INSULFOAM
A CARLISLE COMPANY

Engineered Insulation

INSULROOF R-TECH®

Roofing Starts With Insulfoam

Roofing Product Manual

A Comprehensive Guide

Nationwide Manufacturing ▪ Toll Free: (800) 248-5995 ▪ www.Insulfoam.com

INSULATION ENGINEERED TO MAKE A DIFFERENCE.

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General Information

This manual has been prepared by Insulfoam, a division of Carlisle Construction Materials, for architects, engineers, roof consultants, building owners and roofing contractors, as a reference guide for designing, selecting and constructing roofing systems that utilize Insulfoam roofing products. However, Insulfoam believes that the design and construction of the building that receives these products are best left to the owner, the owner's design representatives and/or the contractor. Prior to selecting or installing a particular roof system, the user should become familiar with all the relevant material in this manual.

Many factors can impact the performance of a roof. Workmanship is as important as the use of quality materials and the proper design of the roof system. The recommendations contained in this manual cannot substitute for the knowledge, skill and experience of a qualified professional roofing contractor or the design expertise of architects and engineers.

This manual cannot address or anticipate every feature of a particular roofing system or the incorporation of alternate or new products, roof decks or building designs. If an unusual condition, which is not explained in this manual, is encountered, contact your local Insulfoam representative or the Insulfoam Technical Center.

Many roof membrane manufacturers have specific restrictions or limitations (technical and/or regional) on the use of roof components in assemblies for which they offer a warranty. All technical and regional recommendations in this manual must be confirmed with the roof membrane manufacturer when a roof system warranty is required.

Consideration must be given to the interaction (chemical and physical compatibility) of the various roof system components with each other and the substrates and decking materials on which they will be installed. When designing a roof system, architects and engineers must ensure that they are familiar with the limitations and characteristics of the specified components.

Statement of Policy

INSULFOAM MANUFACTURES ROOF INSULATION AND SHEATHING MATERIALS. WE DO NOT PRACTICE ARCHITECTURE OR ENGINEERING. THE ROOF INSULATION AND SHEATHING SYSTEMS IN THIS MANUAL WILL PROVIDE SATISFACTORY INSTALLATIONS WHEN PROPERLY APPLIED. INSULFOAM IMPLIES NO WARRANTIES WHATSOEVER.

Insulfoam is not responsible for and will not accept, under any circumstances, any responsibility for the adequacy of a building design, INCLUDING ADEQUACY OF ANY STRUCTURE SUPPORTING THE WEIGHT OF ANY ROOF SYSTEM. Review of plans and specifications by an Insulfoam representative shall be for the sole purpose of making suggestions or recommendations concerning details for the application of InsulFoam and R-Tech insulations and sheathings. Under no circumstances will Insulfoam be responsible for any failure of the roofing system due to structural defects, damage from other building trades or for failure due to errors in design of any building element.

Because all the factors creating uncharacteristic wind conditions on a roof cannot be predicted, Insulfoam does not accept wind damage liability. The information and specifications contained in this manual are based on manufacturing knowledge, extensive field experience and continuous research. The insulation and sheathing systems are intended for use under typical or normal conditions. If unusual conditions are encountered, contact your local Insulfoam representative or the Insulfoam Technical Center for alternative methods of attachment. Insulfoam does not assume responsibility for decisions as to when and where vapor retarder systems or special attachment procedures are advisable. When such decisions are factors, the recommendations and procedures outlined in this manual are to be used as guidelines only, and shall not be taken as an express or implied warranty to fit a particular purpose, WHICH INSULFOAM EXPRESSLY DISCLAIMS.

All information and specifications contained in this manual supersede all prior data published by Insulfoam on this subject. We reserve the right to change or modify the contents of this manual at our discretion, without prior notification. Refer to for the most current version of this manual.

The physical properties and characteristics of Insulfoam's roofing insulations, sheathings and roof accessories, as published in this manual, represent average values obtained in accordance with accepted test methods conducted under controlled laboratory test conditions. They are subject to normal manufacturing variations and could change without notice. Check with your Insulfoam representative to ensure that you are using the most current information.

