

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rigid insulation.
 - 2. Spray applied insulation.
 - 3. Sound attenuation insulation.
 - 4. Fiberglass batt insulation.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 3 Section "Cast-in-place Concrete" for foundation and slab construction.
 - 2. Division 4 Section "Unit Masonry Assemblies" for cavity wall construction.
 - 3. Division 7 Section "Under-Slab Vapor Barrier/Retarder" for vapor barrier.
 - 4. Division 7 Section "Thermoplastic Membrane" for insulation specified as part of roofing construction.
 - 5. Division 9 Section "Gypsum Board Assemblies"
 - 6. Division 9 Section "Acoustic Panel Ceilings"
 - 7. Division 7 Section "Metal Wall Panels."

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.

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. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

- C. Conduct a preinstallation meeting prior to using spray applied insulation with subcontractors working in the area present. Advise workers in area of PPE requirements that may be required. Establish safety work zone requirements for over spray in accordance with manufacturer's instructions.

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.
- B. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 RIGID INSULATION MANUFACTURERS

- A. Extruded-Polystyrene Board Insulation (Rigid insulation)
- B. Basis of Design: Dupont, STYROFOAM™ CAVITYMATE™ Ultra Wall System. Other acceptable manufacturers are:
1. DiversiFoam Products.
 2. Owens Corning.
 3. Pactiv Building Products.

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 (Exterior walls): 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. Rigid closed cell extruded polystyrene foam insulation.
 2. Comply with ASTM C 578-95, Type IV, density 1.6 lb/cu. ft. min. compressive resistance 25 psi (ASTM D 1621-94)
 3. Thermal resistance: R-values of 6.0 and 5.6 min. per inch °F-ft²-h/Btu²/inch at 40 °F and 75 °F respectively (ASTM C 518-98).
 4. Water absorption: Max. 0.1% by volume (ASTM C 272-91 (96)).
 5. Surface Burning Characteristics (ASTM C 578-95)
 - a. Flame spread: 0.
 - b. Smoke Developed: 155.
 6. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.
 7. Underwriters Laboratories, Inc. (UL) Classified.
- C. Extruded-Polystyrene Board Insulation (Foundations and underslab): 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. Rigid closed cell extruded polystyrene foam insulation.
 2. Comply with ASTM C 578-95, Type VI, density 1.8 lb/cu. ft. min. compressive resistance 40 psi (ASTM D 1621-73)
 3. Thermal resistance: 5 aged value. R-values of 5.4 and 5.0 min. per inch °F-ft²-h/Btu²/inch at 40 °F and 75 °F respectively (ASTM C 518-91).
 4. Water absorption: Max. 0.3% by volume (ASTM C 272-91).
 5. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.
 6. Underwriters Laboratories, Inc. (UL) Classified.

2.3 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
 - a. BASF Corporation.
 - b. BaySystems NorthAmerica, LLC.
 - c. Dupont.
 - d. Henry Company.
 2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
- B. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BaySystems NorthAmerica, LLC.
 - b. Demilec (USA) LLC.
 - c. Gaco Western Inc.
 - d. Icynene Inc.
 - e. SWD Urethane Company.
2. Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m), thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F (24 K x m/W at 24 deg C).

2.4 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
 1. CertainTeed Corporation.
 2. Guardian Building Products, Inc.
 3. Johns Manville.
 4. Knauf Insulation.
 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Polypropylene-Scrim-Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).
- D. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- E. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

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. Type as recommended by insulation board manufacturer for application indicated.

- B. Dupont GREAT STUFF PRO™ Gaps & Cracks single component insulating foam sealant or as approved by insulation manufacturer for sealing extruded polystyrene insulation.

2.6 INSULATION BEHIND EXTERIOR METAL SIDING

- A. Provide 4 mil glass-fiber-reinforced polyisocyanurate, vapor barrier as approved by metal siding manufacturer.
- B. Products shall have been tested and approved per the following criteria:
 - 1. UL Classified; Class A UL 723 (ASTM E84) Surface Burning Characteristics of Building Materials.
 - 2. Fire Performance Evaluation approvals per NFPA 285, 2006 Edition (UBC 26.9, intermediate scale – multistory testing)
- C. Provide Dupont; Thermax XARMOR (ci) glass-fiber-reinforced polyisocyanurate foam core insulation with 4.0 mil thermoset-coated aluminum facer to go behind metal wall panels.
- D. Complete assembly shall be fire tested. Insulation shall have FM 4880 approval. Other glass-fiber-reinforced polyisocyanurate manufacturers that meet the criteria above and are pre-approved by the metal siding manufacturer for a complete warranted system are acceptable.
- E. Provide manufacturer approved tape and joint sealants for a complete warranted vapor barrier system. Seal all joints between boards with LIQUIDARMOR™ Sealant and Flashing or other sealant approved by insulation manufacturer for a complete system.”

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.
- B. Verify that masonry joints are struck flush and that other conditions are satisfactory for proper installation.
- C. Remove concrete fins and mortar projections that interfere with placement of insulation boards.

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.
- E. Do not install while raining.

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 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. 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.
- D. Installation on masonry substrates:
1. Apply 2" diameter daubs of adhesive at each of the 4 corners of the board with one approximately in the middle (total of 5) on the inside face of insulation board.
 2. Fit insulation between wall ties and other obstructions with joints staggered providing ¼' to ½" spacing at end joints.
 - a. Press units firmly against inside wythe of masonry or other construction.
 - b. Make insulation continuous.
 3. Fill all voids between insulation boards with single component insulating foam sealant to provide continuous vapor barrier.
 4. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
 5. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
 6. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

3.6 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- 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. Foam-Plastic Board Insulation: Seal joints between 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. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward interior of construction.
- D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not

indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

1. Ensure contractors working in the established work zone have proper PPE during spray application of insulation.

- E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions. Delete below if no self-supported, spray-applied, cellulosic insulation.

3.7 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 072100