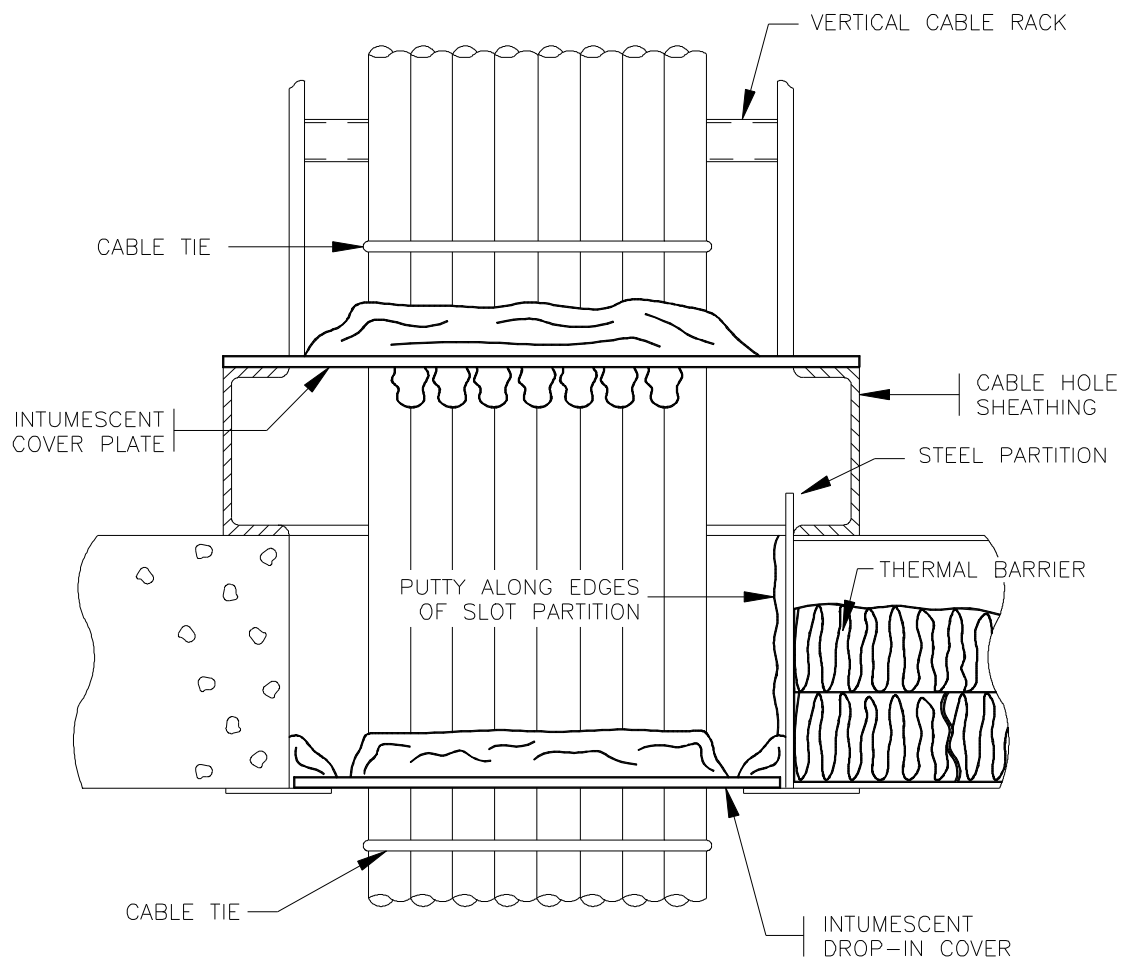


Cross Section Through Floor



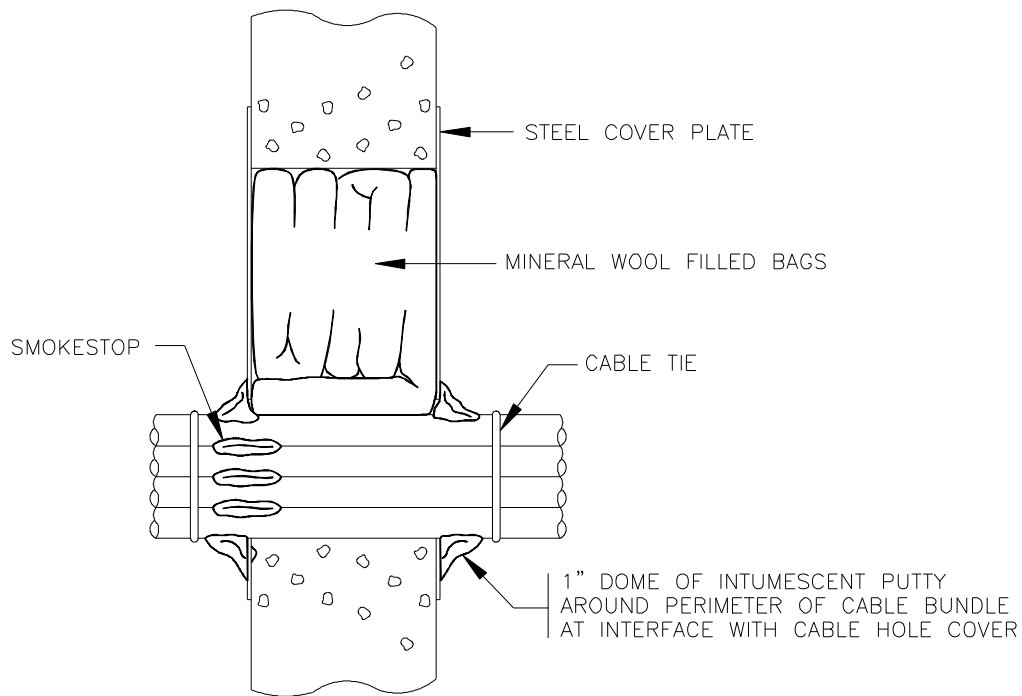
Firestopping Large Floor Openings - All Surface Constructions – CAJ-0004 / FB-3004

Fig. 6

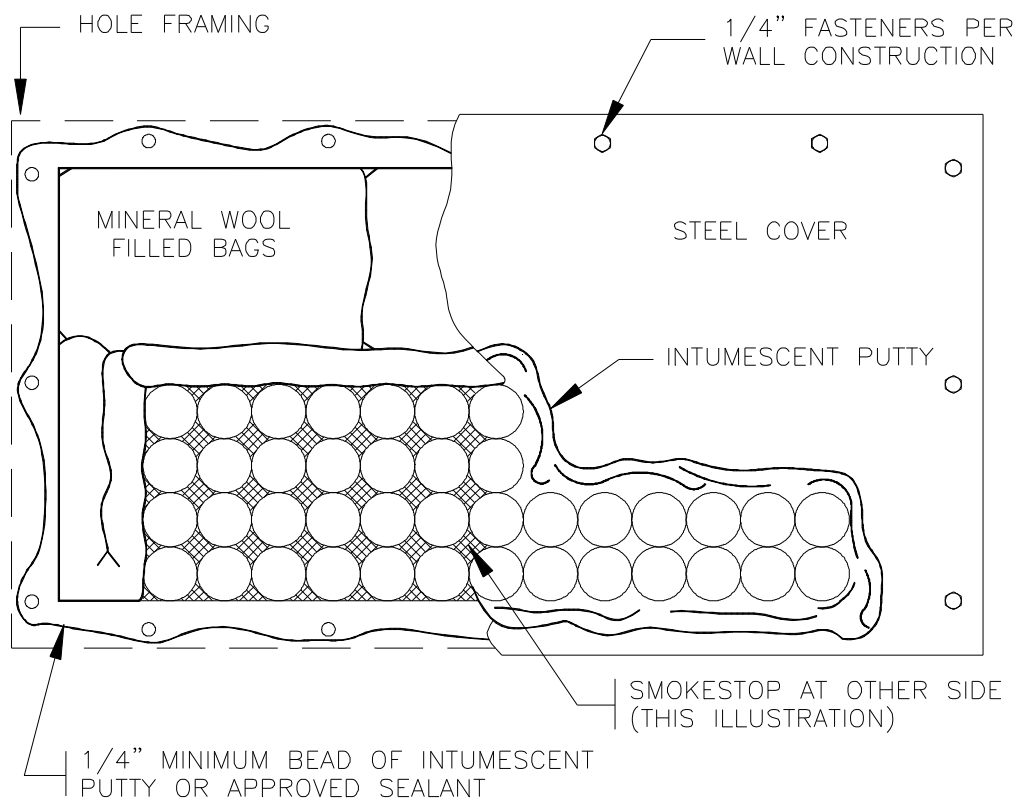


Firestopping Large Floor Openings At Cable Slots - Intumescent Products
(Otherwise Same As Fig. 6)

