SPECIFIER: This section replaces 07270. The ASTM tests referenced in this Spec Guide specifically address only the stopping of flame, but not of smoke. MSCPS insists that for safety in our schools, every effort be made to prevent smoke from passing from one occupied space to another. Because some firestopping products have shrunk, and in some cases degraded, in our moist Florida atmosphere, MDCPS is making every effort to move firestopping and firesafing in the direction of protecting occupants from both flame AND smoke over the long haul.

The number of penetration types encountered in even the simplest school facility is staggering. Specifications are sorely in need of help from descriptive details on the Drawings. The A/E should augment these Spec Guides with as many details on the Drawings, covering as many penetration conditions as possible. Fortunately, there are good UL Fire Resistance Directory details that can be reproduced on the Drawings. Also, producers can often help the A/E augment these details with published details for special conditions.

CSI MasterFormat 2004 number: 07 84 00.

An optional keynote to the Drawings follows major product titles, for A/E's using National CAD Standard.

PART 1  GENERAL

1.1 RELATED REQUIREMENTS

A. Coordinate firestopping, firesafing and smoke sealing with work before and after, especially fire-rated floor and wall construction and all the pipes, ducts, raceways, cable trays, and conductors that penetrate floors/ceilings and walls/partitions.
   1. Contractor shall make firestopping, firesafing and smoke sealing an agenda item at construction progress meetings to alert each subcontractor installing floors, ceilings, walls, partitions, piping, ducts, dampers, raceways, cable trays, busses and conductors to the need to stop passage of fire and smoke.
   2. Contractor shall make the proper routing and grouping of pipes, raceways and conductors by their installing subcontractors an agenda item at construction progress meetings. Among other agreements made at these meetings, a cable tray routing plan shall result from this, and shall be promulgated by the Contractor.
   3. Contractor shall take particular care see that penetrations in gypsum board are not be sealed with joint cement, and that those in masonry (within 1 in. of the penetration) are not sealed with mortar.

1.2 DEFINITIONS

A. Firestopping: A tested, UL-listed, through-penetration fire-stopping and smoke sealing assembly as described in Florida Building Code 712, but that prevents the passage of smoke and air in addition to flame, hot gases, and water from a hose stream.
   1. The term “firestopping” will be used throughout this section to specify firestopping, smoke sealing and firesafing.
   2. Firestopping is used at pipes, ducts, raceways, conductors, cable trays, their supports, and other items that penetrate fire-rated walls and floors within the facility.
   3. The types of firestopping specified here are used (or, with the approval of the A/E, adapted for use) at all types of wall and floor material and construction in the Work.
   4. Non-destructive test: For purposes of field inspection and contract compliance the perceptible passage of air (at a pressure 0.01 in. WG) through the annular space between a penetrating item and the surrounding construction shall be deemed
evidence that the annular space permits the passage of smoke, as well as flame, hot gases, and water from a firehose stream.

B. Firesafing: The treating of joints in floors and walls as described in FBC 713 Fire-Resistant Joint Systems. Firesafing is included in the firestopping work specified here.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM). Test Methods for:
   2. E814-02 Fire Tests of Through-Penetration Fire Stops.

B. Underwriters Laboratories, Inc. (UL). Fire Resistance Directory, 2006:
   1. XHBN Joint Systems. (firestopping and firesafing).
   2. XHEZ Through-Penetration Firestop Systems.
   3. XHHW Fill, Void or Cavity Materials (firestopping and firesafing).
   4. XHJI Firestop Devices.

1.4 QUALITY ASSURANCE

A. Firestopping Producer Qualifications.
   1. Each firestopping producer shall have at least 5 years experience in producing UL-listed firestopping assemblies of the type and function specified in this section.

B. Firestopping Installer Qualifications.
   1. The installing firm and lead installing mechanic shall have least 5 years experience in at least half of the types of firestopping (including that are specified in this section.
   2. The installing firm shall be approved in writing by the proposed firestopping producer.

C. Single Source:
   1. One supplier and installer of firestopping (including firesafing) work shall perform all firestopping work in connection with structural, finish, kitchen, elevator, plumbing, fire suppression, HVAC, telecommunication and electrical installation in the Work.
   2. Except for a firestopping function that cannot be provided by the approved firestopping producer, use the products of one producer for all firestopping.

