

**SECTION 07 21 00  
THERMAL INSULATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Board insulation at perimeter foundation wall.
- B. Batt insulation in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- D. ***Expanded Polystyrene insulation inserts at CMU***

**1.2 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- B. Section 07 26 00 - Vapor Retarders: Separate vapor retarder materials.

**1.3 DEFINITIONS**

- A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.
  - 1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.
  - 2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.
  - 3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

**1.4 REFERENCE STANDARDS**

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- E. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board; 2017.

- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- G. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.
- H. ICC-ES AC239 - Acceptance Criteria for Termite-Resistant Foam Plastic; 2008, with Editorial Revision (2022).
- I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

## 1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

## 1.6 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

## PART 2 PRODUCTS

### 2.1 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. ***Insulation on Inside of Concrete and Masonry Exterior Walls: EPS***

### 2.2 FOAM BOARD INSULATION MATERIALS

- A. Expanded Polystyrene (EPS) Board Insulation: Comply with ASTM C578.
  - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 3. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
  - 4. Board Size: 48 inch by 96 inch.
  - 5. Board Thickness: 1-1/2 inch.
  - 6. Board Edges: Square.
  - 7. Water-Resistive Barrier: Integrated film facer on insulation.
  - 8. Type and Compressive Resistance: Type XI, 5 psi (35 kPa), minimum.
  - 9. Type and Water Absorption: Type XI, 4.0 percent by volume, maximum, by total immersion.
  - 10. Type and Thermal Resistance, R-value: Type XI, 3.1 (0.55), minimum, per 1 inch thickness at 75 degrees F mean temperature.

- B. Termite-Resistant Expanded Polystyrene (EPS) Board Insulation: Comply with ASTM C578.
1. Termite Resistance: Comply with ICC-ES AC239.
  2. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84.
  3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  4. Board Size: 48 inch by 96 inch.
  5. Board Thickness: 1-1/2 inch.
  6. Type and Compressive Resistance: Type XI, 5 psi (35 kPa), minimum.
  7. Type and Thermal Resistance, R-value: Type XI, 3.1 (0.55), minimum, per 1 inch thickness at 75 degrees F mean temperature.
  8. Board Edges: Square.
  9. Products:
    - a. Atlas Molded Products, a Division of Atlas Roofing Corporation; ThermalStar Below Grade EPS Insulation Board: [www.atlasmoldedproducts.com/#sle](http://www.atlasmoldedproducts.com/#sle).
    - b. Nisus Corporation; Bora-Foam: [www.nisuscorp.com/#sle](http://www.nisuscorp.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
1. Type and Compressive Resistance: Type VI, 40 psi (276 kPa), minimum.
  2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
  5. Board Edges: Square.
  6. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
  7. Products:
    - a. DuPont de Nemours, Inc; Styrofoam Brand Square Edge: [building.dupont.com/#sle](http://building.dupont.com/#sle).
    - b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: [www.kingspan.com/#sle](http://www.kingspan.com/#sle).
    - c. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. **Expandable Polystyrene Inserts at CMU cores**
1. **Moisture Absorbtion: ASTM C 272 <1.0%**
  2. **Flame Spread Characteristics: ASTM E 84 - Flame Spread <5**
  3. **Thermal Resistance R=10 min**
  4. **Shape: Compressible insert allowing tight fit with inside faces of both webs of the CMU core.**

### 2.3 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
  2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
  4. Formaldehyde Content: Zero.
  5. Thermal Resistance: R-value of 21.
  6. Thickness: 6 inch or as indicated..
  7. Products:

- a. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
- b. Johns Manville: [www.jm.com/#sle](http://www.jm.com/#sle).
- c. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
- d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.4 ACCESSORIES

- A. Sheet Vapor Retarder: See Section 07 26 00.
- B. Air and Moisture Sealing Insulation Fasteners: Preassembled fastener units consisting of sealing washer, screw, and gasketing tube.
- C. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### 3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
  1. Tape seal joints.
  2. Extend sheet full height of joint.
- B. Apply adhesive to back of boards:
  1. Three continuous beads per board length.
  2. Full bed 1/8 inch thick.
- C. Install boards horizontally on foundation perimeter.
  1. Place boards to maximize adhesive contact.
  2. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### 3.3 ~~BOARD INSTALLATION AT EXTERIOR WALLS~~

- A. ~~Install boards horizontally on walls.~~
- B. ~~Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.~~

### 3.4 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over face of member.
- F. Tape seal tears or cuts in vapor retarder.
- G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

### **3.5 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Control Services for additional requirements.

### **3.6 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION 07 21 00**

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