

SECTION 07220
ROOF INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Scope

1. Provide complete roof insulation system including roof insulation, fastening system, tapered edge strips, tapered roof insulation, and other items necessary for a complete installation. Provide a system of the following type:
 - a. A two-layer roof insulation system consisting of a mechanically-fastened first layer of polyisocyanurate insulation and a second layer of polyisocyanurate insulation set in hot bitumen.

B. Related Work Specified Under Other Sections

1. Rough Carpentry - DIVISION 6
2. Building insulation, other than roof insulation - SECTION 07210
3. PVC Single Ply Roofing - SECTION 07533
4. Roof Accessories - SECTION 07720
5. Roof Drains - DIVISION 15

C. Related Work Performed Under Other Contracts

1. Metal Roof Deck - Structural Steel and Metal Deck Contract

D. Products Furnished But Not Installed Under This Section

1. Metal roof deck flute filler strips for temporary water cut-off by Roofer

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C1289 - Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
2. ASTM D570 - Test Method for Water Absorption of Plastics.

B. Factory Mutual Global (FMG):

1. FMG - Approval Guide, Building Materials.
2. FMG - Loss Prevention Data 1-28, Wind Loads to Roof Systems and Roof Deck Securement.
3. FMG - Loss Prevention Data 1-29, Above Deck Roof Components (January 2009).
4. FMG - Standard 4450, Class 1 Insulated Steel Deck Roofs.
5. FMG - Standard 4470, Class 1 Roof Covers.

C. Underwriters Laboratory (UL):

1. Class A rated roofing system

1.3 QUALITY ASSURANCE

A. Applicator Qualifications

1. The applicator of the roof insulation shall be the applicator of the built-up roofing work and have a minimum of 5 years experience.

B. Design Criteria

1. Provide the roof insulation system to conform with the following design criteria:
 - a. U.L. Class A, Construction No. 1.
 - b. F.M. Class I, per I-A90 requirements. Provide additional fasteners at perimeters and corners to meet specified wind loads.
2. All polyisocyanurate insulation thermal resistance "R" values shall be aged "R" values obtained per ASTM C518 test method in accordance with the 6 month conditioning procedure outlined in TIMA Technical Bulletin 281-1 and PIMA Technical Bulletin Number 101.
3. The specified total overall insulation thermal resistance "R" value of the insulation system shall be the sum of the "R" values of all the insulation layers. The first layer of the insulation system shall be of thickness recommended by the insulation manufacturer to span the flutes of the metal roof deck used unless greater thicknesses are specified herein for the first layer or are required to meet the specified "R" value.
4. The roof insulation must be approved by the roofing material manufacturer for use with their specific roofing system and the roofing guarantee required to be provided by them.

1.4 SUBMITTALS

A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. General submittal requirements pertaining to this SECTION are specified herein under this Article.

B. *Roof Layout [D]*: Submit shop drawings for approval, showing the complete roof layout including:

1. Insulation board stagger patterns and directions relative to roof deck directions.
2. Roof insulation fastener patterns.
3. Roof drains.
4. Roof openings, crickets, valleys and saddles.
5. Typical cross section details indicating arrangement, type and thickness of insulation at parapet, roof sump pan, fabricated and prefabricated curbs; insulation saddle/cricket details.

C. Submit manufacturers product data for the systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with the current applicable ASTM, FM and U.L. Standards.

1.5 RECORD DOCUMENTS

- A. Upon completion of the work, submit per SECTION 01720:
 - 1. A written certificate stating that the insulation system was provided per the CONTRACT DOCUMENTS.
 - 2. From the manufacturer, written certificate with regard to physical properties of bitumen delivered to the site by bulk tanker, per Article “DELIVERY” herein.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery
 - 1. Deliver only specified and approved materials to the site. Deliver materials in original containers and packages with all seals and labels, including U.L., F.M., ASTM, and manufacturers labels intact for identification.
- B. Storage And Handling
 - 1. Store materials at the site within temporary sheds or trailers. Such facilities must be well sealed and kept at least 5 degF warmer than the exterior ambient temperature, to ensure that materials remain dry. Do not use wet, damp, frozen or damaged materials. Do not store more than one day’s supply of materials on the roof at any time. While on the roof, stack materials on pallets, and completely cover with incombustible waterproof tarpaulin whenever work is interrupted, or when there is precipitation of any kind. Securely tie the covering to the pallets in such a way as to be completely weathertight. Plastic covers and shrink-wrap covers by the manufacturers are not acceptable for project site storage.
 - a. Protect foam type composite board insulation from extended exposure to the sun.
 - 2. Distribute materials temporarily stored on the roof to stay within the designated live-load limits of the roof construction. Provide ample bases under equipment and materials to distribute the weight to conform to these live-load limits. Do not store materials on, or transport materials across, completed roof areas.
 - 3. Receive and transport acoustic metal roof deck flute insulation from storage area to installation staging area. Protect such material from weather same as specified for the roof insulation. Material which becomes wet or otherwise made unacceptable for use shall be replaced at no cost to the OWNER.