1.5 SUBMITTALS

A. Product Data. List and description of each assembly and component product, with UL numbers and statement of prior successful use by installer (installing firm).
   1. Because the Contractor’s installer will be selecting one of several specified assemblies or components from UL-listed products specified in PART 2, the Board requires that the firestopping installer have successful experience with each firestop product submitted.
   2. Provide a statement from the installer of prior successful use, stating if each proposed product has performed well or poorly during the 1st year after substantial completion on its 2 most recent projects comparable to this one. Poor performance includes such defects as:
      a. Not maintaining shape, adhesion or cohesion in the local environment,
      b. Signs of decay, degradation or crumbling in the local environment,
c. Shrinking away from the penetrating item or from the fire-rated wall / floor in which the penetration is located, to the point that smoke can pass through.

B. Shop Drawings.
   1. A copy of the Contractor’s cable tray and grouped-raceways routing diagram agreed to by all subcontractors whose raceways and wiring have been grouped to minimize the number of penetrations in walls and floors.
   2. Detail of firestopping / smoke sealing of ducts on both sides of fire dampers so that the gaps between framing angles and ducts, when firestopped using products specified herein, will not allow expansive firestopping to compress or crush the duct, thus inhibiting damper blade operation.

C. Producer's Installation Instructions. Provide for each proposed assembly or component.

D. Report of specified field quality control visit and punchlist, followed by confirmation that punchlist corrections have been made.

PART 2    PRODUCTS

2.1 FIRESTOPPING AND FIRESAFING

A. Description. Assemblies and components shall not:
   1. Degrade in water or in moist Florida atmosphere within 20 years.
   2. Require hazardous waste disposal.
   3. Contain lead, PCBs, ethylene glycol, or solvents.
   4. Employ a sodium silicate expansion agent; use graphite expansion agent instead.

B. Standards.
   1. Through-penetration firestopping: ASTM E814; also UL-listed under XHEZ or XHHW
   2. Firesafing ASTM E1966; also UL-listed under XHJI, XHBN or XHHW.

C. UL-Listed Assembly Product Lines. As approved for all of the producer’s assemblies that perform each firestopping function specified in 2.2 and 2.3 following.
   1. Hilti.
   2. PFPP / JM.
   3. STI (Specified Technologies Inc.).
   4. 3M Fire Protection Products.
   5. Tremco.
   6. W.R. Grace
   7. Lines equal in quality and performance, as approved after review by A/E and Board.

D. UL-Listed Accessory Producers: From the following list, as tested with and approved for use in assemblies specified in 2.2 and 2.3 following:
   1. CIA (Construction Industry Associates)
   2. Delta Mineral Wool Safing (Rockwool)
   3. IIG MinWool / Casilite-JM
   4. Unique Firestop Products (re-enterable cabling sleeves)
   5. Lines equal in quality and performance, as approved after review by A/E and Board.
2.2 SCHEDULE OF FIRESTOPPING ASSEMBLIES

A. Firestop and Smoke Barrier Calk.
   1. Hilti    FS 601 Sealant, FS 604 Sealant, FS-ONE.
   2. PFPP / JM 4800 DW, 3600 EX, 4100 SL, 5100 SP.
   3. 3M    CP 25 Fire Barrier Caulk, Firedam 150+.
   4. Tremco   IA, Fyre Sil, or acrylic.
   5. WR Grace Flamesafe FS900+, FS1900, or FS 4000.
   6. CIA    Fire Barrier, Intumescent

B. Firestop and Smoke Barrier Wrap/Strip.
   1. PFPP / JM WS1 Wrap Strip.
   2. STI    Spec Seal Wrap/Strip.
   3. 3M    FS-195 Wrap/Strip.
   4. Tremco  Intumescent Wrap Strip.
   5. WR Grace Flamesafe FSWS Wrapstrip

C. Trowelable Firestop and Smoke Barrier Mortar.
   1. Hilti    FS 635.
   2. STI    Spec Seal mortar.
   3. Tremco  Tremstop Fire Mortar
   4. WR Grace Flamesafe Mortar

D. Fire Prevention Pillows.
   2. PFPP / JM Pillow
   3. STI:    Spec Seal.
   4. Tremco:  Tremstop.
   5. WR Grace Flamesafe FS Bags or Pillows

E. Firestop and Smoke Barrier Spray.
   1. PFPP / JM 5100SP
   2. 3M    Fire Dam Spray.
   3. WR.Grace Flamesafe FS3000 Elastomeric Spray

F. Firestop and Smoke Barrier Sleeves.
   1. STI    EZ-Path.
   2. WR.Grace Flamesafe FSIS Intumescent Sleeve.
   3. Unique  Firestop Sleeves

