

## SECTION 15140 - FIRESTOP SYSTEMS

## PART 1 – GENERAL

## 1.01 SUMMARY

- A. This section applies to HVAC, Plumbing, and fire protection.
- B. This section includes:
  - 1. Firestop systems for mechanical through-penetrations of the following fire-resistance-rated assemblies, including both blank openings and through penetrations or membrane penetrating items:
    - a. Floors and ceilings
    - b. Walls and partitions
  - 2. Firestop systems for containment of fire, heat and smoke in all penetrating assemblies where pipes, ducts, vents, passing through the following fire-resistance-rated areas:
    - a. All fire rated floor and wall assemblies
    - b. Mechanical/electrical rooms, shafts, stairwell, trash & linen chutes
    - c. Construction enclosed compartmentalized areas

## 1.02 REFERENCES

- A. American Society for Testing and Materials Standards (ASTM):
  - 1. ASTM E84: Standard Test Methods for Surface Burning Characteristics of Building Materials
  - 2. ASTM E814: Standard Test Methods for Fire Tests of Through-Penetration Firestops
  - 3. ASTM E119: Standard Test Methods for Fire Tests of Building Construction Materials
  - 4. ASTM 136: Standard Test Method for Smoke Rated Assemblies
  - 5. ASTM E1725: Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems of Electrical Systems Components
- B. Underwriters Laboratories, Inc. (UL):
  - 1. UL 723 Surface Burning Characteristics of Building Materials
  - 2. UL 1479 Fire Tests of Through-Penetration Firestops, including optional air leak
  - 2. UL Fire Resistance Directory (Component Listing Test Criteria)
- C. National Fire Protection Agency (NFPA)
  - 1. NFPA 101 Life Safety Code
  - 2. NEC 70 National Electrical Code
- D. Other Applicable Standards and Codes

## 1.03 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to a given type of construction described or defined in referenced documents.
- B. Barrier: Any bearing or non-bearing floor, wall, or ceiling assembly that has an hourly fire or smoke rating.

- C. Annular Space: Allowable tolerances that are to be met around penetrating item. Void around pipe where firestop material is to be installed inside the cavity of the rated wall or floor, ceiling.
- D. Engineering Judgment: Evaluations that are developed by a manufacturer for a new firestop system that complies with similar UL approved designs or tests that are acceptable to the code enforcing authorities.
- E. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit the spread of heat, fire, gasses, and smoke.
- F. Firestop System: The use of a specific firestop material or combination of materials in conjunction with a specific wall, floor, or ceiling construction type and a specific penetrating material(s) to achieve a rated fire barrier.
- G. Intumescent: Materials that expand with heat to seal around objects threatened by fire.
- H. Penetration: Opening or foreign material passing through a floor, wall, ceiling barrier such that the full thickness of rated material(s) is breached either in total or in-part.
- I. Sleeve: Metal fabrication or pipe sections that is a part of system that extends through a barrier.
- J. Damming Material: Approved product installed in firestop rated assembly. Typically Mineral Wool.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide firestop systems that are produced and installed to resist the spread of fire according to requirements indicated, resist passage of smoke and other gasses, and maintain original fire-resistance rating of construction assembly.
- B. F-Rated Systems: Provide firestop systems with F-ratings, as determined per ASTM E814, but no less than that equaling or exceeding fire-resistance ratings of the construction assembly.
- C. T-Rated Systems: Provide firestop systems with T-ratings, as determined per ASTM E814 and ASTM E119, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.
- D. L-Rated Systems: Provide firestop systems with L-ratings, as determined per ASTM E814, where systems maintain a barrier to cold smoke at all: penetrations, connections with other surfaces, separations required to permit building movement, sound or vibration absorption, and other construction gaps.
- E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
- F. For firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.