1.7 PROJECT SITE CONDITIONS

- A. Environmental Requirements
 - 1. Do not install materials in rain, cold, moisture, frost, snow or other climatic conditions which would incorporate moisture into the roof materials and prevent proper application and adhesion of bitumen. When the ambient air temperature is less than 45 degF, work will be permitted only upon written approval from the OWNER’S REPRESENTATIVE and then only after receipt of written assurance that materials will be installed properly and in full compliance with the SPECIFICATIONS under such conditions.
 - a. Submit proposed cold weather construction procedures and methods of protection, in writing, which will be initiated, provided and maintained when the ambient

- temperature falls below 45 degF, to ensure proper application of the work, in accordance with the requirements of this SECTION and the material manufacturers.
2. Phased construction of the insulation system is not an acceptable construction method. Coordinate the work of this SECTION with that of the roof covering SECTION, so that the systems are installed in conjunction with each other on a daily basis.
 3. Prior to start of the work, a project site meeting of all parties concerned, will be arranged, to review the SPECIFICATIONS for all work included under this SECTION and to determine a complete understanding of the requirements and responsibilities relative to roof deck responsibility, scope of the work, storage and handling of materials, materials to be used, installation of materials and sequence of work and other matters affecting the construction so as to permit compliance with the intent of the CONTRACT DOCUMENTS.

PART 2 PRODUCTS

2.1 ROOF INSULATION SYSTEM

A. Polyisocyanurate Insulation System

1. Total R Value. Furnish a two layer roof insulation system with an overall insulation thermal resistance "R" value of 30 minimum, except where otherwise specified herein, consisting of the following:
 - a. First Layer. Polyisocyanurate Roof Insulation Board, 3 inch thick, having a minimum aged "R" value of 15, mechanically fastened.
 - b. Second Layer. Polyisocyanurate Roof Insulation Board of thickness having a minimum aged "R" value of 15, mechanically fastened.
2. Insulation to have a minimum compressive strength of 25 psi.
3. Furnish Polyisocyanurate Roof Insulation Board at parapet walls, curbs and other such vertical surfaces to provide the overall thickness shown.
4. Furnish Perlite or Polyisocyanurate Roof Insulation Board in roof sump pans to provide thickness, slope, and recessed areas as shown.

2.2 ROOF INSULATION MATERIALS

- A. Polyisocyanurate Foam Insulation which meets or exceeds FS HH-I-1972/2, both faces covered with glass fiber felt; comply with FMG Standard 4450 Approval.
 1. Overlayered insulation board applied as a second layer with joints offset from bottom layer.
 2. Minimum compressive strength: 25 psi.
- B. Roof Curb Insulation: Polyisocyanurate foam; thickness to match wood nailer.
- C. Tapered Insulation: Provide crickets, saddles, and tapered insulation of same material as second layer of insulation; taper to the following slopes:
 1. Cricket and Saddles: 1/4 inch per foot or twice the slope of the roof, whichever is greater.
 2. Insulation Installed to Counterslope Roof Structure: 1/2 inch to the foot, or twice slope of roof, whichever is greater.

- D. Glass Mat Gypsum Roof Board: ASTM C-1177. Zero flame spread and zero smoke developed per ASTM E84. Minimum 500 pounds per square compressive strength.
- E. *Insulation Fasteners [P]*: F.M. approved metal screw-and-plate type mechanical insulation board fasteners, corrosion-resistant to meet the requirements of F.M. Specification 4470. Provide length as required to meet FM test requirements for uplift.
 - 1. For fastening of roof insulation board to metal deck:
 - a. Buildex “Roofgrip”.
 - b. Construction Fasteners Inc. “Dekfast”.
 - c. Fabco “Insulfixx S”
 - d. GAF “Gafite Screw and Plate”.
 - e. Hilti “12-11 Standard Deck Screw and Plate”.
- F. *Joint Tape [P]*: Woven glass fiber cloth, 6 inches wide:
 - 1. Johns Manville Corp.
- G. Accessories:
 - 1. Bonding Adhesive: Manufacturer’s standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Carefully inspect all surfaces upon which work is to be applied. The installation of any material will be considered an acceptance of the surface covered. Failure of work because of substrate or surface defects, or non-compliance with SPECIFICATION requirements, will require removal of work which becomes defective, and replacing with work conforming to the SPECIFICATIONS at no cost to the OWNER.
- B. Apply materials over smooth, dry surfaces that are free from dirt, debris and other coatings that prevent adhesion of materials to be applied. Have all temporary structures, tools, equipment, loose rubbish and debris removed from areas to be covered. Do not apply materials over wet, damp, frosty or frozen surfaces. Do not apply materials when the effects of low temperature or excessive moisture would prevent bonding of materials, or would incorporate moisture into the system component materials.

3.2 ROOF INSULATION INSTALLATION

- A. Multiple Layer Installation:
 - 1. Place long edge of boards parallel to deck flutes, forming joint over solid bearing. Lay first layer insulation units with long edge joints continuous and end joints staggered.
 - 2. Lay second layer of insulation with both long side and end joints offset 6 inches (15 cm) from joints below. Install insulation fastener and plate through both layers of insulation. Fastener and plate must be approved for and installed at the required density to achieve the

specified FMG 1A-90 system and in accordance with requirements of FMG Loss Prevention Data Sheet 1-29 for specified wind uplift requirements.

- B. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
 - 1. Gaps between insulation boards, nailers and penetrations of 1/4 inch (0.64 cm) or greater are not acceptable.
- C. Place roof crickets and tapered thickness insulation to the required slope pattern in accordance with manufacturer's published instructions.
- D. Apply no more insulation than can be waterproofed with roofing membrane in same day.
- E. Mechanically attach a single layer of insulation to manufactured metal curbs.

END OF SECTION

Revision History	
Date	Rev. No.
04-17-09	0

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