Johns Manville Roofing System
Submittal Package

Project Name: ABC Warehouse

Project Address:

JM Approved Roofing Contractor:

Johns Manville

SBS Heat-Weld Modified Bitumen Specification 2FID-HW

Two Ply Heat Welded Modified Bitumen
Mineral Surfaced Roofing System
For use over Johns Manville (JM) insulation, approved decks, or other approved insulations on inclines up to 6" per foot (500 mm/m).

Materials per 100 sq. ft. (9.3 m²) of Roof Area

Primer (if required):
JM Concrete Primer — 1 gallon (3.8 liters)

Base Felts:
DynaWeld Base — 1 layer

Cap:
DynaWeld Cap FR or DynaClad* — 1 layer
*DynaClad cannot be used for a membrane on any roof that will have significant foot traffic.

General

This specification is for use over any type of approved structural deck which is not nailable and which provides a suitable surface to receive the roof. Poured and pre-cast concrete decks require priming with JM Concrete Primer prior to application of the first heat welded modified bitumen ply. This Specification is not to be used over poured or pre-cast gypsum decks, lightweight insulating concrete decks or fills without JM insulation.

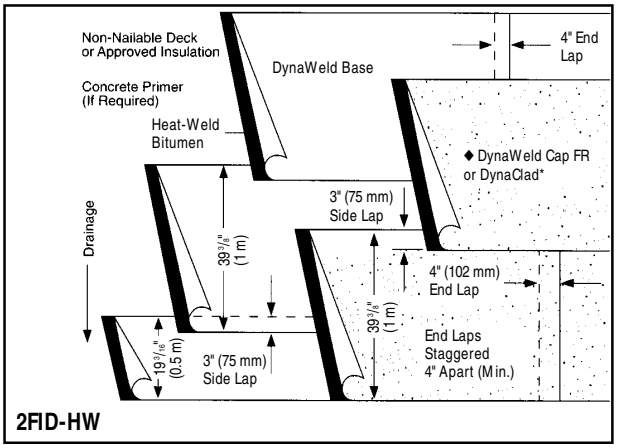
This specification is also for use over JM roof insulations, or other approved roof insulations which are not nailable and which provide a suitable surface to receive the roof. Specific written approval is required for any roof insulation that is not supplied by JM. Insulation should be installed in accordance with the appropriate JM Insulation Specification detailed in the JM Commercial/Industrial Roofing Solutions Manual. This specification can also be used in certain reroofing situations. Refer to the "Reroofing" section of the JM Commercial/Industrial Roofing Solutions Manual.

For heat weld application directly to the insulation, the top layer of insulation must be JM DuraBoard™. Design and installation of the deck and/or roof substrate must result in the roof draining freely, to outlets numerous enough and so located as to remove water promptly and completely. Areas where water ponds for more than 24 hours are unacceptable and will not be eligible for a JM Roofing Systems Guarantee.

Note: All general instructions contained in the current JM Commercial/Industrial Roofing Solutions Manual shall be considered part of this specification.

Refer to the Material Safety Data Sheet and product label prior to using the products listed in this specification.

RS-4256 8-99



2FID-HW

Flashings

Flashing details can be found in the "Bituminous Flashings" section of the JM Commercial/Industrial Roofing Solutions Manual.

Application

On roof decks with slopes up to 1½" per foot (124.8 mm/m), the roofing felts and modified bitumen sheets may be installed either perpendicular or parallel to the roof incline.

Heat weld a 19 3/16 (0.5 m) wide piece of one of the base plies listed. The remaining plies are to be applied full width, with 3" (75 mm) side and 4" (102 mm) end laps over the preceding sheets.

Heat weld a full width piece of one of the cap sheets listed over the installed base felt. Subsequent sheets are to be applied in the same manner, with 4" (102 mm) side laps and 4" (102 mm) end laps over the preceding sheet.

Apply all sheets so that they are firmly and uniformly set, without voids. Using a propane torch, apply the flame to the surface of the coiled portion of the roll . Torch across the full width of the roll and along the lap area. As the surface is heated, it will develop a sheen and the burn-off will disappear. The generation of smoke is an indication that the material is being overheated. Repeat the operation with subsequent rolls, maintaining proper side laps and end laps. A healthy compound flow will simplify seaming the laps. This is done by keeping the flame directed at the adhered ply and in front of the roll. At the end laps, soften the bitumen by heating the granule surface with the torch. When the granules start to sink into the bitumen, stop torching and with a hot trowel, embed the granules into the bitumen. All laps must be checked for good adhesion.

Preparation of the 4" (102 mm) lap of DynaClad requires the removal of 4" (102 mm) of metal surfacing, creating the selvage edge. Next, apply heat to the lap that is being seamed, making sure there is a compound flow to adhere the two surfaces. All laps must be checked for good adhesion.

For cold weather application techniques, refer to Paragraph 7C.14 of the "Modified Bitumen Specifications" section of the JM Commercial/Industrial Roofing Solutions Manual.

Surfacing

No additional surfacing is required.

Steep Slope Requirements

Special procedures are required on incline over 1/2" per foot (41.6 mm/m). Refer to Paragraph 7C.12 of the "Modified Bitumen Specifications" section of the JM Commercial/Industrial Roofing Solutions Manual.

Application of Johns Manville (JM) APP and SBS Modified Bitumen Products may require the use of an open flame propane torch. Improper use of these materials and application equipment can result in severe burns, and/or other physical injury, as well as damage to property. In order to prevent these situations, the mechanic must install the materials using the techniques recommended by JM and those found in "A Guide to Safety: Torch-On Modified Bitumens" available from the Asphalt Roofing Manufacturers Association. These techniques have been endorsed by the National Roofing Contractors Association and the United Union of Roofers, Waterproofers and Allied Workers.

The Roofing contractor must ensure that all mechanics or applicators involved with the application of heat welded modified bitumens are properly trained not only in application and equipment handling, but safety measures. The contractor should verify that all roofing applicators involved with open flame application maintain and carry a valid Certified Roofing Torch Applicator ("CERTA") card as evidence of proper training. Further, the general contractor, jobsite superintendents and the building owner or its representative must also be knowledgeable and/or advised of the proper and necessary safety precautions applicable to heat welded roofing products.

LIMITED WARRANTY/SPECIFICATIONS

All products sold are subject to the following limited warranty: Seller warrants that for a period of one year from the date of shipment the product will be free from defects in material and workmanship and is manufactured in all material respects to Seller's product specifications. Note: Seller's products may vary in details of design and construction from descriptions in any literature or from any sample, display or other model inspected by Purchaser.

SELLER DISCLAIMS ALL OTHER REPRESENTATIONS AND WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, IN FACT OR IN LAW, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Every claim under this limited warranty shall be deemed waived unless in writing and received by Seller within 10 days of delivery if visibly damaged or defective, and, otherwise, within 30 days after the defect to which each claim relates is discovered, or should have been discovered, but in no event longer than 1 year after product shipment.

LIMITATION OF REMEDY

PURCHASER'S EXCLUSIVE REMEDY AND THE LIMIT OF SELLER'S LIABILITY FOR BREACH OF THE LIMITED WARRANTY SET FORTH IN THE ABOVE LIMITED WARRANTY/SPECIFICATIONS, WHETHER BASED ON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER THEORY, SHALL BE, AT SELLER'S OPTION, REPAIR, REPLACEMENT WITH A LIKE QUANTITY OF NON-DEFECTIVE PRODUCT OR REFUND OF THE PURCHASE PRICE, PLUS REASONABLE COMMERCIAL CHARGES INCURRED FOR APPROVED RETURNS.

NO RECOVERY OF CONSEQUENTIAL OR SPECIAL DAMAGES

SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR SPECIAL DAMAGES BASED ON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER THEORY, FOR FAILURE TO PERFORM ITS OBLIGATIONS UNDER THIS AGREEMENT. ADDITIONALLY, CONSEQUENTIAL AND SPECIAL DAMAGES SHALL NOT BE RECOVERABLE EVEN IF THE REPAIR, REPLACEMENT OR REFUND REMEDY FOR SELLER'S BREACH OF ITS LIMITED WARRANTY FAILS OF ITS ESSENTIAL PURPOSE OR FOR ANY OTHER REASON.

For additional sales and product information, contact the Johns Manville Regional Office nearest you.

NORTHEASTERN
437 Atlantic Avenue
Berlin, NJ 08009-9700
609.768.7003
FAX: 609.768.7034
For Technical Services Information
800.345.9603

SOUTHEASTERN
3901 Roswell Road,
Suite 215
Marietta, GA 30062
770.578.3190
FAX: 770.578.3195
For Technical Services Information
800.633.8594

MIDWESTERN
2151 W. Channahon Road
Rockdale, IL 60436-8559
815.744.1545
FAX: 815.741.6131
For Technical Services Information
800.231.1064

SOUTHWESTERN
P.O. Box 9069
Fort Worth, TX 76147-2069
817.339.1500
FAX: 817.339.1540
For Technical Services Information
800.654.0071

WESTERN
3rd & Harbor Streets
Pittsburg, CA 94565
925.432.6426
FAX: 925.427.2409
For Technical Services Information
800.922.5922

Canadian Customer Service
Write to:
27 Pearl Street
Portland, ME 04101
877.766.3295
(877 Roof By JM)
FAX: 800.343.1331

For Guarantee Information
Guarantee Services Department
P.O. Box 625001
Littleton, CO 80162-5001
303.978.2191
FAX: 303.978.2808

For bilingual and international assistance, please call:
Yolanda Griepentrog
303.978.4655 or
FAX: 303.978.3904

Product Information Center
800.654.3103
303.978.2318 (FAX)

Additional Information:
FAX Express® 888.329.3977
www.jm.com

Johns Manville

Roofing Systems Group
717 17th Street
Denver, CO 80202
800.654.3103
303.978.2318 FAX
www.jm.com

Health and Safety

Johns Manville maintains Material Safety Data Sheets (MSDS) for all of its products. These MSDS contain health and safety information for development of appropriate product handling procedures to protect your employees and customers. These MSDS are available and should be read and understood by all personnel using and handling these materials.

The physical and chemical properties of the products described herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Consult a Johns Manville Regional Office to assure current information.

Johns Manville

Commercial/Industrial Roofing Systems

Gold Shield® Roofing Systems Guarantee

Built-Up and Modified Bitumen

Building Owner:

Building Name:

Approved Roofing Contractor:

Guarantee Number:

Term & Maximum Monetary Obligation to Maintain a Watertight Roofing System

Date of Completion:

Years **$**

COVERAGE
The components of the Roofing System covered by this Guarantee are:

Membrane Spec. and Type
Flashing Spec. and Type
Insulation Type
Accessories (Type and Quantity)

These Johns Manville Guaranteed components are referred to below as the "Roofing System", and ALL OTHER COMPONENTS OF THE OWNER'S BUILDING ARE EXCLUDED FROM THE TERMS OF THIS GUARANTEE.

Johns Manville* guarantees to the original Building Owner that during the Term commencing with the Date of Completion, JM will pay for the materials and labor required to promptly repair the Roofing System to return it to a watertight condition if leaks occur due to: ordinary wear and tear, or deficiencies in any or all of the component materials of the Roofing System or workmanship deficiencies in the application of the Roofing System.

WHAT TO DO IF YOUR ROOF LEAKS
If you should have a roof leak please refer to directions on the reverse side.

LIMITATIONS AND EXCLUSIONS
This Guarantee is not a maintenance agreement or an insurance policy; therefore, routine inspections and maintenance are the Building Owner's responsibility (see reverse side of this document). Failure to follow the Maintenance Program on the reverse side of this document will void the Guarantee. This Guarantee does not obligate JM to repair the Roofing System, or any part of the Roofing System, for leaks resulting from (a) natural disasters including but not limited to the direct or indirect effect of lightning, fire, hailstorm, earthquake, tornadoes, hurricanes or other extraordinary natural occurance and/or wind speeds in excess of 72 miles per hour, (b) misuse, abuse or negligence, (c) installation or material failures other than those involving the component materials expressly defined above as the Roofing System or exposure of the Roofing System components to damaging substances such as oil or solvents or to damaging conditions such as vermin, (d) changes to the Roofing System or the Building's usage that are not preapproved in writing by JM, or (e) failure of the Building substrate (mechanical, structural or otherwise and whether resulting from Building movement, design defects or other causes) or improper drainage. JM is not responsible for leaks and damage resulting from water entry from any portion of the Building structure not a part of the Roofing System.

This Guarantee becomes effective when (1) it is delivered to Owner; and (2) all bills for installation, materials and services have been paid in full to the Approved Roofing Contractor and to JM. Until that time, this Guarantee is not in force and has no effect.

The parties agree that any controversy or claims relating to this Guarantee shall be first submitted to mediation under the Construction Industry Arbitration and Mediation Rules of the American Arbitration Association (Regular Track Procedures) or to such other mediation arrangement as the parties mutually agree. No court or other tribunal shall have jurisdiction until the mediation is completed.

TO THE FULLEST EXTENT PERMITTED BY LAW, JM DISCLAIMS ANY IMPLIED WARRANTY, INCLUDING THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND LIMITS SUCH WARRANTY TO THE DURATION AND TO THE EXTENT OF THE EXPRESS WARRANTY CONTAINED IN THIS GUARANTEE.