#### 1.05 SUBMITTALS

- A. Product Data: Manufacturer's product literature for each type of firestop material as follows:
  - 1. Product characteristics, typical uses, installation procedures, performance and limitation criteria.
  - 2. Material Safety Data Sheets (MSDS)
- B. Shop Drawings: For each firestop system show construction conditions (including ratings of construction), relationships to adjoining construction, dimension, description of materials and finishes, component connections, anchorage methods, hardware and installation procedures, plus the following.
  - 1. Firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that confirms compliance with requirements for each condition indicated.
  - 2. Documentation, including illustrations, from a qualified testing and inspection agency that is applicable to each firestop system configuration for construction and penetrating items. Manufacturer furnished installation details must comply with published documents by approved testing agencies (UL, OPL, Warnock Hersey, etc).
  - 3. Where Project conditions require modification of a qualified testing and inspecting agency's illustration to suit a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer.
- C. Product Certificates: Signed by manufacturers of firestop system products certifying that products furnished, comply with requirements.

#### 1.06 QUALITY ASSURANCE

- A. Fire Protection Installer's Qualifications: Engage an experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements, plus the following:
  - 1. Preconstruction meeting to determine appropriate tested systems for submittal process.
  - 2. On-site training for specific rates assemblies. Manufacturer's representative to train, certify and inspect installation process during the construction phase.
- B. Source Limitations: Obtain firestop systems for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article 1.04.
  - 1. Firestopping tests and follow-up inspection services for firestop systems are performed by a representative from the manufacturer who will inspect and report back to the General Contractor during the construction process.
  - 2. Firestop systems are identical to those tested per ASTM E814 or UL 1479 and comply with the following requirements:
    - a. Firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Firestop systems correspond to those indicated by reference to firestop system designations listed by the following:
      - 1) UL in "Fire Resistance Directory"
      - 2) ITS (Warnock Hersey) in "Directory of Listed Products"
      - 3) Omega Point Laboratories
      - 4) Factory Manual

- c. Local and State regulatory requirements: Submit forms of acceptance for proposed assemblies not conforming to specific UL Firestop System numbers or UL classified devices.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop systems products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, shelf life, qualified testing and inspection agency's classification marking, curing time, and mixing instructions.
- B. Store and handle materials for firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer's instructions.

#### 1.08 PROJECT CONDITIONS

- A. Existing Conditions: Verify the condition of the substrates and correct unsatisfactory conditions before installing firestop system products; follow manufacturer's instructions.
- B. Environmental Limitations: Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestop systems.
- C. Ventilation: Ventilate firestop systems during installation per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
- D. Protection: Provide masking and drop cloths to prevent contamination of surfaces by firestop system materials.

#### 1.09 COORDINATION

- A. Coordinate pre-construction site meeting to determine all trades pipe type, wall ratings and sizing of sleeves, openings, core-drilled holes, cut openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- B. Notify owner's inspecting agency at least seven (7) days in advance of firestop system installations; confirm dates and times on days preceding each series of installations.
- C. Do not cover-up or conceal firestop system installations behind other construction until owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.
- D. Copy Architect/Engineer with written record of all inspections of firestop installations. Record should include the date, a list of installations inspected, the name of inspecting agency, and the name of inspecting agency's representative performing the inspection.

### PART 2 – PRODUCTS

#### 2.01 GENERAL

- A. Firestop systems and materials shall meet the requirements specified herein.
- B. Architect/Engineer must review and accept in writing any alternates to the firestop system and materials specified herein.

- C. Compatibility: Provide firestop systems that are compatible, with the substrates forming openings, and with the items, if any, penetrating through the firestop system, under conditions of service and application, as demonstrated by the firestop system manufacturer based on testing and field experience.
- D. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article 1.04. Use only components specified by firestop systems manufacturer and approved by the qualified testing and inspecting agency for the firestop systems indicated. Accessories include, but are not limited to, the following items:
  - 1. Permanent forming/damming/backing materials, including the following:
    - a. Slag/rock-wool-fiber insulation
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state
    - c. Fire-rated form board
    - d. Fillers for sealants
    - e. Mineral Wool
    - f. Backerrod
  - 2. Temporary forming materials
  - 3. Substrate primers
  - 4. Collars and steel sleeves

## 2.02 THROUGH-PENETRATION FIRESTOP SYSTEMS FOR FIRE-RATED ASSEMBLIES

- A. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR (firestop devices) and XHEZ (firestop systems) may be used, providing that they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.
- B. Additional Requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.
- C. All through-penetration Firestop system products must be from a single manufacturer.
- D. Acceptable Products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the attached Systems and Applications Schedule.