Fig. 7

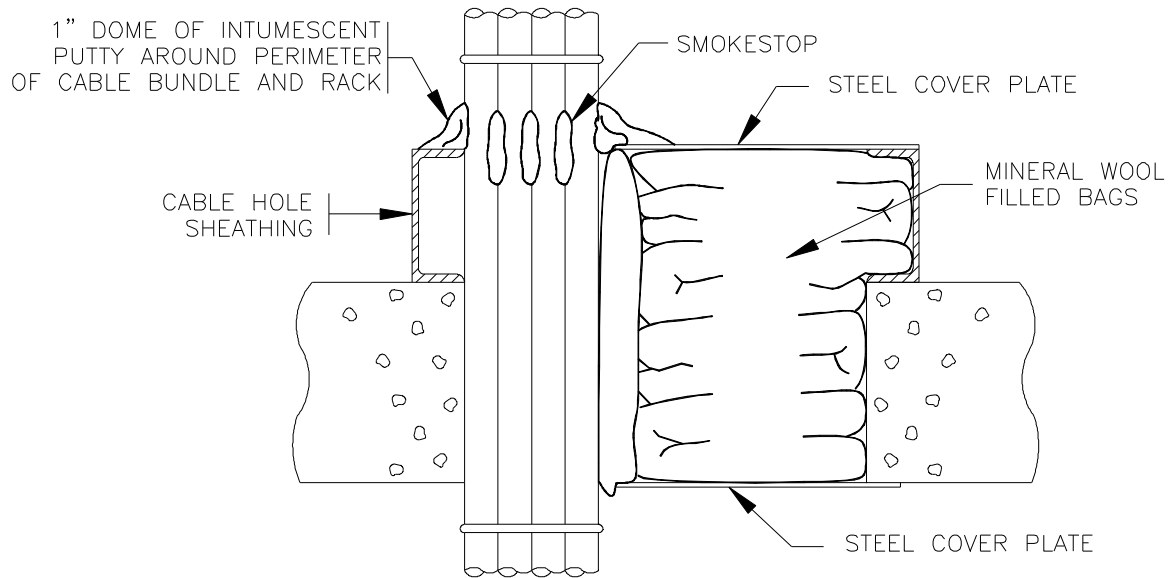


Cross Section Through Wall

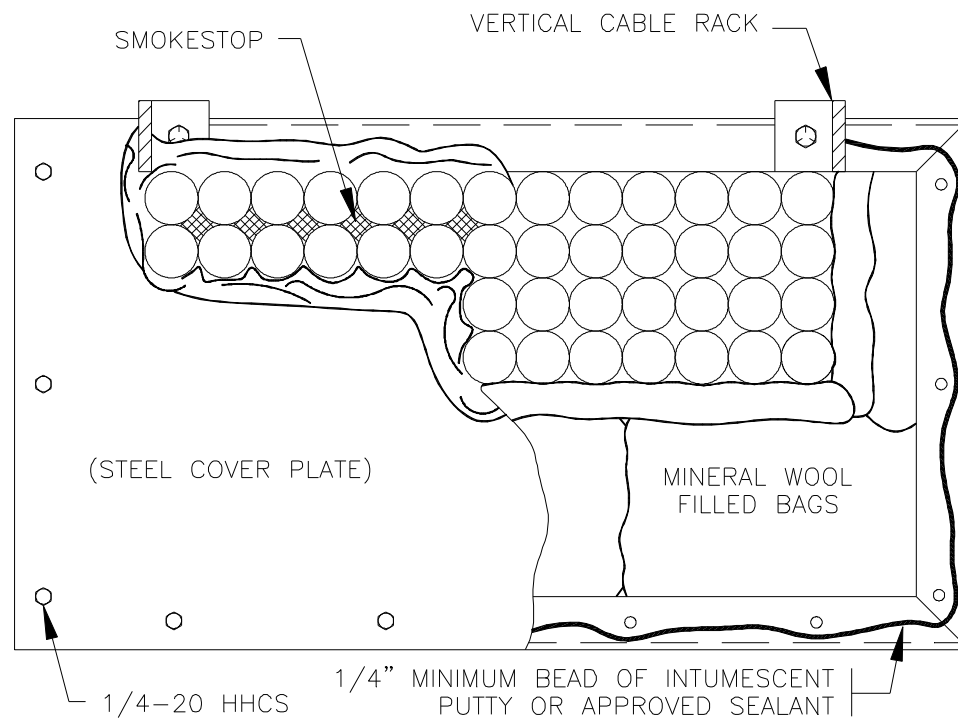


Firestopping Large Wall Openings - All Surface Constructions - Mineral Wool Products

Fig. 8

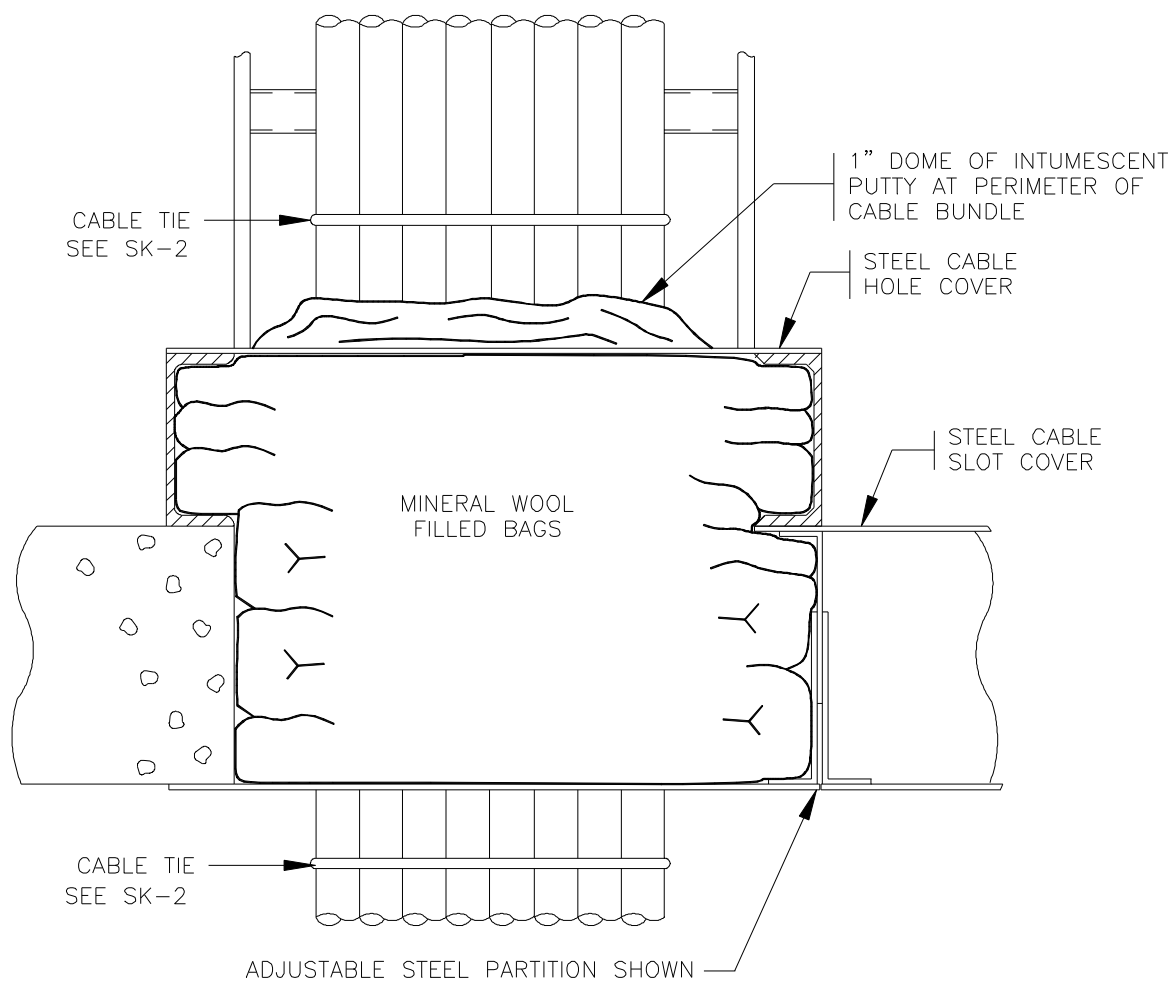


Section Through Floor



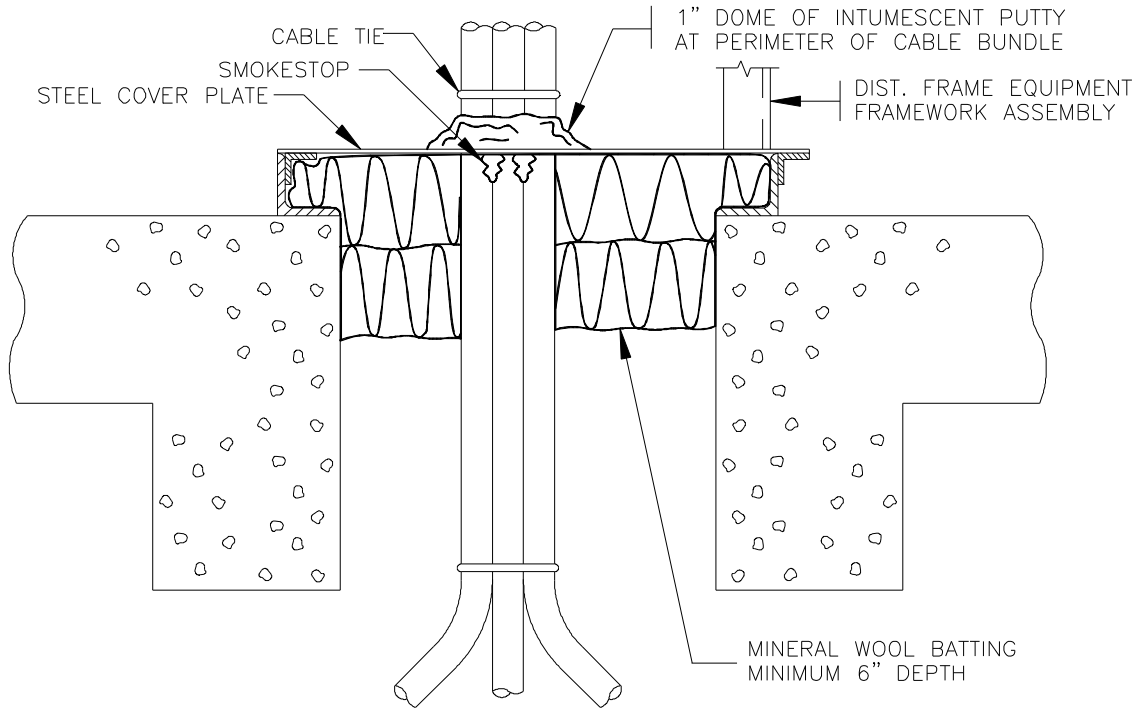
Firestopping Large Floor Openings - All Surface Constructions - Mineral Wool Products

Fig. 9

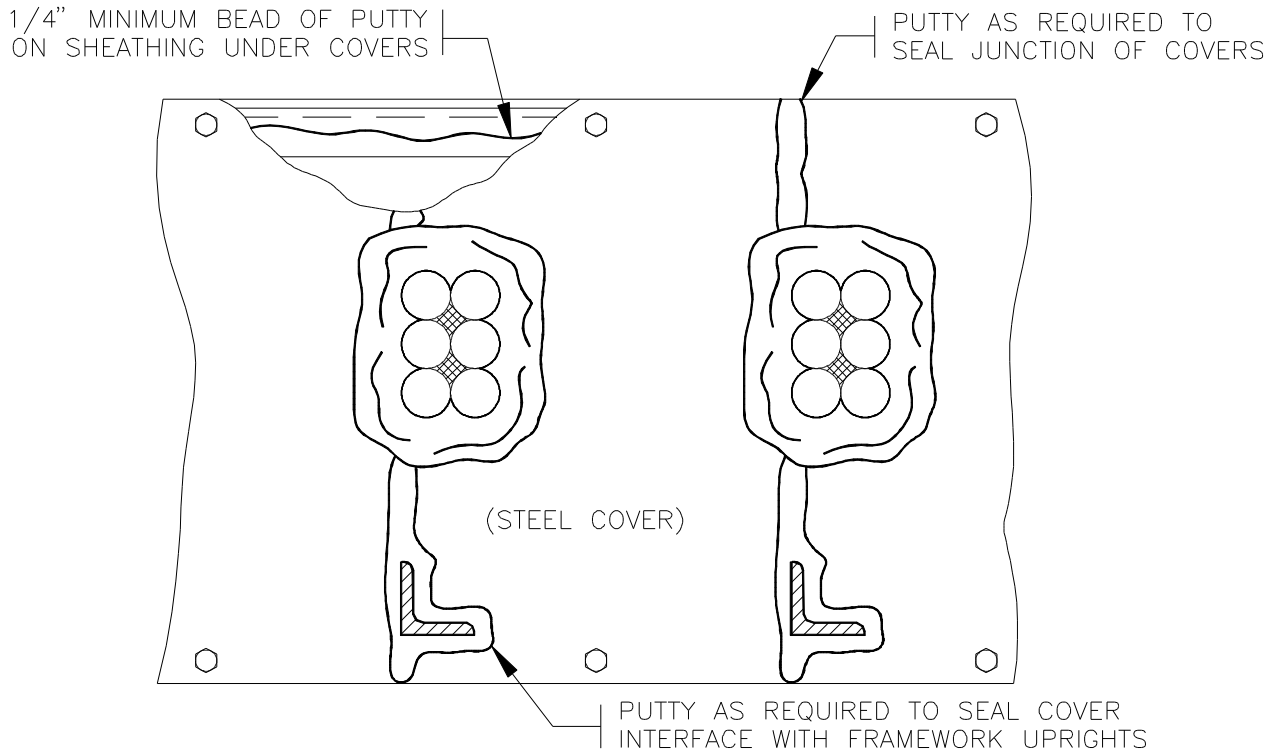


Firestopping Large Floor Openings At Cable Slots - Mineral Wool Products
(Otherwise Same As Fig. 9)