THE EXCLUSIVE RESPONSIBILITY AND LIABILITY OF JM UNDER THIS GUARANTEE IS TO MAKE REPAIRS NECESSARY TO MAINTAIN THE ROOFING SYSTEM IN A WATERTIGHT CONDITION IN ACCORDANCE WITH THE OBLIGATIONS OF JM UNDER THIS GUARANTEE.

JM AND ITS AFFILIATES WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE BUILDING STRUCTURE (UPON WHICH THE ROOFING SYSTEM IS AFFIXED) OR ITS CONTENTS, LOSS OF TIME OR PROFITS OR ANY INCONVENIENCE. JM AND ITS AFFILIATES SHALL NOT BE LIABLE FOR ANY DAMAGES WHICH ARE BASED UPON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY OR ANY OTHER THEORY OF LIABILITY OTHER THAN THE EXCLUSIVE LIABILITY SET FORTH IN THIS GUARANTEE.

No one is authorized to change, alter or modify the provisions of this Guarantee other than the Manager, Marketing and Technical Services or authorized delegate. JM's delay or failure in enforcing the terms and conditions contained in this Guarantee shall not operate as a waiver of such terms and conditions. This Guarantee is solely for the benefit of the Building Owner identified above and Building Owner's rights hereunder are not assignable. Upon sale or other transfer of the Building, Building Owner may request transfer of this Guarantee to the new owner, and JM may transfer this Guarantee, in its sole discretion only after receiving satisfactory information and payment of a transfer fee, which must be paid no later than 30 days after the date of Building ownership transfer.

In the event JM pays for repairs which are required due to the acts or omissions of others, JM shall be subrogated to all rights of recovery of the Building Owner to the extent of the amount of the repairs.

Because JM does not practice Engineering or Architecture, neither the issuance of this Guarantee nor any review of the Building's construction or inspection of roof plans (or the Building's roof deck) by JM representatives shall constitute any warranty by JM of such plans, specifications and construction or in any way constitute an extension of the terms and conditions of this Guarantee. Any roof inspections are solely for the benefit of JM.

JM does not supervise nor is it responsible for a roofing contractor's work except to the extent stated herein, and roofing contractors are not agents of JM.

*JOHNS MANVILLE ("JM"), is a Delaware corporation with its principal mailing address at P.O. Box 5108, Denver, Colorado 80217-5108.

Accepted By Owner's Authorized Representative

Date of Signature

By: **Pat McEvoy**
Title: **Sr. Vice President, Roofing Systems Group**

Attorney-in-Fact

Johns Manville, Guarantee Services Unit, 10100 West Ute Ave., Littleton, CO 80127, 303 978-2000, 800-922-5922, FAX: 303-978-2808, www.jm.com.

DynaWeld™ Cap FR

Description

DynaWeld Cap FR is a fire resistant modified bitumen sheet incorporating the features of a strong fiber glass mat with a blend of SBS (Styrene-Butadiene-Styrene) rubber, high quality asphalt and fire retardant additives.

The elastometric asphalt blend has full recovery properties after 100% elongation and lends elasticity and flexiblilty to the sheet. The inorganic fiberglass reinforcement provides tensile strength, stability and toughness to the product and resists moisture absorption. These properties also afford the product better resistance to the other factors which affect roof performance. The covering layer of ceramic-coated roofing granules provides durability along with superior resistance to damage from weather and foot traffic. The back of the sheet has a polyolefin burn-off film for ease of heat welding.

Use

DynaWeld Cap FR is designed for use as a quality modified bitumen sheet in UL fire rated, multiple ply roofing systems. DynaWeld Cap FR unlike many modified bitumen products, enjoys UL Class A Ratings in numerous constructions, both new and reroof, without the use of additional surfacing. It is ideal for low slope applications (inclines up to 3 inches). Because of its superior weatherability, durability, and handling characteristics, DynaWeld Cap FR may be used both for a finished cap sheet and as a flashing material. This product may only be installed using heat-welding application techniques.

Advantages

- The heavy fiber glass mat provides exceptional tensile strength and puncture resistance
- The elongation and recovery properties of the SBS blend allow the product to easily accommodate the continual expansion and contraction strains experienced on all roofs
- The product's flexibility and dimensional stability provide ease of handling, resulting in quick installations
- Fire-retardant formulation

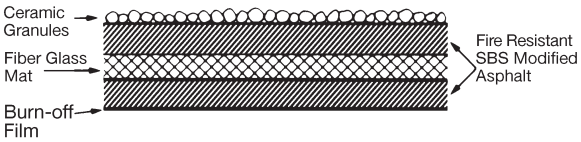
Typical Physical Properties

Material meets or exceeds the criteria for ASTM D 6163, Type I, Grade G.

Thickness	160 mils (4.0 mm)
Tensile Strength @ 0°F (-18°C)	
Machine Direction	135 lbs. force/in. width (23.6 kN/m)
Cross Machine Direction	95 lbs. force/in. width (16.6 kN/m)
Elongation @ -0°F (-18°C)	
Machine Direction	4%
Cross Machine Direction	4%
Tensile-Tear	
Machine Direction	125 lbs./in. (21.9 kN/m)
Cross Machine Direction	100 lbs./in. (17.5 kN/m)
Low Temperature Flexibility	-10°F (-23°C)
Dimensional Stability	
Machine Direction	0.20% change
Cross Machine Direction	0.20% change

Sizes

Roll size	1 square (9.29 m^2)
Roll weight	110 lbs (49.8 kg)
Roll length	32' 10" (10 m)
Roll width	39 3/8" (1 m)



Refer to the Material Safety Data Sheet and Product Label prior to using this product. For an identical copy of this data sheet ask for RS-4387.

DynaWeld™ Base

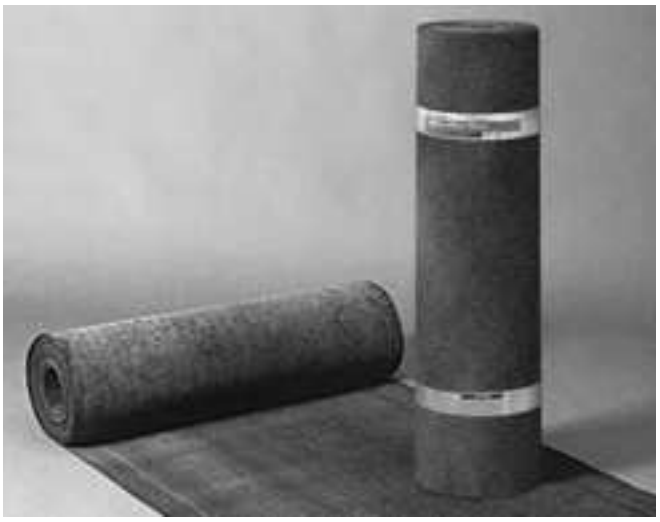
Description

DynaWeld Base is a modified bitumen sheet incorporating the features of a fiber glass mat with a blend of SBS (Styrene-Butadiene-Styrene) rubber and high quality asphalt.

The elastometric asphalt blend has full recovery properties after 100% elongation and lends elasticity and flexibility to the sheet. The inorganic fiberglass reinforcement provides tensile strength, stability and toughness to the product and resists moisture absorption. These properties also afford the product better resistance to the other factors which affect roof performance. The back of the sheet has a polyolefin burn-off film for ease of heat welding.

Use

DynaWeld Base is designed for use as a base or ply in multiple ply modified bitumen roofing systems. It is ideal for low slope applications (inclines up to 3 inches). This product may only be installed using heat-welding application techniques.



Advantages

- The fiber glass mat provides excellent tensile strength and puncture resistance
- The elongation and recovery properties allow the product to easily accommodate the continual expansion and contraction strains experienced on all roofs
- The product's flexibility and dimensional stability provide ease of handling, resulting in quick installations

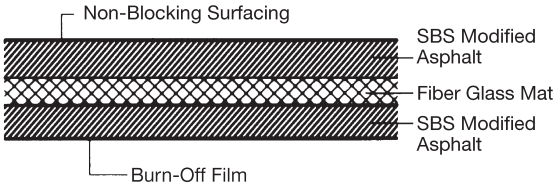
Typical Physical Properties*

Material meets or exceeds the criteria for ASTM D 6163, Type I, Grade S.

Thickness	120 mils (3 mm)
Tensile Strength @ 0°F (-18°C)	
Machine Direction	95 lbs. force/in. width (15.8 kN/m)
Cross Machine Direction	85 lbs. force/in. width (12.3 kN/m)
Elongation @ 0°F (-18°C)	
Machine Direction	3.0%
Cross Machine Direction	3.0%
Tensile-Tear	
Machine Direction	105 lbs./in. (17.5 kN/m)
Cross Machine Direction	95 lbs./in. (15.8 kN/m)
Low Temperature Flexibility	-10°F (-21°C)
Dimensional Stability	
Machine Direction	0.20% change
Cross Machine Direction	0.20% change

Sizes

Roll size	1 square (13.9 m^2)
Roll weight	90 lbs (40.8 kg)
Roll length	32' 10" (10 m)
Roll width	39 3/8" (1 m)



Refer to the Material Safety Data Sheet and Product Label prior to using this product. For an identical copy of this data sheet ask for RS-4388.

Section 1 - Chemical Product and Company Identification

Product Name Modified Asphalt Roofing Products
CAS# Mixture
Generic Name Asphalt-Elastomer Coated Mat
Formula Mixture (Article)
Chemical Name: Mixture (Article)
Hazard Label RR01-Rolled Roof

Manufacturer Information

Johns Manville
Roofing Systems Group
P.O. Box 5108
Denver, CO 80127

Telephone: 303-978-2000
Internet Address: http://www.jm.com
Emergency: 800-424-9300 (Chemtrec)

Trade Names: DynaBase®; DynaBase® PR; DynaBase® XT; DynaClad®; DynaFlex®; DynaGlas®; DynaGlas® FR; DynaGlas® 30 FR; DynaGlas® 30 FR XT; DynaGlas® S; DynaGlas® S XT; DynaKap®; DynaKap® FR; DynaLastic® 180; DynaLastic® 180 FR; DynaLastic® 180 S; DynaLastic® 250; DynaLastic® 250 FR; DynaLastic® 250 S; DynaMax®; DynaMax® FR; DynaMop GL; DynaMop PR; DynaPly; DynaWeld Base; DynaWeld Cap 180; DynaWeld Cap 250; DynaWeld Cap FR; DynaWeld GL; DynaWeld PR; GlasBase Plus; GlasKap® Plus; Roof Defender™ SBS Cap Sheet

Section 2 - Composition / Information on Ingredients

CAS #	Component	Percent
8052-42-4	Asphalt	20-70
12007-56-6	Calcium borate (Colemanite)	0-35**
1317-65-3	Calcium carbonate	0-35
16389-88-1	Dolomite (CaMg(CO3)2)	0-35
Not Available	Mineral granules	0-35*
9003-55-8	Styrene-Butadiene polymer	4-10
65997-17-3	Continuous filament glass fiber	2-10***
Not Available	Polyester fiber	2-10***
14808-60-7	Crystalline silica (sand)	0-10***
9002-88-4	Polypropylene or Polyolefin Film	0-6***
64741-53-3	Distillates, petroleum, heavy naphthenic	>1****
64742-11-6	Extracts, petroleum, heavy naphthenic	>1****
7705-08-0	Ferric chloride	>1****

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: !Missing (15-45-2), Glass filaments.

Additional Component Information

ARTICLE: This product is an article as defined by the US Toxic Substance Control Act (TSCA) and the Canadian Environmental Protection Act (CEPA). All ingredients are bound in a solid matrix. Ingredients and exposure limits are provided for reference only. The product does not release any toxic substances during handling and storage. However, when cut or heated, the product may release irritating fumes and dusts, specifically, glass fiber dust and/or asphalt fumes.

* Ceramic-coated granite; 35% crystalline silica, non-respirable.
** Products with FR suffix (e.g., DynaGlas® FR) contain colemanite for fire resistance.
*** Roll roofing is reinforced with continuous filament fiber glass and/or polyester. Backings composed of either crystalline silica (sand) or polypropylene (polyolefin). Respirable crystalline silica from sand is not expected to be released; sand is adhered to product and is >99.9% too large to become airborne or to be respirable.
**** in GlasKap® only.

DynaClad™ has an aluminum foil surface.

Section 3 - Hazards Identification

Emergency Overview

APPEARANCE AND ODOR: Dark mat with granule surface. Asphalt odor.

When heated or cut, this product may release dust or fumes. If dust or fumes are inhaled to excess (e.g., in a confined space), they may irritate the upper respiratory tract.

Potential Health Effects

Summary
Due to the large size of the particles, minimal exposure to airborne dust is expected. Primarily a nuisance dust. Asphalt and its fumes can irritate skin, eyes, and upper respiratory tract. See Section 11 for more details.

Inhalation
Irritation of the upper respiratory tract (scratchy throat), coughing, and congestion may occur in extreme exposures.

Skin
Temporary irritation (itching) or redness may occur.

Ingestion
This product is not intended to be ingested (eaten). If ingested, it may cause temporary irritation to the gastrointestinal (digestive) tract.

Eyes
Temporary irritation (itching) or redness may occur.

Target Organs
Upper respiratory passages, skin, and eyes.

Primary Routes of Entry (Exposure)
Inhalation, skin, and eye contact.

Medical Conditions Aggravated by Exposure
As with any dust, pre-existing upper respiratory, eye and lung diseases or conditions due to the large size of the particles, minimal exposure to airborne dust is expected.

Section 4 - First Aid Measures

First Aid: Inhalation
Remove to fresh air. Drink water to clear throat, and blow nose to remove dust.