## 2.03 DUCT WRAP FIRESTOP SYSTEMS FOR DUCTS PASSING THROUGH FIRE-RESISTANCE-RATED AREAS

- A. 2-hour fire-resistive rated grease or air duct enclosure materials listed in the UL Fire Resistance Directory under File R8418, Category CAJ7009; File R14229, Categories CAJ7013, CAJ7015, CAJ7020, CAJ7022, YYET, and Grease Duct Enclosures.
- B. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product as a part of the UL system or device, and designed to perform this function.
- C. All duct wrap firestop products must be from a single manufacturer.
- D. Acceptable products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the material schedule below:

1. Fire resistive duct wrap: 3M™ FireMaster® Duct Wrap, 1.5" thick, 24" or 48" wide x 300" long rolls, foil encapsulated with logo identification. 3M™ FireMaster® Duct Wrap collar, 8" wide for air duct butt joint optional wrap method.
2. Tapes:
  - a. High performance filament tape
  - b. Aluminum foil tape: Minimum 3" wide to seal cut blanket edges
3. Banding Material:
  - a. Carbon steel banding for less than or equal to 1-hour ratings; ½" to ¾" wide x 0.015" thick minimum.
  - b. 304 Stainless Steel banding for 2-hour ratings; ½" to ¾" wide x 0.015" thick minimum.
4. Insulation pins/washers:
  - a. Pins: 10 gauge, 4" to 5" long, copper coated steel washers; 1.5" x 1.5" or 1.5" diameter galvanized steel speed clip.
5. Through-penetration fire stop materials:
  - a. Packing material: Scrap pieces, 3M™ FireMaster® Duct Wrap, 1.5" thick or 3 pcf mineral wool.
  - b. 3M FB-2000+ Silicone Sealant.
6. Grease duct access door:
  - a. Single angle opening frame
  - b. Access cover, minimum 16 gauge
  - c. Insulation pins
  - d. Speed clips, minimum 1.5" x 1.5" or 1.5" diameter galvanized steel.
7. Hardware:
  - a. Threaded rods: 4" to 5" long, ¼" diameter galvanized steel with ¼" wing nuts and ¼" metal washers.
  - b. 4" long steel hollow tubing to fit threaded rods.

#### 2.04 FIRESTOP SYSTEMS FOR CONDUITS INSTALLED BY THE MECHANICAL DIVISION PASSING THROUGH FIRE-RESISTANCE RATED AREAS

- A. Electrical System protection material listed in UL-classified UL 1709, ASTM E119, ASTM E1529, and ASTM E1725.
- B. All firestop system products provided by the mechanical division must be from a single manufacturer.
- C. Acceptable products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the material schedule below: Firestopping Caulk:
  1. Tremco Inc. Fire Protection Products or approved equal from an approved testing laboratory.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Examine areas and conditions under which firestop system is to be installed and notify the architect/engineer of conditions detrimental to proper or timely completion of the work.

- B. Examine substrates to determine they are satisfactory to receive firestop system materials.
  - 1. Conduct tests according to firestop systems manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt or other foreign substances capable of impairing bond of fire-resistive materials.
  - 2. Verify objects penetrating firestop materials, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  - 3. Verify substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive materials.
- C. Verify that environmental conditions are safe and suitable for installation of firestop materials.
- D. Do not proceed with installation of firestop system until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect/engineer.

### 3.02 PREPARATION

- A. Clean and repair substrates that could impair the adhesion or proper fitting of firestop materials, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
- B. Secure all pipe, conduit, cable and other items, which penetrate firestop materials.
- C. Provide masking and temporary covering, as required, to prevent contamination of adjacent surfaces by firestop materials.

