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## FIRESTOPPING OF PENETRATIONS

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### TABLE OF CONTENTS

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Section	Content	Page
1.0	Overview	1
2.0	Governing Objectives	4
3.0	General Information	5
4.0	Precautions	7
5.0	Firestopping Requirements: Materials and Tools	10
6.0	Applications and Appropriate Firestopping Systems	12
7.0	Verifying Proper Firestopping of Penetrations	25
8.0	Certification and Training	27
9.0	Reference Documents	28

### Glossary and Abbreviations

### Appendices

1. Contacts for AT&T Practice - Firestopping of Penetrations
  2. Penetration and Firestopping Inspection
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## 1. Overview

**1.01 Purpose and applicability of practice.** This practice establishes AT&T requirements for firestopping of fire-rated walls, floors, ceilings and partitions penetrated by pipes, wires, cables, cable trays, other conduit, mechanical penetrations, and holes in walls or floors in AT&T owned or leased buildings or spaces. Due to the different building and space uses, locations, and varying building maintenance and operation responsibilities in AT&T leased and owned buildings and spaces, the Practice applicability shall be as follows:

- The Guiding Principals of Section 2 apply to all AT&T buildings and spaces.
- All firestopping performed in AT&T network and data center operations owned and leased buildings and spaces worldwide shall comply with all sections of this practice. In countries where the firestop materials specified in this practice are not available, materials and firestop systems that provide an equal level of protection may be used with the approval of AT&T EH&S - Fire Protection Engineering. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**NOTE:** Where AT&T shares ownership of a network operation or data center building with another telecommunications company, AT&T is the minority owner of the building, and the majority owner initiates a major firestopping project using materials and systems other than those specified by this Practice for the whole building, then AT&T EH&S - Fire Protection Engineering shall be contacted to work with the majority owner of the building to insure the firestopping will provide a level of protection equal to that identified in this Practice. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

- In AT&T owned buildings used for purposes other than network and data center operations (e.g., administrative, warehouse), the firestop systems and materials shall comply with all sections of this practice. In countries where the firestop materials specified in this practice are not available, materials and firestop systems that provide an equal level of protection may be used with the approval of AT&T EH&S - Fire Protection Engineering. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.
- In AT&T leased buildings used for purposes other than network and data center operations (e.g., administrative, warehouse), the firestop systems used shall meet federal, provincial, state, or local codes, laws, or regulations, but are not restricted to only the manufacturer's materials and systems listed in this practice. Network and data center operations spaces in leased administrative or warehouse buildings shall meet the specific firestop requirements identified in this Practice
- Administrative spaces in AT&T network and data center operations buildings shall meet all requirements of this practice.

These procedures are specified to provide methods for restoring the integrity of fire-rated barriers as required by codes, laws, and regulations and necessary for the protection of AT&T employees and property and providing continuity of network and data center services. Where any federal, provincial, state, or local codes, laws, or regulations of the public authorities having jurisdiction at the location impose more stringent requirements than those cited in this practice, those codes, laws, or regulations shall be followed. Where the requirements contained in this practice cannot be met, the location shall notify the AT&T – Environment, Health, & Safety (EH&S) - Fire Protection Engineering for guidance in achieving equivalent levels of protection by alternate methods. See AT&T 770-350-100, Appendix 1, Issue 1 for contact information.

**1.02 Document updates and replacements.** This practice updates AT&T 770-350-100, *Firestopping of Penetrations*, Issue 1, May 1993 to current standards and practices and replaces all previous documents issued on this subject. Whenever this practice is reissued, the reason(s) for reissue will be listed in this paragraph.

**1.03 Admonishments.** This practice contains admonishments. See Section 4.0 for details about cautions and warnings regarding:

- proper installation of firestop systems;
- safe procedures for working with tools in an open vertical through-floor penetrations;
- use the appropriate personal protective equipment when preparing and installing the listed firestop system and associated materials;
- establishing load-bearing protection of the penetration in the form of a top steel plate on vertical through-floor penetrations;
- the incompatibility of firestop materials from different manufacturers;
- using materials other than those approved in this Practice, recommended by the 3M Technical Support group, or the AT&T EH&S – Fire Protection Engineering after review. Materials not previously approved or recommended may present possible health hazards (see AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information);
- the proper sampling, handling and disposal of suspected asbestos-containing materials removed during installation of firestopping; and
- issues related to building designs that include metal sleeves in the penetration slots to separate openings. These may not meet some current code requirements for 2-hour F and T ratings.

**1.04 Comments welcome.** AT&T welcomes your comments on this practice. Your comments will aid us in improving the quality and usefulness of AT&T documentation. Please use the Feedback Form provided at the back of this practice.

**1.05 On-line accessibility.** The practice is accessible through the AT&T EH&S Website at <http://ehs.att.com/pps/> or at the On-line Document Management Service (ODMS) Website at <http://implan.web.att.com/homes/1fal27/projects/ehswebtr/odms.html>.

**1.06 Paper copy availability.** Paper copies of this Practice and any associated appendices may be ordered from the Lucent Customer Information Center. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**1.07 Disclaimer notice.** This practice does not contain a disclaimer notice.

**1.08 FCC Warnings.** This practice does not contain a FCC WARNING.

**1.09 Security statement.** This practice does not contain a security statement.

**1.10 Document completeness and accuracy.** Every effort was made to ensure that the information in this practice was complete and accurate at the time of printing. However, information is subject to change.

**1.11 Document issuance.** This practice is issued by the AT&T Environment, Health, & Safety Organization. Questions concerning its content may be referred by e-mail to AT&T – EH&S – Fire Protection Engineering at [fire2@att.com](mailto:fire2@att.com) or at the contact location in AT&T Practice 770, Appendix 1, *Contacts, Firestopping of Penetrations*.

## **2. Governing Objectives**

**2.01 Provision of fire-rated construction.** Fire-rated construction shall be provided when required by federal, provincial, state, or local codes; separation of areas is provided for life safety reasons as identified in AT&T Practices; or the needs of the business must be met as specified in AT&T Practices. See AT&T Practice 760-610-205, *Egress/Access Requirements*, and 760-630-400, *Compartmentation*, for details of requirements.

**2.02 Integrity of fire-rated construction.** The integrity of fire-rated construction shall be maintained at all times by providing listed fire-rated assemblies or systems in all openings and penetrations. See AT&T Practice 760-610-205, *Egress/Access Requirements*, and 760-630-400, *Compartmentation*, for details of requirements.

**2.03 Equal ratings.** The fire-rated assembly or system used to close an opening or penetration shall have a rating that equals the fire-rating of the fire-rated construction.

**2.04 Use listed firestop systems.** Firestop systems listed by a nationally recognized testing laboratory shall be used for any penetration in fire-rated construction (including walls, barriers, and floor-ceiling assemblies.)

**2.05 Install according to manufacturers' instructions.** Install listed firestop systems only as specified by the manufacturer. All AT&T employed and contracted installers of firestopping shall be trained by the manufacturer (See Section 8.01).

**2.06 Use materials specified in listing.** Use only approved firestop materials for the approved firestop systems.

**2.07 Responsibility to firestop.** The AT&T employee or contractor who opens the hole/penetration is responsible for ensuring the holes/penetrations are properly firestopped at the end of the workday. All contracts for work that involves penetrations through fire-rated barriers shall include the requirement to provide the required firestopping.

**2.08 Verification of firestopping.** The responsible AT&T employee or designated representative who is trained to recognize the approved firestopping systems shall verify all penetrations are properly firestopped at the end of the workshift or at the end of the job, whichever occurs first. (See Section 8.02)

### **3. General Information**

**3.01 Practice basis.** This practice is based on AT&T requirements, AT&T accepted standards, the National Fire Codes of the National Fire Protection Association (NFPA), various model building/fire codes, Occupational Safety & Health Act (OSH Act), and other applicable codes and standards. Consult them or location specific federal, provincial, state, or local requirements for additional requirements.

**NOTE:** Equivalent national or local standards can be substituted for NFPA standards in areas where the standards specified in this practice are not commonly used. However, equivalent protection must be provided. The objective of this allowance is to avoid imposing unfamiliar standards unless they result in increased safety.

**3.02 Approved firestop systems for network and data center operations.** Firestopping systems and associated materials of 3M Fire Protection Products are required to be used in all network and data center operations buildings and spaces. Due to the large number of penetrations that occur in AT&T network operation buildings and spaces and the recognized need of the importance of firestopping for life safety of building occupants and the preservation of service continuity, a single manufacturer is specified. The single manufacturer was selected to ensure the systems used meet compliance requirements, as well as, EH&S and business needs. In addition, the specification of a single manufacturer simplifies installation and inspection of those installations and ensures consistency. The firestop systems and their component materials identified in this practice are specified based on the long-term testing of 3M fire barrier products which have proven to be compatible with compliance, EH&S and AT&T business requirements. The appropriate 3M firestop systems shall be used any time penetrations are opened. Where other building uses are in network and data center operations buildings, all penetrations in fire rated barriers shall be firestopped with 3M firestop systems and materials.

