

10.1 Product Information

Effective roof insulation helps lower overall energy consumption, reduces HVAC equipment requirements, and brings about improved comfort for the occupants of a building.

JM provides these benefits with a full line of high performance insulations for built-up and modified bitumen roofs. The section that follows reviews the JM product line. Prior to product selection, it is recommended that the product performance, design and installation concepts of the roofing system be considered to ensure the correct product selection.



This Paper Recycling Symbol indicates that JM has joined other manufacturers of commercial and consumer goods throughout the United States in the utilization of recyclable materials.

In the Fesco products that bear this symbol, JM has incorporated recycled cellulose in the manufacturing process. The minimum recycled content is 25% by weight.

10.2 Guarantees

It is also important to protect a roofing system with a guarantee of performance. JM offers a wide variety of Roofing System Guarantees, including many 20-year No-Dollar-Limit (NDL) specifications which are available from NDL Approved Contractors only. Check with a JM Technical Service Specialist for the names of approved NDL Contractors in your area and details on NDL guarantees.

10.3 Product Considerations

10.3.1 Insulation Characteristics. Roof insulation performs two basic functions in any roof system. It is the primary thermal barrier for the top surface of the building envelope, and it serves as a base for the roofing system. In order to perform these two functions successfully, any roof insulation should have the following characteristics:

- Sufficient thermal resistance (“R” Value) to meet the designer’s needs.
- Resistance to indentation, compression and crushing during installation of the roof membrane and during periodic maintenance, once the roof is completed.
- Rigidity to support the roof membrane and to span the rib openings of metal roof decks.
- Resistance to moisture absorption.
- Dimensional stability.
- Compatibility with common roofing systems and attachment techniques.
- Resistance to wind uplift, and pull-through of mechanical fasteners.
- Acceptability by Underwriters Laboratories, Factory Mutual and Code Agencies.

10.4 Design Considerations

10.4.1 Drainage. Proper drainage must be provided on all roof systems. Standing or ponded water hastens the deterioration of any roof system since the water can work its way through laps or any minor application flaw in the membrane. For information on tapered insulation systems, see pages 10-13 through 10-16.

10.4.2 Double Insulation Layers. Installing roof insulation in multiple layers provides the designer with improved thermal performance. It also contributes to the overall performance of the roof system for the following reasons:

- Recent studies indicate that as much as 8% of the thermal efficiency of the insulation can be lost through the insulation joints and exposed insulation fasteners of single layer installations. Insulation joints that are staggered in multiple layer installations block the flow of heat.
- Multiple layer insulation installation reduces the stress accumulation of a thick, single insulation joint and distributes the stress more evenly over the multiple, thinner insulation joints.
- The bottom side of the membrane is protected from physical damage from insulation plates and fasteners by the second layer of insulation.
- Roof decks are stiffened.

10.5 Installation Considerations

10.5.1 Protection from Weather. Insulation should not be left exposed to the weather. No more insulation should be applied than can be completely covered with the finished membrane on the same day.

JM roof insulations are shipped covered with plastic shrouds which are intended to **temporarily** protect the material while in transit. All roofing materials should be stored on the jobsite with a weatherproof covering such as a tarpaulin. Factory packaging should not be relied upon as protection from the weather.

10.5.2 Asphalt Temperatures. JM endorses the guidelines established by the NRCA and ARMA for heating asphalt for proper insulation applications. Asphalt should be applied at the Equiviscous Temperature (EVT), $\pm 25^{\circ}\text{F}$ ($\pm 14^{\circ}\text{C}$).

10.5.3 Cold Weather Application. Hot asphalt chills rapidly at 40°F (4°C). To avoid problems associated with “cold” asphalt application, insulation should be applied with mechanical fasteners or the “mop and flop” method of installing insulation. The “mop and flop” method entails mopping the back of the insulation so that the asphalt retains its adhesive qualities for a longer period. When applying insulation with hot asphalt, board size should not exceed 4' x 4' (1.22 m x 1.22 m). Care should be taken in any application below 40°F (4°C).

