

Chapter 9 – Design Guides

9.10 FIRESTOPPING GUIDE

A. DESCRIPTION

1. To help prevent the rapid spread of fire through fire-rated construction within a building certain walls (fire walls, fire partitions, fire barriers, smoke barriers), floors, floor / ceiling assemblies and ceiling membranes of roof/ceiling assemblies are required to meet a specific fire resistance rating – the period of time during which a building component has been tested to confine a fire or continue to perform a structural function or both. Through-penetration and joints created during the construction process require the installation of firestop systems in order to bring the building component back to its original fire-rating.
2. Firestop Classifications:
 - a. **Through penetration firestopping** is a specific construction consisting of all materials required to fill the opening around penetrating items such as cables, cable trays, conduits, ducts, pipes, steel beams bar joists, etc. and their means of support through the building component to prevent spread of fire.
 - b. **Construction joint firestopping** is an integral part of the fire resistive assembly that allows for movement in the construction joints such as floor/wall, wall/wall, wall/ceiling, floor/floor, etc.
 - c. **Perimeter fire containment systems** consist of fire rated floor system and curtain wall construction that requires fill material installed between the floor and the curtain wall to prevent the vertical spread of fire in a building.
 - d. **Membrane penetrations** are required when a penetration is made through one side of a rated assembly (floor / wall / ceiling).

B. SPECIFICATIONS

1. [Section 078400 – Construction.](#)
2. [Section 078400 – Mechanical and Electrical.](#)

C. DRAWINGS (C Contract)

1. The Construction Contract (Suffix “C”) contract drawings should provide Code Compliance Plans that indicate fire resistance rating designations for building components.
 - a. Fire rated walls and partitions including smoke partitions should be indicated using graphic symbols including smoke partitions.
 - b. Fire rated floors and roof assemblies should be indicated by the use of notes.
 - c. These plans allow the inspector, owner and Contractors bidding single and multi-contract projects to readily ascertain the extent of the fire rated building components that are penetrated by their building systems.

2. It is recommended that references to firestopping system details should be indicated generically as a “firestop system”.
 - a. Listing the specific manufacture firestop system type and number should be avoided.
 - b. The Contractor’s firestopping subcontractor can provide specific manufacturer firestop system details and catalog numbers during the submittal phase. These details shall be tested to meet ASTM Standards by an Independent Third-Party or Accredited Scientific Lab such as the following:
 - Omega Point Laboratories
 - Underwriters Laboratories
 - Factory Mutual
 - Inchscape – Warnock Hershey
 - c. Indicating a non-specific firestop system allows for maximum bidding flexibility and cost savings.
 - d. Firestop joint systems should be identified on the architectural building sections and details at junctures of wall-to-floor slab and curtain wall-to-floor slab and labeled only as firestop joint systems.

D. DRAWINGS (H, P, & E Contracts)

1. Drawings should include a general note to provide through penetration firestopping at all penetrations through fire rated construction.
 - a. The note should be keyed to the C Contract Code Compliance Plans.
 - b. The OGS Project Manager should confirm that this plan is included in the Construction Contract.
 - c. The firestopping general note should be adequate to cover all through penetration firestops. If the Designer indicates specific firestopping details, then they must indicate details for ALL conditions on the project, otherwise the Contractor could dispute work not shown.
2. Usually, no reference should be made to specific though penetration firestops by use of details. When a specific detail is shown for other reasons, indicate firestopping as “firestop system”. The specific manufacture firestop system type does not have to be indicated. The Contractor’s firestopping subcontractor can provide specific manufacturer firestop system details and catalog numbers during the submittal phase. These details shall be tested to meet ASTM Standards by an Independent Third-Party or Accredited Scientific Lab such as the following:
 - Omega Point Laboratories
 - Underwriters Laboratories
 - Factory Mutual
 - Inchscape – Warnock Hershey

E. PROJECT TOOLS

1. The Firestop Schedule, pre-installation conference, field-constructed sample installations, fire stopping company field advisor, identification labels and wall stenciling are all part of a total package that provides the Designer, Contractor and field inspector with the tools to monitor proper firestop application as it relates

to penetration type and building component fire rated construction. Sufficient site visits shall be taken to identify issues that affect the proposed recommendations for the project.