First Aid: Skin
Wash gently with soap and warm water to remove dust and fibers. Wash hands before eating or using the restroom.

First Aid: Ingestion
Product is not intended to be eaten. If swallowed, product may irritate digestive tract. Rinse mouth with water to remove fibers; drink plenty of water to help reduce the irritation. No chronic effects are expected from ingestion.

First Aid: Eyes
Do not rub or scratch your eyes. Dust particles may cause the eye to be scratched. Flush eyes with large amounts of water for 5-15 minutes. If irritation persists, contact a medical professional.

First Aid: Notes to Physician
Substances released from this product during cutting or heating may be irritating, but are not expected to produce any lasting health effects from acute exposures. Treatment should be directed toward removing the source of irritation with symptomatic treatment as necessary.

Section 5 - Fire Fighting Measures

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not determined
Lower Flammable Limit (LFL): Not determined
Auto Ignition: 460ºC/860ºF
Flammability Classification: Not determined
Rate of Burning: Not determined

General Fire Hazards
Normal fire fighting procedures should be followed to avoid inhalation of smoke and gases. Burning may produce thick, irritating smoke.

Hazardous Combustion Products

Product is combustible. Burning of this material will produce thick, black smoke.

Extinguishing Media

Dry chemical, foam, carbon dioxide.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self contained breathing apparatus.

Section 6 - Accidental Release Measures

Containment Procedures

Pick up large pieces. Vacuum dusts. If sweeping is necessary, use a dust suppressant such as water. Do not dry sweep dust accumulation. These procedures will help to minimize potential exposures.

Clean-Up Procedures

No additional information available.

Section 7 - Handling and Storage

Handling Procedures

Use protective equipment as described in Section 8 of this material safety data sheet when handling uncontained material.

Storage Procedures

Avoid direct exposure to very high heat or flame. Warehouse storage should be in accordance with package directions, if any. Material should be kept dry, and protected from the elements.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Product Information

Due to product form, exposure to hazardous dusts or mists are not expected to occur. Exposure limits are given for reference only.

B: Component Exposure Limits

Asphalt (8052-42-4)

ACGIH: 0.5 mg/m3 TWA (inhalable fraction, as benzene-soluble aerosol)

Calcium carbonate (1317-65-3)

ACGIH: 10 mg/m3 TWA (particulate matter containing no asbestos and <1% crystalline silica)
OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Continuous filament glass fiber (65997-17-3)

ACGIH: 1 f/cc TWA for fibers longer than 5 um with a diameter less than 3 um; 5 mg/m3 TWA inhalable particulate; (Listed under 'Synthetic vitreous fibers') (related to Continuous filament glass fibers)
OSHA: 5 mg/m3 TWA respirable fraction (OSHA)
15 mg/m3 TWA total dust (OSHA)
(related to Continuous filament glass fibers)

Crystalline silica (sand) (14808-60-7)

ACGIH: 0.05 mg/m3 TWA (respirable fraction)
OSHA: 0.1 mg/m3 TWA (respirable dust)

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

When cutting or heating: Safety glasses with sideshields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves are recommended.

Personal Protective Equipment: Respiratory

Recommended when cutting or heating: Use a NIOSH-approved dust/mist respirator to protect against nuisance dust. (Examples of NIOSH-approved disposable dust/mist respirators for this type of exposure are the 3M 9900 and Moldex 2200 respirators.)

Ventilation

No special ventilation systems are required when using this product.

Personal Protective Equipment: General

Recommended during installation: Loose-fitting, long-sleeved shirt and long pants and a cap should be worn to protect skin from irritation from dust.

Section 9 - Physical & Chemical Properties

Appearance:	Dark mat with granule surface	**Odor**:	Asphalt odor
Physical State:	solid	**pH:**	Not applicable
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	>370ºC/>700ºF	**Melting Point:**	>95ºC/>200ºF
Solubility (H2O):	Nil	**Specific Gravity:**	Variable
Freezing Point:	Not determined	**Evaporation Rate**:	Not applicable
Viscosity:	Not applicable	**Percent Volatile:**	0
VOC:	Not applicable		

Section 10 - Chemical Stability & Reactivity Information

Chemical Stability

This is a stable material.

Hazardous Decomposition

The decomposition products from this material are those that would be expected from any organic (carbon-containing) material. These decomposition products may include carbon dioxide, carbon monoxide, carbon particles and hydrocarbons.

Hazardous Polymerization

Will not occur.

Section 11 - Toxicological Information

Acute Toxicity

A: General Product Information

Prolonged skin contact may cause slight irritation. Under normal conditions of use, dust is not expected to be generated. If power equipment is used to cut or saw the product, dust may be generated. Dust and fumes from this product are irritants and may cause transitory irritation to exposed areas such as eyes, skin, and upper respiratory passages.

B: Component Analysis - LD50/LC50

Calcium borate (Colemanite) (12007-56-6)

Oral LD50 Rat: 5600 mg/kg
Oral LD50 Mouse: 5900 mg/kg

Polypropylene or Polyolefin Film (9002-88-4)

Inhalation LC50 Mouse: 12 gm/m3/30M

Ferric chloride (7705-08-0)

Oral LD50 Rat: 450 mg/kg
Oral LD50 Mouse: 895 mg/kg

Carcinogenicity

A: General Product Information

Due to product form, exposure to hazardous dusts or mists are not expected to occur. Exposure limits are given for reference only.

B: Component Carcinogenicity

Asphalt (8052-42-4)

ACGIH: A4 - Not Classifiable as a Human Carcinogen (as benzene-soluble aerosol)
IARC: Supplement 7, 1987; Monograph 35, 1985 (Group 3 (not classifiable))

Styrene-Butadiene polymer (9003-55-8)

IARC: Supplement 7, 1987; Monograph 19, 1979 (Group 3 (not classifiable))

Continuous filament glass fiber (65997-17-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen (related to Continuous filament glass fibers)
IARC: Monograph 43, 1988 (related to Glass filaments) (Group 3 (not classifiable))

Crystalline silica (sand) (14808-60-7)

ACGIH: A2 - Suspected Human Carcinogen
NTP: Known Carcinogen (Select Carcinogen)
IARC: Monograph 68, 1997; (inhaled in the form of quartz or cristobalite from occupational sources) (Group 1 (carcinogenic to humans))

Polypropylene or Polyolefin Film (9002-88-4)

IARC: Supplement 7, 1987; Monograph 19, 1979 (Group 3 (not classifiable))

Chronic Toxicity

Respirable crystalline silica from sand is not expected to be released; sand is adhered to product and is >99.9% too large to become airborne or to be respirable. Crystalline silica is considered a hazard by inhalation. The International Agency for Research on Cancer (IARC) has classified crystalline silica as a Group 1 substance, carcinogenic to humans. This classification is based on the findings of laboratory animal studies (inhalation and implantation) and epidemiology studies that were considered sufficient for carcinogenicity. Several studies have been conducted to determine the risk of cancer to workers exposed to dusts which contain crystalline silica. However, these studies did not consider other factors or elements that workers may be exposed to. Therefore, the causes of the excess deaths due to cancer could not be precisely determined. Further studies are being conducted to determine the risk of cancer when working with crystalline silica products. Excessive exposure to crystalline silica can cause silicosis, a non-cancerous lung disease.

The asphalt in this product exists in a solid state and does not impart any special hazard to the product.

Asphalt (asphalt CAS # 8052-42-4 and oxidized asphalt 64742-93-4; bitumens): In 1985/87, IARC (International Agency for Research on Cancer) concluded the following: (a) Bitumens are not classifiable as to their carcinogenicity to humans (Group 3). (b) Extracts of steam- and air-refined bitumens are possibly carcinogenic to humans (Group 2B). IARC found that evidence for carcinogenicity from animal studies was: inadequate for undiluted air-refined bitumens; limited for steam-refined and cracking-residue bitumens; sufficient for extracts of steam-refined and air-refined bitumen. IARC found that human evidence for carcinogenicity of asphalt fumes was inadequate. Studies of roofers indicated an excess of cancers; however, IARC concluded that, since roofers may be exposed also to coal-tar pitches and other materials, "the excess cancer risk cannot be attributed specifically to bitumens." In 1994, a published review of 20 epidemiology studies of asphalt workers and roofers agreed with IARC, that current human evidence is inadequate for the carcinogenicity of asphalt fumes in humans. Trace amounts of polynuclear aromatic hydrocarbons (PAHs) may be present in some asphalts and can be released upon excessive heating, which results in thermal cracking of the asphalt compounds. Some of these PAHs have been identified as having the potential to induce carcinogenic and reproductive health effects.

Continuous Filament Glass Fiber: No chronic health effects are known to be associated with exposure to continuous filament fiber glass. Long-term epidemiologic studies do not show any increases in respiratory cancer or other disease among employees who manufacture this product. In 1987, the International Agency for Research on Cancer (IARC) classified continuous filament fiber glass as a Group 3 substance, "not classifiable as to its carcinogenicity to humans." In 2001, IARC re-affirmed this designation. Because of the large diameter of continuous filament fibers, these fibers are not considered respirable.

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information

No additional information available.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Ferric chloride (7705-08-0)

24 Hr LC50 striped bass (fingerling): 6 mg/L (Static)
24 Hr LC50 striped bass (larvae): 4 mg/L (Static)

Section 13 - Disposal Considerations

US EPA Waste Number & Descriptions

A: General Product Information

This product is not regulated as a hazardous waste by the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) regulations.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

Section 14 - Transportation Information

US DOT Information

Shipping Name: Not regulated for transportation.

Section 15 - Regulatory Information

US Federal Regulations

A: General Product Information

No information on this product as a whole.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Ferric chloride (7705-08-0)

CERCLA: 1000 lb final RQ; 454 kg final RQ

State Regulations

A: General Product Information

Asphalt fumes may contain trace amounts of the following California Proposition 65 Listed Substances as known to the state of California to cause cancer or reproductive effects: Poly nuclear aromatic hydrocarbons (benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene).

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Asphalt	8052-42-4	Yes	Yes	Yes	Yes	Yes	Yes
Calcium carbonate	1317-65-3	No	No	Yes	Yes	No	Yes
Continuous filament glass fiber	65997-17-3	No	No	No	Yes	No	No
Crystalline silica (sand)	14808-60-7	No	Yes	Yes	Yes	Yes	Yes
Ferric chloride	7705-08-0	Yes	No	Yes	No	Yes	Yes
Extracts, petroleum, heavy naphthenic	64742-11-6	No	No	Yes	No	No	No
Distillates, petroleum, heavy naphthenic	64741-53-3	No	No	Yes	No	No	No

Other Regulatory Information

A: General Product Information

No additional information available.

B: TSCA Status

This product and its components are listed on the TSCA 8(b) inventory.

None of the components listed in this product are listed on the TSCA Export Notification 12(b) list.

C: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Asphalt	8052-42-4	Yes	Yes	Yes
Calcium carbonate	1317-65-3	Yes	No	Yes
Dolomite (CaMg(CO3)2)	16389-88-1	Yes	No	Yes
Calcium borate (Colemanite)	12007-56-6	Yes	No	Yes
Styrene-Butadiene polymer	9003-55-8	Yes	Yes	No
Continuous filament glass fiber	65997-17-3	Yes	Yes	Yes
Crystalline silica (sand)	14808-60-7	Yes	Yes	Yes
Polypropylene or Polyolefin Film	9002-88-4	Yes	Yes	No
Ferric chloride	7705-08-0	Yes	Yes	Yes
Extracts, petroleum, heavy naphthenic	64742-11-6	Yes	Yes	Yes
Distillates, petroleum, heavy naphthenic	64741-53-3	Yes	Yes	Yes

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Crystalline silica (sand)	14808-60-7	1%; English Item 1406; French Item 1491

Section 16 - Other Information

Other Information

Prepared for:
Johns Manville
Roofing Systems Group
P. O. Box 5108
Denver, CO USA 80217-5108

Prepared by:
Johns Manville Technical Center
P.O. Box 625005
Littleton, CO USA 80162-5005

The information herein is presented in good faith and believed to be accurate as of the effective date given. However, no warranty, expressed or implied, is given. It is the buyer's responsibility to ensure that its activities comply with Federal, State or provincial, and local laws.

