SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Provide building insulation work as indicated on Drawings, and as specified, including but not limited to:

1. Fiberglass blanket/batt insulation.
2. Sill sealer.
3. Sheathing board.
4. Other building insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.

1.03 RELATED WORK

1. Section 04810, UNIT MASONRY ASSEMBLIES.
2. Section 06100, ROUGH CARPENTRY; Wood blocking and sheathing.
3. Section 09260, GYPSUM BOARD ASSEMBLIES; Acoustical insulation and sealant.
4. Division 15 MECHANICAL; Pipe and duct Insulation.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

B. Verification Samples: Submit representative samples of each material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq.in.

1.05 QUALITY ASSURANCE

A. Fire Performance: Provide products which meet or exceed flammability ratings indicated or required by authorities having jurisdiction.

B. Thickness: Where R values are indicated, provide thicknesses of insulation materials required to achieve value specified.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to site in original, unopened packages or containers bearing manufacturer's names, brand names and types and thicknesses of contents.

B. Store off floor in interior spaces, adequately protected against damage from all sources.

PART 2 - PRODUCTS

2.01 SILL SEALER

A. Sill sealer shall be a prefabricated product used to fill crevices between top of foundation wall and sill plate around perimeter of exterior walls.

B. Material shall be continuous, sized to fit wall thickness, and shall provide an effective barrier against air leakage.

C. Material shall be equal to "Green-Guard Sill Sealer", manufactured by Pactiv Building Products Company, Atlanta, GA or approved equal.

2.02 FIBERGLASS BLANKET/BATT ACOUSTIC INSULATION

A. Unfaced Fiberglass Blanket/Batt Insulation: shall be indicated thickness(es) by full 16-1/8 in. and 24-1/8 inc width (depending on spacing of framing members) unfaced, commercial fiberglass blanket or batt insulation conforming to ASTM C 665, Type I; manufactured by Owens Corning Fiberglass Corp., Johns-Manville Corp., CertainTeed Corp., or approved equal.

2.03 THERMAX SHEATHING BOARD BY DOW BUILDING SOLUTIONS

A. Exterior Insulation: Glass-fiber-reinforced enhanced polyisocyanurate foam core sheathing faced with nominal 4 mil embossed white or blue acrylic-coated aluminum on one side and 1.25 mil embossed aluminum on the other side, complying with ASTM C1289 and meeting the following physical properties:

1. ASTM C1289 Type 1, Class 1
2. Compressive Strength (ASTM 01621): 25 psi, minimum.
3. Long-Term Thermal Resistance (ASTM C518, measured at Mean Temp of 75F): [R-6.5 per 1 inch] [RSI 1.06 per 25 mm] of thickness [with 15 year thermal warranty]
4. Flexural Strength (ASTM C203): Minimum 40 psi.
5. Water Absorption (ASTM C209): Maximum.1.0 percent by volume.
6. Water Vapor Permeance (ASTM E96): <0.3 perms.
7. Maximum Use Temperature: 250 degrees F.

B. Acceptable Products: The Dow Chemical Company "THERMAXTM ci Exterior Insulation."

1. Panel Size: 4'-0" wide x 8'-0" [12'-0"] long, square edge, shiplap (shiplap on thickness of 1.55" and greater) panels.
2. Thickness and Stabilized R-Value: Nominal 0.625 inch thickness, R-4.1 [1.0 inch thickness, R-6.5] [1.55 inch thickness, R-10.1] [2 inch thickness, R-13.0] [2.5 inch thickness, R-15.8] [3 inch thickness, R 19]

C. Accessories:

1. Fasteners: Provide insulated sheathing manufacturer's recommended organic-polymer or other corrosion-protective coated steel screw fasteners for anchoring sheathing to metal wall framing. Fastener length and size based on wall sheathing thickness.

   a. Acceptable Products: Wind-lock Corporation "ci-Lock Steel Series Selection" with 1-3/4 inch diameter high-grade plastic washers

2. Insulation Flashing Tape: Provide insulation manufacturer's recommended board joint tape for sealing joints, seams and veneer tie penetrations through the insulation layer.

   a. Acceptable Products: The Dow Chemical Company "WEATHERMATETM Straight Flashing 4 inch width high-density polytheylene (HDPE) film facer with 100% butyl rubber adhesive

3. Wall Opening Flashing: Provide insulated sheathing manufacturer's recommended flashing sealing window and door wall openings.

   a. Acceptable Products: The Dow Chemical Company "WEATHERMATETM Straight Flashing 6 inch and 9 inch", high-density polytheylene (HDPE) film facer with 100% butyl rubber adhesive, at straight opening heads, jambs and sills
   b. When greater widths are required for through wall flashings 100% butyl rubber adhesive is recommended.

