

SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies thermal and acoustical insulation for buildings.
- B. Acoustical insulation is identified by thickness and words "Acoustical Insulation".

1.2 RELATED WORK

- A. Insulation in connection with roofing and waterproofing: Section 07 22 00, ROOF AND DECK INSULATION.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES .
- B. Manufacturer's Literature and Data:
 - 1. Insulation, each type used
 - 2. Adhesive, each type used.
 - 3. Tape
- C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.4 STORAGE AND HANDLING:

- A. Store insulation materials in weathertight enclosure.
- B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

1.5 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C270-08.....Mortar for Unit Masonry
 - C518.....Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - C553-08.....Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - C578-08.....Rigid, Cellular Polystyrene Thermal Insulation
 - C591-08.....Unfaced Preformed Rigid Cellular Polyisocynurate Thermal Insulation

C612-04.....	Mineral Fiber Block and Board Thermal Insulation
C665-06.....	Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
C954-07.....	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness
C1002-07.....	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
C1289.....	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
D312-00(R2006).....	Asphalt Used in Roofing
E84-08.....	Surface Burning Characteristics of Building Materials
E96.....	Standard Test Methods for Water Vapor Transmission of Materials
E283.....	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
F1667-05.....	Driven Fasteners: Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 INSULATION - GENERAL:

- A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.
- B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.
- C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.
- D. Insulation Products shall comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Perlite composite board	23 percent post consumer recovered paper
Polyisocyanurate/polyurethane	
Rigid foam	9 percent recovered material
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material
Phenolic rigid foam	5 percent recovered material
Rock wool material	75 percent recovered material

The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

2.2 MASONRY CAVITY WALL INSULATION:

- A. Polystyrene Board (cavity walls): ASTM C578, Type IV, 25 psi (173 kPa).
1. R-Value: R-12
 2. Thickness: 2.125 inches.
 3. To establish an acceptable level of quality for the cavity wall insulation, the following manufacturers are listed as approved manufacturers for the purpose of identifying manufacturers that provide work and materials generally complying with these specifications. Their selection for this work does not relieve them from performing the work as specified:
 - a. Dow Chemical Company, STYROFOAM Brand CAVITYMATE Ultra Extruded Polystyrene Foam Insulation (**BASIS-OF-DESIGN PRODUCT**).
 - b. Or Approved Equal.

2.3 PERIMETER INSULATION IN CONTACT WITH SOIL:

- A. Polystyrene Board (foundation walls): ASTM C578, Type IV where covered by soil or concrete.
1. R-Value: R-10
 2. Thickness: 2 inches.
 3. To establish an acceptable level of quality for the cavity wall insulation, the following manufacturers are listed as approved manufacturers for the purpose of identifying manufacturers that provide work and materials generally complying with these specifications. Their selection for this work does not relieve them from performing the work as specified:

- a. Dow Chemical Company, STYROFOAM Brand SM Extruded Polystyrene Foam Insulation (**BASIS-OF-DESIGN PRODUCT**).
- b. Or Approved Equal.

2.4 EXTERIOR FRAMING OR FURRING INSULATION:

- A. Batt or Blanket: Optional.
- B. Mineral Fiber (shaft wall): ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.
 - 1. R-Value: R-20
 - 2. Thickness: 6 inches.
 - 3. To establish an acceptable level of quality for the cavity wall insulation, the following manufacturers are listed as approved manufacturers for the purpose of identifying manufacturers that provide work and materials generally complying with these specifications. Their selection for this work does not relieve them from performing the work as specified:
 - a. Owens Corning.
 - b. CertainTeed Corporation.
 - c. Johns Manville.
 - d. Or Approved Equal.

2.5 RIGID INSULATION ADHERED TO EXISTING MASONRY WALL:

- A. On the inside face of existing masonry walls (shaft wall) and where shown.
- B. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. R-Value: R-20
 - 2. Thickness: 2 inches.
 - 3. To establish an acceptable level of quality for the cavity wall insulation, the following manufacturers are listed as approved manufacturers for the purpose of identifying manufacturers that provide work and materials generally complying with these specifications. Their selection for this work does not relieve them from performing the work as specified:
 - a. Dow Chemical Company, THERMAX Sheathing; glass-fiber-infused polyisocyanurate foam core laminated between 1.0 mil smooth, reflective aluminum facers on both sides (**BASIS-OF-DESIGN PRODUCT**).
 - b. Or Approved Equal.

2.6 ACOUSTICAL INSULATION:

- A. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.
- B. Thickness as shown; of widths and lengths to fit tight against framing.

2.7 FASTENERS:

- A. Staples or Nails: ASTM F1667, zinc-coated, size and type best suited for purpose.
- B. Screws: ASTM C954 or C1002, size and length best suited for purpose with washer not less than 50 mm (two inches) in diameter.
- C. Impaling Pins: Steel pins with head not less than 50 mm (two inches) in diameter with adhesive for anchorage to substrate. Provide impaling pins of length to extend beyond insulation and retain cap washer when washer is placed on the pin.

2.8 ADHESIVE:

- A. As recommended by the manufacturer of the insulation.
- B. Asphalt: ASTM D312, Type III or IV.
- C. Mortar: ASTM C270, Type 0.

2.9 TAPE:

- A. Pressure sensitive adhesive on one face.
- B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.
- B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.
- C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.
- D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 MASONRY CAVITY WALLS:

- A. Mount insulation on exterior faces of inner wythes of masonry cavity walls and brick faced concrete walls. Fill joints with same material used for bonding.

- B. Bond polystyrene board to surfaces with adhesive or Portland cement mortar mixed and applied in accordance with recommendations of insulation manufacturer.
- C. Bond mineral fiberboard, polyurethane or polyisocyanurate board, and perlite board to surfaces with adhesive as recommended by insulation manufacturer.
- D. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.

3.3 PERIMETER INSULATION:

- A. Vertical insulation:
 - 1. Fill joints of insulation with same material used for bonding.
 - 2. Bond polystyrene board to surfaces with adhesive or Portland cement mortar mixed and applied in accordance with recommendations of insulation manufacturer.
 - 3. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.

3.4 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:

- A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.
- B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.
- C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.
- D. Fasten blanket insulation between wood studs or framing with nails or staples through flanged edges on face of stud. Space fastenings not more than 150 mm (six inches) apart.

3.5 RIGID INSULATION ON SURFACE OF EXTERIOR WALLS:

- A. On the interior face of solid masonry and concrete walls, beams, beam soffits, underside of floors, and to the face of studs for interior wall finish where shown.
- B. Bond to solid vertical surfaces with adhesive as recommended by insulation manufacturer. Fill joints with adhesive cement.
- C. Use impaling pins for attachment to underside of horizontal surfaces. Space fastenings as required to hold insulation in place and prevent sagging.

- D. Fasten board insulation to face of studs with screws, nails or staples. Space fastenings not more than 300 mm (12 inches) apart. Stagger fasteners at joints of boards. Install at each corner.

3.6 ACOUSTICAL INSULATION:

- A. Fasten blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.
- B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.
- C. Do not compress insulation below required thickness except where embedded items prevent required thickness.
- D. Where acoustical insulation is installed above suspended ceilings install blanket at right angles to the main runners or framing. Extend insulation over wall insulation systems not extending to structure above.
- E. Where semirigid insulation is used which is not full thickness of cavity, adhere to one side of cavity maintaining continuity of insulation and covering penetrations or embedments in insulation.

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