Fig. 10

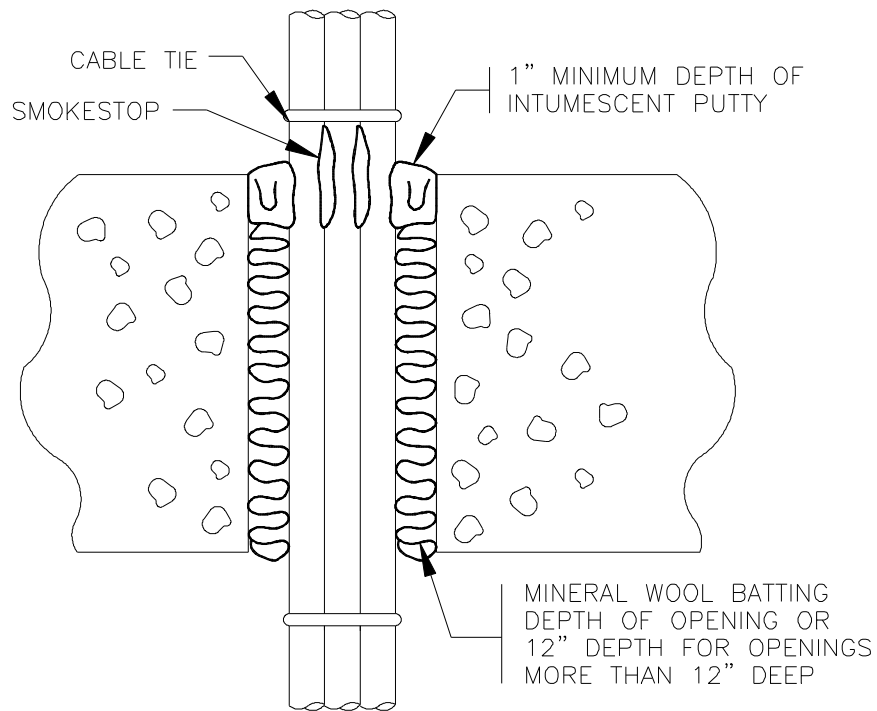


Cross Section Of Opening



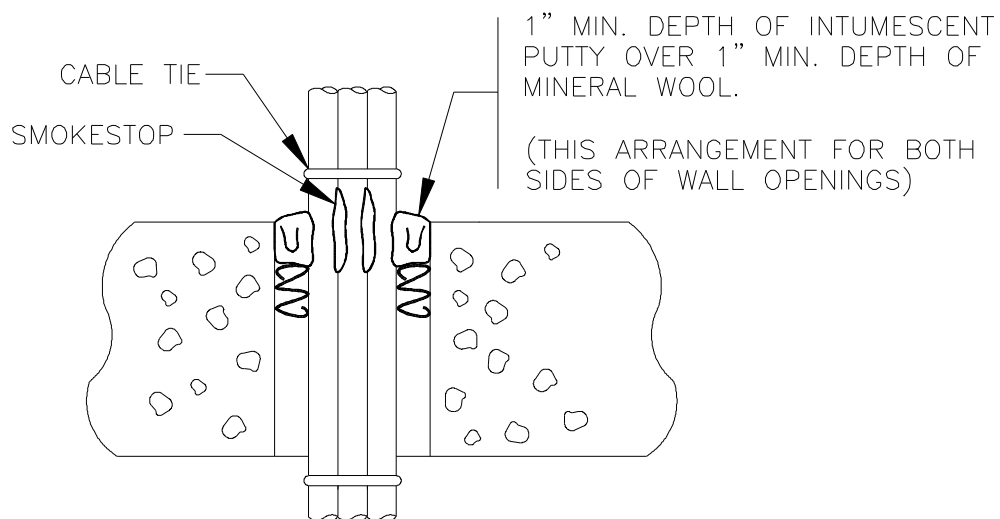
Firestopping Continuous Cable Slots Under Office Distributing Frames - Mineral Wool Products

Fig. 11



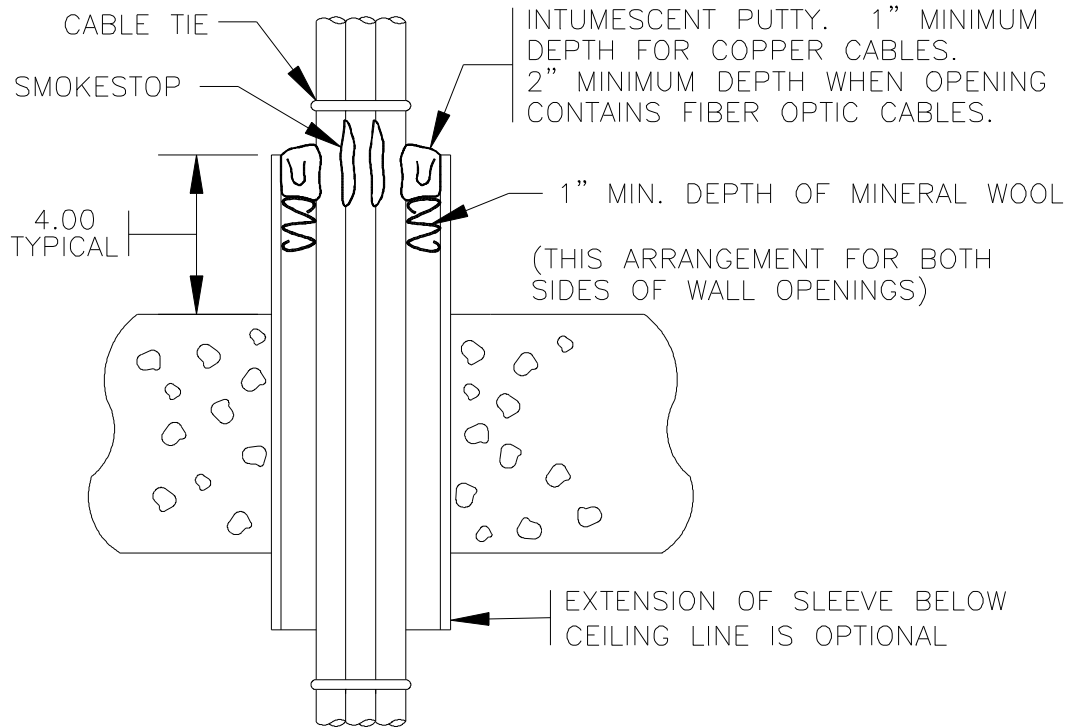
Firestopping Small Rectangular Openings Up To 4 x 10" In Size
Under Office Distributing Frames - Mineral Wool Products

Fig. 12



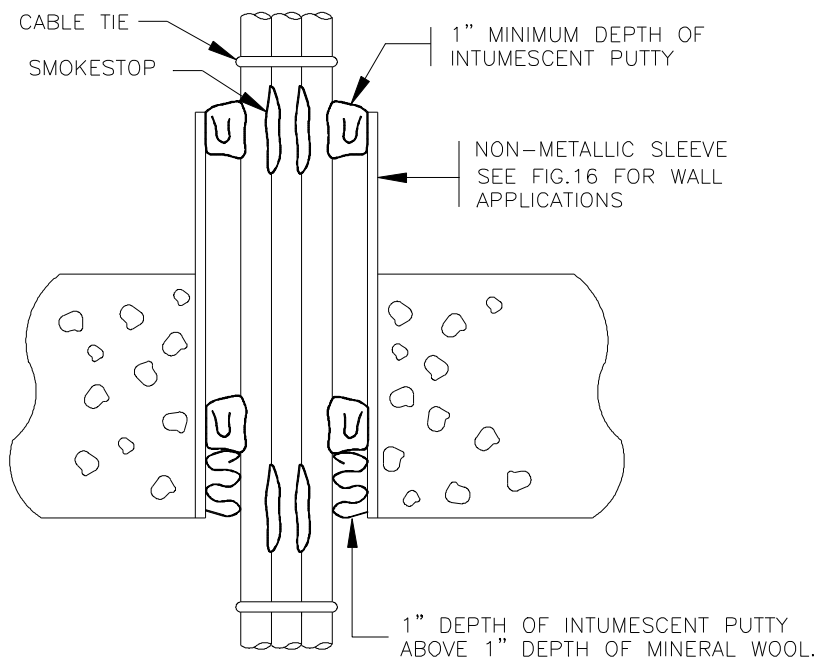
Firestopping Circular Opening Up To 6" Diameter - Concrete/Masonry Floors and Walls – CAJ-3021

