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Common Systems Through-Penetration Firestopping Requirements

This practice provides the guidelines and requirements for firestopping floor and wall penetrations in network facilities.

To: All Network Employees

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INTRODUCTION

This practice applies to floors and fire rated wall penetrations used for 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 practice because they are integral components of through-penetration protection. Unless otherwise indicated, this practice 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. REASON FOR REISSUE

| Issue Number | Date Modified | Brief Description of Changes | Author |
|--------------|---------------|---|--------|
| 1 | 7/7/03 | Renumbered from BSP 800-005-200MP Iss. E and 800-005-200MP Appx.1 Iss. D; general editing and rearrangement of text presentation; added note after 2nd bullet in Part 2; added 2nd bullet item under 2.2.2; added last paragraph in 2.4; deleted product distributor, Semco foam and RFTA form example references; changed order of Fig 2 to 4; added Fig 15 to 17. | bm1924 |

1.1. Definitions

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

| Term | Definition |
|------------|--|
| Cable | In one form or another is used to reference the item(s) penetrating a cable hole. |
| Cable hole | Interchangeable terms for through-penetrations in fire rated building surfaces. |
| Fire Rated | A building construction 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. |

2. GENERAL

The installed arrangement of a through-penetration firestop system must maintain the fire resistance integrity of a building's 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 (temperature) to the unexposed side of the cable hole. T ratings are often not achievable when exposed metal is passed through a building surface.

- Concrete/masonry and load bearing framed constructions have F and T ratings of at least 2 hours.
- Framed constructions of noncombustible materials used for security and privacy partitions usually have F and T ratings of 1 hour and are generally less than 6 inches thick. Generally, framed constructions having a 2-hour fire rating also have a thickness of 6 inches or more.

NOTE: "L" ratings refer to the leakage of air through a cable hole. Smokestopping practices are used to prevent air leakage through a cable hole where possible in lieu of specific firestop system performance criteria.

The temperature performance criteria of firestop systems permit a 400° F temperature on the unexposed side of a building surface at through-penetrations. For this reason, easily combustible materials such as paper, cardboard boxes, etc. shall not be stored within 12 inches of a through-penetration.

2.1. *Waterproofing*

Cable holes in floors shall be waterproofed to prevent the natural flow of water or other liquids between floors and to enhance the smoke stopping capability of an installed firestop system. Waterproofing of cable holes in floors is the responsibility of the person installing apparatus such as equipment frames and sheathing surrounding a cable hole.

Apparatus installed directly over cable holes in floors shall be waterproofed by placing a 1/4- to 1/2-inch wide bead of non-hardening gasket compound (such as Permatex No. 2 or intumescent putty) around the perimeter of the cable hole under the apparatus as illustrated in Fig. 1. The

gasket compound should be applied so that when the apparatus is secured to the floor, excess compound will be forced towards the interior of the cable hole rather than towards equipment aisles. Additionally, the gasketing compound shall be applied so it will prevent water or other liquids from seeping into equipment frame anchoring holes.

A 1/4-inch wide (minimum) bead of a clear non-hardening silicone sealant shall be applied around the exterior of apparatus or equipment frameworks when it is necessary to waterproof existing installations at cable holes, or when it is impractical to install waterproofing under equipment frameworks and apparatus initially.

The performance of approved firestop systems are generally unaffected by standing water allowing them to be placed directly on building floors provided they are properly installed per the manufacturer's instructions.

2.2. Cable Hole Partitions

Steel partitions fabricated from a minimum of #16 gauge (0.06) steel shall be used to segment large cable holes into smaller holes to enable more affective cable management and/or firestopping. Unless otherwise permitted, partitions shall be installed the full depth of cable holes. Partitions shall be fastened to ceiling cover plates or to the building surface at two locations minimum at the lower end and may be fastened at one location at the upper end.

The use of multi-piece partitions is acceptable for deep cable holes. Multi-piece partitions shall be fastened together with a minimum of two fasteners to assure the pieces react as a single rigid entity when subjected to pressure.

2.2.1. Cable Slots

Generally, occupied portions of cable slots (long cable holes) in floors shall be isolated from unoccupied portion(s) by a partitions installed similar to Fig. 2. A partition is not required if the occupied and unoccupied portion(s) of a cable slot are firestopped in the same manner with the same fire stopping products. One such condition exists under office distributing frames where the entire slot is packed with mineral wool batting and only a portion is used for cabling cable connectors.

2.2.2. Large Cable Holes

Partitions fabricated similar to Fig. 3 shall be used when it is necessary to partition large cable holes into smaller holes to enable more affective cable management and/or firestopping. The

actual configuration of Fig. 3 type partitions will depend on building construction, floor/wall hole location and cable hole usage.

- The 15 inch front-to-back maximum size of cable holes shown in Fig. 3 is applicable to holes in floors firestopped with Hilti fire blocks.
- Wall cable holes greater than 2,496 square inches (17.3 ft²) in size require partitioning into smaller openings when firestopped with Hilti Fire Blocks. The longest allowable dimension comprising the 2,496 in² is 52 inches. Reference UL Design WL-8014.

2.3. Cable Hole Covers

Unless otherwise specified for a particular firestop application, a 1/8-inch thick (11 gauge) steel cover shall be used at cable holes in floors to protect the integrity of the installed firestop system and the putty seal around installed cable. Steel covers shall approximate the shape of the cable bundle or other penetrant(s) as specified below or they shall be sized per Fig. 4 when used with intumescent composite sheets.

Unless otherwise indicated for a particular firestopping application, the annular space between installed cable and cable hole covers 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 the cable hole.

2.4. Smokestopping

Smokestopping is an integral component of most firestop systems. It is addressed as a separate firestop element in this practice because it is installed during cable installation rather than when a cable hole is closed (firestopped). The function of smokestopping is to prevent the migration of smoke and gaseous vapors through a cable hole. Generally, effective smokestops are achieved when the perimeter of cable holes and the interior voids of a tightly bound cable bundle and are sealed with intumescent putty.

Unless otherwise specified by a particular firestopping system design, smokestops are only required on one side of a cable hole, and should be installed on the side providing the greatest ease of installation.

The exception to the foregoing is for cable hole constructions that cannot prevent the migration of smoke and gases to the interior of wall cavities. For such unlined cable hole constructions smokestopping shall be applied to penetrating items on both sides of cable holes. For hollow wall

constructions, cable holes that are framed on all four sides or are equipped with a metallic sleeve will generally prevent the migration of smoke interior to wall cavities.

Unless otherwise instructed by a particular firestop system, smokestops shall be achieved by installing a minimum of 2 linear inches of intumescent putty in rope form at the interface of adjacent cables as they are installed through a cable hole. The 2-inch beads/ropes of putty shall be sized so they will effectively fill the voids created when cables are placed one upon the other and shall extend a minimum of 1 inch into the cable hole.

2.5. Caulks and Putties

Caulks and putties are considered secondary firestop components because they are used to effectively seal small gaps and spaces between installed cable and building surfaces. Except for the expandable foam applications discussed later in this practice, intumescent caulk or putty shall be used to seal small spaces and gaps between installed cable and the perimeter of cable holes, and as a smoke stopping medium.

A. Caulks and putties shall not be mixed together as a single substance.

"High-temp" caulks (usually green in color) shall not be installed as new or reapplied in network facilities. 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.

3. FIRESTOP PRODUCTS

3.1. Intumescent Products

Intumescent products are proprietary materials formulated to produce a specific chemical reaction when exposed to high temperatures. For this reason, the products of different manufacturers shall not be mixed together or used in the same cable hole unless the hole is partitioned into separate segments. 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.

- The exception to the foregoing restriction of mixing different supplier's products applies to smokestopping installed inside of cable bundles. When permitted by a firestop supplier, it is acceptable to firestop a cable hole using the products of a supplier other than that which has been used to smokestop the interior of a cable bundle.

3.1.1. *Repair and Replacement After Activation*

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

- A. If it is determined that any part of a composite sheet or fire block has been activated, the entire component 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 person 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.

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

3.1.2. *Safety Precautions*

The product safety procedures and instructions provided by the manufacturer shall be adhered to at all times.

