SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Concealed building insulation.
   2. Exposed building insulation.
   3. Radiant barriers.
   4. Safing insulation.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 2 Section "Foundation Drainage Systems" for insulated drainage panels.
   2. Division 4 Section "Unit Masonry" for insulation installed in cavity walls and masonry cells.
   3. Division 7 Section "Waterproofing" for insulation installed with waterproofing.
   4. Division 7 Section For insulation specified as part of roofing construction.
   5. Division 9 Section indicated below for insulation installed as part of existing wall and roof assemblies:

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

C. Samples of exposed insulation for initial selection in the form of actual units or sections of units showing the full range of colors available for each type of exposed insulation indicated.

D. Samples for verification in full-size units of each type of exposed insulation indicated for each color specified.

E. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

F. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of foam-plastic insulations with building code in effect for Project.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

1. Extruded-Polystyrene Board Insulation:
   a. Amoco Foam Products Company.
   b. DiversiFoam Products.
   c. Dow Chemical Co.
   d. UC Industries, Inc.; Owens-Corning Co.

2. Extruded-Polystyrene Drainage Panels:
   a. Dow Chemical Co.
   b. UC Industries, Inc.; Owens-Corning Co.

3. Polyisocyanurate Board Insulation:
   a. Celotex Corporation (The).
   b. NRG Barriers, Inc.

4. Glass-Fiber Insulation:
   a. CertainTeed Corporation.
   b. Knauf Fiber Glass GmbH.
   c. Owens-Corning Fiberglas Corporation.
   d. Schuller International, Inc.

5. Slag-Wool-/Rock-Wool-Fiber Insulation:
   a. Fibrex Inc.
   b. Partek Insulations, Inc.
   c. USG Interiors, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:

1. Type IV, 1.60-lb/cu. ft. minimum density, unless otherwise indicated.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

C. Extruded-Polystyrene Drainage Panels: Fabric-faced, rigid, cellular polystyrene thermal insulation formed by expansion of polystyrene base resin in an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type indicated below. Provide products fabricated with tongue-and-groove edges and with one side having a matrix of vertical and horizontal drainage channels and faced with insulation manufacturer's standard nonwoven filtration fabric.

1. Type IV, 1.60-lb/cu. ft. minimum density.

D. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using hydrochlorofluorocarbons as blowing agent and faced on both sides with aluminum foil to comply with referenced standards and with other requirements indicated below:
1. Federal Standard: FS HH-I-1972/1, Class 1 (nonreinforced core) or 2 (reinforced core).
2. ASTM Standard: ASTM C 1289, Type I, Class 1 or 2.
3. Surface-Burning Characteristics: Maximum flame spread and smoke-developed indices of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches.
4. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

E. Unfaced, Flexible Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders to comply with ASTM C 612, Type IA; or with ASTM C 553, Types I, II, and III; and with other requirements indicated below:
1. Nominal Density: Not less than 1.5 lb/cu. ft. nor more than 1.65 lb/cu. ft.
2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Surface-Burning Characteristics: Smoke-developed indices of 25 and 50, respectively.

F. Foil-Faced, Flexible Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders and faced on one side with foil-scrim-kraft vapor retarder to comply with ASTM C 612, Type IA; or with ASTM C 553, Types I, II, and III; and with other requirements indicated below:
1. Nominal Density: 1.5 lb/cu. ft.
2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Surface-Burning Characteristics: Maximum flame spread and smoke-developed indices of 25 and 50, respectively.

G. Glass-Mat-Faced, Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders and faced on one side with black glass-fiber mat to comply with ASTM C 612, Type IA or Type IA and IB; and with other requirements indicated below:
1. Nominal density of 6 lb/cu. ft.; thermal resistivity of 4.55 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Surface-Burning Characteristics: Maximum flame spread and smoke-developed indices of 25 and 50, respectively.