**3.03 Unacceptability of other firestop systems for network and data center operations.** Other firestopping systems exist, but are not currently acceptable in AT&T buildings. Many are not compliant with applicable regulations, laws, and codes needs or do not meet AT&T requirements. If manufacturers instructions or other needs arise for equipment installation that require other firestopping systems, they shall be reviewed and approved by AT&T EH&S – Fire Protection Engineering prior to use (see Appendix 1 for contact information).

**3.04 Approved manufacturers for administrative and warehouse operations.** In owned buildings where the predominant use of the building is other than network and data center operations (e.g., administrative, warehouse), the 3M firestop systems shall be used. In leased buildings where the predominant use of the building is other than network and data center operations (e.g., administrative or warehouse), the manufacturer of the firestop systems and materials are not restricted to only 3M. In many of these buildings, AT&T is a tenant and not responsible for the structure and therefore not in control of what firestop systems are used. In these buildings, all penetrations in fire-rated barriers shall be firestopped and the firestopping of fire-rated barriers shall meet regulatory requirements. Several other manufacturers offer firestop systems and materials that are listed for the necessary fire ratings and will meet regulatory requirements and AT&T's life safety and property protection needs – the maintenance of the integrity of the required fire-rated barriers. In selecting an approved manufacturer, the responsible AT&T employee or designated representative shall require proof of UL listing for the appropriate firestop systems. Some manufacturers use materials in their firestop systems that have by-products of combustion that are hazardous to the health of building occupants and emergency responders as well as possible severe impact on sensitive

electronic equipment. To check on whether a firestop system manufacturer is acceptable or not, contact AT&T EH&S – Fire Protection Engineering. See AT&T Practice 770-350-100, Appendix I, Issue 1 for contact information.

**3.05 Existing Penetrations.** Existing penetrations using formerly approved firestop methods **are not** subject to retrofit, until they are reopened due to a change in the penetration.

**Exception:** If the penetration was closed without firestopping or the firestop system is not obviously installed properly (e.g., spaces are left open enough so light shows through from the other side of the barrier), the penetration shall be opened and firestopped as soon as possible with an approved firestop system.

**3.06 New/reopened Penetrations.** All new penetrations and existing reopened penetrations shall be closed with approved firestopping, in network operation buildings and spaces with the systems described herein and by a regulatory acceptable system in all other buildings and spaces.

**NOTE:** The “blue bags” (KS5048) designed for the Bell System should not be used any longer for any firestopping. They do not supply the minimum fire ratings required by law and this Practice. Color variations of these bags (i.e., gray), should be presumed to be asbestos-containing, unless proven otherwise by bulk sampling results, and should be handled as described in Section 4.08.

**3.07 Conflicting Requirements:** Where national, provincial, state, or local codes, laws, or regulations of the "Authority Having Jurisdiction" (AHJ) at the location impose more stringent requirements than those cited in this practice, those codes, laws, rules, or regulations shall be followed. Where local codes, laws, rules, or regulations are less stringent than the requirements cited in this practice, the AT&T requirements of this practice shall be followed.

**EXCEPTION:** Where a legally authorized variance has been granted by the AHJ, in writing, to specific requirements of this practice, the AT&T Fire Protection Engineering Manager shall be consulted for guidance in achieving equivalent levels of protection by alternate means. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

## **4. Precautions**

**4.01 Cautions and warnings.** Some hazards exist in the installation of the firestop systems and if the firestop systems are not installed properly. These cautions and warnings need to be taken seriously and considered when installing firestopping.

**4.02 Proper laboratory listed systems.** Firestop systems shall be installed according to the UL-listed system. If not installed properly, the firestopped system may not prevent the penetration of flame, heat, smoke, and fire gases. The hazard of the fire and heat are easily understood, but the non-thermal hazards of smoke and fire gases are not as well known. The smoke and fire gases will penetrate an improperly firestopped penetration first and present both life safety hazards and threats to the reliability of electronic equipment.

**4.03 Mixing incompatible materials.** Firestop materials from different manufacturers shall not be mixed. If the materials from different firestop material manufacturers are mixed, the firestop system may not successfully prevent the penetration of flame, smoke, heat, and hazardous gases due to product incompatibility.

**4.04 Use appropriate personal protective equipment.** During the preparation of the materials and the installation of the firestop materials, the appropriate personal protective equipment shall be used.

**4.05 Dropped tools and materials.** Protection shall be provided against dropping tools and materials beneath vertical through-floor penetrations. Due to the possibility of tools or material dropping through cable hole openings when work takes place above (a through-floor penetration), adequate protection must be provided for personnel and equipment that may be present on the floor below locations where cable hole work is being performed. This protection is accomplished by cordoning off the section below the penetration to keep it clear.

**4.06 Falling and foot trapping hazards.** The top steel coverplate needs to be installed as a safety precaution. If the top steel coverplate is omitted, the firestop system is not tested for load bearing and could result in the harm of an employee, visitor, or contractor. The potential of this falling and foot-trapping hazard can be avoided by installing the steel coverplate.

**4.07 Potential health hazards.** Materials other than those identified as approved in this Practice, recommended by the 3M Technical Support group, or recommended after review by the AT&T EH&S – Fire Protection Engineering Team should not be used. Some available firestop products are known to have possible health hazards in a fire condition. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**4.08 Asbestos-containing materials.** Asbestos-containing materials were used in some older firestop materials, such as bags and caulking. A comprehensive Asbestos Operations and Maintenance (O&M) Plan should be in place for any buildings constructed before 1980 where asbestos is known or suspected to be present. This plan identifies the location and condition of asbestos-containing materials and establishes a procedure to safely and properly manage those materials. A template for an Asbestos O&M Plan and additional information on asbestos issues is available at the following Supplier Management Division (SMD) web site:



<http://attbuys.smd.att.com/content/process/bldinf/bialas.htm>

Personnel **shall not** perform work operations which would disturb asbestos-containing material or suspected asbestos-containing material. This material may be located in areas such as cable slots/holes, engine exhaust piping, cable rack support clamps or ceiling beams. Personnel should be aware of the possibility that asbestos might be present at these locations. In cases where asbestos material or dust is present, it is the AT&T operating unit's responsibility to take the necessary measures to ensure the asbestos-containing material is handled in accordance with all federal, provincial, state and local regulations.

Exercise caution when opening cable holes or slots. Loose packing materials containing asbestos have been found in some cable slots used to run cable to the main distributing frame. If loose packing material is found upon opening a cable hole/slot, the cable hole/slot shall be closed and secured until the loose packing material is sampled by a licensed asbestos inspector to confirm the presence or absence of asbestos. Samples shall not be taken by unauthorized personnel. Should the material test positive for the presence of asbestos, then it is the responsibility of the customer to obtain a licensed contractor to safely remove and dispose of the asbestos. No work shall proceed in the cable hole/slot until all friable asbestos materials have been safely removed. A list of AT&T approved asbestos consultants and abatement contractors can be found at the following SMD web site address:

<http://attbuys.smd.att.com/content/process/bldinf/bialas.htm>

**Exception:** This requirement does not apply to loose filling from punctured or torn mineral wool or fiberglass-filled bags previously used for fire stopping.

See AT&T Practice 010-160-156, [International Occupational Exposure To Asbestos Program](#) for further information on policies and procedures for working with asbestos-containing and suspect asbestos-containing materials.

When existing floor, wall, and partition cable holes are opened and the present covers are made of non-friable asbestos-containing material, a certified contractor shall properly dispose of the asbestos-containing material. The installer shall replace them with the appropriate 3M firestop system and associated 3M CS-195+ Composite Sheet™. A steel plate should then be placed over the composite sheet on all affected floor and ceiling cable holes.

**CAUTION:** The replaced asbestos-containing material covers are not to be cut or reduced in size prior to disposal. Such covers shall be picked up and disposed of by an AT&T approved asbestos removal contractor.

Questions regarding the disposal of fire-stopping materials can be directed to the AT&T Hazardous Waste Center. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**4.09 Use of metal sleeves.** Some building designs have slots or troughs that run the length of the floor. Cable runs are designated to penetrate floors through these slots or troughs. In order to separate these penetrations, the openings are sleeved with a metal sheet metal "box" with a lip at the bottom to hold the bottom composite sheet. The use of the sleeve may not meet some current code requirements for 2-hour F and T ratings and 3M is helping AT&T to determine an alternative procedure.

## **5. Firestopping Requirements: Materials and Tools**

**5.01 Intumescent firestop technology.** The firestop requirements listed in this practice are based on the use of 3M fire barrier products. As applied, these products provide a barrier or seal against fire, cold smoke, toxic gas, water resistance, and heat. When exposed to temperatures exceeding 250 degrees Fahrenheit (°F) (121 degrees Celsius (°C)), these products rapidly expand up to ten times the original volume to seal any cavities in a penetration or opening. This rapid expansion is called intumescence.