3.2. *Mineral Wool Products*

Unless otherwise specified by a particular firestop system, mineral wool batting material shall have a minimum density of 6 pounds per cubic foot. Foil wrapped or otherwise encased mineral wool batting shall be used to fill the voids of large cable holes that do not have ceiling plates such as slots and cable holes under an office distributing frame, and at cable slots between building columns.

CAUTION: Mineral wool in loose or bulk form shall not be used in network facilities because of its unbound nature and tendency to become airborne during handling.

FR-75/CK5048 mineral wool filled bags (regardless of color) are no longer an acceptable fire stopping medium in AT&T network facilities. When encountered in a cable hole, they shall be replaced with intumescent firestopping technology.

3.2.1. Safety Precautions

The use of eye protection and dust masks is mandatory when working with mineral wool batting and fibrous fire protection products.

Mineral wool shall never be installed in cable holes above human work spaces or network equipment unless the products have been wrapped with aluminum foil or otherwise encased/treated to minimize product "dusting" conditions. Wrapping of mineral wool batting shall be performed in an area more than 10 feet from network equipment and people work locations.

3.3. Expandable Foam Products

Expandable foams are acceptable firestopping products for cable holes that do not require re-entry and for cable holes that cannot be affectively firestopped any other way. 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 cable hole.

Combustible materials used as forms and dams for expandable foam products shall be removed from cable holes when product curing permits.

3.3.1. Safety Precautions

In all cases the manufacturer's instructions for the proper handling and use of chemically reactive products like expandable foams shall be strictly adhered to.

4. FIRESTOPPING CABLE HOLES

4.1. *General*

Cable holes shall be firestopped using Listed systems and procedures documented in the Underwriters Laboratories Inc. Fire Resistance Directory, the approved predivestiture researched and tested methods and procedures documented herein, or by the methods and procedures provided by AT&T's Request For Technical Assistance form.

Refer to TP76300 for the detailed methods and procedures for firestopping cable holes commonly encountered in network facilities. A copy of the Request For Technical Assistance form included with TP76300 shall be used to obtain technical assistance for through-penetration arrangements not specifically covered in TP76300.

The mineral wool firestopping practices contained in this practice were derived from predivestiture 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 reference standard for Listed firestop systems approved for use post-divestiture is UL-1479.

4.2. *Adjacent Walls and Buildings*

Firestopping shall be applied at both exterior walls of adjacent buildings when space between buildings does or may exist, even though the cable holes are connected by a continuous lining or cable chute. The exterior walls of adjacent buildings may be firestopped as a single entity when there is no space between the adjacent building surfaces. Refer to Fig. 9 for typical adjacent wall firestop application scenarios.

5. PROTECTION OF CABLE RUNS

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 office space, 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 and the presence of a fire suppression system.

Protection of cable 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.

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

| Primary Contact | Alternate Contact |
|--|---|
| Area Manager - Common Systems Stnds. 775-333-8553 | Manager - Common Systems Stnds. 925-823-4325 |

6. APPROVED PRODUCTS

This part provides a reference of commercially available products that are approved for use as and with through-penetration firestops, and includes known suppliers of the products at the time the practice was issued. The information is provided to assist in the acquisition of approved firestopping products.

6.1. *Intumescent Products*

- 3M Material orders for 3M Fire Barrier products shall specify water based products by suffixing the product nomenclature with a plus (+) indicator. A complete listing of 3M Fire Barrier products and suppliers can be found at: **www.3m.com/firestop**
- Hilti A complete listing of Hilti products and distribution stores can be found via their Customer Service Store locator at **www.us.hilti.com**. The existence of any telecom regional sources for Hilti products can be determined by calling 800-879-8000.

6.2. *Mineral Wool Products*

Hilti - Thermafiber Safing

Thermafiber, Inc. - Thermafiber Safing

Rock Wool Mfg. Co. - Delta 8 Lamella

6.3. *Expandable Foams*

Hilti - CP-620

7. FIGURES AND SKETCHES

Table 1 provides a cross-reference of firestopping and product application illustrations contained herein that supplement the hole-specific requirements contained in TP76300 Figures 5 and 6 depict predivestiture mineral wool firestopping practices developed by Bell Laboratories which has been augmented with intumescent technology.

| Table 1 | |
|--|--|
| Cross Reference of General Firestopping Methods and Procedures | |
| Figure | Application |
| Fig.1 | Waterproofing holes in floors. |
| Fig.2 | Partitioning of slots in floors. |
| Fig.3 | Partitioning of large cable holes in floors. |
| Fig.4 | Protection of intumescent composite sheets at floors. |
| Fig.5 | Firestop - Continuous slots under distributing frames. |
| Fig.6 | Firestop - Small rectangular openings under distributing frames. |
| Fig.7 | Approved composite sheet assembly alternative at floor holes. |
| Fig.8 | Approved composite sheet assembly alternative at wall holes. |
| Fig.9 | Firestop applications at adjacent walls and buildings. |
| Fig.10 | Wall cover requirements for Hilti fire block systems. |
| Fig.11 | Splicing wall covers at holes using Hilti fire blocks. |
| Fig.12 | Hilti block orientation at common power/fiber and misc. cable holes. |
| Fig.13 | Firestopping at bus bar cable holes using Hilti fire blocks. |
| Fig.14 | Firestopping dead-ended pipe within room cavities. |
| Fig. 15 | Firestopping steel raceway in floor - cast in place. |
| Fig. 16 | Firestopping steel raceway in solid floor/wall - cored opening. |
| Fig. 17 | Firestopping steel raceway in hollow walls. |