H. Foil-Faced, Slag-Wool/Rock-Wool-Fiber Board Insulation: Thermal insulation combining slag-wool or rock-wool fibers with thermosetting resin binders and faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder to comply with ASTM C 612 for type and other requirements indicated below; passing ASTM E 136 for combustion characteristics of unfaced board.
1. Nominal density of 4 lb/cu. ft., Type IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Surface-Burning Characteristics: Maximum flame spread and smoke-developed indices of 25 and 5,

I. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).
1. Mineral-Fiber Type: Fibers manufactured from glass.
2. Surface-Burning Characteristics: Maximum flame spread and smoke-developed indices of 25 and 50, respectively.

J. Faced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type III, Class A (blankets with reflective vapor-retarder membrane facing and flame spread of 25 or less); with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.
1. Mineral-Fiber Type: Fibers manufactured from glass.
2. Flanged Units: Provide blankets fabricated with facing incorporating 5-inch wide flanges along edges for attachment to framing members.

2.3 SAFING INSULATION AND ACCESSORIES
A. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed for use as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft.; passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

B. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.

C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.4 VAPOR RETARDERS

A. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0403 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Reinforced-Polyethylene Vapor Retarders:
      a. DURA-SKIRM 6WB; Raven Industries, Inc.

2.5 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

B. Asphalt Coating for Cellular Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by cellular glass block insulation manufacturer.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Karnak 100; Karnak Corp.
      b. PITTCOTE 300 Coating; Pittsburgh Corning Corporation.

C. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch thick, formed under heat and pressure, standard sizes.

2.7 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:
   1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle, capable of holding insulation securely in position indicated with self-locking washer in place, and complying with the following requirements:
   1. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
   2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.
C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.
   1. Air Space: 1 inch.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

F. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Adhesively Attached, Spindle-Type Anchors:
      a. TACTOO Insul-Hangers; AGM Industries, Inc.
      b. Spindle Type Gemco Hangers; Gemco.
   2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchor:
      a. 90 Degree Insulation Hangers; Gemco.
   3. Insulation-Retaining Washers:
      a. RC150; AGM Industries, Inc.
      b. SC150; AGM Industries, Inc.
      c. Dome-Cap; Gemco.
      d. R-150; Gemco.
      e. S-150; Gemco.
   4. Insulation Standoff:
      a. Clutch Clip; Gemco.
   5. Anchor Adhesives:
      a. TACTOO Adhesive; AGM Industries, Inc.
      b. Tuff Bond Hanger Adhesive; Gemco.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL
A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

C. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.

3.5 INSTALLATION OF CAVITY WALL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
   1. Supplement adhesive attachment of insulation by securing boards with 2-piece wall ties designed for this purpose and specified in Division 4 Section "Unit Masonry."

B. On units of cellular glass insulation, apply insulation with closely fitting joints using method indicated below:
   1. Gob Method: Install 4 gobs of adhesive per unit and apply firmly against inside wythe of masonry or other construction as shown. Apply gobs at each corner; spread gobs to form pads 4 inches in diameter by 1/4 inch thick.
   2. Serrated-Trowel Method: Apply adhesive to entire surface of each cellular-glass insulation unit with serrated trowel complying with insulation manufacturer's specifications.
   3. Coat edges of insulation units with full bed of adhesive to seal joints between insulation and between insulation and adjoining construction.

3.6 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
   1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Set reflective, foil-faced units with not less than 0.75-inch air space in front of foil as indicated.
   1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

E. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
   2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
   3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

F. Install board insulation in curtain wall construction as indicated on Drawings and according to curtain wall manufacturer's written instructions.
   1. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width between insulation and glass of dimension indicated.
   2. Brace insulation where it contacts safing insulation to prevent insulation from bowing under pressure from safing insulation.

3.7 INSTALLATION OF SAFING INSULATION

A. Install safing insulation to fill gap between edge of concrete floor slab and back of exterior spandrel panels on safing clips spaced as needed to support insulation, but not further apart than 24 inches o.c. Cut safing insulation wider than gap to be filled to ensure compression fit and seal joint between insulation and edge of slab with calking approved by safing insulation manufacturer for this purpose. Leave no voids in completed installation.

3.8 INSTALLATION OF RADIANT BARRIERS

A. Install radiant barriers in locations indicated according to ASTM C 1158 and radiant barrier insulation manufacturer's written instructions.

3.9 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.10 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210