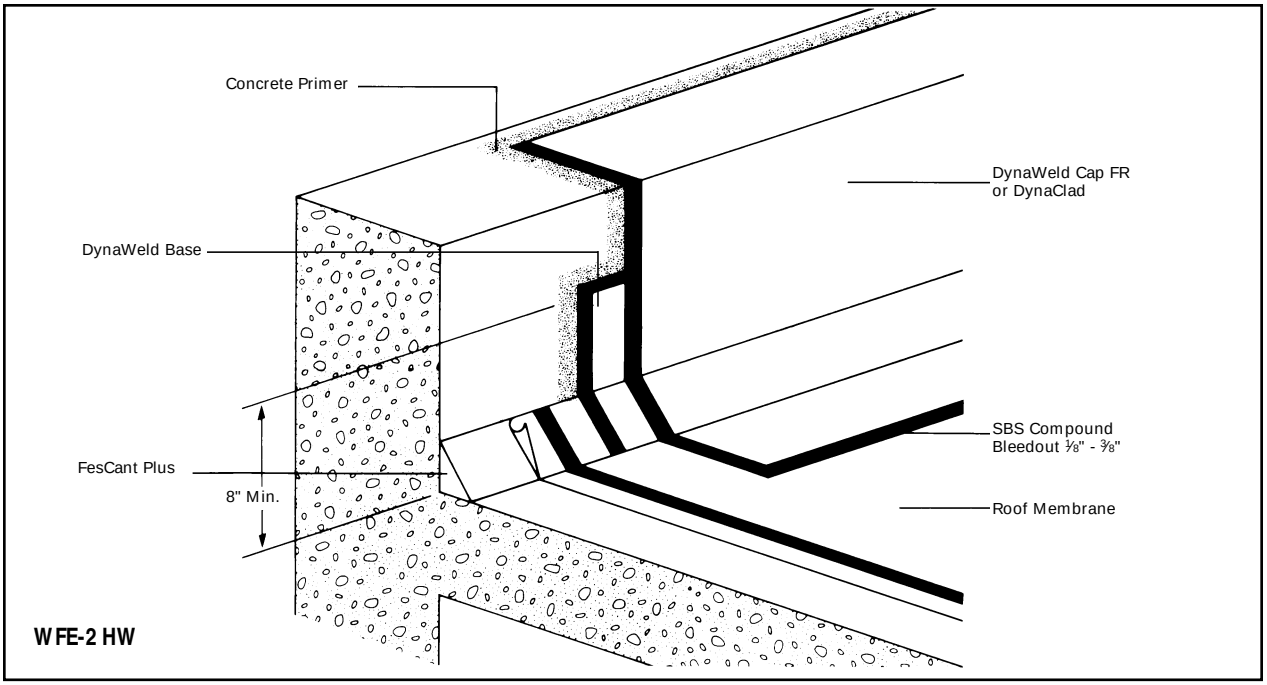
Date	MSDS #	Reason
7/1/00	3003-1.0000	New MSDS Authoring System
4/11/01	3003-1.0100	Sect. 8, 11: Update TLV for asphalt and crystalline silica.
11/06/02	3003-1.0101	Sect. 1: Designated as Articles per TSCA/CEPA; updated trade names. Sect. 11: Revise IARC Group 3 for asphalt fumes.

This is the end of MSDS # 3003

Johns Manville

Specification WFE-2 HW

Bituminous Flashing



For use over masonry constructions

General

This flashing specification is for use on non-nailable surfaces where the roof deck is supported by the wall or parapet and no nailing facilities exist.

Note: All general instructions contained in the current JM Commercial/Industrial Roofing Solutions Manual shall be considered part of this specification.

Primer: Apply Johns Manville (JM) Concrete Primer to the masonry wall to the full height of the proposed base flashing and allow it to dry thoroughly.

Materials

Johns Manville (JM) DynaWeld Base sheet.

Application

Base Flashing: The roof membrane must extend to the top of the cant.

Cut a strip of DynaWeld Base for use as a backer felt. The material should be cut such that when installed it extends up not less than 8" (203 mm) up the vertical surface and down to the bottom of the cant. The backer felt should not project onto the roof membrane.

Over the backer felt, install a layer of DynaWeld Cap FR or DynaClad. This material should extend not less than 8" (203 mm) and not more than 24" (610 mm) on the vertical surface of the parapet. The flashing sheet should project onto the roof membrane not less than 4" (102 mm).

Preparation of the 4" (102 mm) lap of DynaClad requires the removal of 4" (102 mm) of metal surfacing, creating the selvage edge. Next, apply heat to the lap that is being seamed, making sure there is a good compound flow to adhere the two surfaces. Check all laps for good adhesion.

Heat weld the flashing and backer felt so that they are firmly and uniformly set. All laps must be rolled with a 3" (76 mm) rounded edge roller. A minimum ⅛" to ⅜" (3 mm to 10 mm) bleedout of SBS compound shall be visible at the edge of all laps. If the compound bleedout is not accomplished, heat a trowel with a propane flame, lift the lap, apply a flame to both sides of the lap area and smooth the melted compound with the trowel to form an even seal.

Caution: Improper use of these materials and application equipment can result in severe burns, and/or damage to property. The mechanic must install these materials using the techniques recommended by JM and those found in "A Guide to Safety: Torch-On Modified Bitumens" available from the Asphalt Roofing Manufacturers Association.

Refer to the Material Safety Data Sheet and Product Label prior to using this product.

Application of Johns Manville (JM) APP and SBS Modified Bitumen Products may require the use of an open flame propane torch. Improper use of these materials and application equipment can result in severe burns, and/or other physical injury, as well as damage to property. In order to prevent these situations, the mechanic must install the materials using the techniques recommended by JM and those found in "A Guide to Safety: Torch-On Modified Bitumens" available from the Asphalt Roofing Manufacturers Association. These techniques have been endorsed by the National Roofing Contractors Association and the United Union of Roofers, Waterproofers and Allied Workers.

The Roofing contractor must ensure that all mechanics or applicators involved with the application of heat welded modified bitumens are properly trained not only in application and equipment handling, but safety measures. The contractor should verify that all roofing applicators involved with open flame application maintain and carry a valid Certified Roofing Torch Applicator ("CERTA") card as evidence of proper training. Further, the general contractor, jobsite superintendents and the building owner or its representative must also be knowledgeable and/or advised of the proper and necessary safety precautions applicable to heat welded roofing products.

All mechanics or applicators must carry, review, understand and adhere to the safety information and guidelines contained in "Torch Applied/Do's and Don'ts" as published and supplied by the Asphalt Roofing Manufacturers Association ("ARMA") which may be supplemented or amended, as well as the ARMA/NRCA "Guide to Torch Safety on Modified Bitumen" video tape. These are available from ARMA at: ARMA, 4041 Powder Mill Road, Ste. 404, Calverton, Maryland 20705-3016 (Ph. 301-348-2002). Do not begin application procedure until you read and fully understand these safety procedures and installation practices.

Johns Manville International, Inc. does not supervise building owners, contractors, mechanics or any other person in the application of heat welded applied modified bitumens and assumes no responsibility for fire damage or any other damages.

LIMITED WARRANTY/SPECIFICATIONS
All products sold are subject to the following limited warranty: Seller warrants that for a period of one year from the date of shipment the product will be free from defects in material and workmanship and is manufactured in all material respects to Seller's product specifications. Note: Seller's products may vary in details of design and construction from descriptions in any literature or from any sample, display or other model inspected by Purchaser.

SELLER DISCLAIMS ALL OTHER REPRESENTATIONS AND WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, IN FACT OR IN LAW, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Every claim under this limited warranty shall be deemed waived unless in writing and received by Seller within 10 days of delivery if visibly damaged or defective, and, otherwise, within 30 days after the defect to which each claim relates is discovered, or should have been discovered, but in no event longer than 1 year after product shipment.

LIMITATION OF REMEDY
PURCHASER'S EXCLUSIVE REMEDY AND THE LIMIT OF SELLER'S LIABILITY FOR BREACH OF THE LIMITED WARRANTY SET FORTH IN THE ABOVE LIMITED WARRANTY/SPECIFICATIONS, WHETHER BASED ON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER THEORY, SHALL BE, AT SELLER'S OPTION, REPAIR, REPLACEMENT WITH A LIKE QUANTITY OF NON-DEFECTIVE PRODUCT OR REFUND OF THE PURCHASE PRICE, PLUS REASONABLE COMMERCIAL CHARGES INCURRED FOR APPROVED RETURNS.

NO RECOVERY OF CONSEQUENTIAL OR SPECIAL DAMAGES
SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR SPECIAL DAMAGES BASED ON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER THEORY, FOR FAILURE TO PERFORM ITS OBLIGATIONS UNDER THIS AGREEMENT. ADDITIONALLY, CONSEQUENTIAL AND SPECIAL DAMAGES SHALL NOT BE RECOVERABLE EVEN IF THE REPAIR, REPLACEMENT OR REFUND REMEDY FOR SELLER'S BREACH OF ITS LIMITED WARRANTY FAILS OF ITS ESSENTIAL PURPOSE OR FOR ANY OTHER REASON.

For additional sales and product information, contact the Johns Manville Regional Office nearest you.

NORTHEASTERN
437 Atlantic Avenue
Berlin, NJ 08009-9700
609.768.7003
FAX: 609.768.7034
For Technical Services Information
800.345.9603

SOUTHEASTERN
3901 Roswell Road,
Suite 215
Marietta, GA 30062
770.578.3190
FAX: 770.578.3195
For Technical Services Information
800.633.8594

MIDWESTERN
2151 W. Channahon Road
Rockdale, IL 60436-8559
815.744.1545
FAX: 815.741.6131
For Technical Services Information
800.231.1064

SOUTHWESTERN
P.O. Box 9069
Fort Worth, TX 76147-2069
817.339.1500
FAX: 817.339.1540
For Technical Services Information
800.654.0071

WESTERN
3rd & Harbor Streets
Pittsburg, CA 94565
925.432.6426
FAX: 925.427.2409
For Technical Services Information
800.922.5922

Canadian Customer Service
Write to:
27 Pearl Street
Portland, ME 04101
877.766.3295
(877 Roof By JM)
FAX: 800.343.1331

For Guarantee Information
Guarantee Services Department
P.O. Box 625001
Littleton, CO 80162-5001
303.978.2191
FAX: 303.978.2808

For bilingual and international assistance, please call:
Yolanda Griepentrog
303.978.4655 or
FAX: 303.978.3904

Product Information Center
800.654.3103
303.978.2318 (FAX)

Additional Information:
FAX Express® 888.329.3977
www.jm.com

Johns Manville

Roofing Systems Group
717 17th Street
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Health and Safety
Johns Manville maintains Material Safety Data Sheets (MSDS) for all of its products. These MSDS contain health and safety information for development of appropriate product handling procedures to protect your employees and customers. These MSDS are available and should be read and understood by all personnel using and handling these materials.

The physical and chemical properties of the products described herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Consult a Johns Manville Regional Office to assure current information.

ENRGY™ 3 Roof Insulation

Description

ENRGY 3 is a rigid roof insulation board composed of a closed cell polyisocyanurate foam core bonded in the foaming process to universal fiber glass reinforced facers.

ENRGY 3 utilizes an environmentally compliant blowing agent containing pentane hydrocarbon to enhance the thermal performance of the foam insulation. This hydrocarbon has zero ozone depletion potential and conforms to the Montreal Protocol established in 1987.

ENRGY 3 meets the physical property requirements of ASTM C 1289-01 Type II, Class I, Grade 2 and CAN/ULC S 704. ENRGY 3 specialty products are also available as tapered panels, pre-cut miters and pre-cut crickets.

Use

ENRGY 3 provides high thermal insulation value over metal, nailable, and non-nailable roof decks in built-up, modified bitumen and single ply membrane roofing systems. It may be applied using hot bitumen, cold adhesives or mechanical fasteners. The universal facer on the top and bottom side provide a suitable surface for mechanical attachment to a structural deck as well as a suitable surface to apply hot asphalt or cold adhesives. ENRGY 3 has been rated in Factory Mutual 1A-60 and 1A-90 fire and wind-resistant systems for BUR, modified bitumen and single ply systems in specific constructions. It has been classified by Underwriters Laboratories, Inc. as an approved roof insulation in numerous Class A roof constructions and Roof/Ceiling hourly fire-rated assemblies, and is classified by Underwriters Laboratories Canada.

JM also supports NRCA Bulletin #9 in recommending that a cover board of Fesco Board, Fiber Glass Roof Insulation or ½" Retro-Fit Board be installed over foam insulations in hot membrane systems.

Advantages

- High thermal efficiency
- Universal facer that is compatible with BUR, modified bitumen and single ply membrane systems
- Complies with EPA, CEPA and Montreal Protocol requirements
- Meets Clean Air Act Amendments of 1990

Typical Physical Properties

	Values	Test Method
Water Absorption	<3.5%	ASTM D 2842
Dimensional Stability Change	<2%	ASTM D 2126
Compression Resistance* 10% Consolidation-psi (kPa)	20 (138) min.	ASTM D 1621
Moisture Vapor Permeance	<1 perm (57.5 ng/(Pa•s•m²)	ASTM E 96
Service Temperature	-100 to 200°F (-73° to 93°C)	
Tensile Strength-psf (kPa)	730 (35) nom.	ASTM D 1623

*Also available in 25 psi (172 kPa).

For Use Over Metal Decks

The minimum thicknesses of ENRGY 3 insulation over metal decks are as follows:

Width of Rib Opening	Up to 2⅝" (67 mm)	Up to 3⅜" (86 mm)	Up to 4⅜" (111 mm)
Thickness of Insulation (Minimum)	1.0" (25 mm)	1.2" (30 mm)	1.3" (33 mm)

Sizes

ENRGY 3 is available in 4' x 4' (1.22 m x 1.22 m) or 4' x 8' (1.22 m x 2.44 m) boards (other sizes available by special request) and in thicknesses of 1.0" (25 mm) to 4.0" (102 mm). Some sizes are special order with minimum order quantities. Contact your JM Sales Representative for details.

Thermal Performance

Thickness (nom.) in	mm	C-Value (Conductance) BTU/(hr·ft²·°F)	W/m²·°C	R-Value (Resistance) (hr·ft²·°F)/BTU	m²·°C/W
1.0	25	.167	0.95	6.0	1.05
1.5	38	.111	0.63	9.0	1.59
1.6	41	.104	0.59	9.6	1.70
1.7	43	.098	0.55	10.3	1.81
1.8	46	.092	0.52	10.9	1.92
2.0	51	.082	0.47	12.1	2.14
2.3	58	.071	0.41	14.0	2.47
2.5	64	.063	0.37	15.3	2.69
2.7	69	.060	0.34	16.6	2.92
3.0	76	.054	0.31	18.5	3.26
3.2	81	.051	0.29	19.8	3.49
3.3	84	.049	0.28	20.4	3.60
3.4	86	.047	0.27	21.1	3.71
3.6	91	.045	0.25	22.4	3.94
3.8	97	.042	0.24	23.7	4.17
4.0	102	.040	0.23	25.0	4.40

*Long Term Thermal Resistance (LTTR)

*The Long Term Thermal Resistance (LTTR) values were determined in accordance with CAN/ULC S 770.