### 3.03 INSTALLATION – GENERAL

- A. Installation of firestop systems shall be performed in strict accordance with manufacturer's detailed installation instructions and procedures.
- B. Extend firestop material in full thickness over entire area of each substrate or opening to be protected.
- C. Protect firestop material from damage on surfaces subject to traffic.

### 3.04 INSTALLATION OF THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. General:
  - 1. Install through-penetration firestop systems to comply with "Performance Requirements" Article 1.04 and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated. (See Article 3.04E "Through-Penetration Firestop Systems Schedule")
  - 2. Install forming/damming/backing materials and other accessories of types required to support fill material during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
    - a. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop system.
  - 3. Install fill materials for firestop systems by proven techniques to produce the following results:
    - a. Fill voids and activities formed by openings, forming materials, accessories and penetrating items as required to achieve fire-resistance ratings indicated.

- b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
    - c. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining surfaces.
  
- B. Field Quality Control
  - 1. On -site training and certification by each trade, submittals specific to the scope.
  - 2. On site inspection by firestop manufacturer documented in writing during construction process.
    - 1. Proceed with enclosing through-penetration firestop systems with other construction only after inspection and approval by code authorities.
    - 2. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
    - 3. Inspection Agency: If required, owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports indicating whether through-penetration firestop systems comply with or deviate from requirements.
  
- C. Identification
  - 1. Identify though-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or Firestop systems. Include the following information on labels:
    - a. The words: Do not remove opening sealed with Tremco firestopping containment products.
    - b. Contractor's name, address, and phone number.
    - c. Date of installation.
    - e. Though-penetration firestop system manufacturer's name, system number.00
  
- D. Cleaning and Protection
  - 1. Clean off excess fill materials adjacent to openings as work progresses using methods and cleaning materials that are approved in writing by through-penetration firestop systems manufacturer and that do not damage materials in which openings occur.
  - 2. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

**3.04E THROUGH PENETRATION FIRESTOP SYSTEMS SCHEDULE WITH SUBMITTED AND APPROVED MANUFACTURER**

Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
<b>Metallic Pipes 1000 Series</b>	CAJ1064	WL1158	FC1050
	CAJ1205	WL1278	FC1054
	CAJ1302	WL1306	FC1101
	CAJ1456	WL1327	TL/PH60-01
	CAJ1472	WL1328	FE-1011
	CAJ1505	WL1361	FE-1012
	CAJ1519	TL/PV 120-04	
	CAJ1520	WL1020	

	WJ1131 WJ1135 WJ1136 WJ1147 WJ1148 WJ1169	WL1302	
<b>Non-Metallic Pipes 2000 Series</b>	CAJ2069 CAJ2072 CAJ2075 CAJ2081 CAJ2116 CAJ2184 CAJ2229 CAJ2232 CAJ2233 CAJ2431 CAJ2437 CAJ2445 CAJ2446 CAJ2447 CAJ2448	WL2063 WL2082, WL-2083 WL2125 WL2129 WL2158 WL2159 WL2161 TL/PV 120-03 WL2412 WL2420 WL2463 TI/PH 120-02 Strap TL/PV 120-06 WL2429	FC2049 FC2135 FC-2136 FC2144 FC2145 FC2146 FC2147 FC2255 FC2256 <i>TL/PH 60-01</i>  Strap TL/PH 60-03
<b>Insulated Pipes 5000 Series</b>	CAJ5053 CAJ5067 CAJ5089 CAJ5111 CAJ5120 CAJ5121 CAJ5242 CAJ5245 CAJ5254 WJ5091 WJ5095 WJ5096 WJ5097	WL-5081 WL-5083 WL-5115 WL5192 WL-5198 WL-5204 WL-5209 WL-5232 WL-5233	FC5055 <i>WH #6583</i>
<b>HVAC Ducts 7000 Series</b>	CAJ7012 CAJ7014 CAJ7019 CAJ7021 CAJ7049 CAJ7052 CAJ7095	WL7039 WL-7113 WL7125 WL7142 WL-7172 WL-7173 TI/PH 120-01	FC7033 FC7036 FC7037
<b>Combos 8000 Series</b>	CAJ8057 CAJ8111 CAJ8134 CAJ-8157 CA-J8158 CAJ-8165 CAJ-8167	WL-8036 <i>TL/PH60-01</i> WL-8066	FC8035