Material Safety Data Sheets

Insulfoam develops and maintains Material Safety Data Sheets (MSDS) for all of its products. These MSDS contain health and safety information regarding the appropriate product handling procedures that will protect the users of our products.

These MSDS are available through the Insulfoam website, or from your local Insulfoam representative, and should be read and understood by everyone involved in specifying, using and/or handling the products.

Additional Resources

For more on Roof Decks, Roof Membranes, detailed Insulation Specifications, and other information, please visit www.Insulfoam.com.

Introduction

Insulfoam has created this manual to help you select the right product for your roofing system from our diverse line of Insul-Foam® and R-Tech® brand expanded polystyrene (EPS) roof insulations and sheathings. Our product offering includes flat and tapered insulations, composite insulations (InsulFoam laminated to assorted utility boards) and Insulfoam's specialty roofing products – InsulFoam SP, InsulFoam HD Composite, R-Tech and R-Tech Fanfold Roof Underlayment.

About Insulfoam

Insulfoam, a division of Carlisle Construction Materials (hereafter, Insulfoam) headquartered in Washington, is the largest manufacturer of block-molded expanded polystyrene in the United States, with manufacturing locations throughout the country. Insulfoam provides products for commercial, industrial and residential roofing, wall/sheathing systems, OEM garage door manufacturers, foundation and slab insulation and numerous other building system and geofoam applications. Insulfoam's growth over the years has been accomplished by establishing diversified, state-of-the-industry regional manufacturing facilities and by offering one of the highest levels of customer service in the industry. Additional information can be found at *www.Insulfoam.com*.

Insulfoam is strategically aligned with major membrane manufacturers that provide total system warranties.

The Obvious Choice

Experience Insulfoam has been manufacturing quality roofing products for over 40 years. Our product line and service capabilities allow us to meet the insulation and sheathing needs of today's commercial, industrial and residential roofing markets virtually anywhere in the United States.

Technical Support The Insulfoam product line is supported by one of the most comprehensive technical facilities in the industry. Located in Prior Lake, Minnesota, the Insulfoam Technical Center uses its state-of-the-art facility, along with a cadre of independent and allied partner-company laboratories, to identify new product opportunities and to solve roofing problems before they happen. Insulfoam is recognized as the leader in the expanded polystyrene industry for new product development and quality product offerings.

Selling Organization Insulfoam employs a team of experienced Territory Managers (Sales Representatives) located throughout the United States to service the roofing trade. In addition, Insulfoam has a team of tapered roofin g technicians who provide comprehensive tapered insulation layouts for use with virtually any roof system. These two teams are available to provide information and solutions for roofing contractors, building owners and designers. Please contact the Insulfoam location nearest you for the name and contact information of the tapered technician or Territory Manager.

How To Reach Us

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Toll Free 800.248.5995
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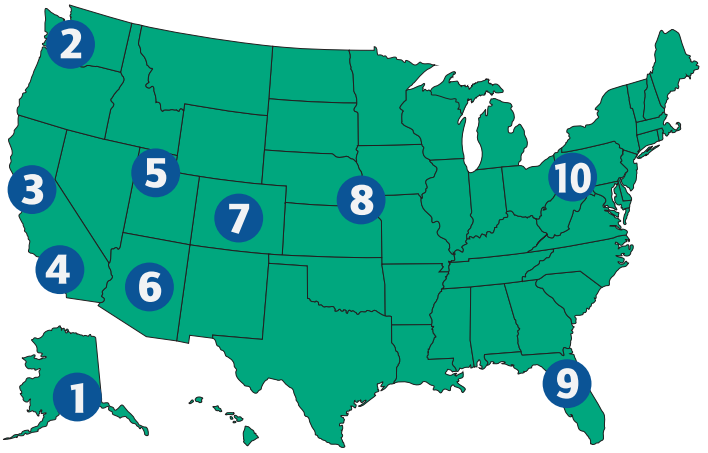


Insulfoam Locations

1. Anchorage, AK
   907.279.9407
2. Puyallup, WA
   800.775.9424
3. Dixon, CA
   707.678.6900
4. Chino, CA
   800.472.4291
5. Tooele, UT
   800.735.4621
6. Phoenix, AZ
   800.437.4437
7. Aurora, CO
   800.735.4621
8. Mead, NE
   800.228.4412
9. Lakeland, FL
   800.242.8879
10. Smithfield, PA
    855.207.0087