G. Prefabricated Firestop and Smoke Barrier Restricting Collars: Provide with galvanized steel or stainless steel hose clamps.
   1. Hilti    CP 642.
   2. PFPP / JM: PPC Pipe Collar
   3. STI Spec Seal plastic pipe collars.
   4. 3M     PPD.
   5. Tremco Tremstop D Firestop Collars.
   6. WR Grace Flamesafe FSD Devices
   7. CIA    Fire Can Collar

H. Cast-in-Place Firestop and Smoke Barrier Devices:
2.3 SCHEDULE OF FIRESAFING ASSEMBLIES

A. Firesafing Insulation:
   1. USG Thermafiber Safing Insulation.
   2. IIG MinWool.
   3. Delta Safing Rockwool.

B. Fire Barrier Composite Sheet.
   1. 3M: Composite sheet CS-195
   2. Nelson: Composite Sheet

C. Fastenings and Supports for Firestops and Firesafing.
   1. Hole plates: 26 ga or heavier galvanized steel, 18 ga or heavier if over fluted steel deck.
   2. Z-clips: 1 in. x 30 ga galvanized sheet steel, to support packing material at floor gaps and penetrations.
   3. Hat-shaped support hangers: 10 ga galvanized steel, to support damming and packing material at floor penetrations.
   4. Hardware cloth: 2 x 2 in. x 19 ga galvanized wire.
   5. Adhesive: Waterproof, VOC-free adhesive with flame spread rating of <25.

PART 3 EXECUTION

3.1 PREPARATION

A. Concrete, masonry, steel and gypsum board surfaces shall be smooth, clean, and free of loose debris, holes, and projections.

B. Obtain, follow and cooperate with the routing and grouping of pipes, raceways and conductors in this Work.

3.2 INSTALLING FIRESAFING AND FIRESTOPPING / SMOKE SEALING

A. Apply firestop (including firesafing) insulation, fire and smoke barrier caulk, and fire and smoke barrier wrap strips/collars following producer's published installation details, directions, UL classified fire test data, and as shown or specified.

B. Follow agreements made by installing subcontractors for floors, ceilings, walls, partitions, piping, ducts, dampers, raceway, cable trays, busses and conductors, as developed and coordinated by Contractor, to group pipes and conductors to minimize the number of penetrations in walls and floors.

3.3 FIRESAFING INSTALLATION

A. Gaps at Floor and Roof Edges Abutting Exterior Walls:
1. Install specified firesafing insulation continuously, following producer's directions, at each floor level above the first floor and at the roof, between the back of the wall construction, beams and columns and in a depth.

2. Install firesafing insulation across exterior faces of columns at each floor level above first floor, including roof, before the erection of the walls. Fasten firesafing in place across columns with specified adhesive and with impaling clips at each side of each column.

3. Fasten firesafing insulation to exterior faces of slab edges and beams with impaling clips 24 in. oc and with specified adhesive.

4. Provide firesafing insulation in thicknesses needed to securely compress it in place in each joint.

5. Where gap is less than 2 in., bend clips slightly upward.

6. Where gap is less than 1 in., apply adhesive to sides of joint and tightly pack firesafing into joint.

7. Recess top surface of firesafing, following producer's directions, to the depth stated in UL-test in order to receive fire and smoke barrier calk that will provide the 1, 2 or 3 hr fire resistance required on Drawings.

8. Apply specified fire and smoke barrier calk, following UL system description, to a uniform depth over horizontal surfaces of firesafing at each floor level above the first floor. Smooth surface of calk at areas exposed to view.

B. Floor and Roof Expansion Joints:
1. Provide firesafing metal clips as needed and as required by UL-tested system.

2. Install specified firesafing insulation, following producer's directions, to the depth required by UL. Tightly pack in each suspended floor and roof expansion joint, being sure that grain of firesafing batt material is correctly oriented following firestop producer's instructions to provide the 1, 2 or 3 hr fire resistance required on Drawings.

3. Apply fire and smoke barrier calk, following UL system description, to a uniform depth over horizontal surfaces of firesafing at each floor level above the first floor except at roof expansion joints. Smooth surface of calk at areas exposed to view.

C. Gaps at Tops of Non-Load Bearing Masonry Fire Walls
1. Ensure the installation of solid CMU course to within 5/8 in. of structural soffit to provide needed gap for installing firesafing insulation.

2. Pack space between top of CMU and underside of overhead structure or soffit with specified firesafing insulation.

3. Recess insulation on each side of wall in order to receive and support the 1/2 to 1 in. depth of fire and smoke barrier calk/spray instructed by UL and producer to provide the 1, 2 or 3 hr fire resistance required on Drawings.