Figure 1. Typical Waterproofing Of Holes In Floors

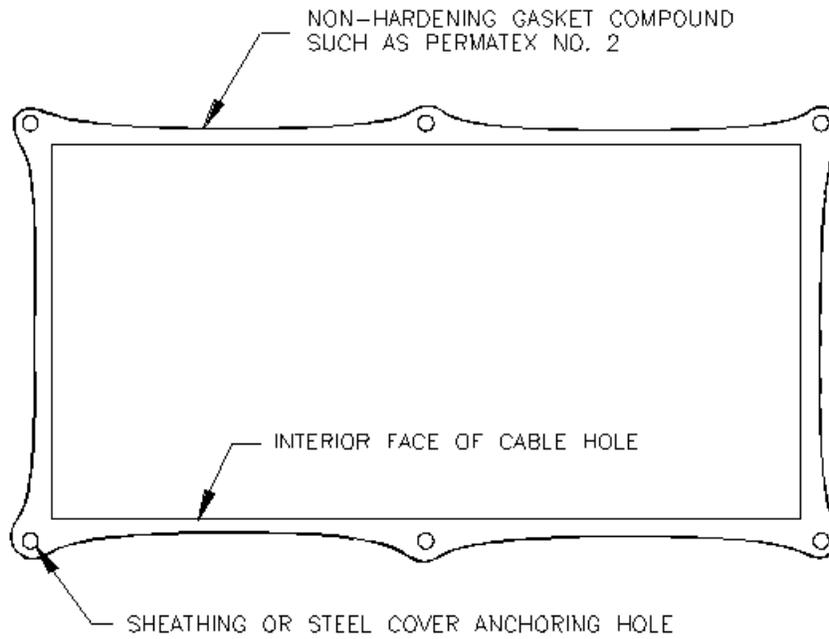


Figure 2. Partitioning Slots In Floors

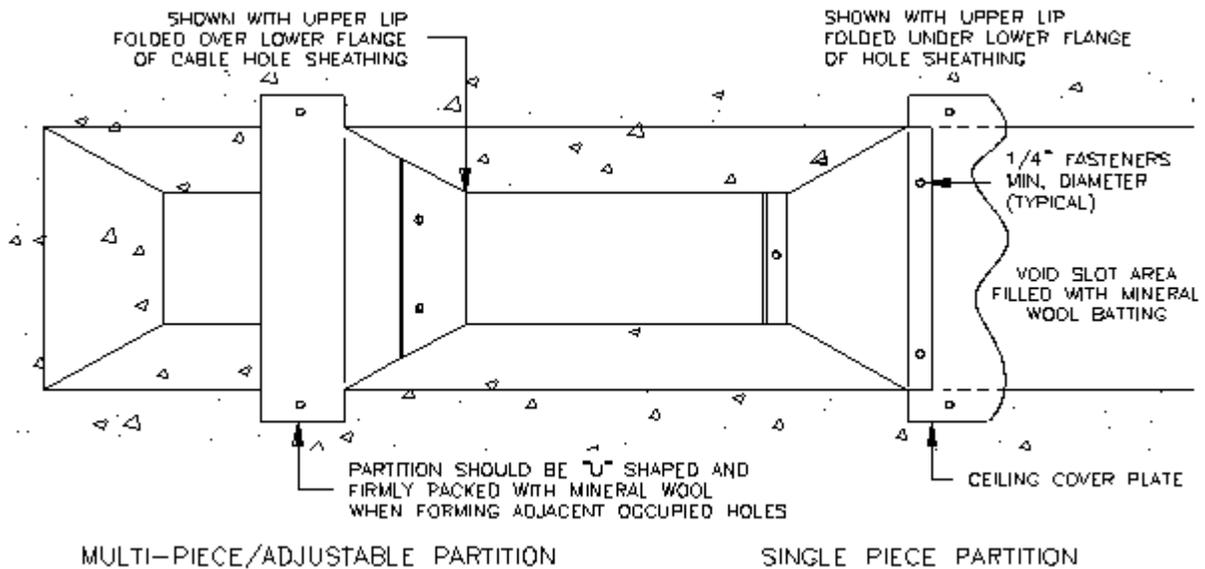
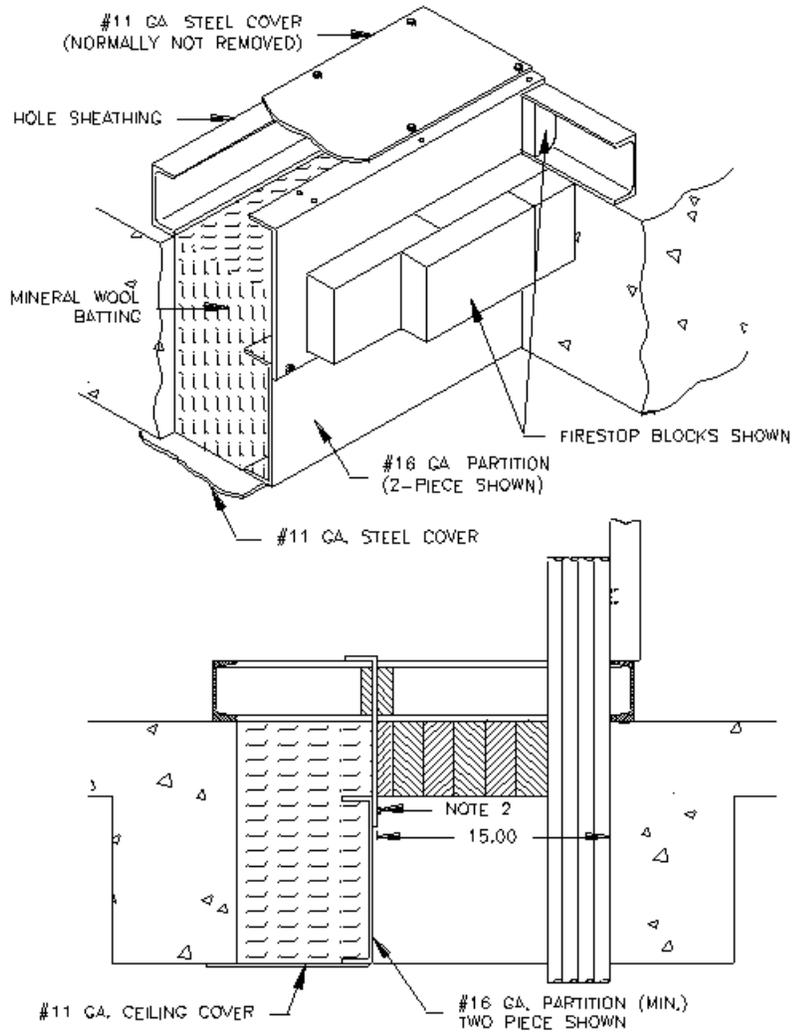


Figure 3. Partitioning Large Holes In Floors



NOTE 1. SINGLE PIECE PARTITIONS MAY BE USED WITH FLOORS UP TO 12-INCHES DEEP. MIN. 1/4-INCH FASTENERS USED THROUGHOUT ASSEMBLY.

NOTE 2. FASTENERS OF TWO PIECE PARTITIONS TO BE LOCATED BELOW FIRESTOP MEDIUM, AT EACH END OF PARTITION AND ON APPROX. 8 CENTERS.

Figure 4. Protection Of Exposed Composite Sheets At Holes In Floors

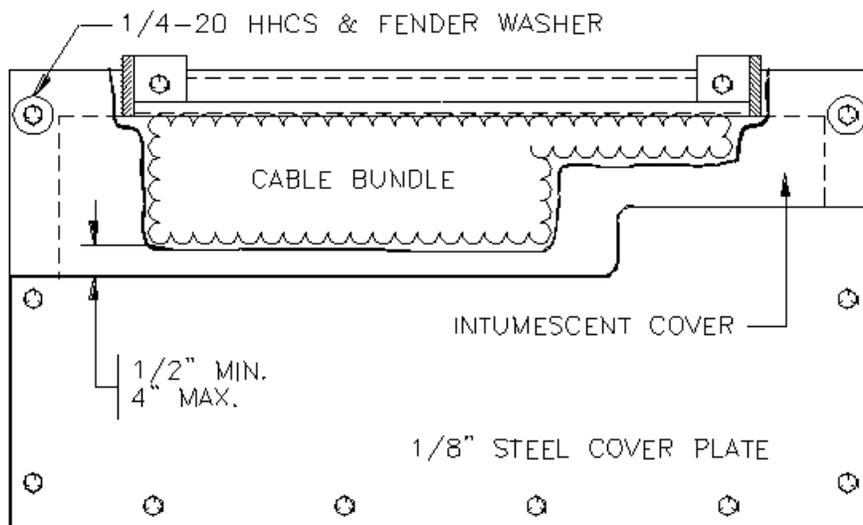


Figure 5. Firestopping Continuous Slots Under Office Distributing Frames - Mineral Wool Products

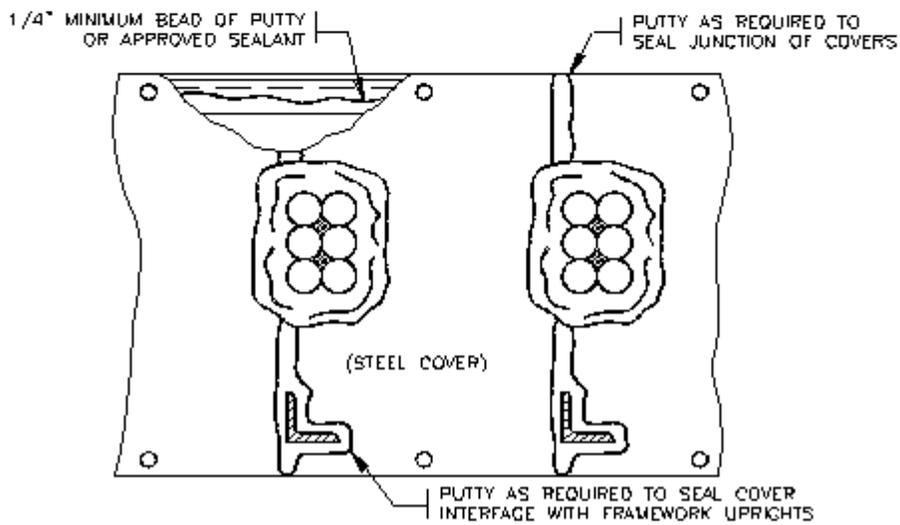
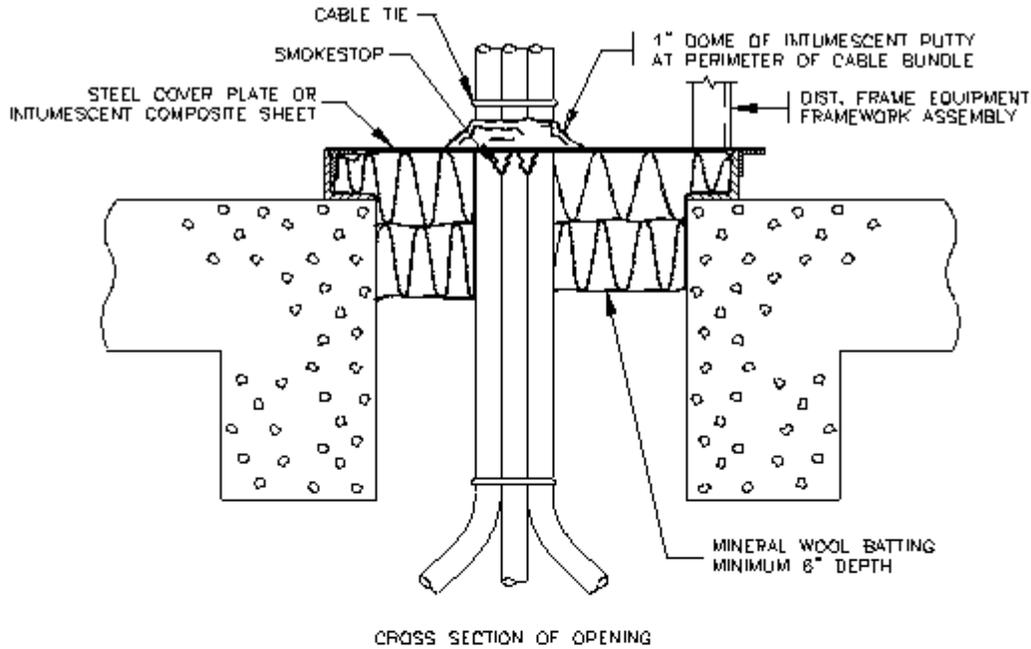


