

## **SECTION 07 2100 - THERMAL INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Insulation under slabs-on-grade.
2. Foundation wall insulation (supporting backfill).
3. Rigid wall insulation.
4. Blanket Insulation

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Unit Masonry" for insulation installed in cavity walls and masonry cells.
2. Division 9 Section indicated below for insulation installed as part of metal-framed wall and partition assemblies: "Gypsum Board Assemblies."

#### **1.2 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. 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.

#### **1.3 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.

## 1.4 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 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:
- B. Manufacturers: Subject to compliance with requirements, provide insulation products by one of the following:
  - 1. Extruded-Polystyrene Board Insulation:
    - 1. Amoco Foam Products Company.
    - 2. Dow Chemical Co.
    - 3. DiversiFoam Products
  - 2. Polyisocyanurate Board Insulation:
    - 1. Celotex Corporation (The).
    - 2. NRG Barriers, Inc.
  - 3. Glass-Fiber Insulation:
    - 1. CertainTeed Corporation.
    - 2. Knauf Insulation
    - 3. Owens-Corning Fiberglas Corporation.
    - 4. Johns Mansville

### 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 VI, 1.60-lb/cu. ft. (26-kg/cu. m) 40 psi (276 kPa).minimum density, unless otherwise indicated.
  2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively, per ASTM E84.
- C. 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 (101 mm).
  4. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F (50 K x m/W at 24 deg C).
- D. 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, slag wool, or rock wool.
  2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- E. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim on 1 face.
1. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
    - a) 3-1/2 inches (89 mm) thick with a thermal resistance of 13 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
    - b) 5-1/2 inches (140 mm) thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F (3.3 K x sq. m/W at 24 deg C).
- F. Cellulose Blown-in Insulation (Thickness as noted on Drawings)
1. Cellulose Fiber Insulation: Class A flame-spread and smoke-developed indexes of 25 and 75, respectively, per ASTM E 84.
  2. 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:
    - a) National Cellulose Corporation
    - b) National Fiber
  3. Minimum density of 3.5 lb/cu. ft., thermal resistivity of 3.8 per inch x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

## 2.3 AUXILIARY INSULATING MATERIALS

- G. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- H. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch (6 mm) thick, formed under heat and pressure, standard sizes.
- C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

## 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.

### 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.
  - 1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.
- C. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

### 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. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
- D. Safing insulations: 4 lb/cu. Ft. mineral wool insulations slightly wider than opening, compress and tightly fit into openings.
  - 1. Fire stopping sealant: firecode (2 hours) Intumescent acrylic firestop sealant type 1A.

### 3.6 INSTALLATION OF BLOW-IN CELLULOSE INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions.

### 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.
- B. Spray Foam insulation: Protect surrounding materials from overspray. Do not spray insulation with wind exceeding 10 mph. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction within 30 days after installation.

END OF SECTION 07 21 00