4. Penetration Filler: Provide insulated sheathing manufacturer's recommended polyurethane foam for sealing penetrations of insulated sheathing.

   a. Acceptable Products: The Dow Chemical Company "Great Stuff™ Pro Gaps & Cracks" single-component polyurethane insulating foam sealant.
   b. Acceptable Products: The Dow Chemical Company "Great Stuff™ Pro Window & Door" single-component polyurethane low-pressure foam sealant

5. Flexible polyethylene foam gasketing strip to reduce air infiltration between a concrete foundation and sill plate.

   a. Acceptable Products: The Dow Chemical Company "WEATHERMATETM SILL SEAL Foam Gasket.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Insulating materials and installation shall be in strict accordance with manufacturer's printed instructions and specific recommendations, and health and safety precautions, for each of project conditions and in accordance with governing laws and building code.

3.02 SILL SEALER

A. Install sill sealer in accordance with manufacturer's recommendations and as indicated on the Drawings.

3.03 FIBERGLASS BLANKET/BATT INSULATION

A. Install continuous application of fiberglass blanket/batt at ceiling and sloped roofs and at walls to protect interior spaces of building, as indicated. Fit batts tightly together and to framing member, furring strips, penetrations and abutting construction for positive thermal seal. Carry continuously behind light cans, junction boxes, etc.

B. Install blanket/batt insulation, fully filing spaces between framing members. Staple through insulation into rear of sheathing with 9/16 in. long divergent point staples at center and near each corner of blanket/batt. Fit batts tightly together at joints. Pack tightly into corners, and fill double studs and box headers and sills and other similar voids, with insulation to maintain insulation integrity across entire wall area.

C. Coordinate work with that of other Sections.

3.04 THERMAX SHEATHING BOARD

A. Install insulation in accordance with manufacturer's recommendation. Fasten to substrate using sheathing manufacturers recommended type and length screw fasteners with washers. Abut panels tightly together and around openings and penetrations.

B. Install flashing joint tape at end and edge joints with sufficient hand pressure to ensure seal and in accordance with sheathing manufacturer's joint sealing recommendations.

C. Seal sheathing joints and penetrations of 'sheathing in accordance with sheathing manufacturer's joint and penetration sealing recommendations

3.05 CLEANING

A. Upon completion of building insulation work in area. Remove rubbish and debris from work area and leave in broom clean condition.

END OF SECTION 07210

SECTION 07815

SPRAY-APPLIED CEMENTIOUS FIREPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, applicable parts of DIVISION 1 – GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.02 WORK INCLUDED

A. Provide spray applied cementitious fireproofing, as indicted on the Drawings and as specified herein. Provide the following:

1. Type 2: Exposed Spray-on Cementitious Fireproofing.

1.03 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:

1. Section 09900, PAINTING.
2. Division 15 - MECHANICAL.

1.04 SUBMITTALS

A. Submit representative sample panels of sprayed-on cementitious fireproofing on sheet steel, at least 12 in. by 12 in., with proposed surface finish.

B. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

C. Fireproofing material shall be a material classified as a cementitious fireproofing material in accordance with UL "Fire Resistance Directory".

1.05 QUALITY ASSURANCE

A. Source: For each material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.

B. Installer: A firm with a maximum of three years experience in type of work required by this section and which is acceptable to the manufacturers of the primary materials.

1.06 TESTS

A. Fire Resistance Ratings: Where fire resistant ratings are indicated or required by Authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Manufactured materials shall be mill-mixed and shall be delivered in original, unopened packages bearing the name of the product, manufacturer's name, and the Underwriters' Laboratories, Inc. label.

B. Materials shall be kept dry until ready for use, and shall be kept off the ground, under cover and away from sweating walls and other damp surfaces. Materials that have been exposed to water before actual use shall be discarded.

1.08 TESTING AND INSPECTION

A. Inspection and testing is to be carried out to ensure that applied thickness and density meets fire rating requirements, and to verify installation meets reviewed test reports. Initial inspection and testing to be paid for by Owner in accordance with Section 01450, QUALITY CONTROL.

B. Correct unacceptable work and pay for further testing required to prove acceptability of installation.

C. Patch test areas as required to re-establish fireproofing integrity.

1.09 EXISTING CONDITIONS

A. Ensure structure and surfaces to which sprayed fireproofing is applied is not enclosed and is open to view until application is reviewed.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply spray fireproofing when temperature of substrate materials and surrounding air is below 40°F. Maintain temperature 24 hours before and 24 hours after application of fireproofing.

