**SECTION 07 21 13**
**THERMAL INSULATION**

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Thermal insulation.
    a. Batt or blanket insulation at exterior framed walls.
    b. Board or block insulation at floor assemblies above unconditioned spaces.
2. Acoustical insulation.
    a. Semi-rigid insulation at interior framed partitions.
    b. Batt and blanket insulation at interior framed partitions and ceilings.

### 1.2 RELATED REQUIREMENTS

A. Loose Fill Insulation for Attic Floors: Section 07 21 23, LOOSE-FILL INSULATION.

B. Safing Insulation: Section 07 84 00, FIRESTOPPING.

### 1.3 APPLICABLE PUBLICATIONS

A. Comply with references to the extent specified in this section.

B. ASTM International (ASTM):

1. C516-08(2013)e1 - Vermiculite Loose Fill Thermal Insulation.
2. C549-06(2012) - Perlite Loose Fill Insulation.
3. C552-15 - Cellular Glass Thermal Insulation.
4. C553-13 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
5. C578-15 - Rigid, Cellular Polystyrene Thermal Insulation.
6. C591-15 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
7. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
8. C665-12 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
9. C728-15 - Perlite Thermal Insulation Board.
10. C954-15 - 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.

11. C1002-14 - Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
12. D312/D312M-15 - Asphalt Used in Roofing.
13. E84-15a - Surface Burning Characteristics of Building Materials.
14. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.

**1.4 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Show insulation type, thickness, and R-value for each location.

C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Adhesive indicating manufacturer recommendation for each application.

**1.5 DELIVERY**

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

**1.6 STORAGE AND HANDLING**

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

C. Protect foam plastic insulation from UV exposure.

**1.7 WARRANTY**

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

**PART 2 - PRODUCTS**

**2.1 INSULATION - GENERAL**

A. Insulation Thickness:
   1. Provide thickness required by R-value shown on drawings.
   2. Provide thickness indicated when R-value is not shown on drawings.

B. Insulation Types:

1. Provide one insulation type for each application.
   a.

**2.2 THERMAL INSULATION**

A. Perimeter Insulation in Contact with Soil:
   1. Polystyrene Board: ASTM C578, Type IV, V, VI, VII, or IX.
   2. Cellular Glass Block: ASTM C552, Type I or IV.

B. Exterior Framing or Furring Insulation:
   1. Mineral Fiber: ASTM C665, Type II, Class C, Category I where concealed by thermal barrier.
   2. Mineral Fiber: ASTM C665, Type III, Class A at other locations.

C. Floor Assemblies Above Unconditioned Spaces:
   1. Mineral Fiber Board: ASTM C612, Type IB or Type II.
   2. Perlite Board: ASTM C728.
   3. Cellular Glass Block: ASTM C552, Type I.

**2.3 ACOUSTICAL INSULATION**

A. Semi Rigid, Batts and Blankets:
   1. Widths and lengths to fit tight against framing.
   2. Mineral Fiber Batt or Blankets: ASTM C665 unfaced.
   3. Maximum Surface Burning Characteristics: ASTM E84.
      a. Flame Spread Rating: 25.
      b. Smoke Developed Rating: 450.

**2.4 ACCESSORIES**

A. Fasteners:
   1. Staples or Nails: ASTM F1667, zinc-coated, size and type to suit application.
   2. Screws: ASTM C954 or ASTM C1002, size and length to suit application with washer minimum 50 mm (2 inches) diameter.
   3. Impaling Pins: Steel pins with head minimum 50 mm (2 inches) diameter.
      a. Length: As required to extend beyond insulation and retain cap washer when washer is placed on pin.
      b. Adhesive: Type recommended by manufacturer to suit application.

B. Insulation Adhesive:
   1. Nonflammable type recommended by insulation manufacturer to suit application.

C. Tape:
   1. Pressure sensitive adhesive on one face.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

### 3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

B. Install insulation with vapor barrier facing the heated side, unless indicated otherwise.

C. Install batt and blanket insulation with joints tight. Fill framing voids completely. Seal penetrations, terminations, facing joints, facing cuts, tears, and unlapped joints with tape.

D. Fit insulation tight against adjoining construction and penetrations, unless indicated otherwise.

### 3.3 THERMAL INSULATION

A. Perimeter Insulation in Contact with Soil:

1. Vertical insulation:

a. Fill joints of insulation with the same material used for bonding.

b. Bond polystyrene board to surfaces with adhesive.

B. Exterior Framing or Furring Insulation:

1. General:

a. Open voids are not acceptable.

b. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.

c. Pack behind outlets, around pipes, ducts, and services encased in walls.

d. Hold insulation in place with pressure sensitive tape.

e. Lap facing flanges together over framing for continuous surface. Seal penetrations through insulation and facings.

2. Metal Studs:

a. Fasten insulation between metal studs, framing, and furring with pressure sensitive tape continuous along flanged edges.

3. Ceilings and Soffits:
   a. Metal Framing:
      1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
      2) At metal framing and ceilings suspension systems, install insulation above suspended ceilings and metal framing at right angles to main runners and framing.
      3) Tape insulation tightly together without gaps. Cover metal framing members with insulation.
   b. Ceiling Transitions:
      1) In areas where suspended ceilings transition to structural ceiling, install blanket or batt insulation.
      2) Extend insulation from suspended ceiling to underside of structure above.
      3) Secure blanket and batt with continuous cleats to structure above.

C. Inside Face of Exterior Wall Insulation:
   1. Location: On the interior face of solid masonry and concrete walls, beams, beam soffits, underside of floors, and to face of studs to support interior wall finish where indicated.
   2. Bond insulation to solid vertical surfaces with adhesive. Fill joints with adhesive cement.
   3. Fasten board insulation to face of studs with screws, nails, or staples. Space fastenings maximum 300 mm (12 inches) on center. Stagger fasteners at board joints. Install fasteners at each corner.

D. Floor Assemblies Above Unconditioned Spaces:
   1. Use impaling pins to attach insulation to underside of horizontal surfaces. Space fastening as required to hold insulation in place and prevent sagging.
      a. Bond insulation with adhesive when separate vapor retarder is used.

**3.4 ACOUSTICAL INSULATION**

A. General:
   1. Install insulation without voids.
   2. Pack insulation around door frames and windows, in building expansion joints, door soffits, and other voids.

3. Pack behind outlets, around pipes, ducts, and services encased in walls.
4. Hold insulation in place with pressure sensitive tape.
5. Lap facer flanges together over framing for continuous surface. Seal all penetrations through the insulation and facers.
6. Do not compress insulation below required thickness except where embedded items prevent required thickness.

B. Semi Rigid, Batts and Blankets:
1. When insulation is not full thickness of cavity, adhere insulation to one side of cavity, maintaining continuity of insulation and covering penetrations or embedment's.
a. Metal Framing:
1) Fasten insulation between metal framing with pressure sensitive tape continuous along flanged edges.
2) At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing.
3) Tape insulation tightly together so no gaps occur, and metal framing members are covered by insulation.

**3.5 CLEANING**

A. Remove excess adhesive before adhesive sets.

**3.6 PROTECTION**

A. Protect insulation from construction operations.
B. Repair damage.

- - E N D - -