Figure 6. Firestopping Rectangular Holes Up To 4 x 10" In Size Under Office Distributing Frames

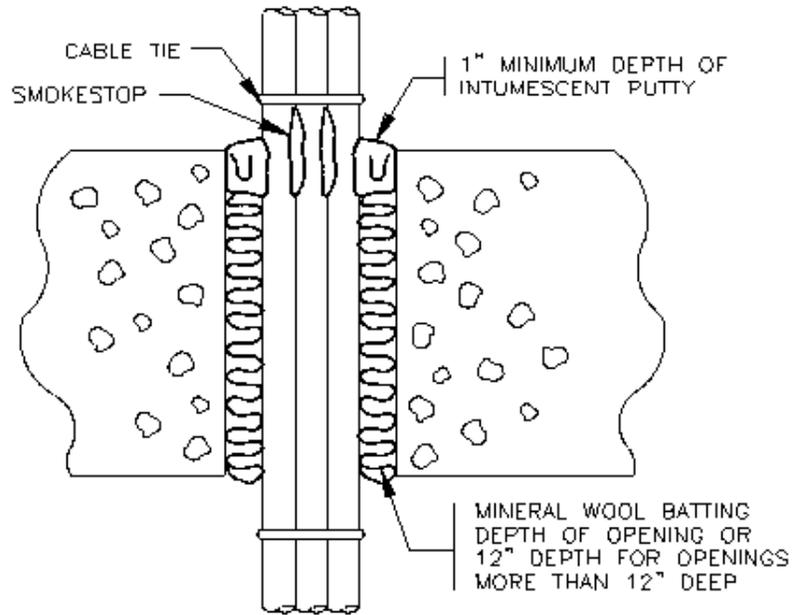
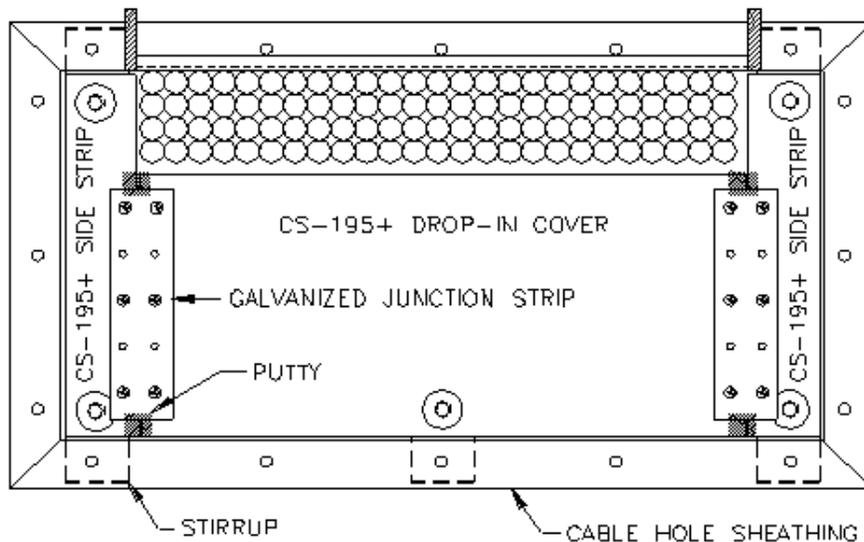
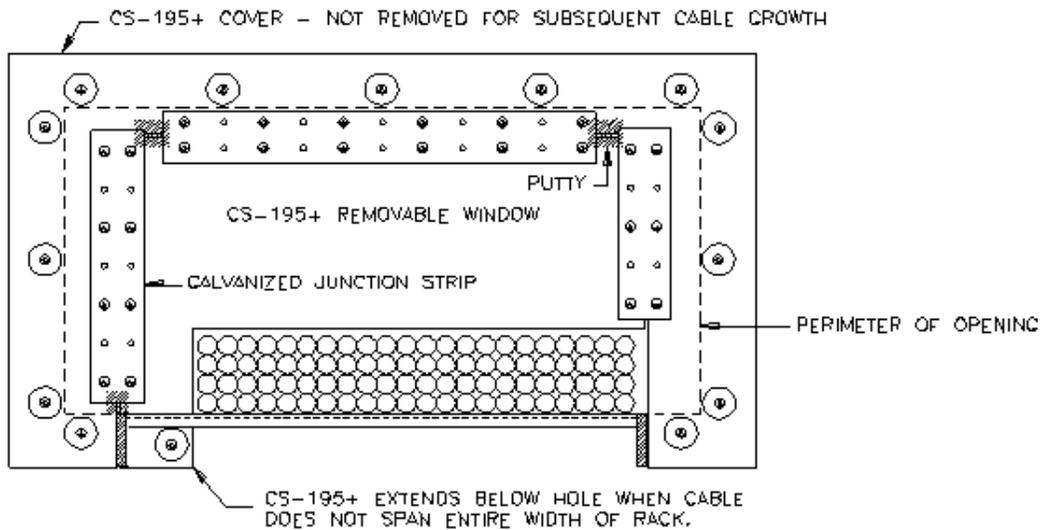


Figure 7. Acceptable Alternative To Single Piece Drop-in Cover At UL Design FB-3004 Floor Applications



1. SIDE STRIPS SIZED ACCORDING TO WIDTH OF VERTICAL CABLE RACK AND INSTALLED BEFORE CABLE INSTALLATION. (BECOMES PERMANENT PART OF INSTALLATION)
2. DROP-IN COVER CUT TO FIT CONTOUR OF CABLE BUNDLE AND EQUIPPED WITH JUNCTION STRIPS.
3. BEAD OF PUTTY APPLIED TO UNDERSIDE OF JUNCTION STRIP AT INTERFACE WITH DROP-IN COVER BEFORE INSTALLATION.
4. PUTTY APPLIED OVER EXPOSED EDGES OF DROP-IN COVER AND SIDE STRIPS, AND JUNCTION STRIP FASTENER HOLES AS CABLE BUNDLE INCREASES AND STRIPS BECOME SHORTER.
5. ONLY DROP-IN COVER IS REMOVED FOR SUBSEQUENT CABLE ADDITIONS.