Fig. 13



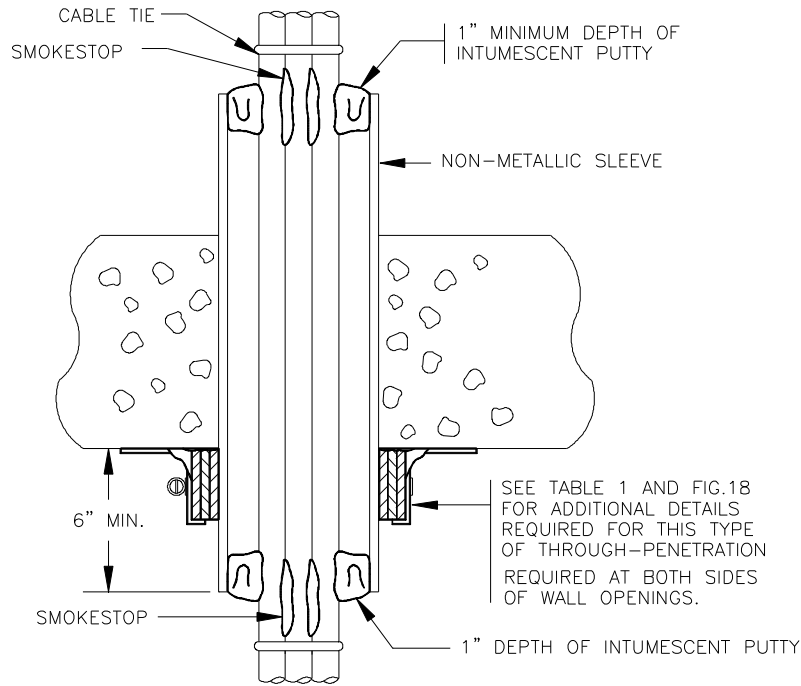
Firestopping Circular Opening In Concrete/Masonry Floors And Walls - Metallic Sleeve – CAJ-3021

Fig. 14



Firestopping Circular Opening In Concrete/Masonry Floors And Walls - Non-Metallic Sleeve
(Sleeve Does Not Extend Beyond Ceiling Surface) – CAJ-3058 EJ

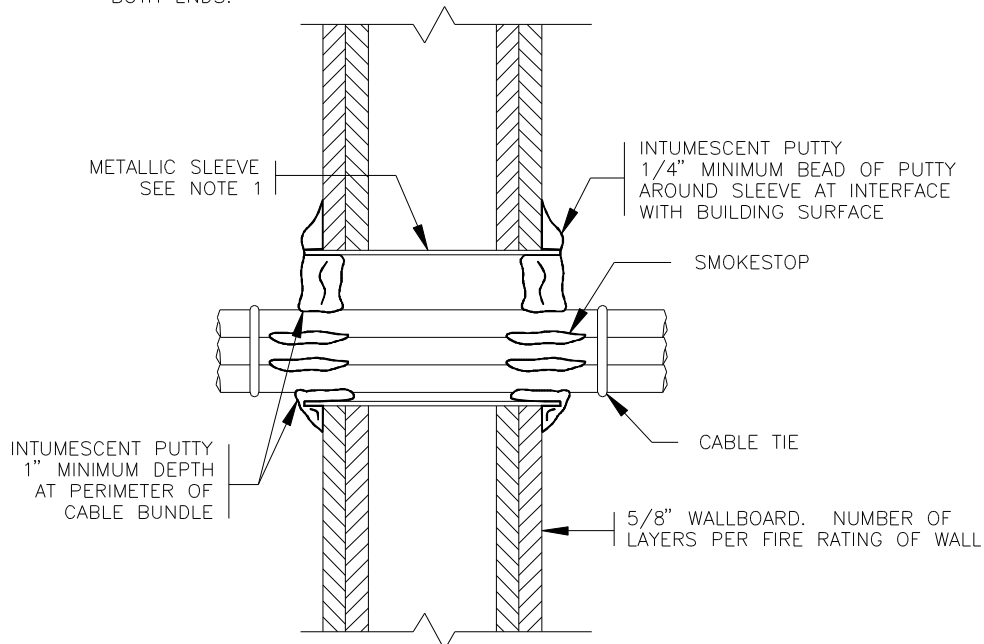
Fig. 15



Firestopping Circular Opening Concrete/Masonry Floors And Walls - Non-Metallic Sleeve – CAJ-3058
(Sleeve Extends Beyond Building Ceiling Surface)

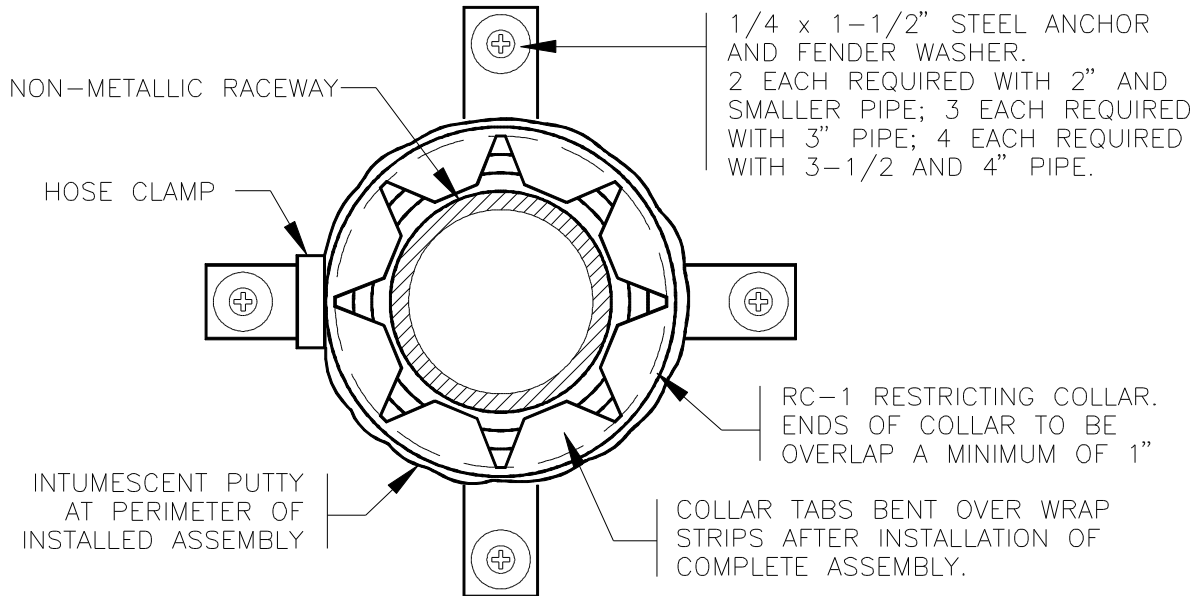
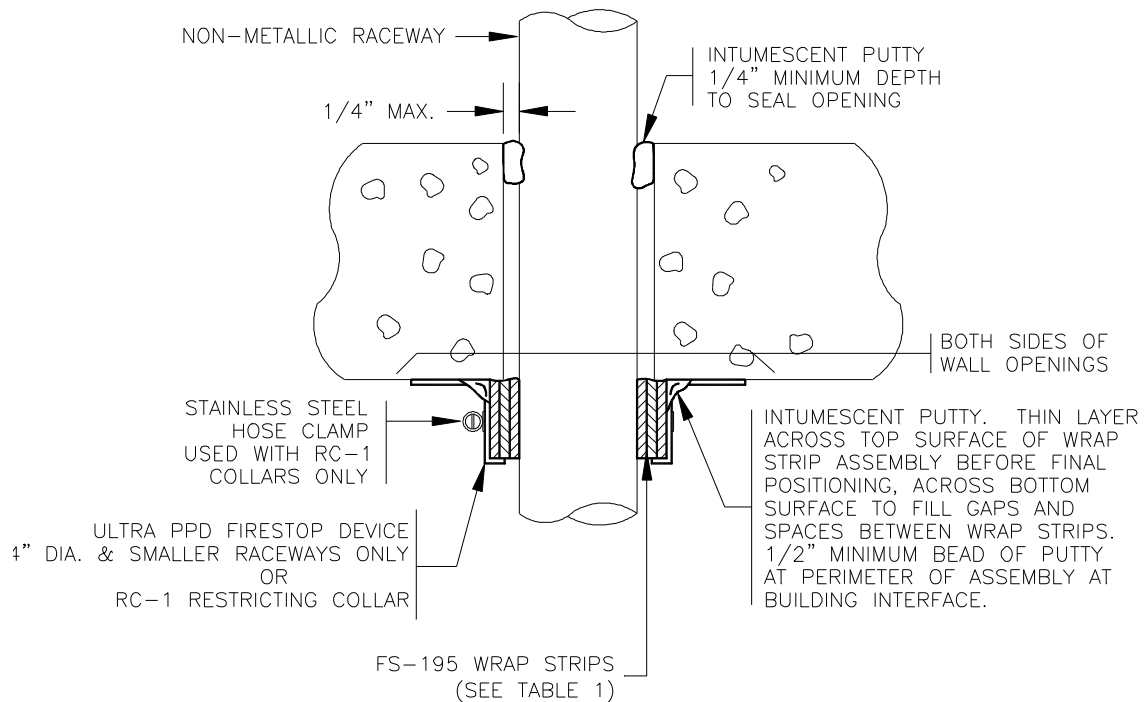
Fig. 16

NOTE 1. SLEEVE TO BE 4" MAXIMUM DIAMETER EMT OR NO.28 GAUGE GALVANIZED SHEET STEEL. SLEEVE TO EXTEND 1/2" MINIMUM BEYOND WALL SURFACES. SHEET STEEL SLEEVE TO HAVE 2" MINIMUM OVERLAP ALONG ITS LONGITUDINAL LENGTH AND BE EQUIPPED WITH CABLE PROTECTION SUCH AS SLIT FLEXIBLE TUBING AT BOTH ENDS.