This intumescent action of the material also fills any voids left by items consumed by fire, such as plastic pipe, pipe insulation, or electrical, communications, or signal cable. Once all the voids are filled, the integrity of the fire-rated wall or floor is fully restored.

Under continuous exposure to high heat, the intumescent materials convert to a high-strength insulating char that seals out fire, toxic fumes, smoke and water for up to 3 hours (hrs.). The char also can withstand the thermal and mechanical shock of high-powered water streams.

**5.02 Typical materials.** Most AT&T buildings require the following materials most typically used in the 3M firestop systems needed in AT&T buildings (as discussed in Section 6.0):

**3M Fire Barrier CS-195+ Composite Sheet™** – (available in sizes: 16 inch (") x 28"; 24"x36"; 36"x36"; and 41"x36") is an organic/inorganic fire resistive elastomeric sheet which provides a basic fire-resistant barrier. It is used to seal large floor and wall openings. The elastomeric material of this sheet is factory-bonded on one side to a layer of 29-gauge galvanized steel, reinforced on the other side with a hexagonal steel wire mesh, and then covered with aluminum foil. It is readily cut using nippers, a hack saw, a saber saw, nibblers, or other cutters commonly used for light metal or plastic materials. It should never be cut in any areas with sensitive electronic equipment. When properly installed, the steel wire mesh (foil side) should face into the hole - never out.

**3M Fire Barrier Moldable Putty (MPP-1+, MPP-4S+, and MPS-2+)™** – (available as pads of approximately 4" x 8" x 1/8" (10 centimeter (cm) x 20 cm x 3 cm); 7" x 7" x 1/8" (18 cm x 18 cm x .32 cm); or in sticks (1.6" x 11" (4 cm. x 28 cm.)). Reusable, moldable, intumescent putty used to seal openings between floors, walls, and penetrating items providing a smoke seal. Moldable putty remains pliable after installation to allow re-entering of system.

**3M Fire Barrier CP25WB+ Caulk™** - (available as 10.5 fluid ounces (fl. oz.) cartridge, 1-gallon (gal.) pail, or 5-gal. pail) A one-part, water-based intumescent caulk used to permanently seal openings between floor and wall openings and penetrating items from fire, smoke, noxious gas, and water sealant. The unique intumescent property of this material means that as cable or pipe insulation is consumed by fire, the caulk expands to maintain the penetration seal.

**3M Fire Barrier FS-195+ Wrap Strip™** – A strip of flexible foil-faced intumescent material used to seal combustible materials or high heat conducting penetrating items through-floor or wall assemblies.

**3M Plastic Pipe Devices** – One-piece metal collar assemblies used to encase the heat expanding intumescent materials. In order to seal PVC (polyvinyl chloride), CPVC (carbon polyvinyl chloride), PE (polyethylene), PP (?), PB (?), and ABS (?) pipes; ENT (electrical non-metallic tubing) conduit; drain, waste, vent, or closed pipe systems.

**5.03 Other Materials and tools.** The following are the other materials and tools required for the firestop systems covered in Section 6:

- C-clamp, 6" (15 cm)
- Contour gauge
- Electric drill, 3/8" (9 millimeters (mm)) and appropriate drill bits
- Electric nibbler, Saber saw or equivalent
- Latex gloves
- Metal file
- Nylon straps
- Perforating punch, 7/16" (11 mm)
- Ratchet box wrench, 9/16" (14 mm) or equivalent
- Trowel
- Safety glasses
- Work gloves (leather, cotton, etc.)
- #10 sheet metal screws
- 1-1/4" steel fender washers
- 1/4 -20 by 1" H.H. cap screws.

- ¼" x 1-¼" masonry anchors
- Metal drywall anchors (for drywall penetrations only)
- Packing material found in some firestop systems (mineral wool, backerod, etc.)
- Cardboard or other material for making a template
- Permanent marker
- Clean-up materials including sponges, rags, paper towels, and water.

**5.04 Material Safety Data Sheet availability.** Material Safety Data Sheets should be available for all chemical materials used in the firestop systems. MSDS's can be acquired from 3M or AT&T EH&S. For contact information see AT&T Practice 770-350-100, Appendix 1, Issue 1.

## **6. Applications and Appropriate Firestop Systems**

**6.01 General installation procedures.** This practice provides general firestop installation procedures and related diagrams for the most typical penetrations found in AT&T buildings. For penetrations not described herein, the required system information may be found in the 3M Fire Protection Products Application and Specifiers Guide for Through-Penetration Fire Protection Systems; the 3M website at <http://www.mmm.com/firestop>; the 3M CDRom; the 3M Autofax System; or the 3M Technical Hotline. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**6.02 Engineering judgements.** All firestop systems shall be installed according to the UL-listing. Any variations that are needed due to the applications not fitting those specified by the UL listing require an engineering judgement that can only be provided by the 3M Technical Staff dedicated to the Telecommunications Industry. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

**6.03 Temporary firestopping.** All penetrations shall be closed at the end of the work shift unless the work on the penetration will continue into the next work shift. Codes require minimum hour-ratings be provided and maintained for fire-rated assemblies. No allowance is given for temporary situations or construction. AT&T requires, for employee safety, preservation of our networks, and code compliance (in many locations), the firestopping in floor ceiling assemblies provide both temperature (T) and fire (F) ratings. In most buildings, a minimum of 2-hour F and T ratings are required. By providing the firestopping identified in the following sections that meets these ratings, not only fire and heat are prevented from penetrating for the specified time period, but also smoke and fire gases. Smoke and fire gases are responsible for more damage to personnel and equipment in fire situations than the other hazards associated to fire.

**NOTE:** The “blue bags” used in the past for “temporary” firestopping, are no longer to be used in firestopping installations or as a “temporary” measure. The “blue bags” do not meet code or provide the protection required for employee and network protection.

**6.04 Standard applications.** The following are some of the applications or types of opening/penetrations found in AT&T buildings and the appropriate UL listed firestop systems required:

Type of Opening or Penetration	UL System # for 3M Firestop System	Products Required	Max. Hole Size	F/T Rating
Insulated cables in a rack through a concrete floor	FB3004	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	12" x 24" or 288 square inches (sq, in.).	2 hr. F and 1-1/2 hr. and 2 hr. T
Metal pipes or conduit through concrete floor or wall	CAJ1044	<ul style="list-style-type: none"> <li>CP 25 WB+ Caulk<sup>TM</sup></li> </ul>	32"	2, 3, and 4 hr. F and 0 hr. T
Metal pipes or conduit through gypsum walls	WL1001	<ul style="list-style-type: none"> <li>CP 25 WB+ Caulk<sup>TM</sup></li> </ul>	13-1/2"	1, 2, 3, and 4 hr. F and o, 1, 2, 3, and 4 hr. T
Concrete floor opening – blank	CAJ0004	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	12" x 24" or 288 sq. in.	2 hr. F
Signal cables in a cable rack through a concrete floor	CAJ4003	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>FS-195+ Wrap Strip<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	12" x 24" or 288 sq. in.	2 hr F

Type of Opening or Penetration	UL System # for 3M Firestop System	Products Required	Max. Hole Size	F/T Rating
Insulated cables in a rack through a concrete floor	CAJ4003	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>FS-195+ Wrap Strip<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	36 square feet (sq. ft.)	2 hr F
Blank cable opening wall seal	CAJ0004	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> </ul>	36 sq. ft	3 or 4 hr F
Cable tray cable hole seal in a wall	CAJ4003	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>FS-195+ Wrap Strip<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	36 sq. ft	1 or 2 hr F
Multiple riser cables through a large opening in concrete	CAJ3044	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet<sup>TM</sup></li> <li>FS-195+ Wrap Strip<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	8" x 30" or not to exceed 240 sq. in	2 hr F & ½ hr T with 900 pr. cable
Insulated cables through concrete	CAJ3030	<ul style="list-style-type: none"> <li>CP25WB+ Caulk<sup>TM</sup></li> <li>Ceramic fiber or Mineral wool</li> </ul>	8"	Depends on % of cable fill
Cables through concrete floor or wall	CAJ3021	<ul style="list-style-type: none"> <li>Moldable Putty</li> <li>Ceramic fiber or Mineral wool</li> </ul>	6-1/4"	2hr F
Single fiber optic/ inner duct through concrete	CAJ2028	<ul style="list-style-type: none"> <li>FS-195+ Wrap Strip<sup>TM</sup></li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix<sup>TM</sup> and/or 3M Moldable Putty+ Pads<sup>TM</sup>)</li> </ul>	4"	2hr F and 2hr T

Type of Opening or Penetration	UL System # for 3M Firestop System	Products Required	Max. Hole Size	F/T Rating
Multiple fiber optic/inner duct through concrete	CAJ2029	<ul style="list-style-type: none"> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix™ and/or 3M Moldable Putty+ Pads™)</li> <li>Plastic Pipe Devices</li> </ul>	5"	2hr F and 2hr T
Multiple fiber optic/inner duct through a large opening in concrete	CAJ2030	<ul style="list-style-type: none"> <li>CS-195+ Composite Sheet™</li> <li>Moldable Putty (3M MPS-2+ Moldable Putty Stix™ and/or 3M Moldable Putty+ Pads™)</li> <li>FS-195+ Wrap Strip™</li> </ul>	8" x 30 or Not to exceed 240 sq in	2hr F and 0-2hr T

**6.05 Typical systems.** The following are the detailed instructions for the five most typically used 3M firestop systems found in AT&T buildings:

#### **A. 3M Firestop System F-B-3004:**

**System Application:** This system should be used for floor/ceiling cable penetrations. This system provides a 2-hr. F-Rating and 1-1/2 to 2-hr. T-Ratings when installed in minimum 8 in. thick concrete floor. Maximum area of opening is 288 sq. in. Maximum 34 percent (%) fill (based on available area of opening) of either communication or power cables. **Note:** When maximum 72 pair No. 26 American Wire Gauge (AWG) telecommunication cable is used, the T-Rating is 2-hr. When single conductor maximum 750 kcmil power cable (as identified in AT&T Practice 790-100-669, *DC Power Systems Engineering and Installation Standard for Outside Suppliers*) is used, T-Rating is 1-1/2-hr.