Figure 8. Acceptable Alternative To Single Piece Cover At UL Design CAJ-4003 Wall Applications



1. CS-195+ WINDOW SIZED ACCORDING TO WIDTH OF CABLE RACK AND MAXIMUM ALLOWABLE CABLE PILEUP - MINUS ROOM FOR JUNCTION STRIP FASTENERS.
2. WINDOW CUT TO FIT CABLE BUNDLE CONTOUR AND EQUIPPED WITH JUNCTION STRIPS. PUTTY APPLIED TO UNDERSIDE OF JUNCTION STRIPS AT INTERFACE WITH CS-195+ COVER AND INSTALLED INTO OPENING.
3. PUTTY INSTALLED OVER EXPOSED EDGES OF WINDOW AND COVER.
4. PUTTY TO COVER EXPOSED JUNCTION STRIP FASTENER HOLES AS CABLE BUNDLE GROWS AND JUNCTION STRIPS BECOME SHORTER.

Figure 9. Firestop Applications - Adjacent Walls and Buildings

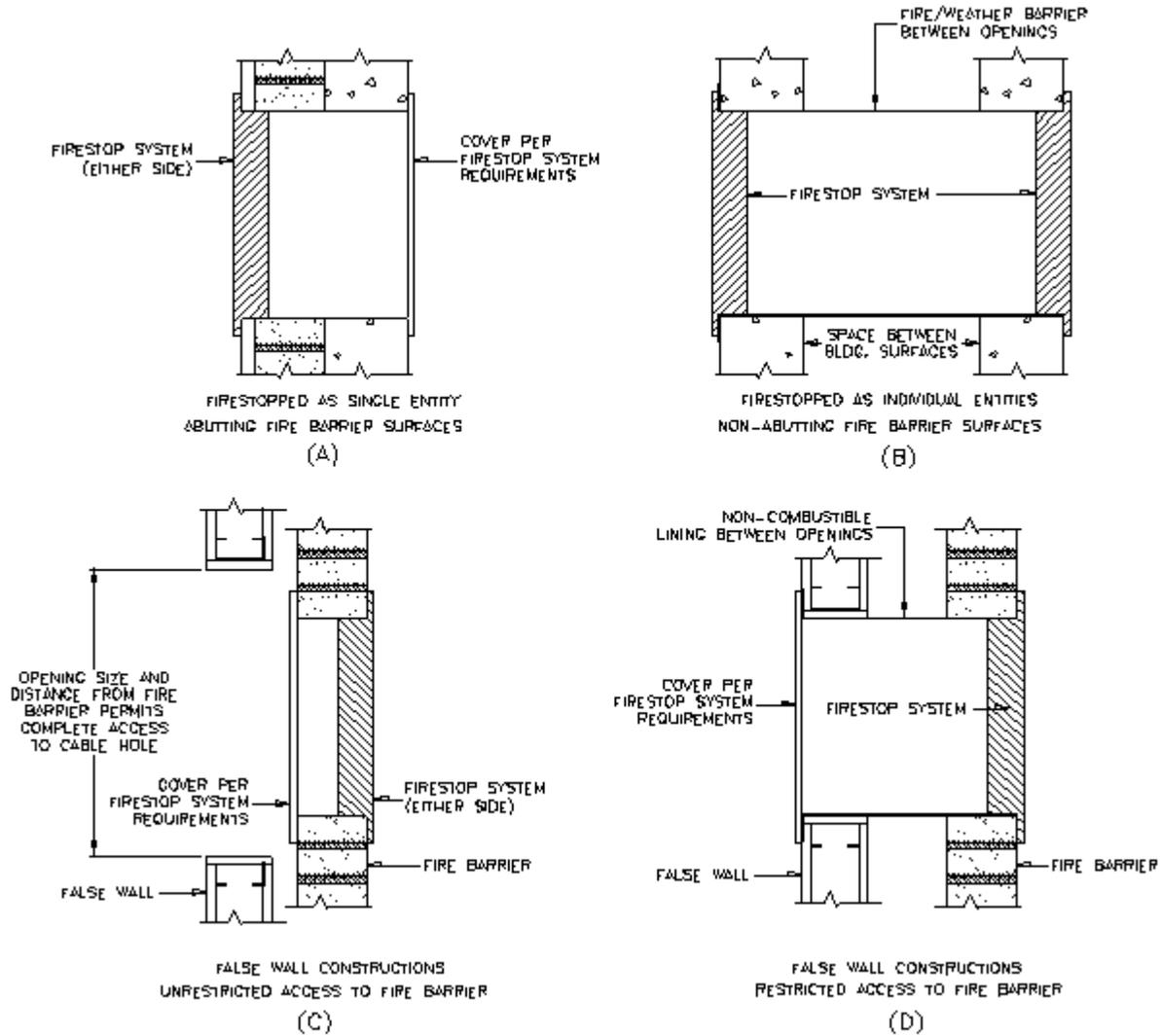
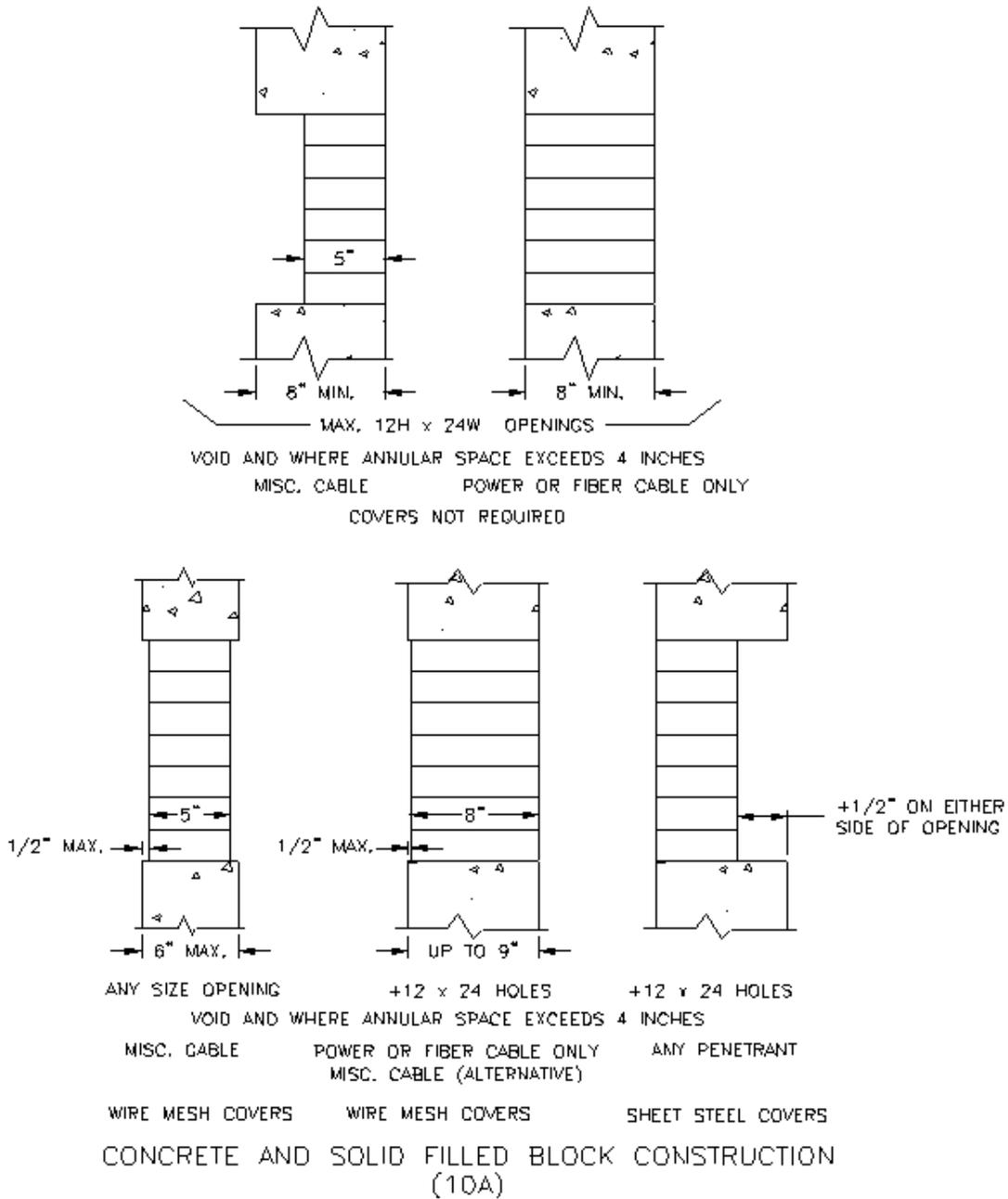
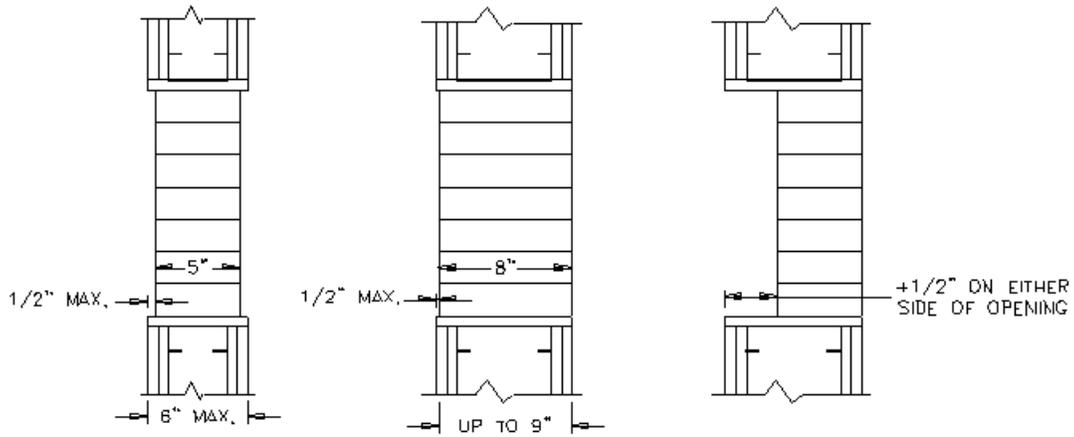