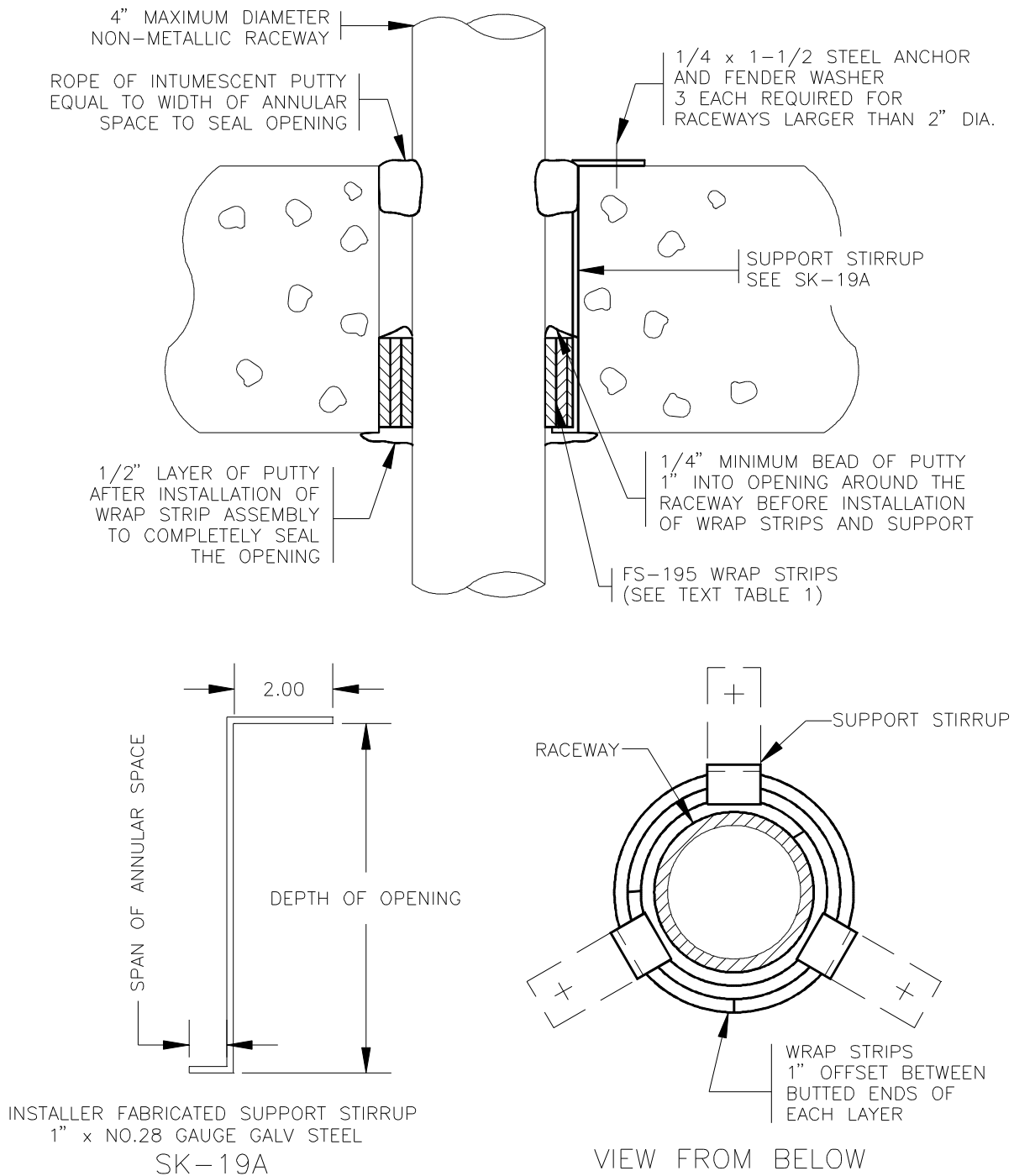
Firestopping Job Site Constructed Circular Opening In Framed Walls – WL-3031

Fig. 17



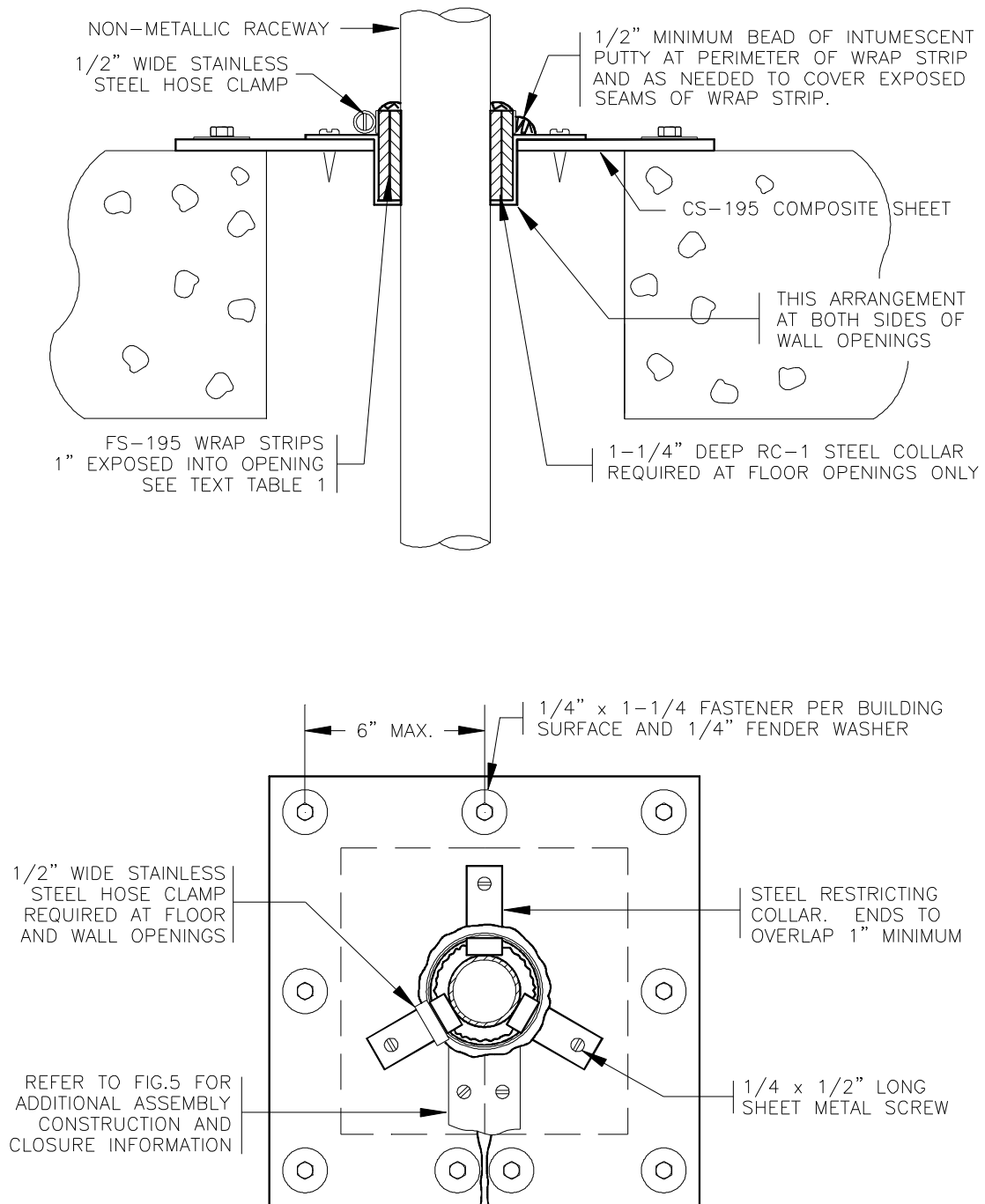
Firestopping Non-Metallic Raceways In Floors And Walls - All Constructions – CAJ-2001/CAJ-2226
(Small Annular Space Openings)

Fig. 18



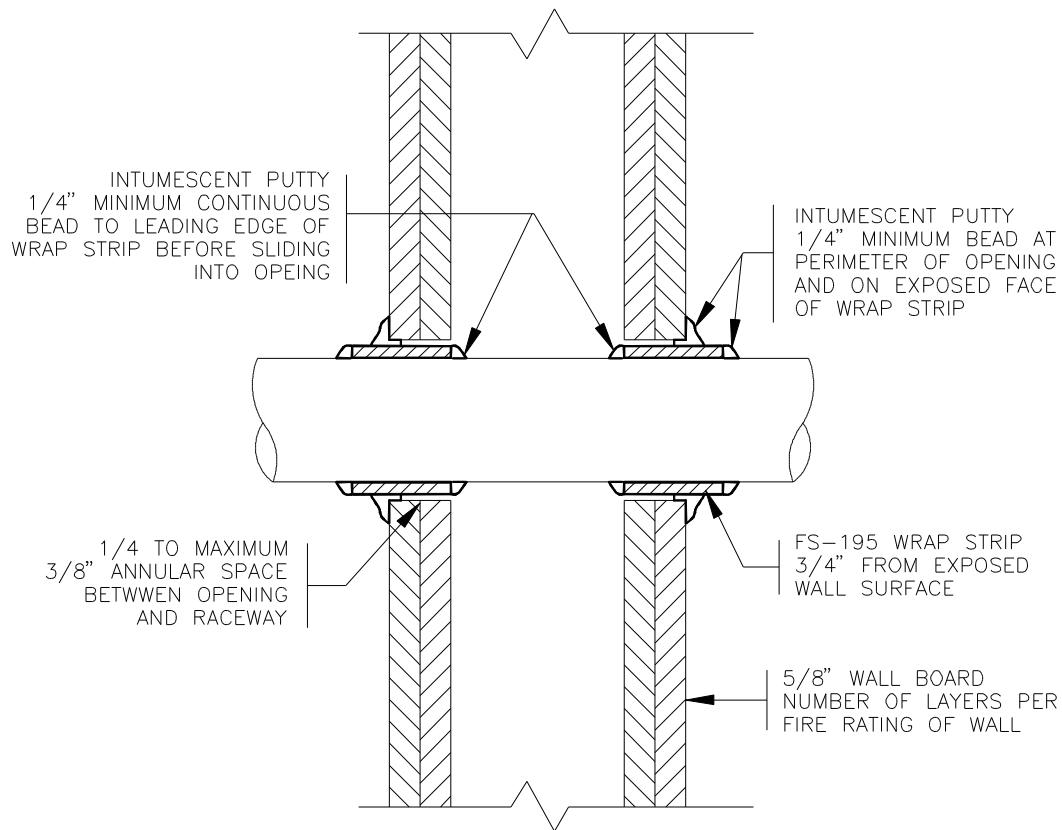
Firestopping Non-Metallic Raceways In Concrete/Masonry Floors And Walls – CAJ-2002
(Large Annular Space Openings)

Fig. 19



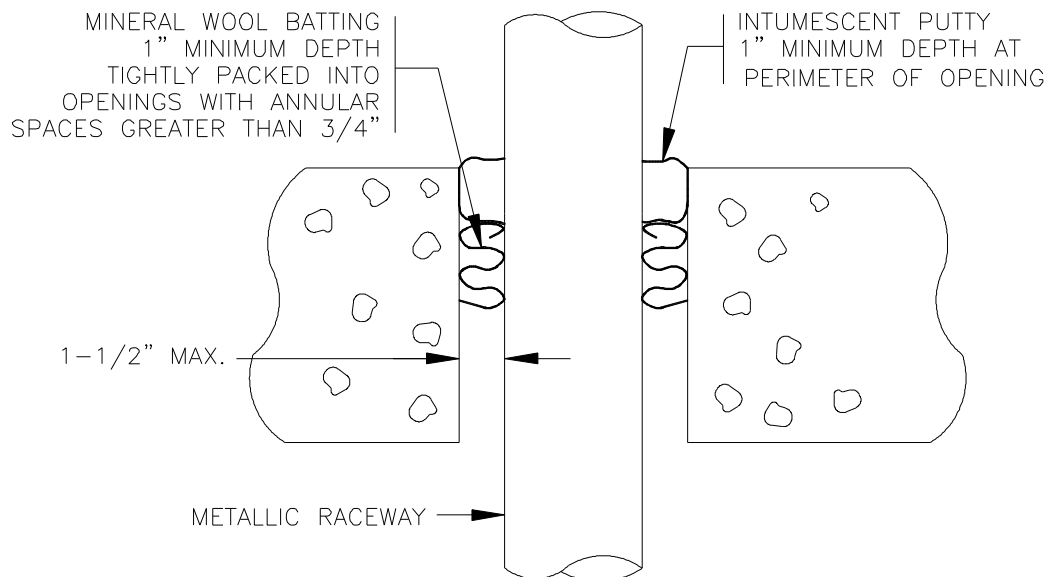
Firestopping Single Run Of Non-Metallic Raceway In Large Circular
Or Rectangular Opening – CAJ-2003 (see Fig. 24)