The ultimate R-Value of these products will depend on individual installation circumstances.

Refer to the Material Safety Data Sheet and Product Label prior to using this product.

RS-5137 12-02 (Replaces 7-02)

Section 1 - Chemical Product and Company Identification

Product Name Polyisocyanurate Foam Insulation
CAS# None Assigned
Generic Name Insulation (Polyisocyanurate Foam)
Formula Polymer
Chemical Name: Proprietary
Hazard Label RSD-003

Manufacturer Information

Johns Manville
Roofing Systems Group
P.O. Box 5108
Denver, CO 80127

Telephone: 303-978-2000
Internet Address: http://www.jm.com
Emergency: 800-424-9300 (Chemtrec)

Trade Names: DuraFoam™; E'NRG'Y 2; Fesco Foam; ISO-1; Tapered E'NRG'Y 2; Tapered Fesco Foam; Tapered ISO-1

Section 2 - Composition / Information on Ingredients

CAS #	Component	Percent
Not Available	Fesco perlite board*	25-75
Not Available	Polyisocyanurate foam	10-90
Not Available	Paper Facing**	0-30
Not Available	Foil Facing**	0-30
65997-17-3	Continuous filament glass fibers***	***

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Glass filaments.

Additional Component Information

* Component of Fesco Foam products.
** Facings, if present, are either paper or foil.
*** Reinforcement in paper facing.

Section 3 - Hazards Identification

Emergency Overview

APPEARANCE AND ODOR: Yellow or tan foam board faced with black, reinforced paper, foil, or perlite board; no significant odor.

Under normal conditions of use, this product is not expected to create any unusual emergency hazards.

Inhalation of excessive amounts of dust from the product may cause temporary upper respiratory irritation and/or congestion--remove affected individuals to fresh air.

Skin irritation may be treated by gently washing affected area with soap and warm water.

Eye irritation may be treated by flushing eyes with large amounts of water. If irritation persists, contact a physician.

In the event of fire, use normal fire fighting procedures to prevent inhalation of smoke and gases.

Product is combustible. Burning product may produce thick black smoke.

Potential Health Effects

Summary

Breathing dust from this product may cause a scratchy throat, congestion, and slight coughing. Getting dust or fibers on the skin, or in the eyes may cause itching, rash, or redness. Due to the physical properties of the continuous filament containing products, the fibers cannot be carried into the lower lung passages when inhaled. Therefore, the inhalation hazard is limited to irritation of the upper respiratory tract (nose, throat, upper airways).

Inhalation

Irritation of the upper respiratory tract (scratchy throat), coughing, and congestion may occur in extreme exposures.

Skin

Temporary irritation (itching) or redness may occur.

Absorption

Not applicable

Ingestion

This product is not intended to be ingested or eaten under normal conditions of use. If ingested, it may cause temporary irritation to the gastrointestinal (GI) tract, especially the stomach.

Eyes

Temporary irritation (itching) or redness may occur.

Target Organs

Upper respiratory passages, lungs, skin, eyes.

Primary Routes of Entry (Exposure)

Inhalation (breathing dust), skin, and eye contact.

Medical Conditions Aggravated by Exposure

Pre-existing chronic respiratory, skin, or eye diseases or conditions.

Section 4 - First Aid Measures

First Aid: Inhalation

Remove to fresh air. Drink water to clear throat, and blow nose to remove dust.

First Aid: Skin

Wash gently with soap and warm water to remove dust and fibers. Wash hands before eating or using the restroom.

First Aid: Ingestion

Product is not intended to be ingested or eaten. If this product is ingested, irritation of the gastrointestinal (GI) tract may occur, and should be treated symptomatically. Rinse mouth with water to remove material or dust, and drink plenty of water to help reduce the irritation. No chronic effects are expected following ingestion.

First Aid: Eyes

Do not rub or scratch your eyes. Dust particles may cause the eye to be scratched. Flush eyes with large amounts of water for 5-15 minutes. If irritation persists, contact a medical professional.

First Aid: Notes to Physician

This product is a mechanical irritant, and is not expected to produce any chronic health effects from acute exposures. Treatment should be directed toward removing the source of irritation with symptomatic treatment as necessary.

Section 5 - Fire Fighting Measures

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not applicable
Lower Flammable Limit (LFL): Not applicable
Auto Ignition: Not determined
Flammability Classification: Not determined
Rate of Burning: Not determined

General Fire Hazards

Product is combustible. Avoid direct contact with flame.

Hazardous Combustion Products

Burning foam may emit thick, black smoke.

Extinguishing Media

Carbon dioxide (CO_2), water, water fog, dry chemical.

Fire Fighting Equipment/Instructions

Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing. Firefighters should avoid inhaling any combustion products.

Section 6 - Accidental Release Measures

Containment Procedures

Vacuum dusts. If sweeping is necessary, use a dust suppressant such as water. Do not dry sweep dust accumulation. These procedures will help to minimize potential exposures.

Clean-Up Procedures

Wastes are not hazardous as defined by the Resource Conservation and Recovery Act (RCRA; 40 CFR 261). Comply with state and local regulations for disposal of these products. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the Environmental Protection Agency (EPA).

Section 7 - Handling and Storage

Handling Procedures

Use protective equipment as described in Section 8 of this material safety data sheet when handling uncontained material.

Storage Procedures

Warehouse storage should be in accordance with package directions, if any. Material should be kept dry, and protected from the elements. Eliminate all sources of ignition.

Section 8 - Exposure Controls / Personal Protection

A: Component Exposure Limits

Continuous filament glass fibers* (65997-17-3)**

ACGIH: 1 f/cc TWA for fibers longer than 5 um with a diameter less than 3 um; 5 mg/m3 TWA inhalable particulate; (Listed under 'Synthetic vitreous fibers') (related to Continuous filament glass fibers)

OSHA: 5 mg/m3 TWA respirable fraction (OSHA)
15 mg/m3 TWA total dust (OSHA)
(related to Continuous filament glass fibers)

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Safety glasses with sideshields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation. Barrier creams may also be used to reduce skin contact and irritation caused by fiber glass.

Personal Protective Equipment: Respiratory

A respirator should be used if ventilation is unavailable, or is inadequate for keeping dust and fiber levels below the applicable exposure limits. In those cases, use a NIOSH-certified disposable or reusable particulate respirator with an efficiency rating of N95 or higher (under 42 CFR 84) when working with this product. For exposures up to five times the established exposure limits use a quarter-mask respirator, rated N95 or higher; and for exposures up to ten times the established exposure limits use a half-mask respirator (e.g., MSA's DM-11, Racal's Delta N95, 3M's 8210), rated N95 or higher. Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentrations requiring a higher level of respiratory protection. For exposures up to 50 times the established exposure limits use a full-face respirator, rated N99 or higher.

Ventilation

Local exhaust ventilation should be provided at areas of cutting to remove airborne dust and fibers. General dilution ventilation should be provided as necessary to keep airborne dust and fibers below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

Section 9 - Physical & Chemical Properties

Appearance:	Yellow or tan foam board faced with black, reinforced paper, foil or perlite board	**Odor:**	No significant odor
Physical State:	Solid	**pH:**	Not applicable
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	Not applicable	**Melting Point:**	Not determined
Solubility (H2O):	None	**Specific Gravity:**	0.03
Freezing Point:	Not applicable	**Evaporation Rate:**	Not applicable
Viscosity:	Not applicable	**Percent Volatile:**	Negligible
VOC:	Not applicable		

Section 10 - Chemical Stability & Reactivity Information

Chemical Stability

This is a stable material. This product is not reactive.

Chemical Stability: Conditions to Avoid

Keep away from heat, sparks, or open flame.

Incompatibility

Acetone, methyl ethyl ketone, tetrahydrofuran, chlorine, chloroform, hydrogen peroxide, ethylene dichloride, dimethyl sulfoxide, and dimethyl formamide.

Hazardous Decomposition

The decomposition products from this material are those that would be expected from any organic (carbon-containing) material, and are mainly derived from pyrolysis, or burning, of the resin. These decomposition products may include carbon monoxide, carbon dioxide, carbon particles, and traces of hydrogen cyanide.

Hazardous Polymerization

Will not occur.

Section 11 - Toxicological Information

Acute and Chronic Toxicity

A: General Product Information

Dust from this product is a mechanical irritant, which means that it may cause temporary irritation or scratchiness of the throat, and/or itching of the eyes and skin.

B: Component Analysis - LD50/LC50

No LD50/LC50's are available for this product's components.

Carcinogenicity

A: General Product Information

The Occupational Safety and Health Administration (OSHA), National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), and American Conference of Governmental Industrial Hygienists (ACGIH) have not classified this product in its entirety as a carcinogen.

B: Component Carcinogenicity

Continuous filament glass fibers* (65997-17-3)**

ACGIH: A4 - Not Classifiable as a Human Carcinogen (related to Continuous filament glass fibers)

IARC: Monograph 43, 1988 (related to Glass filaments) (Group 3 (not classifiable))

Chronic Toxicity

Polyisocyanurate Foam: There is no evidence that dust from this material causes disease in man. Although one animal study has reported lung cancer following exposure to high levels of dust, subsequent animal studies have not show that result. Emphysema has been produced in animals following exposure to high levels of dust.

No chronic health effects are known to be associated with exposure to continuous filament fiber glass. Results from epidemiologic studies have not shown any increases in respiratory disease or cancer. The International Agency for Research on Cancer (IARC) has classified continuous filament fiber glass as a Group 3 substance, not classifiable as to its carcinogenicity to humans. Because of the large diameter of continuous filament fibers, these products are not considered respirable.

A detailed listing of references on fiber glass health effects can be found in the publication HSE-64C, "Heath and Safety Aspects of Fiber Glass," which can be downloaded from Johns Manville's internet homepage, www.jm.com (select "Health Safety and Environment").

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information

No data available for this product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

No ecotoxicity data are available for this product's components.

Section 13 - Disposal Considerations

US EPA Waste Number & Descriptions

A: General Product Information

This product is not regulated as a hazardous waste by the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) regulations.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

Section 14 - Transportation Information

US DOT Information

Shipping Name: This product is not classified a hazardous material for transport.

Section 15 - Regulatory Information

US Federal Regulations

A: General Product Information

No information on this product as a whole.

B: Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

A: General Product Information

No information available for the product.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Continuous filament glass fibers***	65997-17-3	No	No	No	Yes	No	No

Other Regulatory Information

A: General Product Information

No information available for the product.

B: TSCA Status

This product and its components are listed on the TSCA 8(b) inventory.

None of the components listed in this product are listed on the TSCA Export Notification 12(b) list.

C: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Continuous filament glass fibers***	65997-17-3	Yes	Yes	Yes

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Section 16 - Other Information

Other Information

Prepared for:
Johns Manville
Roofing Systems Group
P. O. Box 5108
Denver, CO USA 80217-5108

Prepared by:
Johns Manville Technical Center
P.O. Box 625005
Littleton, CO USA 80162-5005

The information herein is presented in good faith and believed to be accurate as of the effective date given. However, no warranty, expressed or implied, is given. It is the buyer's responsibility to ensure that its activities comply with Federal, State or provincial, and local laws.

Date	MSDS #	Reason
08/01/00	3013-1.0000	New MSDS authoring system.
10/31/00	3013-1.0100	LOLI update, minor. Sect. 1 add to trade names: DuraFoam™.

This is the end of MSDS # 3013

DuraBoard™ Roof Insulation

Description

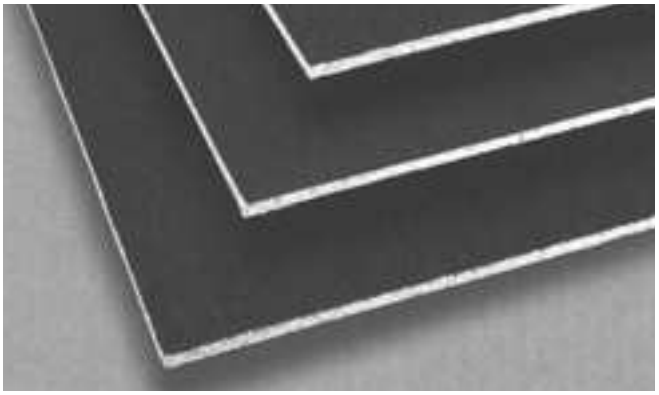
DuraBoard Roof Insulation is a high density, low thermal rigid insulation board, composed primarily of expanded perlite with reinforcing cellulosic fibers and selected binders. The top surface is sealed with a special polymerized asphalt emulsion coating which allows for direct application of SBS or APP membranes using torch application techniques.

Use

DuraBoard Roof Insulation is a general purpose board for use in new and recover applications or over closed cell foam insulations utilizing SBS or APP membrane roofing systems with torch application. Since an APP or SBS membrane can be directly applied to DuraBoard, the base sheet requirement can be eliminated and fastener quantity and labor time reduced.