Figure 10. Hilti Fire Block Orientation and Cover Requirements



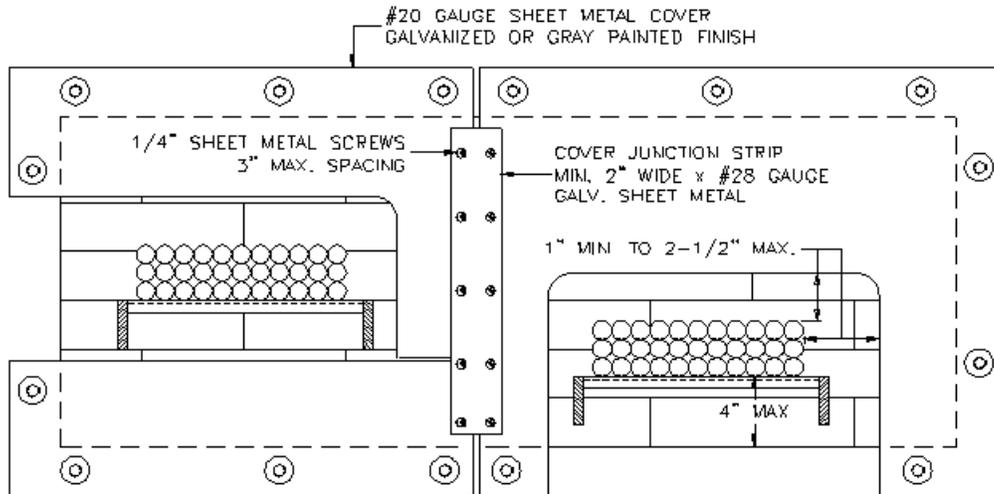


ANY SIZE RECTANGULAR OPENING
VOID AND WHERE ANNULAR SPACE EXCEEDS 4 INCHES

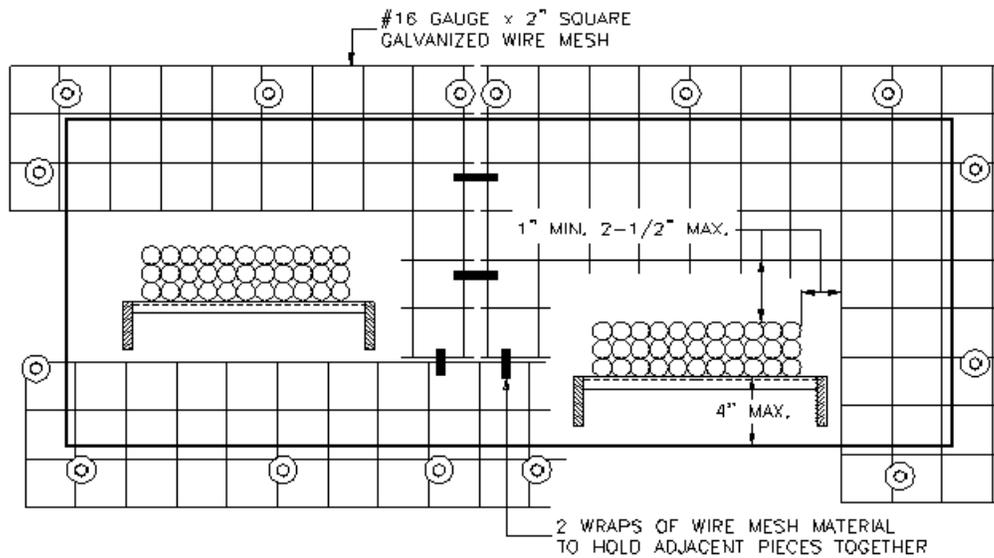
| | | |
|------------------|--|--------------------|
| MISC. CABLE | POWER OR FIBER CABLE ONLY MISC. CABLE (ALTERNATIVE) | ANY PENETRANT |
| WIRE MESH COVERS | WIRE MESH COVERS | SHEET STEEL COVERS |

HOLLOW WALL CONSTRUCTIONS
(10B)

Figure 11. Splicing Covers At Holes Using Hilti Fire Blocks



SOLID SHEET METAL
(11A)



WIRE MESH
(11B)

Figure 12. Typical Hilti Fire Block Orientation In Holes Having Mixed Cable Types