2. **Firestop Schedule:** [The Firestop Schedule](#) is included in the Contract Manual Appendix. This schedule should be completed as part of the required submittal package to be completed by all prime Contractors.
3. **Pre-Installation Conference:** This meeting should be a joint meeting attended by the Director's Representative and all prime Contractors, respective firestopping sub-contractors and firestopping company field advisor to review project requirements. It is recommended that the Designers attend the Pre-Installation Conference. Coordinate firestopping systems with prime contractors in congested areas such as at fire rated walls above a finished corridor ceiling.
4. **Field- Constructed Sample Installations:** Field installed mock-ups should be required for each type of firestop system utilized on the project to establish standard of quality and performance.
 - a. Inspectors should be present to observe the installation according to the submittal requirements for wall or floor construction type and thickness, hourly fire rating, penetrating item including size; annular space and firestop fill materials. Do not deviate from the firestop system details provided.
5. **Quality Assurance:**

Typical Installer Qualifications require a minimum of 3 years of firestopping installation experience. Specify a Firestopping Specialty Contractor who is certified and licensed for larger or more complex projects.
6. **Identification Labels:** Labeling of firestopping systems provides the inspector and owner specific information relating to the firestop including company name, product / catalog number, F rating and T rating (if available). These labels provide information to the building owner for rehabilitation projects.
7. **Wall Stenciling:** On larger size projects stencil walls and partitions above the ceiling to indicate the fire-ratings of the walls and partitions shown on the Code Compliance Plans prior to the installation of firestopping. Wall stenciling should be part of the C Contractor work either under the firestopping or gypsum board system specification sections. The stenciling also provides information to the building owner for rehabilitation projects.
8. **Destructive Testing:** Include destructive testing sampling (1% of each type) in the project specifications. Performing destructive testing to verify that the firestop installation meets the mock-up standard and specific requirements for the listed assembly should ensure better quality installations.

F. SINGLE TRADE PROJECTS (H, P, & E)

1. Single trade projects should include drawings indicating fire rated construction. For renovation projects the Designer needs to ascertain locations and hourly ratings of existing fire rated building components.

G. CODE REQUIREMENTS

1. See the Building Code of New York State Section 712 Penetrations and Section 713 Fire-Resistant Joint Systems.

H. INSPECTION

1. The selection of a qualified firestop system should be based on four documents.
 - a. The listing directory's drawing and explanation of the tested system.
 - b. The manufacturer's drawing of the tested firestop system.
 - c. The manufacturer's installation instructions for the firestop system.
 - d. The manufacturer's product data sheet for the firestop material(s).
2. The Inspection Checklist:
 - a. Is the **hourly fire rating** of the firestop system equal or greater than the firestop rating of the barrier in which the firestop is installed?
 - b. Is the **F rating** of the firestop system equal or greater than the F rating of the barrier in which the firestop is installed?
 - c. Is the **T rating** of the firestop system capable of meeting specification requirements?
 - d. Does the **barrier material type** (concrete, gypsum board, cmu, etc) of the firestop system match the type of the material in the field?
 - e. Is the **thickness of the barrier** (wall, floor, ceiling) of the firestop system less than or equal to the thickness of the barrier in the field?
 - f. Is the **opening size** within the opening size limits stated on the tested system detail?
 - g. Does the **opening surface** (sleeved, painted, fireproofed, etc.) in the field match the allowable surface of the firestop system?
 - h. Is the **opening type** (drilled, sleeved, saw cut, etc.) within the limits of the system detail?
 - i. Does the **opening shape** (square, round, rectangular) meet the shape requirements of the system design?
 - j. Do **field obstructions** (building systems, building components) prevent the required mineral wool or other damming material (backing), and firestop product component thickness specified by the system from being installed?
 - k. If backing material is required, such as mineral wool or ceramic fiber, does the material meet the minimum **specified density** of the tested firestop system?
 - l. If required, does the mineral wool need to be installed to a specific **amount of compression**? What is the percentage of compression?
 - m. If required, does the mineral wool need to be installed in a **specific layer configuration**, such as two parallel layers with the opening covered by one perpendicular layer? Do the fibers need to be oriented a certain way in the firestop system?