Fig. 20



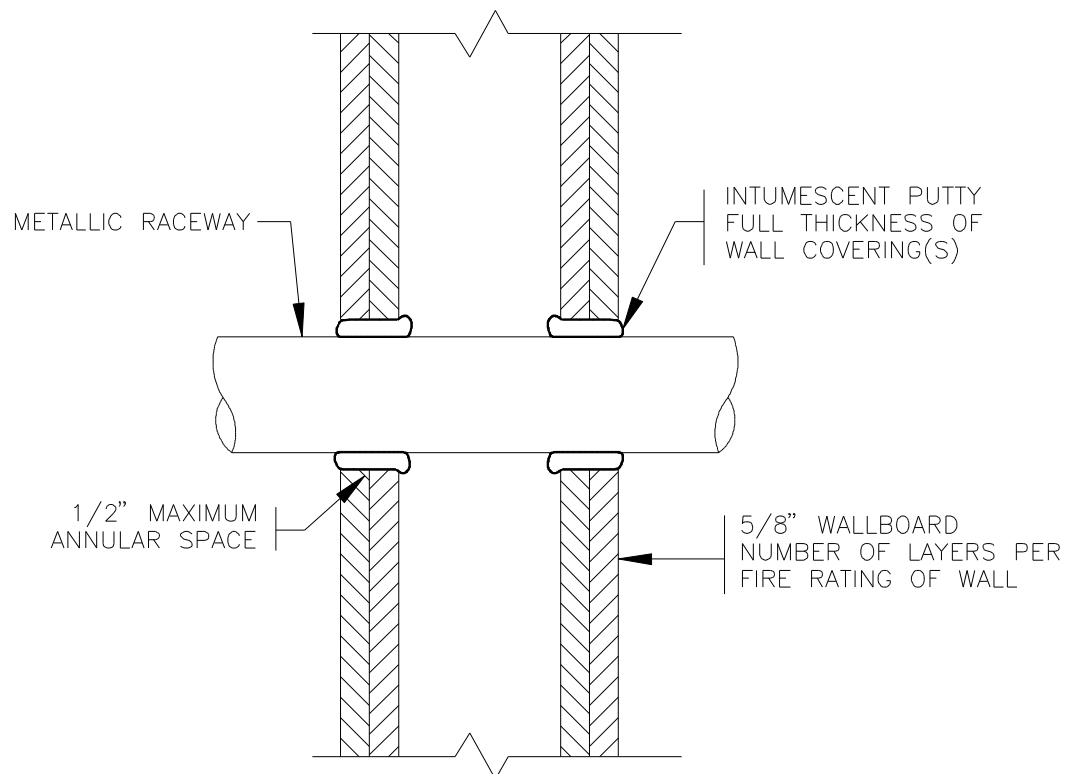
Firestopping Non-Metallic Raceway Up To 2" Diameter In Framed Wall Opening – WL-2033

Fig. 21



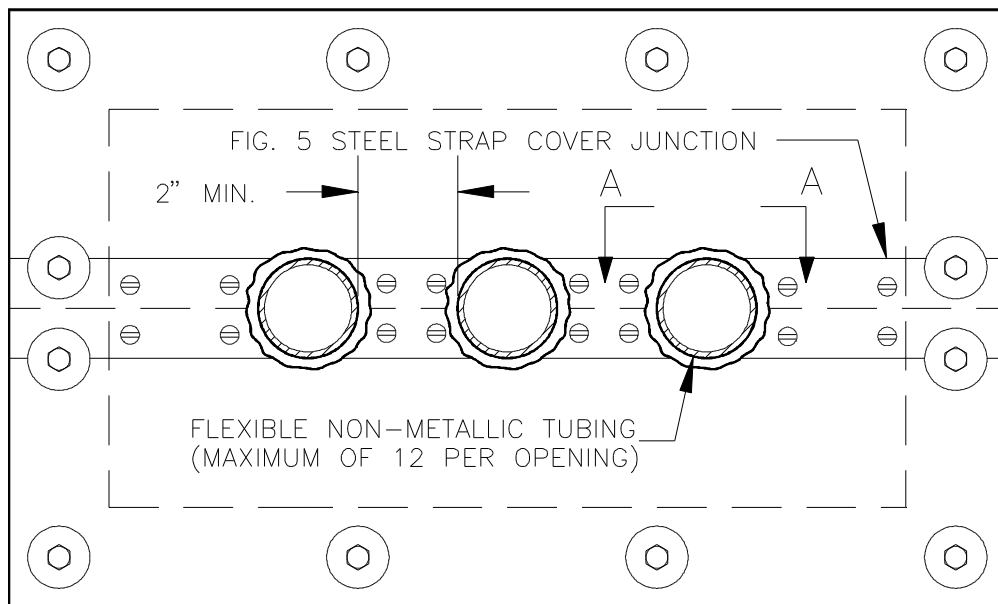
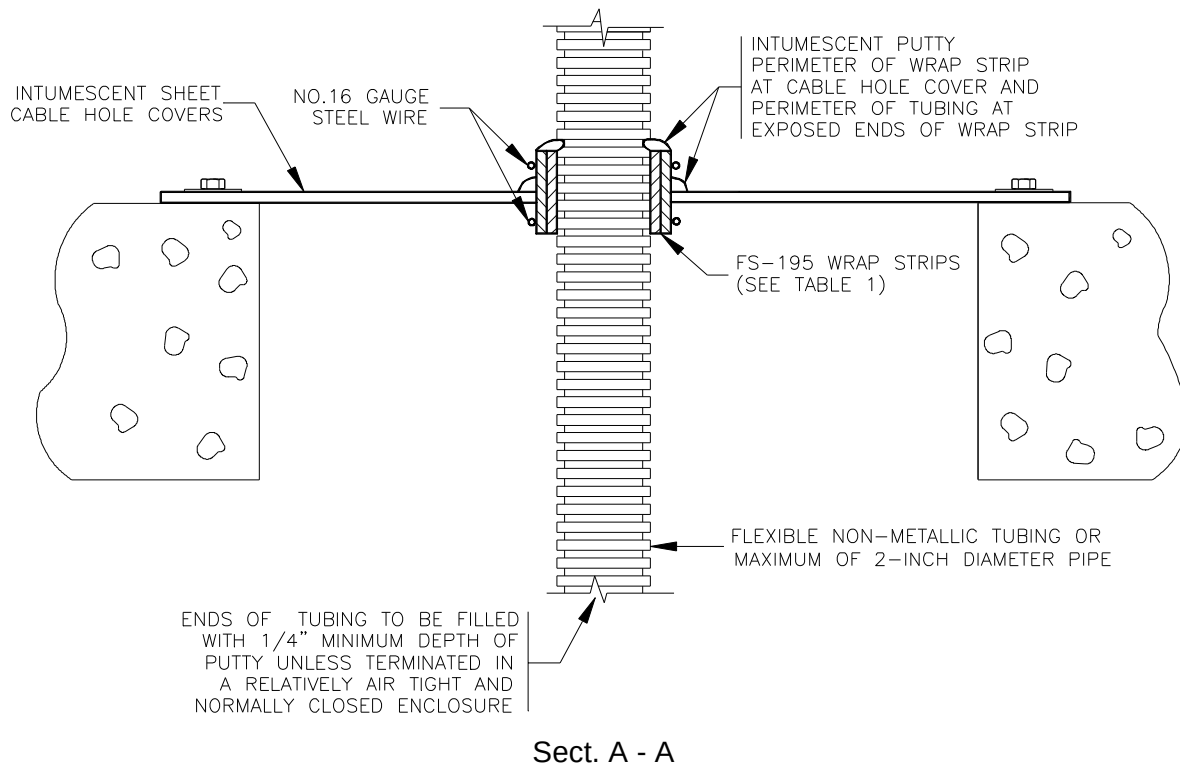
Firestopping Metallic Raceways In Concrete/Masonry Floors And Walls – CAJ-1027
(Both Sides Of Openings In Walls)

Fig. 22



Firestopping Metallic Raceways In Framed Walls – WL-1032

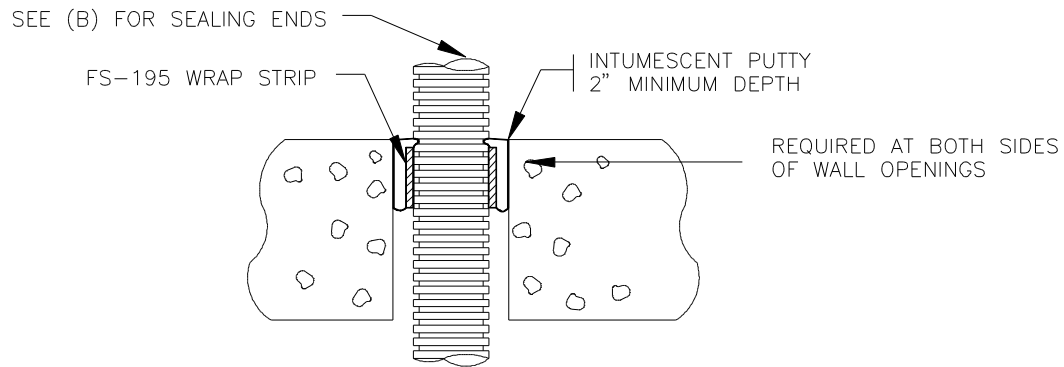
Fig. 23



(REFER TO FIG. 5 AND FIG. 6 FOR ADDITIONAL CLOSURE DETAILS)
(REFER TO FIG. 25 FOR FIRESTOPPING GROUPS OF TUBING)