**Penetrating Item(s):** Maximum 20" ladder-type cable rack. Maximum 72 pair No. 26 AWG communications cables and maximum 750 kcmil power cables (as identified in AT&T Practice 790-100-669, *DC Power Systems Engineering and Installation Standard for Outside Suppliers*).

**System Materials:**

- Needed for Option 1 below: Minimum 5 prefabricated stirrups constructed of 2 " wide x 1/8" thick steel strip with a minimum 2 in. lip at the bottom end for support and attachment of the intumescent composite sheet. Stirrups shall be long enough to attach to curbing with the 2" lip being flush with the bottom of the opening.
- Minimum 1-1/4" fender washers
- Minimum 1" long No. 10 (or 3/16") self-tapping sheet metal screws
- Minimum 1/4" diameter x 1" long steel bolts with washers
- Needed for Option 3 below: Minimum 3/16" diameter. x 1-1/4" long steel anchor screws or equivalent
- Minimum 10 gauge steel cover plate (approx. 14" x 28")
- 16" x 28" 3M CS-195+ Composite Sheets™
- 3M MPS-2+ Moldable Putty Stix™
- 3M Moldable Putty+ Pads™

**System Installation:**

1. With entirely new installations of communications or power cables in a penetration, apply 2" wide strips of moldable putty pad to the cables at the point where the top composite sheet will bisect the pad when installed. Individually wrap the cables with 2" wide moldable putty pads or they may be laid across the face of each cable row for smoke sealing, prior to lacing. Where new cable is being added to an existing installation, wrap the putty pad strips around the individual cables that are added to the bundle, prior to lacing. Lace the cables to the cable rack and to each other to form a tight bundle with minimum voids between cables. **NOTE:** Existing cable bundles should not be opened to add the putty retroactively.

2. Mount the bottom 3M intumescent sheet (wire mesh side faces into the opening) in one of the following four ways:

**Option 1**

**With stirrups, located in each corner of the opening and spaced a maximum of 12 inches on center.** Use a piece of cardboard or other easily cut rigid material to create a template of the cable opening to fit the composite sheet in the opening. The annular space shall be 1/2" (+ 1/4") between the cable bundle and the perimeter of the opening. Outline the template on the composite sheet using a permanent marker. Take the marked composite sheet to an area approved for metal cutting/sawing where the composite sheet can be cut along the outline. The cutting **should not** take place in the equipment space. Cut the composite sheet to fit within 1/2" (+ 1/4") of the cable bundle and perimeter of the opening.



Anchor the composite sheet to stirrups on the inside with minimum 1" long No. 10 (or 3/16") self-tapping sheet metal screws in conjunction with minimum 1-1/4" steel fender washers, spaced a maximum 12" on center. Apply a minimum 1/2" "dome" of putty to the intumescent sheet at its interface with the concrete around the inside perimeter of the through opening. "Dome" additional putty to a minimum thickness of 1 in. and to a height of 2". Pack the putty tightly around the perimeter of the cable bundle and atop the intumescent composite sheet.

### **Option 2**

**A metal sleeve with a "lip" on the bottom is provided for individual floor/ceiling penetrations in slots that run column to column.** Use a piece of cardboard or other easily cut rigid material to create a template of the cable opening to fit the composite sheet in the opening. The annular space shall be 1/2" ( $\pm$  1/4") between the cable bundle and the perimeter of the opening. Outline the template on the composite sheet using a permanent marker. Take the marked composite sheet to an area approved for metal cutting/sawing where the composite sheet can be cut along the outline. The cutting **shall not** take place in the equipment space. Cut the composite sheet to fit within 1/2" ( $\pm$  1/4") of the cable bundle and perimeter of the opening. Anchor the composite sheet to the lip on the bottom on the inside with minimum 1" long No. 10 (or 3/16") self-tapping sheet metal screws in conjunction with minimum 1-1/4" steel fender washers, spaced a maximum 12" on center. Apply a minimum 1/2" "dome" of putty to the intumescent sheet at its interface with the concrete around the inside perimeter of the through opening. "Dome" additional putty to a minimum thickness of 1" and to a height of 2". Pack the putty tightly around the perimeter of the cable bundle and atop the intumescent composite sheet. **NOTE:** The use of the metal sleeve reduces the T-rating of this system.

### **Option 3**

**A ceiling steel plate is secured from underneath that has a minimum 1-1/2" lip into the opening.** Use a piece of cardboard or other easily cut rigid material to create a template of the cable opening to fit the composite sheet in the opening. The annular space shall be 1/2" ( $\pm$  1/4") between the cable bundle and the perimeter of the opening. Outline the template on the composite sheet using a permanent marker. Take the marked composite sheet to an area approved for metal cutting/sawing where the composite sheet can be cut along the outline. The cutting **shall not** take place in the equipment space. Cut the composite sheet to fit within 1/2" ( $\pm$  1/4") of the cable bundle and perimeter of the opening. Starting from the corners, anchor the composite sheet from inside into 1-1/2" lip with minimum 1" long No. 10

self-tapping (or 3/16") sheet metal screws in conjunction with minimum 1-1/4" steel fender washers, spaced a maximum of 8" on center. Apply a minimum 1/2" "dome" of putty to the intumescent composite sheet at its interface with the concrete around the inside perimeter of the through opening. "Dome" additional putty to a minimum thickness of 1" and to a height of 2". Pack the putty tightly around the perimeter of the cable bundle and atop the intumescent sheet.

#### **Option 4**

**The composite sheet needs to be attached from underneath (the floor below working on a ladder) directly to the bottom side of the concrete floor because no support is provided from above.** Use a piece of cardboard or other easily cut rigid material to create a template of the underside of the opening. The annular space shall be 1/2" ( $\pm$  1/4") between the cable bundle and the cardboard. Outline the template on the composite sheet using a permanent marker. Take the marked composite sheet to an area approved for metal cutting/sawing where the composite sheet can be cut along the outline. The cutting **shall not** take place in the equipment space. Cut the composite sheet to fit within 1/2" ( $\pm$  1/4") of the cable bundle. Cut the composite sheet to overlap a minimum 2" on the underside of the floor on all sides of the opening. Starting at the corners, anchor the composite sheet with minimum 3/16" diameter by 1-1/4" long steel anchor screws, or equivalent, in conjunction with minimum 1-1/4" steel fender washers, spaced a maximum 8" on center. Apply a minimum 1/2" "dome" of putty stick to the intumescent sheet at its interface with the concrete around the inside perimeter of the through opening. "Dome" additional putty stick to a minimum thickness of 1" and to a height of 2". Pack the putty tightly around the perimeter of the cable bundle and atop the intumescent sheet.

**CAUTION: Safe ladder practices must be followed for this option. See AT&T Practices 010-110-004, *Ladder & Ladder Safety Precautions – General* and 010-160-015, *Ladder Safety Program*.**

**3.** Cut the top composite sheet to fit outside dimensions of the steel sheathing/curbing and within a 1/2" ( $\pm$  1/4") of the perimeter of the cable bundle. **NOTE:** Use the cardboard template as described in step 2.

**4.** Cut the steel coverplate with a straight cut to provide a load bearing support. The steel plate needs to be cut so space is not allowed that would fit or trap a foot. The steel plate should not be closer than 1/2" to the cables to avoid possible damage to the cables. **NOTE:** Use the cardboard template described in step 2 to provide the guidance of where the cables are and to show where the openings should be.

**CAUTION:** Composite sheets can bend if subjected to sufficient vertical loading and therefore the steel coverplate is provided to prevent falling or trapping a foot.