3.05 INSTALLATION OF DUCT WRAP FIRESTOP SYSTEM

- A. Installation
1. Install duct wrap firestop system to comply with "Performance Requirements" Article 1.04 and duct wrap firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
  2. Install duct wrap firestop system in direct contact with the duct that it encloses. Protect every portion of duct with no less than 2 layers for the grease duct applications and 1 layer for 1-hour air duct enclosures. Overlap both perimeter and longitudinal joints with a minimum of 3" per layer of material. **Air Duct Enclosure Optional Wrap:** Follow same traditional wrap method with exception of utilizing a 3" perimeter overlap in conjunction with longitudinal butt joint wrap plus a duct wrap firestop system collar over exterior layer joints. Filament tape is used as a temporary hold on both layers until banding hardware is in place. Band exterior layers should be spaced minimum of 10.5" on center. For duct widths greater than 24", weld insulation pins to bottom horizontal and outer vertical duct runs. Impale duct wrap firestop system material over pins and secure with galvanized steel speed clips until banding is applied.
  3. Locate grease duct access doors at horizontal cleanouts as required by local codes. Protect with 3 layers of duct wrap firestop system material, each layer overlapping previous 1" on all sides and in accordance with manufacturer's instructions.
  4. Protect floor and wall penetrations with an approved through-penetration firestop system having an F and T hourly rating not less than that of the assembly penetrated and installed in accordance with manufacturer's instructions as follows:
    - a. Grease Ducts (1 or 2-hour enclosure):
      - 1) Option A: 2 layers of duct wrap firestop system material per manufacturer's installation instructions, maintaining 3" transverse and longitudinal overlaps continuous through the penetration
      - 2) Option B: Tightly butt duct wrap firestop system material to the floor or wall on both sides of the assembly. Fill remaining annular space (3" minimum) between the wrapped duct (Option A) or bare steel duct (Option B) and periphery of the opening with 4 ¼" thickness of scrap duct wrap firestop opening. Apply ¼" minimum 2000+ Silicone over packing material, within the annulus, flush with top surface of floor or both surfaces of wall.
    - b. Air Ducts (1-hour enclosure):
      - 1) Option A: 1 layer duct wrap firestop system material per manufacturer's installation instructions, maintaining 3" transverse and longitudinal overlaps or optional 3" perimeter overlap with longitudinal butt joints plus duct wrap firestop system collar over exterior layer joints.
      - 2) Option B: Tightly butt duct wrap firestop system material to the floor or wall on both sides of the assembly. Fill remaining annular space between the wrapped duct (Option A) or bare steel duct (Option B) and periphery of the opening with 4 ¼" thickness of scrap duct wrap firestop material or 4 ¼" pcf material wool batt firmly packed into opening. Apply ¼" minimum 2000+ Silicone over packing material within the annulus, flush with top surface of floor or both surfaces of wall.
    - c. Air Ducts (2-hour enclosure):
      - 1) Same as 1-hour air duct enclosure system except apply 2 layers of duct wrap firestop system material per manufacturer's installation instructions.
- B. Repair Procedure:

1. Repair damaged duct wrap firestop system material in accordance with manufacturer's instructions.
2. Remove damaged section. Apply a new section of the same dimension. Place and fit ensuring same overlap that existed previously. Place banding around new duct wrap firestop system material and tension to sufficiently hold in place.
3. If damage has penetrated to interior layer, remove affected sections and reinstall as specified in Article 3.05A "Installation".

END OF SECTION 15140