

SECTION 072200

ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Roof and deck insulation, vapor retarder and cover board on new construction ready to receive roofing or waterproof membrane.
- B. Repairs and alteration work to existing roof insulation.

1.2 RELATED WORK

- A. Wood CANTS, blocking and edge strips: Section 061000, ROUGH CARPENTRY.
- B. Perimeter, rigid, and batt or blanket insulation: Section 072113, THERMAL INSULATION.
- C. Sheet metal components and wind uplift requirements for roof-edge design: Section 076000, FLASHING AND SHEET METAL.

1.3 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.
- B. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE):

90.1 - 07.....Energy Standard for Buildings Except Low-Rise
Residential Buildings.

- C. American International ASTM):

C208-08.....Cellulosic Fiber Insulating Board

C552-07.....Cellular Glass Thermal Insulation

C726-05.....Mineral Fiber Roof Insulation Board

C728-05.....Perlite Thermal Insulation Board

C1177/C1177M-08.....Standard Specification for Glass Mat Gypsum
Substrate for Use as Sheathing.

C1278/C1278M-07.....Standard Specification for Fiber-Reinforced
Gypsum Panel

C1289-10.....Faced Rigid Cellular Polyisocynurate Thermal
Insulation Board

C1396/C1396M-09.....Standard Specification for Gypsum Board

D41-05.....Asphalt Primer Used in Roofing, Dampproofing,
and Waterproofing

- D312-06.....Asphalt Used in Roofing
- D1970-09.....Standard Specification for Self-Adhering Polymer
Modified Bituminous Sheet Materials Used as
Steep Roofing Underlayment for Ice Dan
Protection.
- D2178-04.....Asphalt Glass Felt Used in Roofing and
Waterproofing
- D2822-05.....Asphalt Roof Cement
- D4586-07.....Standard Specification for Asphalt Roof Cement,
Asbestos-Free
- E84-09.....Standard Test Method for Surface Burning
Characteristics of Building Material
- F1667-05.....Driven Fasteners: Nails, Spikes, and Staples
- D. FM Approvals: RoofNav Approved Roofing Assemblies and Products.
- 4450-89.....Approved Standard for Class 1 Insulated Steel
Deck Roofs
- 4470-10.....Approved Standard for Class 1 Roof Coverings
- 1-28-09.....Loss Prevention Data Sheet: Design Wind Loads.
- 1-29-09.....Loss Prevention Data Sheet: Above-Deck Roof
Components
- 1-49-09.....Loss Prevention Data Sheet: Perimeter Flashing
- E. National Roofing Contractors Association: Roofing and Waterproofing Manual
- F. U.S. Department of Agriculture (USDA): USDA Biopreferred Catalog.
- G. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory (2009)
- H. U.S. Department of Commerce National Institute of Standards and Technology
(NIST):
- DOC PS 1-09.....U.S. Product Standard for Construction and
Industrial Plywood.
- DOC PS @-04.....Performance Standard for Wood Based Structural
Use Panels.

1.4 PERFORMANCE REQUIREMENTS

- A. Thermal Performance: Provide roof insulation meeting minimum overall
average R-value of 25, with minimum R-value at any location of 10.

1.5 QUALITY CONTROL

- A. Requirements of Division 07 roofing section for qualifications of roofing
system insulation Installer; Work of this Section shall be performed by same
Installer.

- B. Requirements of Division 07 roofing section for inspection of Work of this Section and qualifications of Inspector.
- C. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.
- D. Requirements of roofing system uplift pressure design for specified roofing system.

1.6 SUBMITTALS

- A. Submit in accordance with Section 013323, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data:
 - 1. Asphalt and adhesive materials, each type
 - 2. Roofing cement, each type
 - 3. Roof insulation, each type
 - 4. Cover board, each type.
 - 5. Fastening requirements
 - 6. Insulation span data for flutes of metal decks
- C. Shop Drawings: Include plans, sections, details, and attachments:
 - 1. Nailers, cants, and terminations.
 - 2. Layout of insulation showing slopes, tapers, penetration, and edge conditions
- D. Certificates:
 - 1. Indicating type, thermal conductance and Minimum and average thickness of insulation.
- E. Laboratory Test Reports: Thermal values of insulation products.
- F. Layout of tapered roof system showing units required.
- G. Documentation of supervisors and inspectors qualifications.

1.7 DELIVERY, STORAGE AND MARKING

- A. Comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to built-up roofing for storage, handling and installation requirements.

1.8 QUALITY ASSURANCE:

- A. Roof insulation on steel decks shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E84, or shall have successfully passed FM Approvals 4450.
 - 1. Insulation bearing the UL label and listed in the UL Building Materials Directory as meeting the flame spread and smoke developed ratings will be accepted in-lieu-of copies of test reports.
 - 2. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the particular type used for this project and the construction

is listed as fire-classified in the UL Building Materials Directory or listed as Class I roof deck construction in the FM Approvals "RoofNav".

3. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

PART 2 - PRODUCTS

2.1 ADHESIVE MATERIALS

- A. Adhesive Materials, General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use, identical to materials utilized in approved listed roofing system, and compatible with roofing membrane.
 1. Liquid-type adhesive materials shall comply with VOC limits of authorities having jurisdiction.
 2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Multipurpose Construction Adhesives: 70 g/L.
 - c. Fiberglass Adhesives: 80 g/L.
 - d. Contact Adhesives: 80 g/L.
 - e. Other Adhesives: 250 g/L.
 - f. Nonmembrane Roof Sealants: 300 g/L.
 - g. Sealant Primers for Nonporous Substrates: 250 g/L.
 - h. Sealant Primers for Porous Substrates: 775 g/L
- B. Primer: ASTM D41.
- C. Asphalt: ASTM D312, Type III or IV for vapor retarders and insulation.
- D. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- E. Bead-Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- F. Full-Spread Applied Urethane Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- G. Roof Cement: ASTM D2822, Type I or Type II, asbestos free; or, D4586, Type I or Type II.

2.2 ROOF AND DECK INSULATION

- A. Roof and Deck Insulation, General: Preformed roof insulation boards approved by roofing manufacturer and listed as component of FM Approvals-approved roofing system.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- C. Tapered Roof Insulation System:
 - 1. Fabricate of polyisocyanurate Use only factory-tapered insulation.
 - 2. Cut to provide high and low points with crickets and slopes as shown.
 - 3. Minimum thickness of tapered sections; 13 mm (1/2 inch).
 - 4. Minimum slope 1:48 (1/4 inch per 12 inches).

2.3 INSULATION ACCESSORIES

- A. Cants and Tapered Edge Strips:
 - 1. Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.
 - 2. Tapered Edge Strips: 1:12 (one inch per foot), from 0 mm (0 inches), 300 mm to 450 mm (12 inches to 18 inches) wide.
 - a. Cellulosic Fiberboard: ASTM C208.
- B. Cover Board:
 - 1. Glass-mat, water-resistant gypsum substrate, ASTM C1177/C1177M, 6 mm (1/4 inch) thick, factory primed.

2.4 FASTENERS

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with FM Approvals 4470, designed for fastening substrate board to roof deck.
- B. Staples and Nails: ASTM F1667. Type as designated for item anchored and for substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Comply with requirements of Division 07 roofing section.

3.2 PREPARATION

- A. Comply with requirements of Division 07 roofing section.

3.3 RIGID INSULATION INSTALLATION

- A. Insulation Installation, General:
 - 1. Install roof insulation in accordance with roofing system manufacturer's written instructions.
 - 2. Base Sheet: Where required by roofing system, install one lapped base sheet specified in Division 07 roofing section by mechanically fastening to roofing substrate prior to installation of insulation.

3. Use same insulation as existing for roof repair and alterations unless specified otherwise.

B. Insulation Thickness:

1. Thickness of roof insulation shown on drawings is nominal. Actual thickness shall provide the average thermal resistance "R" value of not less than that specified in Performance Requirements Article.
2. Insulation on Metal Decks: Provide minimum thickness of insulation for metal decks recommended by the insulation manufacturer to span rib opening (flute size) of metal deck used. Support edges of insulation on metal deck ribs.
3. When thickness of insulation to be used is more or less than that shown on the drawings, make adjustments in the alignment and location of roof drains, flashing, gravel stops, fascias and similar items at no additional cost to the Government.
4. Where tapered insulation is used, the thickness of the insulation at high points and roof edges shall be as shown on the drawings; the thickness at the low point (drains) shall be not less than 38 mm (1-1/2 inches).
5. Use not less than two layers of insulation when insulation is 68 mm (2.7 inch) or more in thickness unless specified otherwise. Stagger joints minimum 150 mm (6 inches).

C. Lay insulating units with close joints, in regular courses and with cross joints broken. When laid in more than one layer, break joints of succeeding layers of roof insulation with those in preceding layer.

D. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing felt.

E. Seal all cut edges at penetrations and at edges against blocking with bitumen or roof cement.

F. Cut to fit tight against blocking or penetrations.

G. Cover all insulation installed on the same day; comply with temporary protection requirements of Division 07 roofing section.

H. Installation Method:

1. Adhered Insulation:

- a. Prime substrate as required.
- b. Set each layer of insulation firmly in solid mopping of hot asphalt.
- c. Set each layer of insulation firmly in ribbons of bead-applied insulation adhesive.
- d. Set each layer of insulation firmly in uniform application of full-spread insulation adhesive.

2. Mechanically Fastened Insulation:

- a. Fasten insulation in accordance with FM Approval's "RoofNav" requirement in Division 07 roofing section.
- b. Fasten insulation to resist uplift pressures specified in Division 07 roofing section

3. Mechanically Fastened and Adhered Insulation:

- a. Fasten first layer of insulation according to "Mechanically Fastened

Insulation" requirements.

- b. Fasten each subsequent layer of insulation according to "Adhered Insulation" requirements.
- 4. Cover Board: Install cover boards over insulation with long joints in continuous straight lines with staggered end joints. Offset cover board joints from insulation joints minimum 150 mm (6 inches). Fasten cover boards according to "Adhered Insulation" requirements.

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