1.11 PROTECTION

A. Provide ventilation in areas to receive fireproofing during and 24 hours after application, to properly dry material and maintain nontoxic, unpolluted safe working area.

B. Protect adjacent surfaces and equipment from damage by overspray fall-out, and dusting. Mask adjacent work as required.

C. Provide temporary enclosures to prevent spray from contaminating air.

D. Close off and seal ductwork in areas where fireproofing is being applied.

E. Protect applied sprayed fireproofing from damage.

1.12 WARRANTY

A. Provide certificate stating that sprayed fireproofing has been completed in full accordance with requirements to provide necessary fire resistance ratings.

B. Warrant fireproofing against cracks, checking, dusting, flaking, spalling, separation, and blistering for minimum period of two years from date of Substantial Completion. Failure to provide such performance will require reinstallation or repair to satisfaction of Owner at now additional cost.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS AND MANUFACTURERS

A. Type 2 – Sprayed-On Fireproofing, Exposed to View: Provide the following product, or an Architect approved equal that meets or exceeds specified performance requirements:

1. Monokote Type Z-106 Medium Density Cementitious Fireproofing; Grace Construction Products Division, W. R. Grace & Co.

2.02 PERFORMANCE REQUIREMENTS

A. Type 2 – Sprayed-On Fireproofing, Exposed to View in Mechanical Rooms, etc.: Provide cementitious spray applied fireproofing that is a mill-mixed cementitious blend of minerals and Portland, or magnesium oxychloride cements with the following properties:

Property	Test Method	Value
Compressive Strength	ASTM E 761	80 lb./in.^{2}, minimum
Bond Strength over Uncoated or Galvanized Steel	ASTM E 736	1000 lb./ft.^{2}, minimum
Air Erosion	ASTM E 859	0.000 gms/ft.^{2}, minimum
Hardness	ASTM D 2240	Greater than 10
Deflection	ASTM E 759	No evidence of cracking or delamination
Bond Impact	ASTM E 760	No evidence of cracking or delamination
Dry Density	ASTM E 605	22 lb./ft. minimum (applied)

1. Fireproofing material shall not be subject to losses from finished application by sifting, flaking, or dusting.
2. Fireproofing shall not deform more than 10% under 500 lb./sq. ft. compressive forces in accordance with ASTM E 761.
3. Bare, shop-coated, and galvanized steel sheets with the fireproofing applied shall be kept at 90 ±3°F and 70 ±3% relative humidity for 240 hours without evidence of corrosion of steel, tested in accordance with ASTM E 937.
4. Fireproofing shall contain a mold inhibitor.

B. Protective Coating: Provide manufacturer's recommended clear-drying protective coating as a sealer for all areas to receive Type 2 Fireproofing.

C. Material shall be UL-listed.

D. Manufactured materials shall be mill-mixed requiring only the addition of water at the job site.

E. Water shall be clean, fresh, potable, from public mains, free of deleterious amounts minerals or organic substances.

F. Materials, procedures for applications, dry densities and thicknesses necessary to provide the required protection shall be approved by UL for the uses indicated. Submit certification by an independent Testing Laboratory acceptable to the Owner that materials, dry densities, thicknesses, and application procedures satisfy the requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements below when tested in accordance with ASTM E 119.

G. Thickness and Density: Thickness of fire protection material for each condition for the required fire resistance rating shall be according to manufacturer's data and UL requirements. Where required thickness is given as an average thickness the minimum thickness permitted shall be that given as average thickness. Acceptable minimum thickness of applied material shall be that measured at specified dry density.

H. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials and installation methods and materials have been approved by all authorities having jurisdiction.

2.03 AUXILIARY MATERIALS

A. Provide all required primers, adhesives, lath, reinforcing fabric, clips, hangers, supports, sleeves and other auxiliary materials and attachments prior to application of the fireproofing material. Comply with applicable UL Designs.

PART 3 - EXECUTION

3.01 PRIOR WORK OF OTHER SECTIONS

A. clips, hangers, supports, sleeves and other attachments to the fireproofing bases shall be placed under other Sections of the Specifications prior to application of the fireproofing material wherever practicable.

B. Ducts, piping, conduit and other suspended equipment which would interfere with the uniform application of the fireproofing material shall be positioned after application of sprayed-on fireproofing.