5. Prior to the installation of the top composite sheet and steel coverplate, a minimum ½" diameter bead of putty shall be applied over the top surface of the floor or steel sheathing/curbing if provided. **NOTE:** The top composite sheet may be comprised of multiple pieces, or have partially disconnected pieces. If so, piece together the composite sheet, applying a minimum ¼" bead of putty along the butted edges. Cover the seam of the butted edges with a minimum 2" wide, 28 gauge sheet metal strip centered over the seam. Secure this strip with (1" long No. 10 or 3/16") self-tapping screws spaced at 3" on-center on each side of the seam.

6. Starting from the corners, anchor the top composite sheet in conjunction with the steel coverplate to the floor or the top of steel sheathing/curbing with minimum ¼" diameter by 1" long steel bolts with nuts and washers spaced a maximum 8" on-center.

7. After installation of the top composite sheet and steel coverplate, pack a "dome" of putty tightly around the perimeter of the cable bundle at its egress from the steel cover plate. The "dome" of putty shall be minimum 1" thick and extend to a minimum height of 2" above the top of the composite sheet/steel coverplate.

## **B. 3M Firestop System CAJ4003:**

**System Application:** Typical installation through a wall opening. This system provides 2 and 3-hr F-Ratings with a 0-hr T-Rating when installed in minimum 4-1/2" thick concrete wall. Maximum area of opening is 36 sq. ft. with one dimension of opening being 36" or less.

**Penetrating Item(s):** Maximum 20" wide ladder type cable rack. Maximum 39 % fill (based on cross-sectional area of the cable tray) of maximum 150 pair telecommunication cables, maximum 1000 kcmil power cables, or max. No. 2 AWG multi-conductor power and control cables.

### **System Materials:**

- Min. 1-1/4" fender washers
- Min. 1" long No. 10 (or 3/16") self-tapping sheet metal screws
- Min. ¼" diameter x 1" long steel bolts with washers
- Min. 3/16" diameter x 1-1/4" long steel anchor screws or equivalent
- 3M CS-195+ Composite Sheets™
- 3M FS-195+ Wrap Strip™
- 3M MPS-2+ Moldable Putty Stix™
- 3M Moldable Putty+ Pads™

**System Installation:**

**Note:** When more than one cable rack is installed in an opening, call 3M Technical Service dedicated to the Telecommunications Industry. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information.

1. With entirely new installations of communications or power cables in a penetration, apply 2" wide strips of moldable putty pads to the cables at the point where the top composite sheet will bisect the pad when installed. Individually wrap the cables with 2" wide strips of moldable putty pads or they may be laid across the face of each cable row for smoke sealing. Where new cable is being added to an existing installation, wrap the putty pad strips around the individual cables that are added to the bundle, prior to lacing. Lace the cables to the cable rack and to each other to form a tight bundle with minimum voids between cables. **NOTE:** Existing cable bundles should not be opened to add the putty retroactively.
2. Use a piece of cardboard or other easily cut rigid material to create a template to fit the composite sheet in the opening. The annular space shall be  $\frac{1}{2}$ " ( $\pm \frac{1}{4}$ ") between the wrap strip and the composite sheet. Outline the template on the composite sheet using a permanent marker. Take the marked composite sheet to an area approved for metal cutting/sawing where the composite sheet can be cut along the outline. The cutting **shall not** take place in the equipment space. Cut the composite sheet to overlap a minimum 2" onto wall surface on all sides of the opening (mesh/foil facing into opening) and to fit within  $\frac{1}{2}$ " ( $\pm \frac{1}{4}$ ") of the wrap strip. The composite sheet is required on both sides of the wall assembly to obtain the 2-hr F-rating. Composite sheet cut to tightly follow outside dimensions of steel cable rack and to within a  $\frac{1}{2}$ " ( $\pm \frac{1}{4}$ ") of the perimeter of the wrap strip. **Note:** The top composite sheet may be comprised of multiple pieces, or have partially disconnected pieces. If so, piece together the composite sheet, applying a minimum  $\frac{1}{4}$ " bead of putty along the butted edges. Cover the seam of the butted edges with a minimum 2" wide, 28 gauge sheet metal strip centered over the seam. Secure this strip with (1" long No. 10 or 3/16") self-tapping screws spaced at 3" on-center on each side of the seam.
3. Starting at the corners, anchor the composite sheet to the wall surface with minimum 3/16" diameter by 1-1/4" long steel anchor screws, or equivalent, in conjunction with minimum 1-1/4" steel fender washers with maximum spacing not to exceed 6" on-center.
4. After installation of composite sheet, a "dome" of putty shall be tightly packed around the perimeter of the cable bundle at its egress from the composite sheet on both sides of the wall. The "dome" of putty shall be min. 1" thick and extend to a minimum height of 1" out from the base of the composite sheet. Min  $\frac{1}{2}$ " bead of putty shall be applied around rails of cable rack as it exits the composite sheet.

### C. 3M Firestop System CAJ2030:

**System Application:** Typical installation for flexible non-metallic tubing in existing 1' x 2' floor/ceiling cable penetration. This system provides a 2-hr F-Rating with a 2-hr T-Rating when installed in minimum 4-1/2" thick concrete floor or wall. Maximum area of opening not to exceed 240 sq. in. with one dimension 30" or less.

**Penetrating Item(s):** Maximum 1-1/4" diameter corrugated wall ENT or innerduct constructed of PE or maximum 2" diameter corrugated wall ENT or innerduct constructed of PVC. Multiple fiber optic communication cables with max outside diameter of 3/4" within ENT.

#### Materials List:

- Minimum 16 gauge steel tie wire
- Filament tape
- 3M MPS-2+ Moldable Putty Stix™
- 3M FS-195+ Wrap/Strip™

#### System Installation:

**NOTE:** ENT or innerduct shall be installed as a complete system with all terminations in junction boxes, outlet boxes or other approved enclosures as specified in the National Electrical Code.

1. Seal the ends of each innerduct with a minimum 1/4" thickness of moldable putty unless it is determined that the enclosure in which it terminates is relatively air tight and is normally closed. Support innerducts rigidly on each side of the floor or wall assembly.
2. Where the innerduct enters bottom composite sheet, cut a length of "intumescent wrap strip" (FS-195+) so that one will fit around the perimeter of the innerduct. Place wrap strip, foil face outward, in a position so as to bisect composite sheet (hold in place with a piece of filament tape). Secure the wrap strips around innerduct in two places, one above the composite and one below the composite sheet with No. 16 gauge steel tie wire. If innerduct is larger than 1-1/4" in diameter, cut a second length of wrap strip such that it will fit around the perimeter of the first wrap strip (hold in place with a piece of filament tape). Position the wrap strip so that the butted edges are offset. Secure outer wrap strip only, in two places, one above the composite and one below the composite sheet with No. 16 gauge steel tie wire.

3. Cut top composite sheet tightly (1/4" or less) around innerduct.
4. Fill the voids between wrapped innerducts and adjacent cables or other wrapped innerducts with a "dome" of tightly packed putty to a thickness of minimum 1" and to a height of 1" atop of the bottom composite sheet and atop of the top composite sheet.

#### D. 3M Firestop System CAJ1044:

**System Application:** This system should be used for metal pipes and conduit in concrete. This system provides 2,3, or 4-hr F-ratings and 0-hr. T-rating. Maximum diameter of opening is in solid lightweight or normal weight concrete. Floor is 32" maximum diameter of opening in floor constructed of hollow-core pre-cast concrete units is 7".

**Penetrating Item(s):** One metallic pipe, conduit, or tubing installed either concentrically or eccentrically within the firestop system. Maximum annular space between pipe, conduit, or tubing and edge through opening or sleeve is dependent on the required F-rating.

Type of Penetrant	Size	Description
Steel pipe	Nominal 30" diameter (or smaller)	Schedule 10 or higher steel pipe
Iron pipe	Nominal 30" diameter (or smaller)	Cast or ductile iron pipe
Conduit	Nominal 6" diameter (or smaller)	Rigid steel conduit
Conduit	Nominal 4" diameter (or smaller)	Steel electrical metallic tubing
Copper tubing	Nominal 6" diameter (or smaller)	Type L or heavier copper tube
Copper pipe	Nominal 6" diameter (or smaller)	Regular (or heavier) copper pipe

#### System Materials:

- Polyethylene backer rod or nominal 1" thickness of tightly packed mineral wool batt or glass fiber insulation
- 3M Fire Barrier CP25WB+ Caulk™

#### System Installation:

1. Firmly pack backer rod, mineral wool batt, or glass fiber insulation into opening as a permanent form. Recess the packing material from the top surface of the floor or from both surfaces of wall as required to accommodate the required thickness of caulk fill material.
2. In a floor penetration, apply the caulk to fill the annular space flush with the top surface of the floor. In wall assemblies, install the required caulk thickness symmetrically on both sides of the wall, flush with the wall surface.

3. Apply a minimum  $\frac{1}{4}$ " bead of caulk at point of contact location between the penetrating item and the sleeve or between penetrating item and concrete at the top surface of the floor in a floor penetration and at both surfaces of the wall in a wall penetration. The hourly F-ratings and the minimum required caulk thickness is dependent upon a number of parameters, as shown below.