10.5.4 Mechanical Application to Steel Decks. Mechanical attachment of insulation to steel decks is the only acceptable attachment method. For current information regarding Factory Mutual requirements over insulated steel decks, please check with a JM Technical Service Specialist, or the current FM Approval Guide.



10.5.5 Cold Adhesive Application. JM insulations may be installed in MBR® Cold Application Adhesive. For additional installation information, refer to Section II, Insulation Specifications.

10.5.6 Foam Insulation Products are Combustible. They should be properly protected from exposure to fire during storage, transit and application.

10.5.7 Mopping Asphaltic Membranes to Foam Insulations. Although Fesco Foam and E'NRG'Y 2 are compatible with hot asphalt and asphaltic membranes, JM supports PIMA and NRCA in recommending that a cover board of Fesco Board, Fiber Glass Roof Insulation or ½" Retro-Fit Board be installed over foam insulations.

10.5.8 Limitations. When installed over metal decks, spans shall be limited for specific deck gauges as outlined in the current FM Loss Prevention Data Sheets 1-28, 1-29 and Factory Mutual Approval Guide. JM insulations are not recommended for applications where temperatures are maintained in excess of 200°F (93°C). Although JM roof insulations are designed to be compatible with most membranes, the membrane manufacturer should be consulted for specific approval with individual membrane products.

10.6 Foam Thermal Values

10.6.1 Thermal Values. The thermal values of all closed cell urethane or isocyanurate foam insulations are at their optimum at the time of manufacture. As these products "age", some thermal loss occurs due to air infiltrating the foam cells and diluting the insulating gas in the cells. This process continues to occur over time. The degree to which this occurs is a function of the product formula and quality. It may vary from one manufacturer to another. The ultimate R-value of foam products will also depend on individual installation circumstances.

10.6.2 Conditioned R-Value. JM Fesco Foam and E'NRG'Y 2 roof insulations are sold based on 6-month conditioned thermal values as determined by the PIMA Thermal Conditioning Procedure. JM has elected to support the use of the PIMA 6-month conditioning procedure because it is the only standard currently available in the

roofing industry. The use of 6-month conditioned thermal values by architects and specifiers should be done with the knowledge that the isocyanurate foam insulation products will continue to age beyond the published values. No manufacturer or organization has been able to identify the thermal value that urethane or isocyanurate foam insulation will reach in a roofing system after years of service. Continuing research is being undertaken, and JM supports this activity for the benefit of the roofing industry.

10.6.3 Design R-Value. When calculating the anticipated thermal performance over the expected life of isocyanurate foam insulation products, JM suggests the use of an R-value of 5.56 per inch of foam thickness (0.98 m² • °C/W).

10.6.4 PIMA Thermal Conditioning Procedure. These guidelines were published in PIMA Technical Bulletin No. 101. They were endorsed by the National Roofing Contractors Association (NRCA) and adopted by many state and local code authorities. They are also included in Federal Specification HH-I-1972 and ASTM C 1289.

10.7 Definition of Terms and Symbols

10.7.1 k-Value (Thermal Conductivity): the measurement of heat flow in BTUs through a 1" (25 mm) thickness of any single homogeneous material, per hour per sq. ft. per degree F temperature difference (W/m • °C).

10.7.2 C-Value (Thermal Conductance): the measurement of heat flow in BTUs per hour per sq. ft. per degree F temperature difference through any single material, regardless of thickness (W/m² • °C).

10.7.3 R-Value (Thermal Resistance): the measurement of the resistance to heat flow. The reciprocal of the C-value.

10.7.4 U-Value (Overall Heat Transfer Coefficient): the measurement, in BTUs of heat flow, per hour per sq. ft. per degree F temperature difference through a combination of materials such as roof deck, vapor barrier, roof insulation, built-up roofing, and the air films below and above such combinations.