C. Patching and repair of sprayed-on fireproofing resulting from cutting or damage by other trades shall be performed under this Section and paid for by the trade doing the cutting or causing the damage.

D. Schedule and coordinate work with other trades allowing them ample time to install all required clips, hangers, inserts and other items which must be in place prior to application of fireproofing material.

3.02 SURFACE PREPARATION

A. Examine all surfaces to which the sprayed-on fireproofing is to be applied and notify Architect in writing of conditions detrimental to the proper and expeditious installation of fireproofing which cannot be corrected by normal cleaning of surfaces. Starting work within an area shall be construed as acceptance of the conditions of that area.

B. Thoroughly clean all surfaces to receive sprayed-on fireproofing, just prior to the application of the fireproofing, with hand tools, power tools or solvent cleaning methods to eliminate mill scale, dirt, grim, oil, grease, dust, loose rust or paint, and all other foreign material which would prevent satisfactory bonding of fireproofing applicator.

C. Application of fireproofing shall constitute acceptance of the suitability of the surface to receive this work by the fireproofing applicator.

3.03 TEMPERATURE AND VENTILATION

A. Exterior openings in areas to be sprayed shall be covered during application with tarpaulins or similar closures to confine the overspray and dusting to within the Contract-Limit Lines.

B. The surfaces to which fire protection material is to be applied as well as the ambient temperature during application for at least one week following application shall be at least 55°F. Relative humidity shall be low enough to assure proper drying of the applied material.

C. Provide natural ventilation to properly dry all sprayed-on fireproofing during and after its application. In enclosed areas lacking openings for natural ventilation, circulate exterior air and exhaust it to the outside by use of temporary circulators and exhaust fans.

3.04 SAMPLE AREA

A. Concealed, Sprayed-On Fireproofing: A sample area, not less than 100 sq. ft. of concealed sprayed-on fireproofing, comprising a typical overhead fire protection installation, including steel deck, beams, columns and other critical areas, shall be installed in location of the building selected by the Architect, for joint approval by the representative of the fireproofing material manufacturer and the Architect. Fireproofing in other areas shall not proceed until sample installation is approved. Approved sample installation shall remain in place and open to observation as a standard for all work under the Contract.

B. Exposed To View, Sprayed-On Fireproofing: A sample area, not less than 100 sq. ft. of exposed to view sprayed-on fireproofing, comprising a typical fire protection installation, including steel deck, beams, columns and other critical areas, shall be installed in location of the building selected by the Architect, for joint approval by the representative of the fireproofing material manufacturer and the Architect. Fireproofing in other areas shall not proceed until sample installation is approved. Approved sample installation shall remain in place and open to observation as a standard for all work under the Contract.

3.05 MIXING AND APPLICATION

A. Mixing shall conform to manufacturer's published instructions.

B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer's applicators. Procedures shall be in strict accordance with said manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturer's representative shall be present for initial application to guide and assist applicator's personnel.

C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution control regulations.

D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform quality and thickness is maintained.

E. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

3.06 FIELD QUALITY CONTROL

A. Tests of thickness, quality and dry density of applied material may be performed by Testing Laboratory as described in Section 01450, QUALITY CONTROL. Such testing or lack of testing shall not diminish responsibilities under this Contract.

B. Where sample fails to meet thickness, quality or dry density requirements, further sampling and testing will be required in the area of the deficient sample. If such further testing indicates an area deficient in thickness, quality or dry density, correction shall be made by application of additional material or removal of deficient material and replacement with satisfactory material.

C. Patching: Areas from which samples have been removed shall be patched by applicator to provide the specified fire ratings.

3.07 CLEAN-UP

A. Upon completion of each day's work, the working area shall be swept clean, placing waste material in suitable bags or containers, and all waste material removed from site.

B. Upon completion of fireproofing work, clean walls, floors and surrounding surfaces of overspray, drippings, etc.

END OF SECTION 07815

SECTION 07841

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
b. Classification markings on penetration firestopping correspond to designations listed by the following:

1) UL in its "Fire Resistance Directory."
2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
3) FM Global in its "Building Materials Approval Guide."

D. Pre-installation Conference: Conduct conference at Project site.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.06 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Hilti, Inc.
2. Johns Manville.
3. 3M Fire Protection Products.
4. Tremco, Inc.; Tremco Fire Protection Systems Group.

