

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 1177	(1996) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM E 84	(1998) Surface Burning Characteristics of Building Materials

FACTORY MUTUAL ENGINEERING AND RESEARCH CORPORATION (FM)

FM A/S4470	(1986; R 1992) Class I Roof Covers
FM P7825	(1999) Approval Guide

UNDERWRITERS LABORATORIES INC. (UL)

UL BMD	(1997) Building Materials Directory
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1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.2.1 SD-02, Shop Drawings

- a. Wood nailers
- b. Tapered roof insulation system; Show location and spacing of wood nailers that are required for securing insulation .Show a complete description of the procedures for the installation of each phase of the system indicating the type of materials, thicknesses, identity codes, sequence of laying insulation, location of ridges and valleys, special methods for cutting and fitting of insulation, and special precautions. The drawings shall be based on field measurements.

1.2.2 SD-03, Product Data

- a. Fasteners;
- b. Insulation;

1.2.3 SD-06, Test Reports

- a. Flame spread and smoke developed ratings
- b. Submit in accordance with ASTM E 84.

1.2.4 SD-07, Certificates

- a. Installer qualifications

1.2.5 SD-08, Manufacturer's Instructions

- a. Nails and fasteners
- b. Roof insulation, including field of roof and perimeter attachment requirements.

1.3 MANUFACTURER'S CERTIFICATE

Submit certificate from the insulation manufacturer attesting that the installer has the proper qualifications for installing tapered roof insulation systems.

1.4 QUALITY ASSURANCE

1.4.1 Insulation on Non Combustible Decks

Roof insulation 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 E 84. Insulation bearing the UL label and listed in the UL BMD as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports. 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 type used for this project and the construction is listed as fire-classified in the UL BMD or listed as Class I roof deck construction in the FM P7825. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

- a. Name of manufacturer;
- b. Brand designation;

Deliver materials in sufficient quantity to allow continuity of the work.

1.5.2 Storage and Handling

Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Replace damaged material with new material.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 4 degrees C 40 degrees F or when there is ice, frost, or moisture visible on the roof deck.

1.7 PROTECTION OF PROPERTY

1.7.1 Special Protection

Provide special protection approved by the insulation manufacturer, or avoid heavy traffic on completed work when ambient temperature is above 80 degrees F.

PART 2 - PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Roof insulation shall be one or an assembly of a maximum of three of the following materials and compatible with attachment methods for the specified insulation and roof membrane:

- a. Polyisocyanurate Board: ASTM C 1289 Type II, fibrous felt or glass mat membrane both sides, compressive strength shall be 20 pounds per square inch (psi).
- b. Gypsum, as specified in paragraph 2.2.1

2.1.2 Insulation Thickness

As necessary to provide an average thermal resistance (R value) of 30 or more Thickness shall be based on the "R" value for aged insulation.

2.1.3 Tapered Roof Insulation

One layer of the tapered roof insulation assembly shall be factory tapered to a slope of not less than one in 1/4 inch per foot. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope and thermal conductance. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

2.2 PROTECTION BOARD

For use as a overlayment, or protection board for adhesively-applied roofing membrane over roof insulation.

2.2.1 Glass Mat Gypsum Roof Board

ASTM C 1177, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, 500 psi, 5/8 inch thick 4 by 8 feet board size.

2.3 FASTENERS

Flush-driven through flat round or hexagonal steel or plastic plates. Steel plates shall be zinc-coated, flat round not less than 1 3/8 inch diameter or hexagonal not less than 28 gage. Plastic plates shall be high-density, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fastener head shall recess fully into the plastic plate after it is driven. Plates shall be formed to prevent dishing.

2.3.1 Fasteners for Poured Concrete Decks

Approved hardened fasteners or screws to penetrate deck at least one inch but not more than 1 1/2 inches, conforming to FM A/S4470, and listed in FM P7825 for Class I roof deck construction. Quantity and placement to withstand an uplift pressure of 90 psf conforming to FM P7825.

2.4 WOOD NAILERS

Pressure-preservative-treated as specified in Section 06100, "Rough Carpentry."

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Surfaces shall be clean, smooth, and dry. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work. The Contractor shall inspect and approve the surfaces immediately before starting installation. Prior to installing insulation, perform the following:

a. Examine concrete decks to ensure that joints between cast units are properly grouted and leveled to provide suitable surfaces for installation of vapor retarder if required by membrane or insulation manufacturer and insulation.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

a. Install wood nailers the same thickness as insulation at eaves, edges, curbs, walls, and roof openings, gravel stops, gutters, and flashing flanges as required for membrane manufacturers warranty requirements.

3.2 INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with roof deck surface if required for warranty. Vapor retarder shall consist of two plies of No. 15 asphalt-saturated felt. Lay vapor retarder at right angles to direction of slope. Install first ply of felt as specified for the specific deck. Apply second ply of 2-ply vapor retarder system using asphalt at rate of 20 to 35 lbs per 100 square feet, applied within plus or minus 25 degrees F

of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less. Use thermometers to check temperatures during heating and application. Vapor retarder shall be free of wrinkles or buckles. Press out air bubbles to obtain complete adhesion between surfaces. At walls, edges, and other vertical projections, extend vapor retarder 6 inches to form a lap which shall later be wrapped around edge of insulation on top of vapor retarder.

3.3 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of roofing, as specified in Section 07535, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

3.3.1 Installation Using Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners as recommended by membrane manufacturer. If allowed, insulation may be loose laid for use in the vented roof system application. The use of asphalt to secure insulation is prohibited. Use of foam adhesives are acceptable, if the adhesive and the attachment are warranted for the duration period of the roof coverings, and have UL and FM approval for the specific installation. Submit documentation of approvals prior to start.

3.3.2 Special Precautions for Installation of Foam Insulation

3.3.2.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install 1/2 inch thick wood fiberboard, glass mat gypsum roof board, or 3/4 inch thick expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.4 PROTECTION

3.4.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with the finished roofing specified in Section 07535 on same day. Do not permit phased construction. Protect open ends of each day's work with temporary water cutoffs, and remove when work is resumed. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight.

3.4.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

END OF SECTION