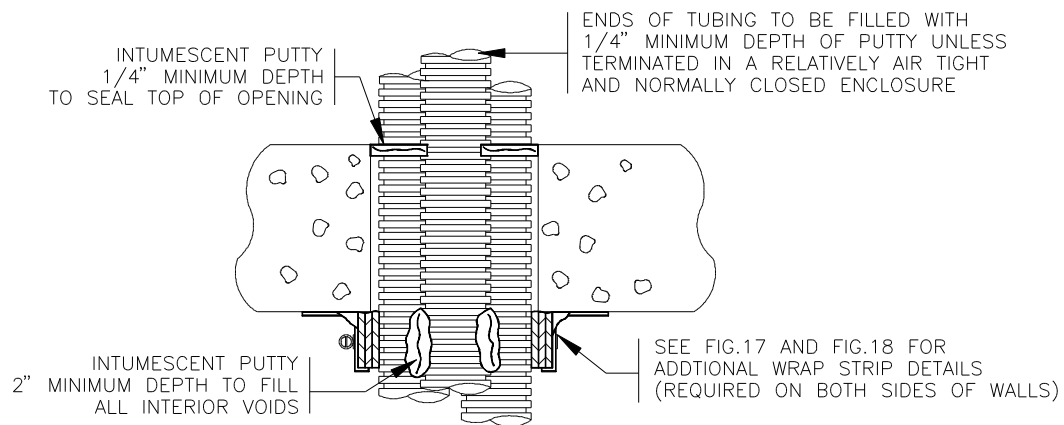
Firestopping Non-Metallic Penetrants In Large Openings – CAJ-2030
(Including Tubing Installed On Office Cable racks)

Fig. 24



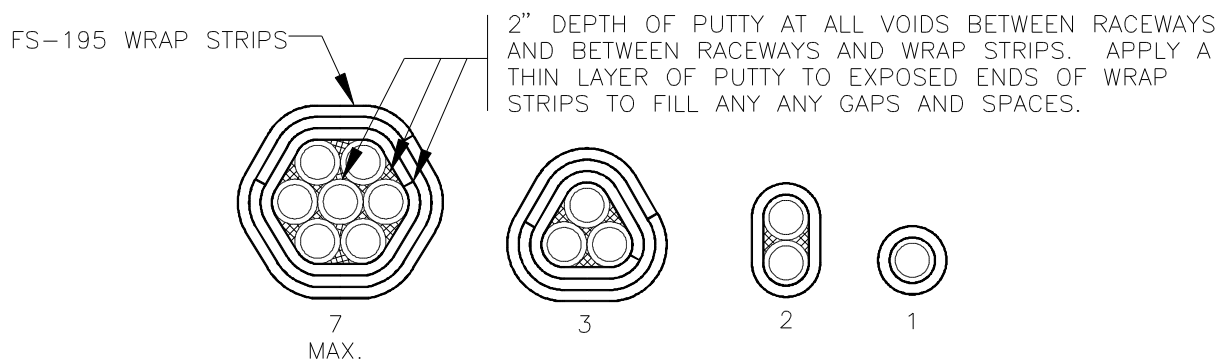
Single Run Of Tubing Up To 2" In Diameter – CAJ-2028

(A)



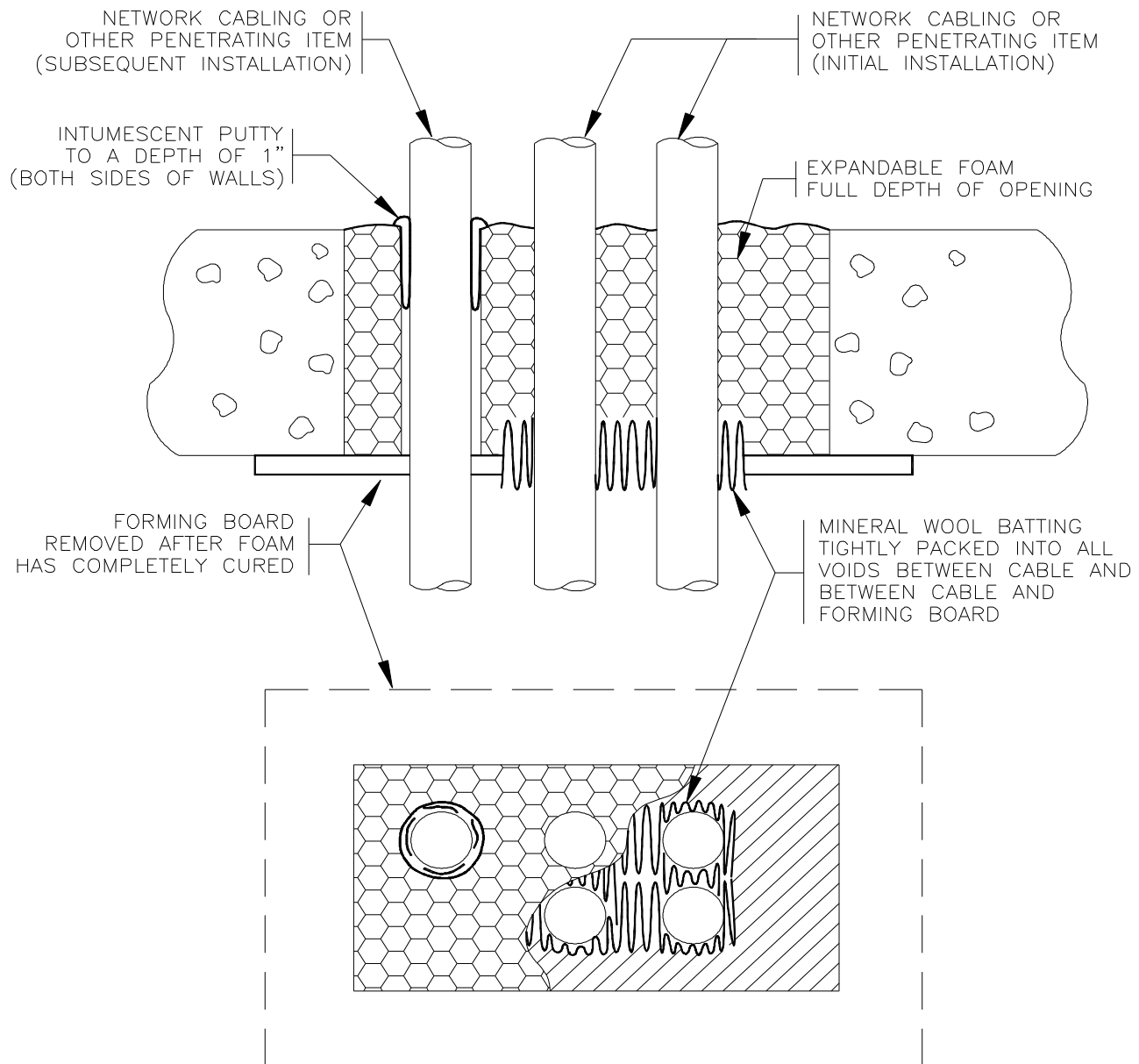
Multiple Runs Of Tubing Up To 2" In Diameter In A Single opening – CAJ-2029

(B)



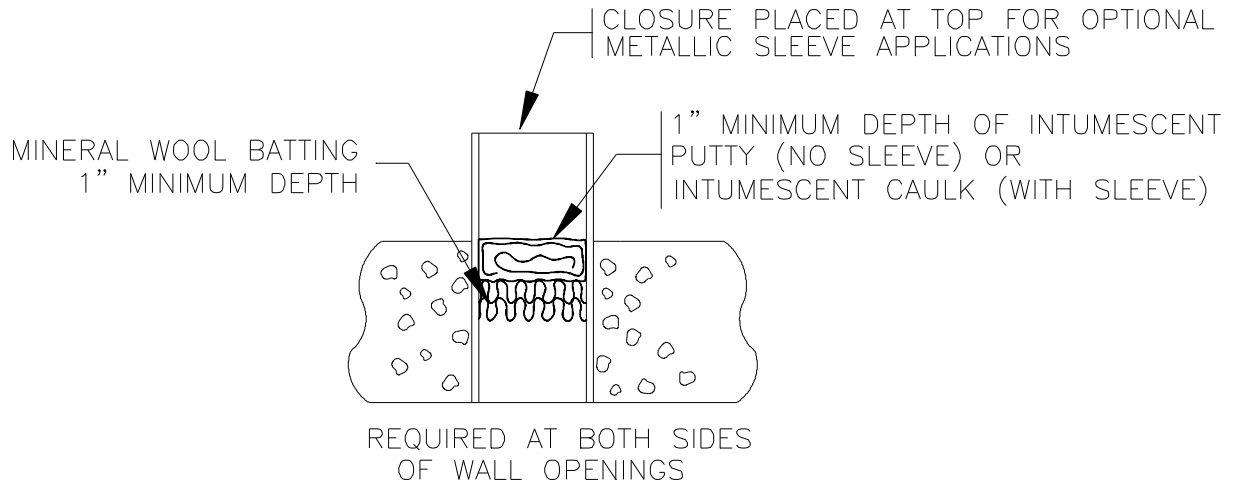
Assembly Of Wrap Strips According To Number Of Installed Raceways

(C)



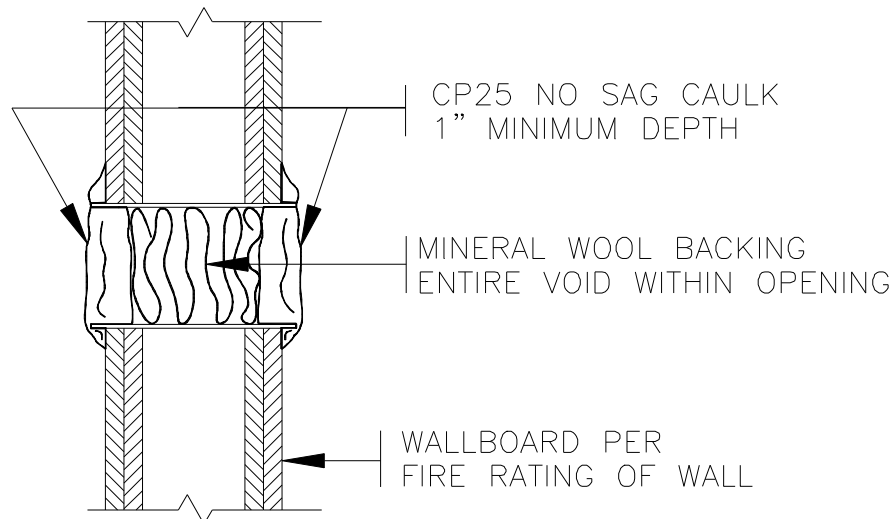
Firestopping Cable Openings In Floors And Walls - Expandable Foam Products
(Permanent Closure)

Fig. 26



Void Circular Opening In Concrete/Masonry Floor And Walls – CAJ-0007/CAJ-0009

(A)