4. Install the specified fire and smoke barrier calk or putty in that recess. Smooth the surface of the calk, making it flush with visible wall surfaces.

3.4 FIRESTOPPING INSTALLATION

A. Floor and Fire Wall Penetrations - such as metal pipe, raceways, conductors, and the perimeters of HVAC ducts:
1. Where gaps between pipes, raceways, conductors, and ducts are 1/4 in. or less, seal gaps with specified fire and smoke barrier calk and other firestop products.

2. Where gaps between pipes, raceways, conductors, and ducts are more than 1/4 in.:
a. Pack the space between opening and pipe, raceway, conductor or duct with the specified firesafing insulation following UL and firestopping producer requirements. The depth of the insulation shall be as needed to provide the 1, 2 or 3 hr fire resistance required on Drawings.

b. Install specified fire and smoke barrier calk at uniform depth, usually 1/2 to 1 in., over the supporting firesafing insulation. Smooth the surface of the calk to make it flush with visible wall surfaces.

c. Option: In place of specified fire and smoke barrier calk, provide fire and smoke barrier firestopping wrap strips or collars, fastened in place and covered with the specified fire and smoke barrier calk following UL- and producer requirements.

B. Floor and Fire Wall Penetrations - such as plastic pipe, raceways, and cables.

1. Where plastic pipes and plastic raceways penetrate floors and walls, provide prefabricated fire barrier collars with fire and smoke barrier calk on both sides of wall and at underside of floor. Collars and calk shall provide the UL- and producer-required depth of fire and smoke barrier calk or spray for the 1, 2 or 3 hr fire resistance required by Drawings.

   a. Provide firestop collars fastened to each side of wall at fire wall penetrations and to underside of floor for floor penetrations following UL and producer requirements.

   b. Seal firestop collars at wall and floor with a 1/4 in. bead of the specified fire and smoke barrier calk.

   c. Where annular space between plastic pipes, plastic raceways, cables and floor openings is more than 1/4 in. and where the firestop collar does not cover this annular space, cover it with a specified hole-plate between the firestop collar and the underside of the floor.

   d. Fasten hole-plates to floor following UL and firestop producer requirements.

2. Grout the entire annular space around pipes that penetrate concrete floors from top of floor to bottom, leaving elevated steel rim to restrain water. Insulated electrical and telecommunication cable penetrations through fire walls:

   a. Provide galvanized steel pipe sleeves equivalent to EMT, sized to allow annular space of not less than 3/4 in. around cable. Extend the pipe sleeve 3 in. beyond wall on each side. Tightly fit the pipe sleeves to the wall.

      1) In masonry walls, grout the sleeves in solid.

      2) At gypsum board, fill the openings solidly with firecalk, not wallboard joint cement.

   b. Fill the space around cable to within 1 in. of the end of the pipe sleeve using firesafing insulation.

   c. Provide firestop calk at both ends of the sleeve following UL and firestop producer requirements.

   d. Do not permit any conductor to penetrate a partition without a grouted sleeve and firestopping around the conductor.

C. Floor and Fire Wall Penetrations, such as bus ducts and cable trays.

1. Where cable trays and bus ducts penetrate floors and fire walls, install firestops and firesafing following UL and producer requirements as needed for each condition to provide the 1, 2 or 3 hr fire resistance required on Drawings.

2. Where "packing material" is shown on the producer's details, only specified firesafing mineral wool shall be used – not fiberglass. The depth of the packing material shall follow UL and firestopping producer requirements.
3. Where cable trays penetrate floors and fire walls, provide a “re-enterable” fire prevention pillow assembly placed inside the opening in a staggered brick style along with other firestopping materials required by UL and the firestopping producer.

4. Provide firestopping / smoke sealing of ducts on both sides of fire dampers in such a way that the gaps between framing angles and ducts, when firestopped using the specified products, will not allow expansive firestopping to compress or crush the duct, thus inhibiting damper blade operation.

3.5 FIELD QUALITY CONTROL

A. Before covering joints and penetrations in walls and floors (as with ceiling panels, gypsum board ceilings, or flooring materials) the firestopping installer, Contractor, A/E and Board representative shall tour the project to observe the work completed to date for completeness and conformity to Construction Documents and UL requirements.

B. So as not to delay the work of finishes and delays caused by repeated uncovering of the Work, the Contractor shall make a firestopping punchlist of incomplete, non-complying and defective items of firestopping work as a guide to prompt completion and correction.

C. Promptly complete and correct items of unfinished and defective firestopping work. Submit report of each item on punchlist as completed, corrected, or when.

3.6 PROTECTION

A. Protect finished firestopping from water and punctures. //