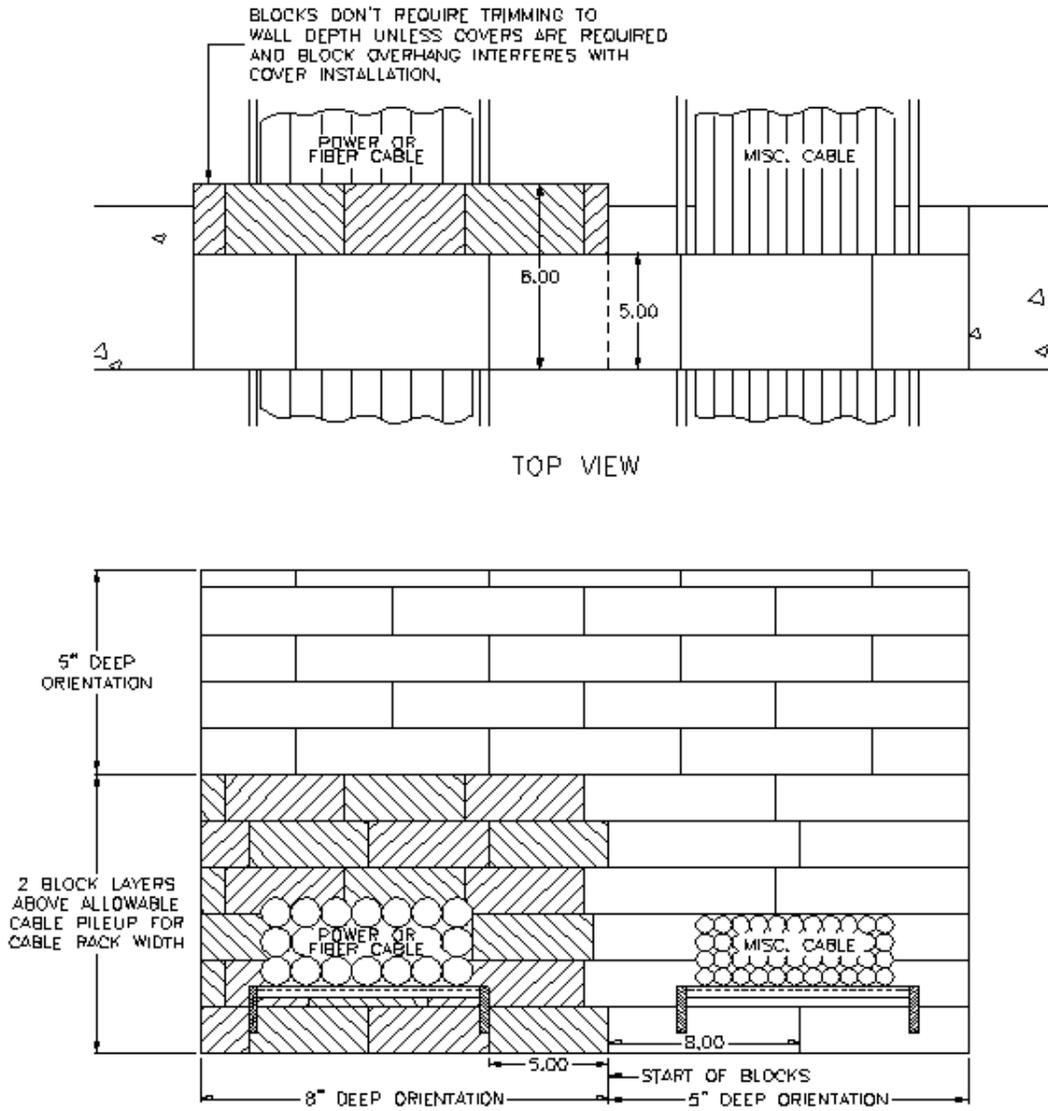


Figure 13. Firestopping At Bus Bar Cable Hole Using Hilti Fire Blocks (Hilti EJ #15521b)

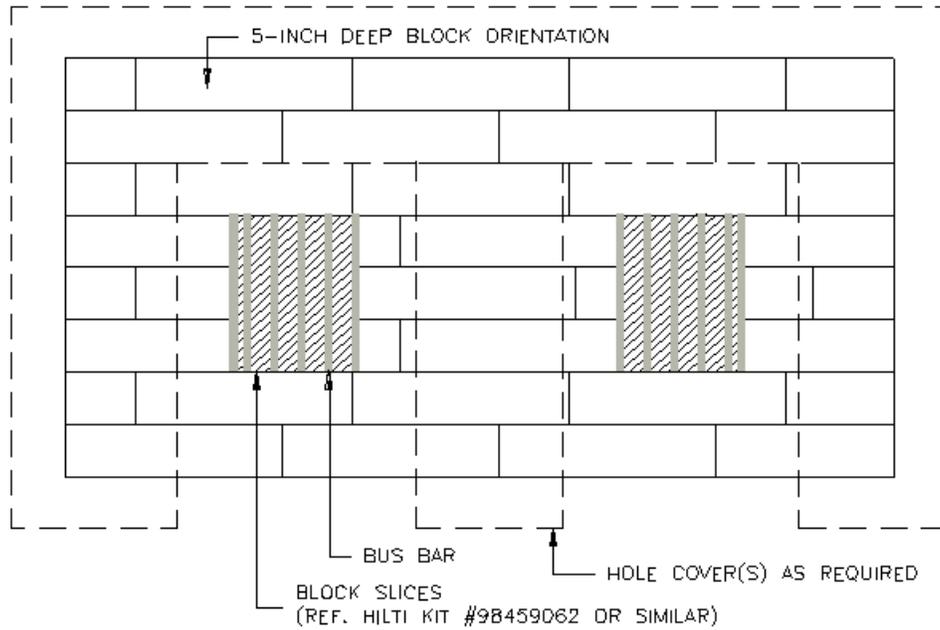


Figure 14. Sealing Pipe/Raceway Dead-ended Within Room Cavity (Vertical or Horizontal Orientation)

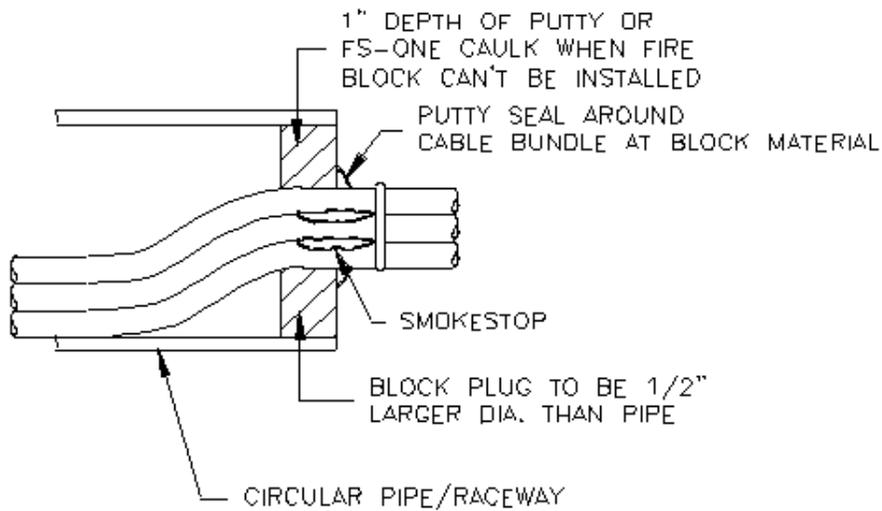


Figure 15. Firestopping Steel Raceway In Concrete Floors - Raceway Cast In Place (Hilti USA EJ 34153b)

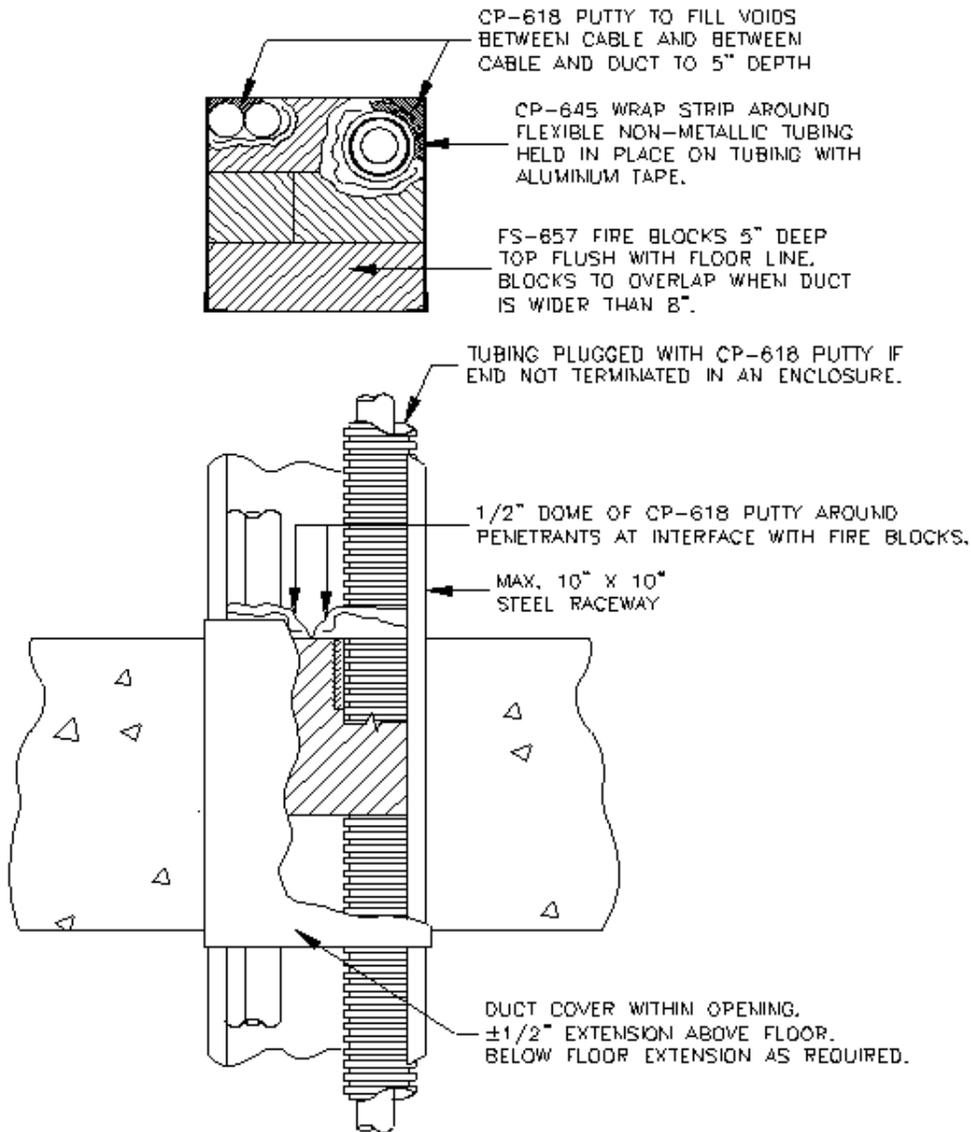


Figure 16. Firestopping Steel Raceway In Solid Floor/Wall - Cored Opening (Hilti USA EJ 34154b)