2.02 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Acceptable Manufacturers: See 2.1.A

C. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

D. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

E. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

F. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

G. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

H. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

I. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

a. Slag-wool-fiber or 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.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.03 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.04 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.03 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.05 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.06 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 07841

SECTION 07901

JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes: Work of this Section consists of installing all materials furnished under this Section, including all equipment, labor, services, and incidental items required to complete work as shown on Drawings and specified in this Section

1. One-part, nonsag polyurethane joints sealers for exterior joints in vertical surfaces and nontraffic horizontal surfaces:
2. One-part, pourable polyurethane joint sealers for exterior and interior joints in horizontal traffic surfaces.
3. Paintable acrylic emulsion joint sealers for interior joints in vertical surfaces and horizontal nontraffic surfaces, except as otherwise noted.
4. One-part, mildew-resistant silicone sealant for use in sealing interior between:

a. Metal door frames and adjacent construction in toilet rooms, mechanical rooms, and electrical rooms.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each joint-sealer product required, including instruction for joint preparation and joint sealer application.

B. Samples for Verification Purposes:

1. Submit samples of each type and color of joint sealer required.
2. Install joint sealer samples in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealers in work.

1.04 QUALITY ASSURANCE

A. Design Criteria:

1. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from single manufacturer for each different product required.
2. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Conditions:

1. Do not proceed with installation of joint sealers under following conditions:

a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealer manufacturer or below 40 deg F.
b. When joint substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint-sealer manufacturer for applications indicated.

C. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. Compatibility: Provide joint sealers, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
2. Use self-leveling compounds for horizontal joints and nonsag compounds for all other areas except as indicated or specified.
3. Sealant Color:

a. Concealed Joints: Use sealant with manufacturer's standard color having best overall performance qualities for indicated application.
b. Exposed Joints: Use sealant with manufacturer's standard or special colors, as selected by Architect.

B. Elastomeric Joint Sealants:

1. Elastomeric Sealants Standard: Provide manufacturer's standard chemically curing elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those referenced for Type, Grade, Class, and Uses.
2. One-Part, Nonsag Urethane: Tremco, Inc. Model Vulkem 116, Sika Corporation, Inc. Model Sikaflex - 1a, Sonneborn Building Products, Model NP1.
3. One-Part, Pourable Urethane: Tremco, Inc. Model Vulkem 45, Pecora Corp. Model HR-201, Sonneborn Building Products, Model SL1.
4. Mildew-Resistant Silicone: Dow Corning Model 786, GE Silicones Model Sanitary 1700, Tremco Inc. Model Tremsil 600.

C. Acrylic-Emulsion Latex Joint Sealant:

1. Manufacturer's standard, one-part, nonsag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of max. +/- 5 percent.
2. Product: Bostik Construction Products Division Model Chem-Calk 600, Pecora Corporation Model AC-20+, Tremco Inc. Model Acrylic Latex 834.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Cleaning of Joints:

1. Clean out joints immediately before installing joint sealers to comply with recommendations of sealant manufacturers following requirements:
2. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust, paints except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
3. Remove loose particles remaining from above cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
4. Remove laitance and form-release agents from concrete.

B. Joint Priming:

1. Prime joint substrates, where indicated or where recommended by sealant manufacturer, based on preconstruction joint-sealer-substrate tests or prior experience.
2. Apply primer to comply with joint-sealant manufacturer's recommendations.
3. Confine primers to areas of joint-sealant bond.
4. Do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape:

1. Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears.
2. Remove tape immediately after tooling without disturbing joint seal.

3.02 INSTALLATION

A. General:

1. Comply with sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
2. Elastomeric Sealant Installation Standard:

   a. Comply with recommendations of ASTM C962 for use of joint sealants as applicable to materials, applications, and conditions indicated.
   b. Ensure building joint width at time of installation is 4 times expected joint movement.

3. Latex Sealant Installation Standard: Comply with requirements in ASTM C790 for use of latex sealants.

B. Sealant Backings:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
2. Do not leave gaps between ends of joint fillers.
3. Do not stretch, twist, puncture, or tear joint fillers.
4. Remove absorbent joint fillers which have become wet before sealant application and replace them with dry materials.

5. Install bond-breaker tape between sealants where and joint fillers, compression seals, or back of joints where required to prevent third side adhesion of sealant to back of joint.
6. Install compressible seals serving as sealant backings to comply with requirements indicated for joint fillers.
7. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

C. Tooling of Nonsag Sealants:

1. Immediately after sealant application and before time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
2. Remove excess sealant from surfaces adjacent to joints.
3. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
4. Provide concave joint configuration per Figure 6A in ASTM C962, unless otherwise indicated.
5. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.03 PROTECTION AND CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

B. Protection:

1. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.
2. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07901