Minimum Floor or Wall Thickness, (inch (in.))	Nominal Pipe Tube or Conduit Diameter, (in.)	Maximum Annular Space (in.)	Minimum Caulk Thickness, (in.)	F-Rating, (hr.)
2-1/2	$\frac{1}{2}$ -12	1-3/8	$\frac{1}{2}$	2
2-1/2	$\frac{1}{2}$ -12	3-1/4	1	2
4-1/2	$\frac{1}{2}$ -6	1-3/8	$\frac{1}{4}(a)$	2
4-1/2	$\frac{1}{2}$ -12	1-1/4	$\frac{1}{2}$	3
4-1/2	$\frac{1}{2}$ -20	2	1	3
4-1/2	$\frac{1}{2}$ -20	2	1	3
4-1/2	$\frac{1}{2}$ -12	3-1/4	1	3
4-1/2	22-30	2	2	3
5-1/2	$\frac{1}{2}$ -6	1-3/8	1(b)	4

(a) Minimum 2" thickness of mineral wool batt insulation required in annular space.

(b) Minimum 1" thickness of mineral wool batt insulation required in annular space on both sides of floor or wall assembly. Minimum 1" thickness of caulk to be installed flush with each surface of floor or wall assembly.

### E. 3M Firestop System WL1001:

**System Application:** This system should be used for metal pipes and conduit in gypsum walls. This system can provide F-ratings of 1, 2, 3, or 4-hr.; T-ratings of 0, 1, 2, 3, or 4-hr; L-ratings at ambient temperature of less than 1 CFM/sq. ft.; and L-rating at 400°F of less than 1 CFM/sq. ft.

**Penetrating Item(s):** Pipes or conduits of nominal 12" diameter (or smaller) Schedule 10 (or heavier) cast iron pipe, nominal

Type of Penetrant	Size	Description
Steel pipe	Nominal 12" diameter (or smaller)	Schedule 10 (or heavier)
Iron pipe	Nominal 12" diameter (or smaller)	Service weight (or heavier) cast iron soil pipe
Iron pipe	Nominal 12" diameter (or smaller)	Class 50 (or heavier) ductile iron pressure pipe
Conduit	Nominal 6" diameter (or smaller)	Rigid steel conduit
Conduit	Nominal 4" diameter (or smaller)	Steel electrical metallic tubing
Copper tubing	Nominal 6" diameter (or smaller)	Type L or heavier copper tube
Copper pipe	Nominal 1" diameter (or smaller)	Flexible steel conduit

When copper pipe is used, the maximum F-rating of the firestop system is 2-hr. Steel pipes or conduits larger than nominal 4" diameter may only be used in walls constructed using steel channel studs. A maximum of one pipe or conduit is permitted in the firestop system. Pipe or conduit to be installed near the center of the stud cavity width and to be rigidly supported on both sides of wall assembly.

#### Materials List:

- PE backer rod or nominal 1 in. thickness of tightly packed mineral wool batt or glass fiber insulation
- 3M Fire Barrier caulk CP25WB+™

#### System Installation:

1. Install caulk fill material to completely fill annular space between pipe or conduit and gypsum wallboard.
2. Apply a minimum ¼" diameter bead of caulk to the perimeter of pipe or conduit at its egress from the wall.
3. Install caulk symmetrically on both sides of wall assembly. The hourly F-rating of the firestop system is dependent upon the hourly fire rating of the wall assembly in which it is installed, as shown in the following table. The hourly T-rating of the firestop system is dependent upon the type or size of the pipe or conduit and the hourly fire rating of the wall assembly in which it is installed, as tabulated below:



Maximum Pipe of Conduit Diameter, (in.)	Annular Space (in.)	F-Rating, (hr.)	T-Rating, (hr.)
1	0 to 3/16	1 or 2	0+, 1, or 2
1	1/4 to 1/2	3 or 4	3 or 4
4	0 to 1/4	1 or 2	0
4	0 to 1-1/2#	1 or 2	0
6	1/4 to 1/2	3 or 4	0
12	3/16 to 3/8	1 or 2	0

+ When copper pipe is used, T-rating is 0-hr.

# 0 to 1-1/2" annular space applies only when Type CP-25WB+ caulk is used and only when the minimum thickness of the gypsum wallboard is 5/8" for 1-hr rated walls and 1-2/4" for 2-hr rated walls.

## 7. Verifying Proper Firestopping of Penetrations

**7.01 Labeling.** Labels shall be provided as a means of verifying proper firestopping in applications that involve the use of the composite sheets and, in the case of a vertical floor/ceiling penetration, a top steel plate. The labels can not be effectively used with the firestop systems of other types of penetrations (e.g., where caulk or wrap strips are used without composite sheets).

Firestopping labels shall include:

- Engineering work order number
- Installer name and company
- Firestop system listing identification number
- Hour rating of the firestop system
- Date of completion of job and firestopping

3M offers complimentary permanent labels that could be used to supply this information. They can be acquired by calling Their Product Information Helpline. See AT&T Practice 770-350-100, Appendix 1, Issue 1. Their label looks like the following:

This opening has been sealed with 3M™  
Fire Protection Products. \_\_\_\_\_

**DO NOT REMOVE!**

To maintain UL classification in retrofitting,  
Reseal with 3M Fire Barrier Products **ONLY!**

Installer \_\_\_\_\_

UL # \_\_\_\_\_ Hr. Rating \_\_\_\_\_

Date \_\_\_\_\_

Compliments of 3M Fire Protection Products  
7

98-0400-3277-

**7.02 Visual inspection of new firestopped penetrations.** All new or re-opened penetrations shall be inspected at the end of each workday and at the end of the job by the installer and verified by a responsible AT&T employee or designated representative for proper firestopping. See Section 8.02 for firestopping inspection training information. The inspection should be done with consideration to AT&T Practice 770-350-100, Appendix 2, Inspection – Firestopping of Penetrations.

**7.03 Monthly visual inspection.** On a monthly basis, penetrations shall be visually reviewed by a responsible AT&T employee or designated representative for proper firestopping on a monthly basis as specified in AT&T Practice 770-310-200, *Firesafety – Conducting Monthly Firesafety Inspections*. The inspection shall include all penetrations in fire-rated construction and verify that:

- (a) The penetration is firestopped.
- (b) If an old firestopped penetration, it is sealed so it is not open to the other side of the barrier. If a through floor penetration, the steel coverplate should be in place.

- (c) If a new penetration that was already checked at the time the job was completed or at the end of the day, check to ensure the penetration is sealed with the appropriate 3M firestop system (or other approved system in a non-network or data center operation building or space). Firestop systems that employ composite sheets should have a label identifying the responsible installer. The label should be in place and not broken.

Where variations are found they should be noted. The following actions should be taken because inadequate firestopping constitutes a hazard to employees; threat to electronic equipment due to the lack of a seal from fire and smoke; and a compliance issue.:

- If the penetration is new (within the year), the penetration is not firestopped at all or the appropriate firestop system is not installed; this should be reported to the person responsible for the last penetration. The contractor responsible for the last penetration should install the appropriate firestop system. All contractors responsible for penetrations in fire-rated assemblies in AT&T buildings are required to firestop the penetrations with appropriate listed firestop systems.
- If the penetration is old, no firestop system was installed, and the penetration is covered with only a steel plate or floor tiles; the penetration shall be scheduled to be properly firestopped with the appropriate firestop system as soon as possible.
- If the penetration is old, the firestopping job is not the appropriate system, but it thoroughly covers the hole (no light shows through), and the top steel coverplate is in place; firestopping in this penetration shall be identified to be replaced upon the next penetration.
- If the penetration is old, the firestop system appears to be the appropriate system, but the steel coverplate is missing; the coverplate must be put in place as soon as possible.
- If the penetration is old, the firestop system is not the appropriate system (but it covers the hole (no light shows through)) and the steel coverplate is missing; the coverplate must be put in place and the firestopping in this penetration should be identified to be replaced upon the next penetration.
- If the penetration is old and the firestop system does not cover the penetration (light shows through); the penetration shall be scheduled to be properly firestopped with the appropriate listed firestop system as soon as possible.

## 8. Training

**8.01 Installation Training.** Listed firestop systems shall be installed per the manufacturer's instructions. All AT&T employed and contracted installers of firestop systems shall be trained by the manufacturer, a representative of the manufacturer, or an authorized trainer certified by the manufacturer through one of their provided training classes or a program approved by the manufacturer that will provide their firestop training requirements.

**NOTE:** All firestop installers in AT&T buildings must be trained by the manufacturer by 3/1/2000. Until then, the firestop installers must confirm with the manufacturer the appropriate firestop system installation; acquire the appropriate materials; and receive detailed step-by-step instructions (see Section 6). In some 3-D condo buildings where the other company is A-owner, the A-owner may require certification of manufacturer's training prior to this date.