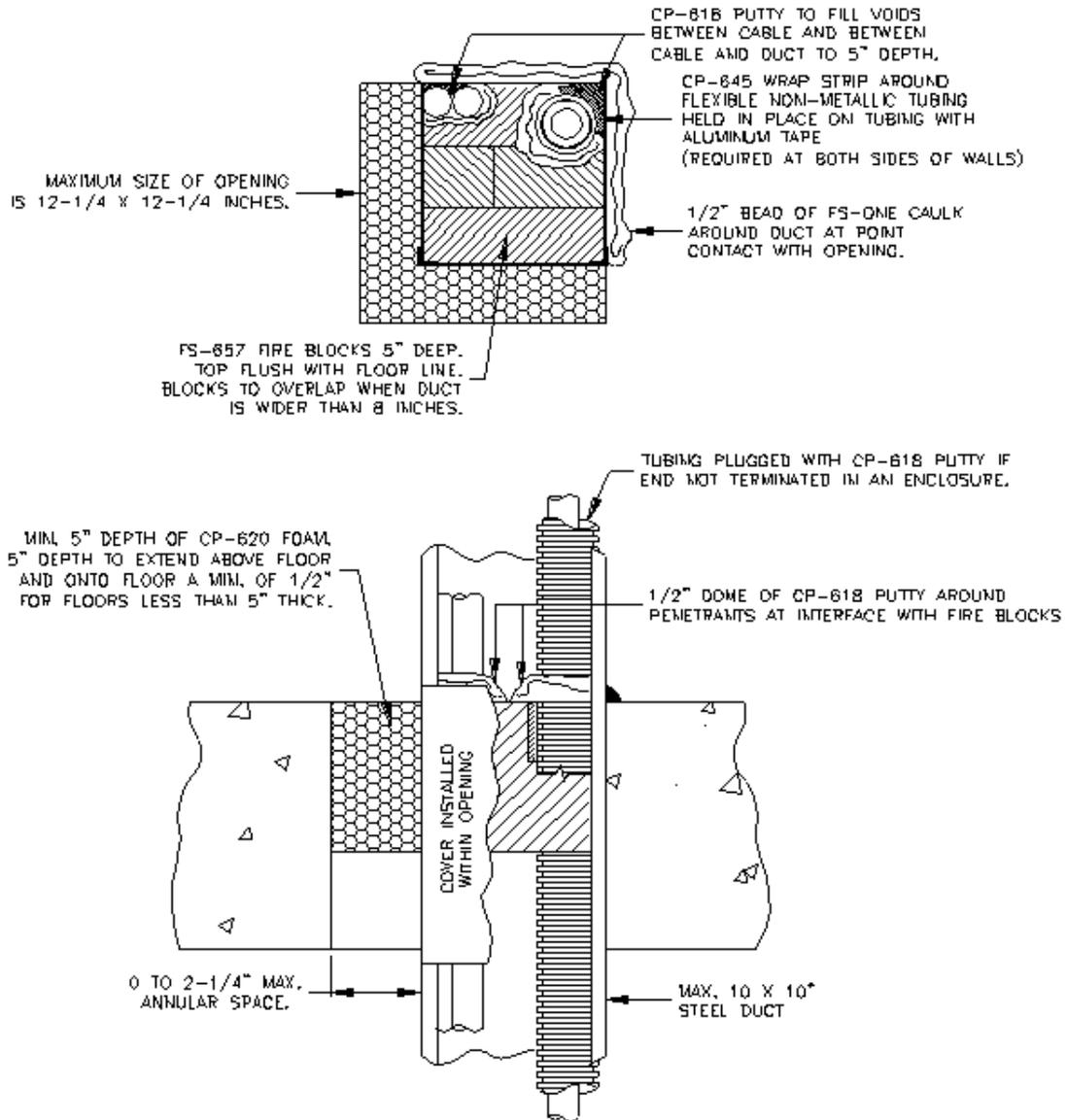
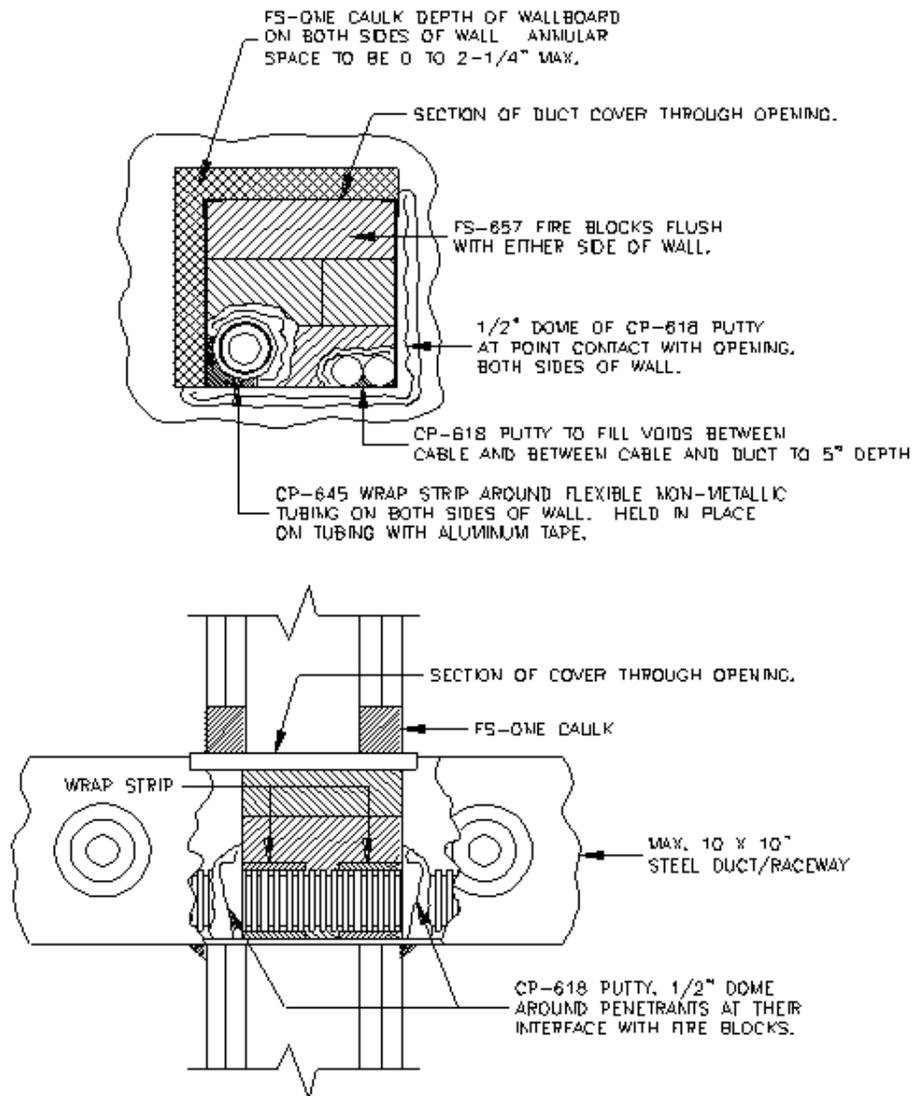


Figure 17. Firestopping Steel Raceway In Hollow Walls (Hilti USA EJ 34155b)



8. RELATED DOCUMENTS

9. ACKNOWLEDGEMENTS

10. CONTACT LIST

ACRONYMS

A.1 NETWORK ACRONYMS DICTIONARY

Refer to ATT-000-000-020, Network Acronyms Dictionary.