There are numerous Factory Mutual fire and wind-resistant systems (90 psf to 135 psf ratings) and specific Underwriters Laboratories, Inc. Class A constructions approved with DuraBoard. (Note: 1/2" DuraBoard should not be used directly over steel decks if UL or FM approval is required, and should not be used directly over wood decks without a base sheet underlayment.) DuraBoard also meets the strength requirements of ASTM C 728.

DuraBoard's unique coating does not require pre-heating like heavily coated boards, concrete surfaces or base sheets; therefore, the flame of the application torch should be focused on the membrane roll, and not applied directly to the surface of DuraBoard. This results in fuel savings and labor efficiencies.



DuraBoard is a universal substrate that can be used in hot mopped or cold application systems as well.

Advantages

- Direct application of SBS or APP membranes without base sheet requirement
- Superior fire resistance and durability
- Excellent strength and handleability
- Good dimensional stability
- Labor, fuel and material savings
- Minimum recycled content 25% by weight

Typical Physical Properties

		1/2" Thick (13 mm)	3/4" & 1" Thick (19 & 25 mm)
Water Absorption (ASTM C 209)			
% by Volume - 2 hours		5.5%	3.5%
Compression Resistance (ASTM C 165)			
5% Consolidation	psi	35	50
	(kPa)	241	345
10% Consolidation	psi	75	85
	(kPa)	517	586
Laminar Tensile Strength (ASTM C 209)			
	psi	10 min.	7 min.
	(kPa)	69	48
Flexural Strength, psi (ASTM C 203)			
	psi	125	90
	(kPa)	862	620
Product Density (ASTM C 209)			
	pcf	12.0 nom.	12.0 nom.
	(kg/m³)	192	192
Linear Expansion (ASTM C 209)			
	% max	0.5	0.5

Sizes

DuraBoard is available in 4' x 4' (1.22m x 1.22m) board size and 1/2", 3/4" and 1" (13 mm, 19 mm and 25 mm) thickness.

For Use Over Metal Decks

The minimum thicknesses of DuraBoard Roof Insulation over metal decks are as follows:

Width of Rib Opening	Up to 1 1/2" (38 mm)	Up to 3 1/2" (89 mm)
Min. Thickness of Insulation	1/2" (13 mm)*	3/4" (19 mm)

*For Underwriters and Factory Mutual approved constructions, 1/2" (13 mm) DuraBoard must be used over other approved foam plastic insulation boards in metal deck applications or can be used directly over concrete decks.

Thermal Performance

Thickness		Nominal C-Value (Conductance)		Nominal R-Value (Resistance)	
in	mm	BTU/(hr•ft²•°F)	W/m²•°C	(hr•ft²•°F)/BTU	m²•°C/W
1/2	13	0.83	4.7	1.2	0.21
3/4	19	0.56	3.2	1.8	0.32
1	25	0.44	2.5	2.3	0.41

Refer to the Material Safety Data Sheet and Product Label prior to using this product. For an identical copy of this data sheet ask for RS-5091.

Section 1 - Chemical Product and Company Identification

Product Name Fesco® Roof Insulation
CAS# Mixture/None Assigned
Generic Name Insulation (Perlite)
Formula Mixture
Chemical Name: Mixture
Hazard Label L3002

Manufacturer Information

Johns Manville
Roofing Systems Group
P.O. Box 5108
Denver, CO 80127

Telephone: 303-978-2000
Internet Address: http://www.jm.com
Emergency: 800-424-9300 (Chemtrec)

Trade Names: Cant Board; DuraBoard™; Fes-Cant; Fesco Board; Fesco Board HD; High Density Single Ply Board; Laminator Board; Retro Fit Board; Tapered Cant Strip; Tapered Edge; Tapered Fesco Board

Section 2 - Composition / Information on Ingredients

CAS #	Component	Percent
93763-70-3	Perlite, expanded	35-75
65996-61-4	Cellulose fiber	20-50*
64742-93-4	Asphalt, oxidized	3-20
9005-25-8	Starch	1-11
Not Available	Polymeric latex	0-10**
1344-09-8	Sodium silicate	0-1.0**

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Asphalt (8052-42-4).

Additional Component Information

* Recycled newspring.
** Component of DuraBoard, Fesco Board HD, and High Density Single Ply Board only.

Section 3 - Hazards Identification

Emergency Overview

APPEARANCE AND ODOR: Brown to light brown board.

Under normal conditions of use, this product is not expected to create any unusual emergency hazards.

Inhalation of excessive amounts of dust from the product may cause temporary upper respiratory irritation and/or congestion--remove individual to fresh air.

In the event of fire, use normal fire fighting procedures to prevent inhalation of smoke and gases.

Potential Health Effects

Summary

The primary hazards from this product are due to dust particles released during physical handling or cutting of the material. Breathing dust from this product may cause a scratchy throat, congestion, and slight coughing. Getting dust on the skin, or in the eyes may cause itching, rash, or redness. The asphalt contained in the product has been solidified and will not present a fume hazard.

Inhalation

Irritation of the upper respiratory tract (scratchy throat), coughing, and congestion may occur in extreme exposures.

Skin
Temporary irritation (itching) or redness may occur.

Absorption
Not applicable

Ingestion
Product is not intended to be ingested or eaten under normal conditions of use. If ingested, it may cause temporary irritation to the gastrointestinal (GI) tract, and should be treated symptomatically.

Eyes
Temporary irritation (itching) or redness may occur.

Target Organs
Upper respiratory system, skin, and eyes.

Primary Routes of Entry (Exposure)
Inhalation, skin, and eye contact.

Medical Conditions Aggravated by Exposure
As with any dust, pre-existing upper respiratory, eye and lung diseases or conditions due to the large size of the particles, minimal exposure to airborne dust is expected.

Section 4 - First Aid Measures

First Aid: Inhalation
Remove to fresh air. Drink water to clear throat, and blow nose to remove dust.

First Aid: Skin
Wash gently with soap and warm water to remove dust and fibers. Wash hands before eating or using the restroom.

First Aid: Ingestion
Product is not intended to be ingested or eaten. If this product is ingested, irritation of the gastrointestinal (GI) tract may occur, and should be treated symptomatically. Rinse mouth with water to remove material or dust, and drink plenty of water to help reduce the irritation. No chronic effects are expected following ingestion.

First Aid: Eyes
Do not rub or scratch your eyes. Dust particles may cause the eye to be scratched. Flush eyes with large amounts of water for 5-15 minutes. If irritation persists, contact a medical professional.

First Aid: Notes to Physician
This product is a mechanical irritant, and is not expected to produce any chronic health effects from acute exposures. Treatment should be directed toward removing the source of irritation with symptomatic treatment as necessary.

Section 5 - Fire Fighting Measures

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not determined
Lower Flammable Limit (LFL): Not determined
Auto Ignition: Not determined
Flammability Classification: Not determined
Rate of Burning: Not determined

General Fire Hazards
There is no potential for fire or explosion.

Fire Fighting Equipment/Instructions
No special procedures are expected to be necessary for this product. Normal fire fighting procedures should be followed to avoid inhalation of smoke and gases.

Section 6 - Accidental Release Measures

Containment Procedures
Pick up large pieces. Vacuum dusts. If sweeping is necessary, use a dust suppressant such as water. Do not dry sweep dust accumulation. These procedures will help to minimize potential exposures.

Clean-Up Procedures
Wastes are not hazardous as defined by the Resource Conservation and Recovery Act (RCRA; 40 CFR 261). Comply with state and local regulations for disposal of these products. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the Environmental Protection Agency (EPA).

Section 7 - Handling and Storage

Handling Procedures
Use protective equipment as described in Section 8 of this material safety data sheet when handling uncontained material.

Storage Procedures

Warehouse storage should be in accordance with package directions, if any. Material should be kept dry, and protected from the elements.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Product Information

Protective equipment should be used as necessary to prevent irritation of the throat, eyes, and skin, and to keep exposures below the applicable exposure limits identified in Section 8.

B: Component Exposure Limits

Perlite, expanded (93763-70-3)

ACGIH: 10 mg/m3 TWA (particulate matter containing no asbestos and <1% crystalline silica)
OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Asphalt, oxidized (64742-93-4)

ACGIH: 0.5 mg/m3 TWA (inhalable fraction, as benzene-soluble aerosol) (related to Asphalt (Bitumen) fumes)

Starch (9005-25-8)

ACGIH: 10 mg/m3 TWA
OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Safety glasses with sideshields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves are recommended.

Personal Protective Equipment: Respiratory

A respirator should be used if ventilation is unavailable, or is inadequate for keeping dust and fiber levels below the applicable exposure limits. In those cases, use a NIOSH-certified disposable or reusable particulate respirator with an efficiency rating of N95 or higher (under 42 CFR 84) when working with this product. For exposures up to five times the established exposure limits use a quarter-mask respirator, rated N95 or higher; and for exposures up to ten times the established exposure limits use a half-mask respirator (e.g., MSA's DM-11, Racal's Delta N95, 3M's 8210), rated N95 or higher. Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentrations requiring a higher level of respiratory protection. For exposures up to 50 times the established exposure limits use a full-face respirator, rated N99 or higher.

Ventilation

Local exhaust ventilation should be provided at areas of cutting to remove airborne dust and fibers. General dilution ventilation should be provided as necessary to keep airborne dust and fibers below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Protective equipment should be provided as necessary to prevent irritation to the throat, eyes, and skin, and to keep exposures below the applicable exposure limits.

Section 9 - Physical & Chemical Properties

Appearance:	Brown to light brown board.	**Odor**:	Asphalt odor
Physical State:	solid	**pH:**	Not applicable
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	Not applicable	**Melting Point:**	Not applicable
Solubility (H2O):	Negligible	**Specific Gravity:**	0.2
Freezing Point:	Not determined	**Solids Content**	Not applicable
Evaporation Rate:	Not applicable	**Viscosity:**	Not applicable
Percent Volatile:	Negligible	**VOC:**	Not applicable

Section 10 - Chemical Stability & Reactivity Information

Chemical Stability

This is a stable material.

Hazardous Decomposition
None identified.

Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

Acute Toxicity

A: General Product Information
The dusts and fumes from this product are irritants and may cause transitory irritation to exposed areas such as eyes, skin, and upper respiratory passages.

B: Component Analysis - LD50/LC50
Perlite, expanded (93763-70-3)
Oral LD50 Mouse: 12960 mg/kg

Carcinogenicity

A: General Product Information
The Occupational Safety and Health Administration (OSHA), National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), and American Conference of Governmental Industrial Hygienists (ACGIH) have not classified this product in its entirety as a carcinogen.

B: Component Carcinogenicity
Perlite, expanded (93763-70-3)
ACGIH: A4 - Not Classifiable as a Human Carcinogen

Asphalt, oxidized (64742-93-4)
ACGIH: A4 - Not Classifiable as a Human Carcinogen (as benzene-soluble aerosol) (related to Asphalt (Bitumen) fumes)
IARC: Supplement 7, 1987; Monograph 35, 1985 (related to Bitumens, steam-refined, cracking-residue and air-refined) (Group 3 (not classifiable))

Starch (9005-25-8)
ACGIH: A4 - Not Classifiable as a Human Carcinogen

Chronic Toxicity
Asphalt: in these products, asphalt exists in a physical state and does not impart any special hazard. In 1994, IARC reconfirmed its earlier assessment that studies of workers exposed to asphalt provide inadequate evidence of carcinogenicity. IARC had previously classified asphalt as a Group 3 substance. Animal studies in which high concentrations of asphalt fumes were breathed for extended periods of time did not indicate any cancer effects. Bronchitis and pneumonitis were observed. Two studies where condensed fractions of certain asphalt fume condensates were repeatedly applied to the skin of laboratory animals reported the induction of skin cancers. The asphalt fume condensates collected for these studies were subjected to extremely high temperatures (316°C/601°F) and were heated for seven to ten hours while being continually stirred. This is not typical of any asphalt application. Trace amounts of polynuclear aromatic hydrocarbons (PAHs) may be present in some asphalts and can be generated upon excessive heating, which results in thermal cracking of the asphalt compounds. Some of these PAHs have been identified as having potential carcinogenic and reproductive health effects.

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information
No additional information available.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity
No ecotoxicity data are available for this product's components.

Section 13 - Disposal Considerations

US EPA Waste Number & Descriptions

A: General Product Information
This product, as supplied, is not regulated as a hazardous waste by the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) regulations. Comply with state and local regulations for disposal. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the EPA.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

Section 14 - Transportation Information

US DOT Information

Shipping Name: This product is not classified as a hazardous material for transport.

Section 15 - Regulatory Information

US Federal Regulations

A: General Product Information

No information on this product as a whole.

B: Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

A: General Product Information

No information available for the product.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Perlite, expanded	93763-70-3	No	Yes	Yes	Yes	No	Yes
Asphalt, oxidized ([1]related to Asphalt (petroleum fumes) ([2]related to Asphalt fumes) ([3]related to Asphalt)	64742-93-4	Yes[1]	Yes[2]	Yes[2]	Yes[1]	Yes[2]	Yes[3]
Starch	9005-25-8	No	No	Yes	Yes	No	Yes

Other Regulatory Information

A: General Product Information

No information available for the product.

B: TSCA Status

This product and its components are listed on the TSCA 8(b) inventory.

None of the components listed in this product are listed on the TSCA Export Notification 12(b) list.