**8.02 Inspection Training.** All employees who do inspections of penetrations and associated firestop systems should be trained in Inspection of Firestopping. The tapes developed from the Interactive Video Broadcast Network (IVBN) Training conducted on May 26, 1999 are available through the AT&T School of Business & Technology (ASB&T) (Course # EHS573). Courses are also available through 3M at their facility in Minneapolis, MN or brought to a site with a negotiated, guaranteed attendance. See AT&T Practice 770-350-100, Appendix 1, issue 1 for contact information on training.

## 9. Reference Documents

**9.01 Associated internal documents.** The following AT&T Practices are associated with this Practice.

Number	Title
AT&T 010-110-004	Ladder and Ladder Chair Safety Precautions – General
AT&T 010-160-015	Ladder Safety Program
AT&T 010-160-156	International Occupational Exposure to Asbestos Program
AT&T 760-610-205	Egress/access Requirements
AT&T 760-630-400	Compartmentation
AT&T 790-100-669	DC Power Systems Engineering and Installation Standards for Outside Suppliers
AT&T 800-614-105	AT&T Installation Generic Requirements Fiber Diversity and Protection Guidelines

**9.02 Document availability.** See Sections 1.05 and 1.06 for document availability.

**9.03 Associated external documents.** The following external documents are associated with this Practice.

ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
3M	3M Fire Protection Products Application and Specifiers Guide for Through-Penetration Fire Protection Systems.

**GLOSSARY**

**AHJ** – Authority having jurisdiction

**Approved** - refers to acceptance by the Authority Having Jurisdiction at the particular company location.

**Annular space** – Distance from side of hole to penetration.

**ASB&T** - AT&T School of Business & Technology

**Authority having jurisdiction** – The organization, office, or individual responsible for “Approving” equipment, an installation, or a procedure.

NOTE: The phrase “authority having jurisdiction” is used in a broad manner since jurisdictions and “approval” agencies vary as do their responsibilities. Where public safety is primary, the “authority having jurisdiction” may be a federal, provincial, state, local, or other regional department or individual such as the fire chief, fire marshal, chief of a fire prevention bureau, labor department official, health department official, building official, electrical inspector, or others with statutory authority. For insurance purposes, an insurance inspection department rating bureau, or other insurance company representative may be the “authority having jurisdiction.” In other circumstances, Corporate Fire Protection Engineering will be the “authority having jurisdiction”. See AT&T Practice 770-350-100, Appendix 1, Issue 1 for contact information).

**AWG** – American Wire Gauge

**Blue or KS 5048 Bags** – Bags, designed by the Bell System, that contain a material that is fire retardant. They were previously used in firestop systems in our facilities, and currently exist in many penetrations.

**CFM/sq. ft.** - Cubic foot per minute per square foot

**cm** - centimeter

**CPVC** -

**CSA** – Canadian Standards Association

**°C** – degrees Celsius

**°F** – degrees Fahrenheit

**EHS573V** – Course number for the videotaped training program for Firestopping of Penetrations, Inspection Introduction course developed from the IVBN Broadcast on May 28, 1999.

**EH&S** – Environment, Health, & Safety

AT&T - PROPRIETARY  
Use pursuant to Company instructions

**ENT** – Electrical non-metallic tubing.

**FM** – Factory Mutual

**F-Rating** – As specified in ASTM E 814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stops*, a rating given to firestops that for the rating period, remain in the opening and do not permit the passage of flame through openings, or the occurrence of flaming on any element of the unexposed side of the firestop. It also shall not develop any openings during the hose stream test that would permit a projection of water from the stream beyond the unexposed side.

**Fire barrier wall** – A wall, other than a fire wall, having a fire resistance rating.

**Fire-rated assembly** – A combination of the components that together provide a specific degree of fire protection to the opening or penetration. Examples are: fire rated door assembly - fire door frame, hardware, and other accessories; fire rated window assembly – window panes, window frame, and hardware

**Fire resistance rating** – The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of nationally recognized standards such as NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials*.

**Fire wall** – A wall separating buildings or subdividing a building to prevent the spread of fire and having a fire resistance rating and structural stability.

**fl. oz.** – fluid ounce(s)

**ft. sq. or ft<sup>2</sup>** – square foot (feet)

**gal** - gallon

**hr(s)** – hour(s)

**in.** or “– inch(es)

**Intumescent firestop materials** – Materials which expand upon exposure to heat, restricting the transfer of flame, heat, and smoke.

**IVBN** – Interactive Video Broadcast

**kcml** – 1000 circular millimeters

**Listed** - refers to a requirement which is satisfied if the equipment, component, device or procedure of interest is either listed by Underwriters' Laboratories (UL Listed) or approved by Factory Mutual (FM Approved). Listings or approvals granted by similar recognized agencies (e.g., CSA [Canadian Standards Association]) also satisfy this requirement

**mm** – millimeter

**MSDS** – Material Safety Data Sheet

**Network and data center operations:** all communications networks and data center services (voice, packet, long-distance, wireless, cable, internet, data, and local).

**NFPA** – National Fire Protection Association

**O&M** – Operations and maintenance

**OSHA** – Occupational Safety & Health Administration

**PE** - polyethylene

**Penetrations** – Openings in walls, partitions, ceilings, and floors that are used for: a) communications, data, power, control, and grounding cables; b) cable trays; c) pipes; c) runways; d) ducts; and e) conduits.

**%** - percent

**PVC** – polyvinyl chloride type of plastic conduit or pipe

**PVC, CPVC, PP, PB, or ABS** – Types of plastic conduit or pipe.

**Shall** - indicates a requirement for compliance with this practice.

**Should** - indicates a strong recommendation that is not required.

**SMD** – Supplier Management Division

**sq. in.** – square inch(es)

**T-Rating** – As specified in ASTM E 814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stops*, a rating given to firestops that for the rating period, meet the requirements for the F rating and the transmission of heat through the firestop during the rating period shall not raise the temperature of any thermocouple or on any penetrating item on the unexposed surface of the firestop more than 325°F (181°C) above its initial temperature.

**UL** – Underwriters' Laboratories

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## Contacts

### Fire Stopping of Penetrations

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#### 1. Overview

**1.01 Purpose of Appendix.** This appendix provides the names, addresses, and telephone numbers of current contacts as specified by AT&T 770-350-100, *Firestopping of Penetrations*.

**1.02 Issuance of Appendix.** This is the first issuance of this Appendix. Whenever this appendix is reissued, the reason(s) for reissue will be listed in this paragraph.

#### 2. Contacts Internal to AT&T

**2.01 AT&T – Environment Health & Safety (EH&S).** For general safety, environment, and health information:

**Information:** 800-KNOW EHS (800-566-9347)  
**Emergency Incident Hotline:** 800-TELL EHS (800-835-5347)  
**MSDS's:** 800-TELL EHS (800-835-5347)  
**Hazardous Waste Center:** 800-HAZ WAST (800-544-4787)  
**Accident/Injury Reporting:** 800-544-4787

**2.01 AT&T – EH&S – Fire Protection Engineering.** For guidance and assistance with this Practice or review of alternative methods:

**Address:** AT&T – EH&S - Fire Protection Engineering:  
20 Independence Boulevard  
Warren, NJ 07059-6747  
**Phone:** 908-542-6365  
**E-mail:** fire2@att.com

**2.02 AT&T – Installation, Testing & Acceptance.** For information on the installation of equipment and the related firestopping:

**Address:** AT&T – Installation, Testing, and Acceptance  
Promenade II  
1200 Peachtree Street, NE  
Atlanta, GA 30309  
**Phone:** 404-810-3990  
**Website:** <http://prototype.infoswap.att.com/>

**2.03 AT&T – Supplier Management Division (SMD).** For information on the corporate discount status for 3M products, contract, and contractor information.



**Address:** AT&T – Supplier Management Division  
Promenade II  
1200 Peachtree Street, NE  
Atlanta, GA 30309  
**Phone:** 404-810-3301  
**Website:** <http://attbuys.smd.att.com/content/process/bldinf/bialas.htm>

**2.04 AT&T School of Business and Technology (ASBT).** For ordering the tapes of the Firestopping Inspection Training Course #EHS573V:

**Address:** AT&T School of Business & Technology  
19 School House Road  
Somerset, NJ 08875  
**Phone:** 800-TRAINER (800-872-4637)

**3. Contacts External to AT&T**

**3.01 3M Fire Protection Products.** For 3M technical assistance or product information:

**Address:** 3M Fire Protection Products  
3M Center  
St. Paul, MN 55144-1000  
**Technical Hotline:** (800) 458-4452  
**Telecommunications Liaison:** 800-946-0504.  
**Autofax:** (800) 621-3090  
**Website:** <http://www.mmm.com/firestop>

**3.02 Lucent Customer Information Center.** For paper copies of AT&T Practices call or mail completed form IND1-80-80 to:

**Address:** Lucent Customer Information Center  
Attention: Order Entry Department  
2855 N. Franklin Road  
P.O. Box 19901  
Indianapolis, IN 46219-1999  
**Phone:** 800-432-6600

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## Penetration and Firestopping Inspection

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### 1. Overview

**1.01 Purpose of Appendix.** This appendix provides the guidance on the inspection of firestopping of penetrations as specified by AT&T 770-350-100, *Firestopping of Penetrations*.