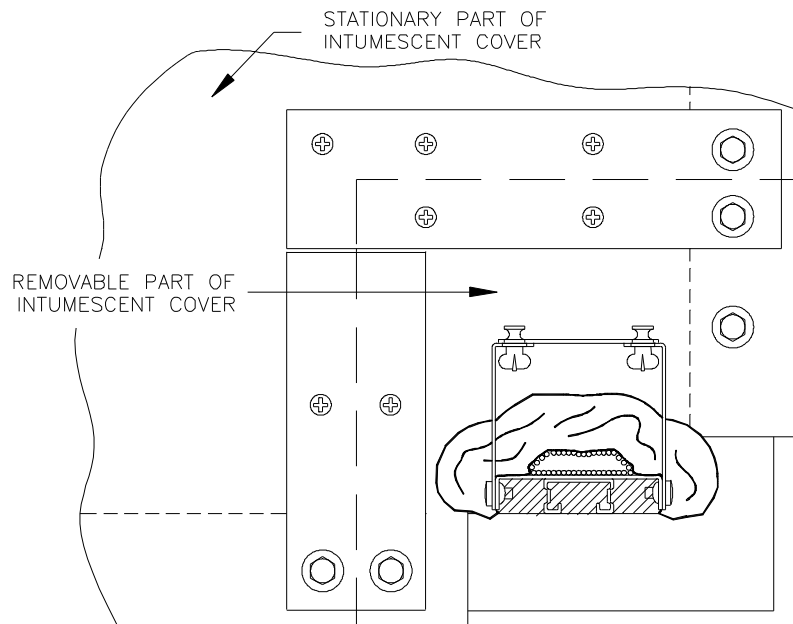


Void Circular opening In Framed Walls
(Otherwise Same As Fig. 17)

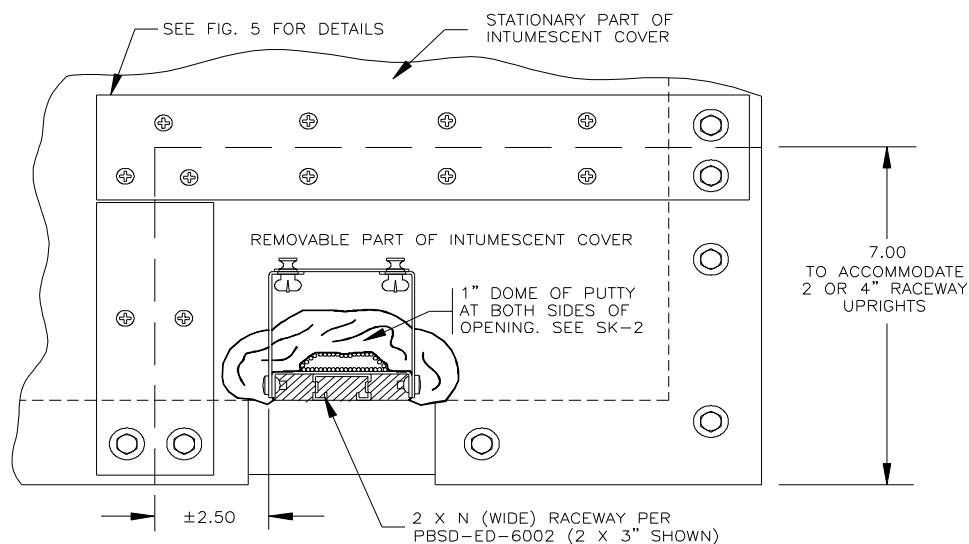
(B)

Firestopping Unused Circular Openings In Floors And Walls

Fig. 27



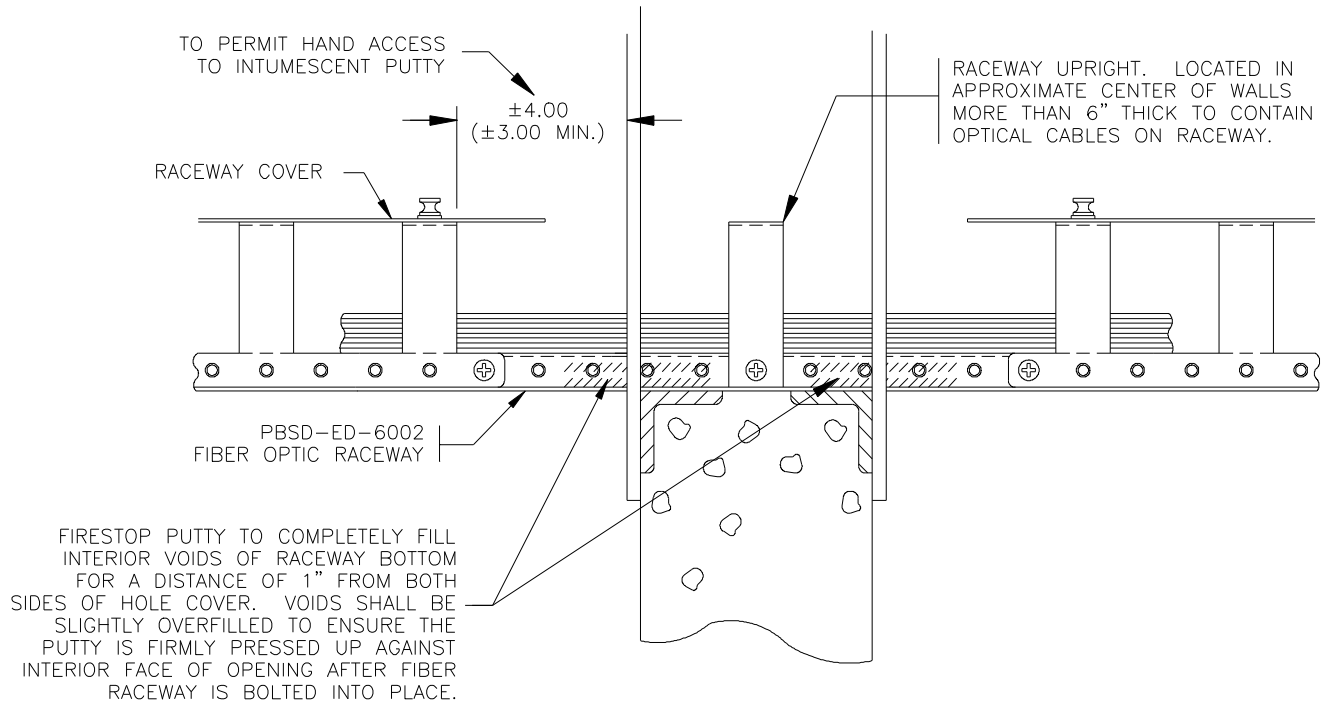
Preferred Cable Hole Cover Assembly When Raceway Is Located To One Side Of Opening



Preferred Cable hole Cover Assembly When Raceway Occupies Interior Portion Of Large Opening
(Intumescent Cover Segmented To Minimize Size Of Cover
Needed To Be Removed For Cable Installation/Removal)

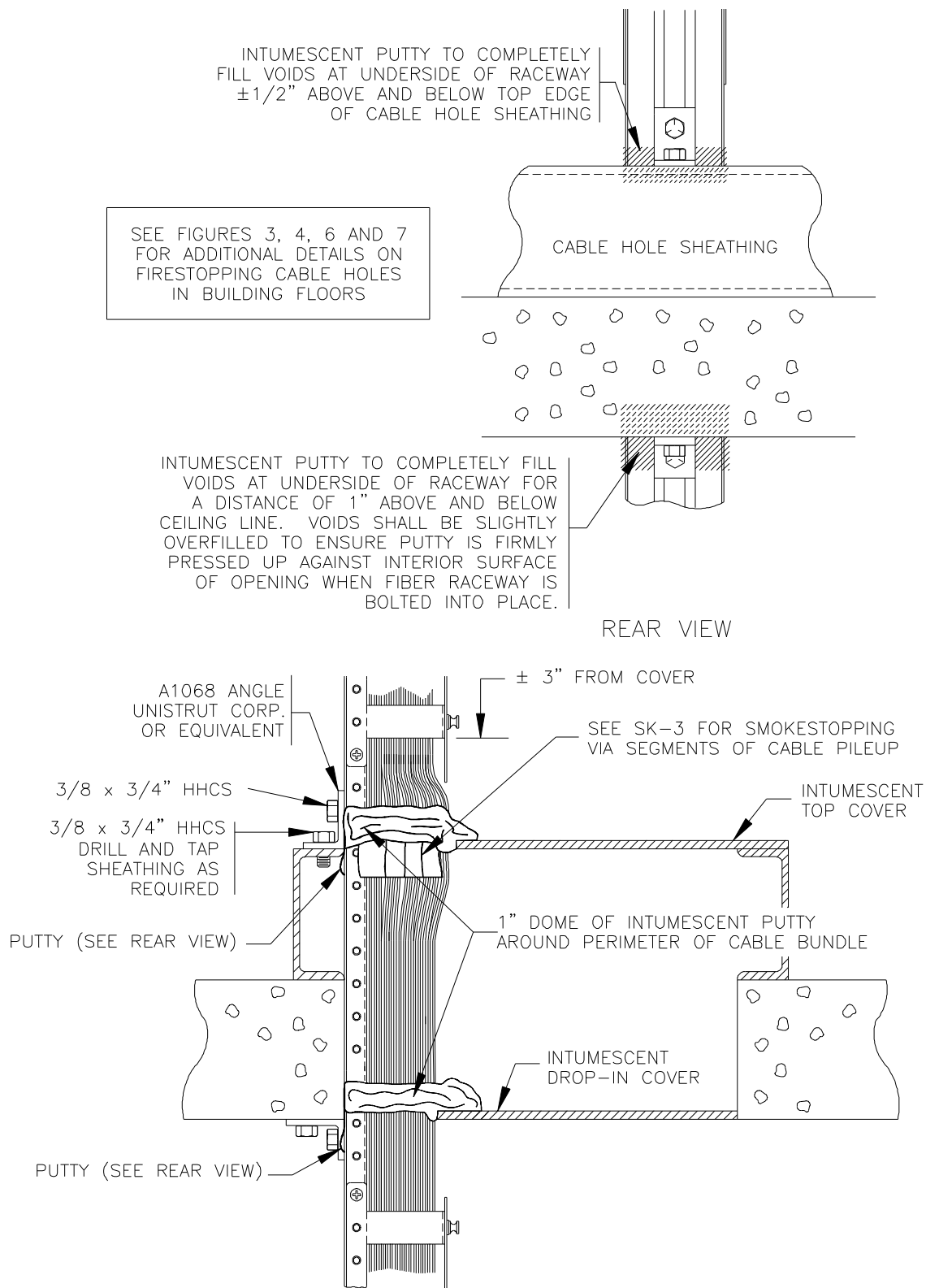
Firestopping Fiber Optic Raceways In Wall Openings

Fig. 28



Cross Section Through Wall

Part Of Fig. 28



Firestopping Fiber Optic Raceways In Floor Openings

Fig. 29