C: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Perlite, expanded	93763-70-3	No	Yes	No
Cellulose fiber	65996-61-4	Yes	Yes	Yes
Asphalt, oxidized	64742-93-4	Yes	Yes	Yes
Starch	9005-25-8	Yes	Yes	Yes
Sodium silicate	1344-09-8	Yes	Yes	Yes

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Section 16 - Other Information

Other Information

Prepared for:
Johns Manville
Roofing Systems Group
P. O. Box 5108
Denver, CO USA 80217-5108

Prepared by:
Johns Manville Technical Center
P.O. Box 625005

Littleton, CO USA 80162-5005

The information herein is presented in good faith and believed to be accurate as of the effective date given. However, no warranty, expressed or implied, is given. It is the buyer's responsibility to ensure that its activities comply with Federal, State or provincial, and local laws.

Date	MSDS #	Reason
7/1/00	3002-1.0000	New MSDS Authoring System
10/27/00	3002-1.0100	Sect. 1, Trade names deleted: NordBoard and Sorbents. Deleted crystalline silica & other components (sect. 2) and regulatory information (sect. 8, 11, & 15) for these products.
04/25/02	3002-1.0101	Sect. 1 - added trade names: Fesco Board HD and High Density Single Ply Board. Sect. 2 - CAS# added for latex and perlite. Sect. 8 & 11 - added regulatory info. for latex, perlite, and asphalt.
10/16/02	3002.1.0102	Update Sect. 11: IARC classification of asphalt fume as Group 3 Not classifiable as a human carcinogen.

This is the end of MSDS # 3002

UltraFast® Fasteners and Plates

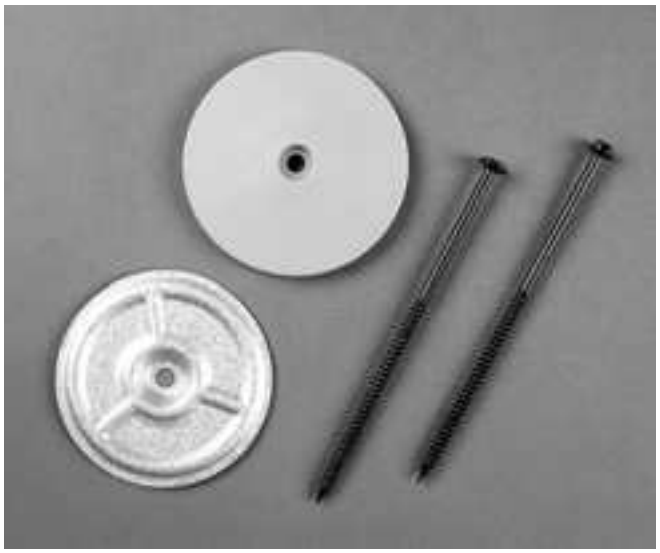
Description

UltraFast® Fasteners are #12 diameter, phillips or hex head fasteners with a modified buttress thread and corrosion resistant coating, exceeding Factory Mutual Approval Standard #4470 corrosion requirements.

The UltraFast® fastener has a nominal 0.22" (5.6 mm) thread diameter, with 12.5 threads per inch (12.5 threads per 25 mm). The UltraFast® Fastener is available with either a #3 phillips head or a 1/4" hex head. The point is designed for quick installation in new or reroof applications.

UltraFast® Locking Plastic Plates are 3" (76 mm) round, high strength polypropylene plates with a special locking feature.

UltraFast® Galvalume Metal Plates are 3" (76 mm) round or square, premium Galvalume metal plates.



Use

UltraFast® Fasteners and Plates are used to attach roof insulation to either 18-22 gauge (1.2 mm - 0.8 mm) metal, or wood decks. The screw and plate system provides positive attachment and resistance to up-lift forces.

UltraFast® Fasteners are approved to install JM roof insulation within any JM Roofing System Guarantee, either penal sum or NDL.

Advantages

- The Buttress thread design provides maximum pullout values and minimizes fastener pullout
- The Locking Plastic Plate prevents fastener pop-up
- UltraFast® Fasteners exceed the corrosion resistance standards of Factory Mutual Approval Standard #4470. UltraFast is also approved for use in Dade County, Florida.

Application

UltraFast® Fasteners shall be installed through UltraFast Metal or Locking Plastic Plates at Factory Mutual usage rates and patterns appropriate for the size and type of insulation.

The fastener must penetrate the metal flange a minimum of 3/4" (19 mm). The fastener is fully seated when the head is tight against the metal plate, or snaps into the UltraFast® Locking Plastic Plates. UltraFast® fasteners should not be overdriven as to cause the plate surface to deflect more than 1/16" (1.6 mm). Overdriven fasteners will significantly reduce fastener and plate performance, possibly damaging the membrane, decrease corrosion resistance and /or strip the deck. Underdriven or overdriven fasteners will not distribute the load over the plate properly. A standard screw gun with a disengaging clutch should be used to install UltraFast® Fasteners.

For steel decks, Factory Mutual requires that the fastener penetrates the deck at the top flange.

Sizes and Packaging

The UltraFast® Fastener is available in the following lengths:

1 5/8" (41 mm)	4 1/2" (114 mm)
2 1/4" (57 mm)	5" (127 mm)
2 7/8" (73 mm)	6" (152 mm)
3 1/4" (83 mm)	7" (178 mm)
3 3/4" (95 mm)	8" (203 mm)

Longer lengths are available.

Packaging: 1000 per box.
1 bit in each box.
Packaging in buckets is available for an additional charge.

Plates are packaged: 1000 per box.

Refer to the Material Safety Data Sheet and Product Label prior to using this product. For an identical copy of this data sheet ask for RS-7099.

Section 1 - Chemical Product and Company Identification

Product Name Roofing Accessories
CAS# Mixture/None Assigned
Generic Name Drains, Vents, Fasteners and Flashings
Formula Article
Chemical Name: Article
Hazard Label None Required

Manufacturer Information

Johns Manville
Roofing Systems Group
P.O. Box 5108
Denver, CO 80127

303-978-2000
http://www.jm.com
800-424-9300 (Chemtrec)

Trade Names: CD-10 Fasteners & Plates; DynaTred and DynaTred Plus Walkway Pads; EPDM Splice Tabs, Uncured; EPDM Strips, Peel and Stick; Expand-O-Flash® Expansion Joint Covers; Expand-O-Flex® Flexible Closure; Expand-O-Gard® Expansion Joints & Transitions; Flex-I-Drain®; FP-10 One Way® Vents; Foil Tape, LWC CR Base Sheet Fasteners; NTB Fasteners; High Load Fasteners and Plates; High Load ASAP Fasteners; Intersections & Transition Details; Presto Lock® Fascia & Coping Systems; Presto Stop™ Systems; Presto-Tite™ Fascia System; PVC Fasteners (Pitch Pocket, Termination Bars); PVC Slipsheets (DN Flameguard, Microfoam, Polyester Mat, Seekure); RetroDrain®; SPM® Fasteners, Bars, Disks, & Plates; UIA Application Cart; UltraFast®: Fasteners & Plates, ASAP Fasteners, Pre-Assembled Fasteners; UltraGard® EPDM Walkway Pads; UltraGard® EPDM Metal/Membrane Flashing; UltraGard® EPDM Membrane Battens; UltraGard® EPDM Termination Systems

Section 2 - Composition / Information on Ingredients

Additional Component Information

The products listed above are articles as so defined under OSHA's Hazard Communication Standard at 29 CFR 1910.1200. Each has an end-use that is dependant upon its shape and design, and will not release or otherwise result in exposure to hazardous chemicals under normal conditions of use.

Section 3 - Hazards Identification

Emergency Overview

APPEARANCE AND ODOR: Various shapes, designs and colors with metal and rubber parts..

Under normal conditions of use, this product is not expected to create any unusual emergency hazards.

In the event of fire, use normal fire fighting procedures to prevent inhalation of smoke and gases.

Potential Health Effects

Summary

The products listed above are articles as so defined by the OSHA Hazard Communication Standard at 29 CFR 1910.1200. Each has an end-use that is dependant upon its shape and design, and will not release or otherwise result in exposure to hazardous chemicals under normal conditions of use. Consequently, no health effects from working with these products are expected to occur. Accessory products such as cements, coatings, and adhesives may contribute hazards to the work area. Review material safety data sheets for accessory products before use.

Inhalation

Not applicable

Skin

Not applicable

Absorption

Not applicable

Ingestion

Not applicable

Eyes
Not applicable

Target Organs
Eyes

Primary Routes of Entry (Exposure)
Eyes

Medical Conditions Aggravated by Exposure
None.

Section 4 - First Aid Measures

First Aid: Inhalation
Not applicable

First Aid: Skin
Not applicable

First Aid: Ingestion
Not applicable

First Aid: Eyes
Not applicable

First Aid: Notes to Physician
None.

Section 5 - Fire Fighting Measures

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not applicable
Lower Flammable Limit (LFL): Not applicable
Auto Ignition: Not determined
Flammability Classification: Not determined
Rate of Burning: Not determined

General Fire Hazards
There is no potential for fire or explosion.

Extinguishing Media
Carbon dioxide (CO2), water, water fog, dry chemical.

Fire Fighting Equipment/Instructions
No special procedures are expected to be necessary for this product. Normal fire fighting procedures should be followed to avoid inhalation of smoke and gases.

Section 6 - Accidental Release Measures

Containment Procedures
Pick up large pieces.

Clean-Up Procedures
Wastes are not hazardous as defined by the Resource Conservation and Recovery Act (RCRA; 40 CFR 261). Comply with state and local regulations for disposal of these products. If you are unsure of the regulations, contact your local Public Health Department, or the local office of the Environmental Protection Agency (EPA).

Section 7 - Handling and Storage

Handling Procedures
No special procedures necessary

Storage Procedures
No special precautions are required.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Product Information
No information available for the product.

B: Component Exposure Limits
This material has no components listed.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face
Not required

Personal Protective Equipment: Skin
Not required

Personal Protective Equipment: Respiratory
No special procedures necessary

Ventilation
No special ventilation systems are required under normal conditions of use.

Personal Protective Equipment: General

Section 9 - Physical & Chemical Properties

Appearance:	Various shapes, designs and colors with metal and rubber parts	**Odor**:	No significant odor
Physical State:	Solid	**pH:**	Not determined
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	Not determined	**Melting Point:**	Not applicable
Solubility (H2O):	Nil	**Specific Gravity:**	Variable
Freezing Point:	Not applicable	**Evaporation Rate**:	Not applicable
Viscosity:	Not applicable	**Percent Volatile:**	0
VOC:	Not applicable		

Section 10 - Chemical Stability & Reactivity Information

Chemical Stability
This is a stable material. This product is not reactive.

Hazardous Decomposition
None.

Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

Acute Toxicity

A: General Product Information
None.

B: Component Analysis - LD50/LC50
This material has no components listed.

Carcinogenicity

A: General Product Information
None identified.

B: Component Carcinogenicity
This material has no components listed.

Chronic Toxicity
None identified.

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information
No data available for this product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity
This material has no components listed.

Section 13 - Disposal Considerations

US EPA Waste Number & Descriptions

A: General Product Information
This product is not regulated as a hazardous waste by the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) regulations.

B: Component Waste Numbers
This material has no components listed.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

Section 14 - Transportation Information

US DOT Information

Shipping Name: Not Regulated for Transport.

Section 15 - Regulatory Information

US Federal Regulations

A: General Product Information

No information available for the product.

B: Component Analysis

This material has no components listed.

State Regulations

A: General Product Information

No information available.

B: Component Analysis - State

This material has no components listed.

Other Regulatory Information

A: General Product Information

All of the components in this product are listed in Toxic Substances Control Act Inventory (TSCA 8(b)).

B: TSCA Status

This material has no components listed.

Component Analysis - WHMIS IDL

This material has no components listed.

WHMIS Classification

Canada Environmental Protection Act Domestic Substance List (Section 25 (1) DSL): All components of product are listed.

Section 16 - Other Information

Other Information

Prepared for:
Johns Manville
Roofing Systems Group
P. O. Box 5108
Denver, CO USA 80217-5108

Prepared by:
Johns Manville Technical Center
P.O. Box 625005
Littleton, CO USA 80162-5005

The information herein is presented in good faith and believed to be accurate as of the effective date given. However, no warranty, expressed or implied, is given. It is the buyer's responsibility to ensure that its activities comply with Federal, State or provincial, and local laws.

Date	MSDS #	Reason
08/01/00	3201-1.0000	New MSDS authoring system.
10/26/00	3201-1.0001	Sect. 1, Trade Names: added 'EPDM Strips, Peel and Stick'
02/27/02	3201-1.0002	Sect. 1 Trade Names, added UIA Application Cart.

This is the end of MSDS 3201.

Steel new or Concrete new or recover: Min 1.5 in. (38 mm) thick ENRGY 2, or ENRGY 3 roof insulation is placed loose over the deck and covered with min 1 /2 in. (13 mm) thick DuraBoard secured to deck with fasteners and plates at a max contributory area per fastener of 2 sq ft (0.2 sq m). Meets Class 1-90.

SBS MODIFIED BITUMEN SYSTEMS

Class A

Deck: C-15/32 **Incline:** 1/2

Insulation (Optional): — Any thickness, one or more layers, "Fesco-Foam", "DuraBoard", "ISO 1", "ENRGY-2" “ENRGY-3, hot mopped or mechanically fastened. All insulation joints offset from plywood deck joints, 6 in. min.