**1.02 Issuance of Appendix.** This is the first issuance of this Appendix. Whenever this appendix is reissued, the reason(s) for reissue will be listed in this paragraph.

### 2. Inspections of Firestopping of Penetrations

**2.01 Inspections of new or newly opened penetrations.** Firestopping of penetrations shall be inspected by the responsible AT&T employee or designated representative at the end of each day for new or newly opened penetrations

**2.02 Inspections of existing penetrations.** Firestopping of existing penetrations shall be inspected by the responsible AT&T employee or designated representative at least monthly.

**2.03 Inspection review.** Each firestop system should be inspected against the description of the firestop system that earned its UL listing. The descriptions are available through one of the following mediums:

- a) 3M Fire Protection Products Applications and Specifier's Guide for Through-Penetration Protection Systems (see Appendix 1 for ordering information);
- b) the 3M website at <http://www.3m.com/firestop>;
- c) the 3M CD-ROM (see Appendix 1 for ordering information);
- d) the 3M Autofax System (800) 621-3090; or
- e) the 3M technical Helpline (800) 458-4452

**2.04 Inspection checklist of select firestop systems.** In Section 6.05 of AT&T Practice 770-350-100, *Firestopping of Penetrations*, the five most typically used 3M firestop systems found in AT&T buildings are described in detail. The following is the recommended inspection checklist that includes the details for the five most typically used firestop systems in AT&T buildings:

## INSPECTION OF FIRESTOPPING OF PENETRATIONS

Review the following questions for each penetration at the end of the workday (when the job is shut down until a later shift). This list can also be used for guidance to items that should be considered during the monthly review of all penetrations in fire rated assemblies as specified in AT&T Practice 770-310-200, *Conducting Monthly Fire Safety Inspections*.

#	Inspection Item	OK <sup>1</sup>	NR <sup>1</sup>	NI <sup>1</sup>	Comments
1	Is the barrier (wall or floor/ceiling assembly) appear to be a fire rated barrier?				
2	Is the barrier required <sup>2</sup> to be fire rated? If so, what rating is required? _____				
3	Has the penetration been firestopped?				
4	Does the penetration appear to be sealed so no light can be seen from the other side of the penetration?				
5	Only 3M products are used together in the same cable penetration. Products from a manufacturer other than 3M shall not be mixed since they are incompatible and will void the UL listing of the firestop system				
6	Does the firestop system appear to meet the fire-rating of the barrier penetrated (as per Checklist item #2)?				
7	The firestop system should be 3M Firestop System <sup>3</sup> (provide the firestop system #): # _____				
8	Does the firestop system appear to be installed properly? (for the 5 most typically used systems, continue to the applicable section of the checklist)				
<b>TYPICAL FIRESTOP SYSTEMS</b>					
<b>A</b>	<b>3M Firestop System F-B-3004</b> - Used for floor/ceiling cable penetrations providing 2-hr. F-Rating and 1-1/2 to 2-hr. T-Rating in a min. 8" thick concrete floor. Max. area of opening = 288 sq. in. Max. fill = 34 % (based on available area of opening) of either communication or power cables.				
<b>A1</b>	The cable fill amount <sup>4</sup> for this system does not exceed 34%.				

#	Inspection Item	OK <sup>1</sup>	NR <sup>1</sup>	NI <sup>1</sup>	Comments
<b>A2</b>	In new installations, 2" putty pad strips shall be wrapped around individual cables bisecting composite sheet. Where cable has been added to an existing installation, the putty pad strips shall be around the individual cables that are added to the bundle.				
<b>A3</b>	The bottom composite sheet shall be installed in all cases. The bottom composite sheet shall be installed in all cases.				
<b>A4</b>	The top and bottom composite sheets shall be cut to within ½" (+ ¼") of the cable bundle. To check this, on the top pull back the moldable putty atop of the composite sheet. From the floor below, look up at the bottom composite sheet checking for obviously greater spacing.				
<b>A5</b>	The putty used to seal bottom composite sheet, shall be located on the inside of the cable penetration. It shall not be pressed on from the underside.				
<b>A6</b>	The putty is molded into the dimensions specified in the installation procedures. Putty pads are not to be laid flat over void between composite sheet and cable bundle.				
<b>A7</b>	A steel cover plate is in place over the top composite sheet.				
<b>B</b>	<b>3M Firestop System CAJ4003</b> – For typical wall opening providing 2 and 3-hr F-Ratings with a 0-hr T-Rating when installed in min. 4-1/2" thick concrete wall. Max. area of opening = 36 ft <sup>2</sup> with one dimension of opening being 36" or less.				
<b>B1</b>	The cable fill amount <sup>4</sup> for this system does not exceed 39%.				

#	Inspection Item	OK <sup>1</sup>	NR <sup>1</sup>	NI <sup>1</sup>	Comments
<b>B2</b>	In new installations, 2" putty pad strips are wrapped around individual cables bisecting composite sheet. Where cable has been added to an existing installation, the putty pad strips shall be around the individual cables that are added to the bundle.				
<b>B3</b>	Composite sheets are installed on both sides of the wall. Composite sheets are installed on both sides of the wall. Composite sheets are installed on both sides of the wall. Composite sheets are installed on both sides of the wall.				
<b>B4</b>	The composite sheets are cut to within ½" (+ ¼") of the wrap strip. To check this, pull back the moldable putty atop of the composite sheet.				
<b>B5</b>	The putty is molded into the dimensions specified in the installation procedures. Putty pads are not to be laid flat over void between composite sheet and cable bundle/wrap strip.				
<b>C</b>	<b>3M Firestop System CAJ2030</b> - For flexible non-metallic tubing in existing 1' x 2' floor/ceiling cable penetration providing a 2-hr F-Rating with a 2-hr T-Rating when installed in minimum 4-1/2" thick concrete floor or wall. Maximum area of opening not to exceed 240 sq. in. with one dimension 30" or less.				
<b>C1</b>	The ends of the innerduct are sealed with moldable putty or the enclosure in which it terminates is relatively air tight and is normally closed.				
<b>C2</b>	At least one layer of wrap strip is wrapped around innerduct, as it enters the bottom composite sheet.				
<b>C3</b>	At least two pieces of minimum No. 16 gauge steel tie wires secure the wrap strips on the outer wrap strip only.				

#	Inspection Item	OK <sup>1</sup>	NR <sup>1</sup>	NI <sup>1</sup>	Comments
<b>C4</b>	Composite sheet is cut tightly (1/4" or less) around innerduct as it exits the top composite sheet and then apply a 1/2" dome of moldable putty around perimeter of innerduct.				
<b>C5</b>	Only putty that has been formed into the required dimensions specified in the installation procedures are used. No putty pads are used to lay over void between composite sheet and wrapped innerducts.				
<b>D</b>	<b>3M Firestop System CAJ1044</b> Used for metal pipes and conduit in concrete providing 2,3, or 4-hr F-ratings and 0-hr. T-rating. Maximum diameter of opening is in solid lightweight or normal weight concrete. Floor is 32" maximum diameter of opening in floor constructed of hollow-core pre-cast concrete units is 7".				
<b>D1</b>	The caulk fills the space flush with the top surface of the floor.				
<b>D2</b>	A minimum 1/4" bead of caulk at point of contact location between the penetrating item and the sleeve or between penetrating item and concrete at the top surface of the floor in a floor penetration and at both surfaces of the wall in a wall penetration.				
<b>E</b>	<b>3M Firestop System WL1001</b> - Used for metal pipes and conduit in gypsum walls providing F-ratings of 1, 2, 3, or 4-hr.; T-ratings of 0, 1, 2, 3, or 4-hr; L-ratings at ambient temperature of less than 1 CFM/sq. ft.; and L-rating at 400°F of less than 1 CFM/sq. ft.				
<b>E1</b>	The annular space is filled with 3M Fire Barrier caulk CP25WB+.				
<b>E2</b>	A 1/4" bead of caulk is provided around the perimeter of the pipe or conduit at the egress from the wall.				
<b>E3</b>	The caulk is applied symmetrically on both sides of the wall assembly.				

<sup>1</sup> OK – yes or Meets the requirement. NR – Not Required, Not Applicable NI – Not in Compliance, Area of Improvement

<sup>2</sup> All floor/ceiling barriers are required to be fire-rated (at least 2 hours). Walls vary according to Practice and code requirements. See AT&T Practice 760-630-400, *Compartmentation*, for required fire-ratings of barriers.

<sup>3</sup> See 2.03 of this Appendix for where to get this information.

<sup>4</sup> To determine the cable fill amount, identify the percentage of space taken up by cables and divide that in half. The actual percentage (calculated) equals approximately half of what you are seeing.

## FEEDBACK FORM

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