- n. If an opening is a single penetrant, is the **minimum annular space** within the limit stated on the tested system detail?
 - o. If an opening is a single penetrant, is the **maximum annular space** within the limit stated on the tested system detail?
 - p. If an opening has multiple penetrants, is the **spacing between penetrants** within the limits stated on the tested system detail?
 - q. Are the **penetrant sizes** (example ½" diameter cable, 6" diameter pipe or 4"x12" cable tray) within the penetrant size limits stated on the tested system detail?
 - r. Are the **penetrant types** (example plastic pipe, jacketed cable, copper pipe, or aluminum cable tray) within the penetrant type limits stated on the tested system detail?
 - s. If a penetrant is insulated, is the **insulation type and thickness** allowed by the tested system detail?
 - t. Are the **joint types** (floor to floor, head of wall, wall to wall, perimeter within the joint type limits stated on the tested system detail)?
 - u. If required, does the selected firestop system accommodate **movement**?
 - v. Is the penetrant part of a closed system, such as a liquid filled supply piping, or is the penetrant part of an open system such as a drain-waste-vent piping? Is the selected firestop system qualified to firestop an **open or closed pipe system**?
 - w. Is the selected firestop system **exposed to water**?
 - x. Is the firestop system **exposed to traffic** or have a **load bearing** requirement?
 - y. Will it be necessary to **re-enter/retrofit** the selected firestop system?
 - z. In a **perimeter fire barrier containment** condition, are there vertical as well as horizontal protection requirements that are part of the joint system.
3. Installation Concerns:
- a. Sheetrock Contractor left too large an opening around penetration.
 - b. Other Contractors utilizing the same opening (ex. metal pipe, duct and cabling) creates a responsibility conflict.
 - c. No sleeve when the assembly requires one.
 - d. Utilizing existing holes on renovation projects.
 - e. Utilizing a hammer and not a hole saw.
 - f. Multiple cables in sleeves exceed quantity or percentage allowed by assembly (typically 25% to 60% maximum cable fill is allowed).
 - g. Shaft opening in precast plank and casting holes in planks are open to other penetrations that are firestopped on one side only.
 - h. Ducts with damped assemblies need to be to follow manufacturer's guidelines for proper installation.
 - j. Electric box criteria for membrane penetrations not adhered by the Contractor.
 - k. Voice/data Sub Contractor (most often owner furnished) runs cable through sleeves and does not properly firestop the annular space.
 - l. Firestopping system not continuous at hard to reach installation areas at head of partition walls running side by side to structural shapes. Access is difficult if not impossible at top of wall on adjacent side to properly firestop. Need to box out structural shape with sheetrock and firestop deck flutes.

- m. Firestopping not continuous at hard to reach installation areas at perimeter spandrel beams and curtain wall.
 - n. Water resistant firestopping missing at floors that can potentially get wet such as janitor closets.
 - o. Joint compound used to firestop penetrations through gypsum partitions.
 - p. Firestopping not continuous and installed on top of pipe riser clamps.
 - q. Contractor mortared in insulated piping.
 - r. Membrane penetrations missing at non-rated boxes such as fire extinguisher cabinets, fire hose cabinets, fire phones, etc.
- 4. Common Problems**
- a. Deviation from approved assembly.
 - b. Lack of firestop submittals for each specific condition.
 - c. Firestop Schedule did not identify all the firestop systems.
 - d. Lack of mock-ups.
 - e. Lack of a Pre-installation Conference.
 - f. Poor inspection procedures.
 - g. Covering or enclosing areas prior to firestopping and/or inspection, especially at sheetrock walls and finished ceilings.
 - h. Coordination with and between trades.
 - i. Multiple firestop manufacturer's products and assemblies used by the same Contractor.
- 5. Where no testing agency listed firestop design exists that meet the requirements of a specific project condition, a manufacturers written recommendation Engineering Judgment of a design meeting the condition may be acceptable.**
- a. When may Engineering Judgments be acceptable?
 - When tested systems do NOT exist.
 - When modifying the application is unrealistic.
 - When existing test data supports the interpolation.
 - b. Sources of Engineering Judgments:
 - Manufacturer
 - Third Party labs (such as UL, Warnock Hersey, Omega Point Laboratories)
 - Fire Protection Engineer

End of Firestopping Guide