Base Sheet: — One or more plies Type G1 or "GlasPly IV" or "GlasPly Premier" or Type G2 "PermaPly 28", "GlasBase" or "Ventsulation", "DynaPly" or "DynaBase" (SBS modified bitumen), hot mopped or "DynaWeld Base", heat welded.

Membrane: — "DynaKap FR", "DynaGlas 30 FR", "DynaLastic 180FR", "DynaMax FR", "DynaLastic 250FR" or "DynaGlas FR" (SBS modified bitumen), hot mopped, or "DynaWeld Cap", heat welded.

Fastener Placement

4 x 8 Ft. (1.2 x 2.4 m) Boards

Factory Mutual Fastener Density
4′ x 8′ Board

- Choose the density required by the FM Approval Guide.
- Diagram shows number of fasteners required per board in field, perimeter (field + 50%) and corner (field + 75%).

1 Fastener per 1.33 Sq. Ft.

Field	Perimeter	Corner
24 Fasteners/Bd	**36** Fasteners/Bd	**42** Fasteners/Bd

1 Fastener per 1.45 Sq. Ft.

Field	Perimeter	Corner
22 Fasteners/Bd	**33** Fasteners/Bd	**39** Fasteners/Bd

1 Fastener per 2 Sq. Ft.

Field	Perimeter	Corner
16 Fasteners/Bd	**24** Fasteners/Bd	**28** Fasteners/Bd

1 Fastener per 2.67 Sq. Ft.

Field	Perimeter	Corner
12 Fasteners/Bd	**18** Fasteners/Bd	**21** Fasteners/Bd

1 Fastener per 2.9 Sq. Ft.

Field	Perimeter	Corner
11 Fasteners/Bd	**18** Fasteners/Bd	**20** Fasteners/Bd

1 Fastener per 3.2 Sq. Ft.

Field	Perimeter	Corner
10 Fasteners/Bd	**15** Fasteners/Bd	**18** Fasteners/Bd

1 Fastener per 4 Sq. Ft.

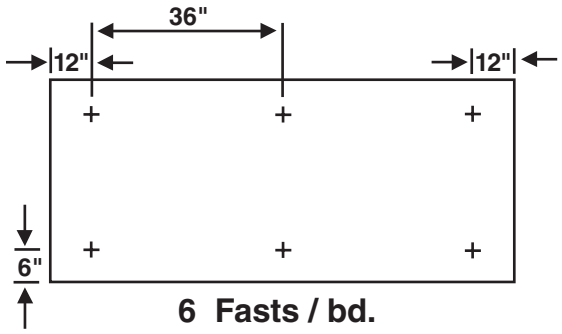
Field	Perimeter	Corner
8 Fasteners/Bd	**12** Fasteners/Bd	**14** Fasteners/Bd

1 Fastener per 5.33 Sq. Ft.

Field	Perimeter	Corner
6 Fasteners/Bd	**9** Fasteners/Bd	**11** Fasteners/Bd

Fastener Placement

4 x 8 Ft. (1.2 x 2.4 m) Boards



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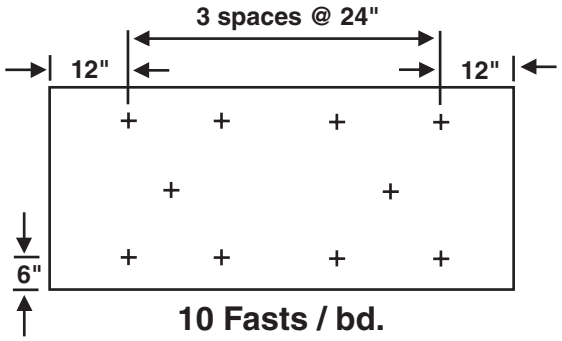

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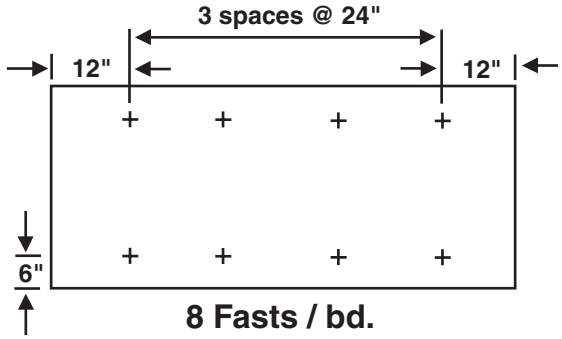

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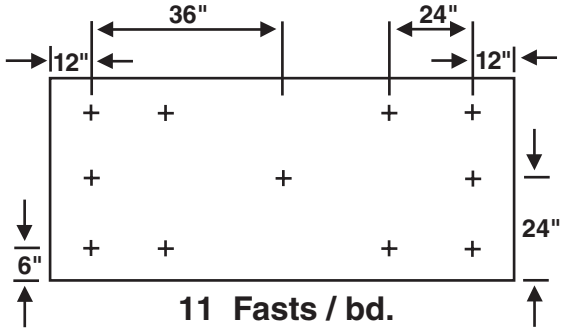

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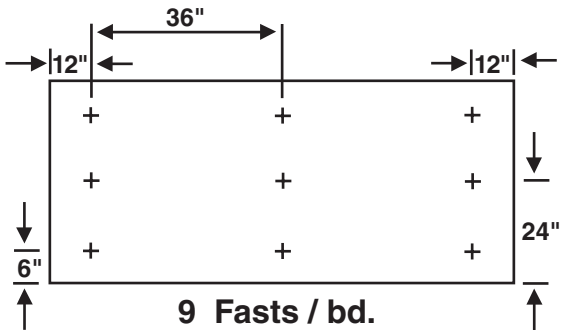

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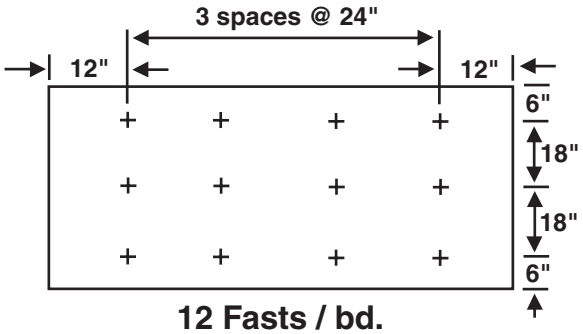

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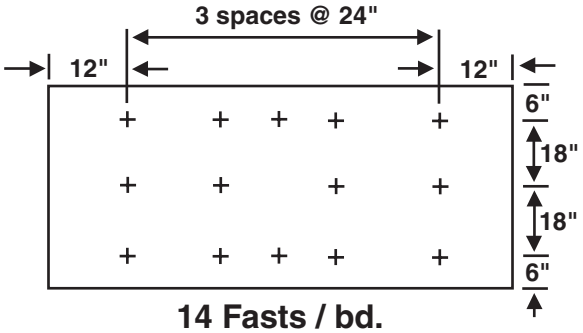

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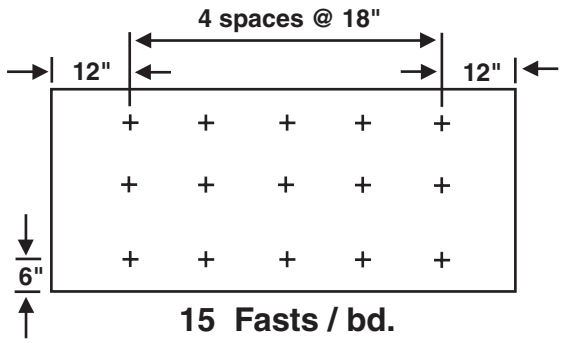
Fastener Placement

4 x 8 Ft. (1.2 x 2.4 m) Boards Continued



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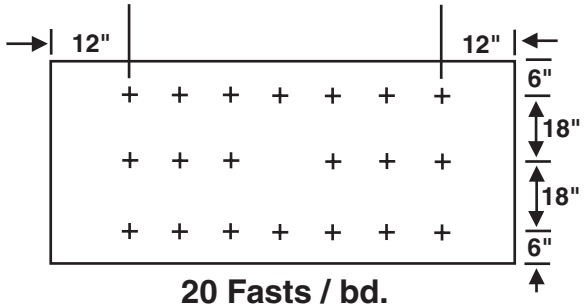

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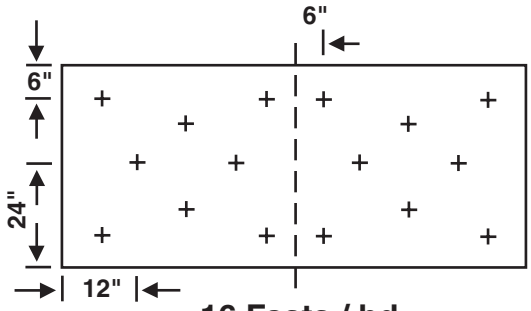

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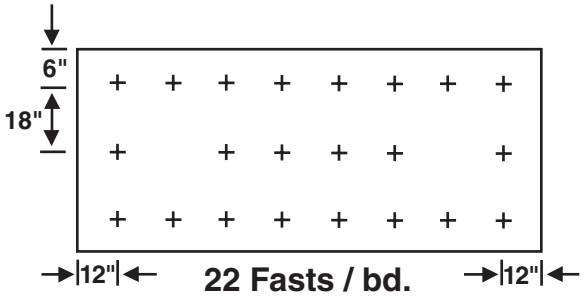

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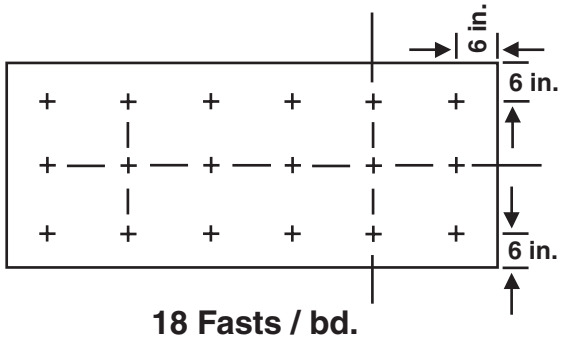

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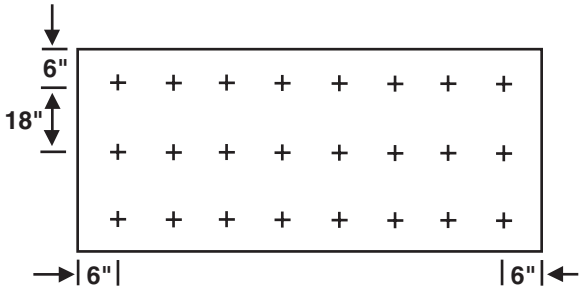
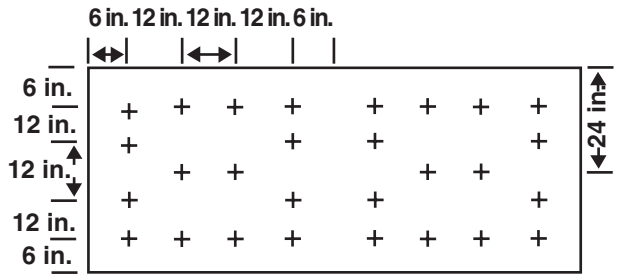


24 Fasts / bd.

Fastener Placement

4 x 8 Ft. (1.2 x 2.4 m) Boards Continued



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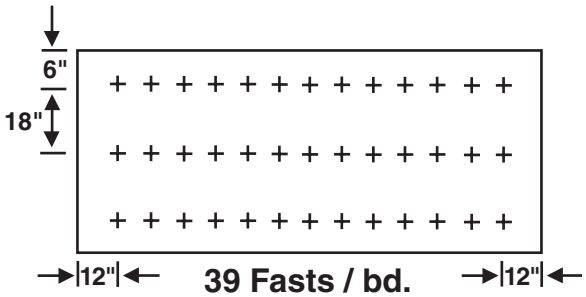

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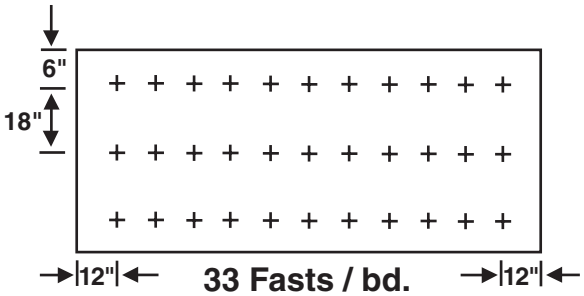

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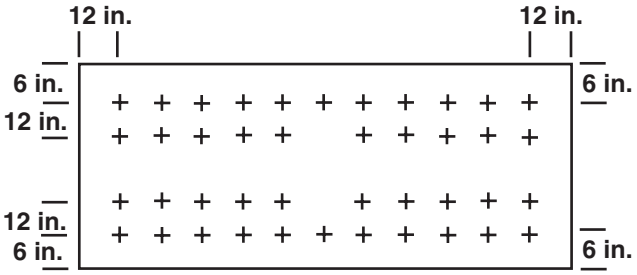

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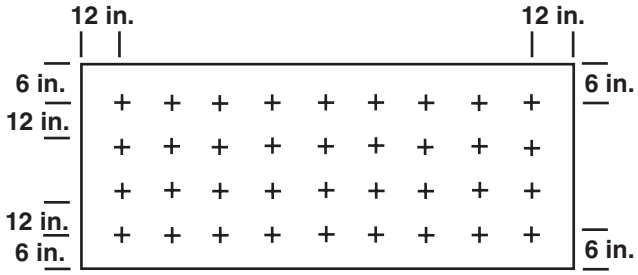

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