About Expanded Polystyrene Insulation

At the core of every InsulFoam and R-Tech product is a state-of-the-art expanded polystyrene, foamed-plastic insulation core. Its unique closed-cell structure provides remarkable physical and thermal properties. While lightweight and resilient, it is also capable of supporting virtually any of the loads typically encountered on a roof. This material has long-term, non-degenerative thermal properties (R-Value), excellent moisture resistance and dimensional stability. It is compatible with virtually every commercial, low-slope roofing system offered, with only a few exceptions.

Styrene is the primary ingredient used in the production of InsulFoam and R-Tech insulations. Styrene (styrene monomer) is a derivative of both crude oil and natural gas processes. The styrene is polymerized to form polystyrene. Expandable polystyrene resin is processed in a molten state into which a pentane blowing agent is introduced and formed into tiny spheres, similar in size to beach sand. With steam, these miniature beads expand up to 40 times their original resin size. The expanded beads are stabilized in curing bins, fused into billets or blocks in a block mold, and cut into roof insulation and sheathing boards of various thicknesses, sizes and tapers. Typical roof insulations are manufactured to a nominal density of 1.25 pounds per cubic foot; however, products may be ordered in nominal densities ranging from 1 to 3 pounds per cubic foot.

Energy Efficiency The escalating price of petroleum and natural gas continues to make energy consumption and conservation a critical issue for building owners and designers. Typically, the initial or design R-Value of an insulation product is the primary factor in determining which product to use. Some insulations exhibit a phenomenon known as thermal drift. This is a result of diffusion or dilution of the blowing agent (a gas that has high resistance to heat flow) in the insulation's cells. Some insulations will lose up to 30% of their initial insulation capability over the design life. InsulFoam and R-Tech products do not use these blowing agents for insulating purposes, and therefore do not exhibit this degradation. The products provide the same consistent and reliable thermal performance after 60 days, one year or twenty years, as they did on the day they were purchased. Designers should request the specific thermal design value from the manufacturer and not rely on general, typical or average R-Value tables found in most manufacturers' literature. Additional factors to be considered in a design are roof components that can cause thermal shorts or bridging, air infiltration, as well as unique construction details and quality of workmanship. Each of these factors can have a significant impact on the thermal performance of the roof assembly.

Environmental Issues Another issue facing the building design and construction industry is the impact a product will have on the environment. While many products are marketed as green or environmentally friendly, it is difficult for the owner and designer to determine the real impact of a given product. The designer should consider the long-term characteristics of the insulation, its thermal resistance, initial recycled material content, recyclability after the system's life-cycle, and the re-usability in the next roof system. Some insulations contain ozone-depleting gases, CFCs (chlorofluorocarbons) or HCFCs (hydro-chlorofluorocarbons). InsulFoam and R-Tech products have never contained these chemicals. Manufacturers of products that contained these gases were forced to re-formulate their products several times in the past decade, and as a result, the thermal and physical product properties have changed dramatically. Today, of these products employ the same family of blowing agents that have been used in InsulFoam and R-Tech since their origin. However, while the chemistry used to make these Insulfoam products is tried and true, the alternative insulations have limited track records.

For more information regarding the environmental characteristics of expanded polystyrene insulation, visit *www.buildinggreen.com*. This is the website of the publishers of the Environmental Building News, the developers of GreenSpec®, a data-base of environmental data of thousands of products.

Introduction

Insulfoam, the nation's largest expanded polystyrene (EPS) block-molder offers one of the broadest roof insulation product lines in the industry. With manufacturing locations throughout the United States, Insulfoam is able to meet the insulation needs of virtually any roofing project. Insulfoam is the obvious choice.

The Insulfoam Advantage!

Proven Performer – manufactured for more than 50 years using the same basic chemistry.

Stable R-Value – no thermal drift; eligible for a 20-year thermal-performance warranty.

Environmentally Friendly – made with recycled materials and includes no formaldehyde or ozone-depleting CFCs or HCFCs; InsulFoam products are 100% recyclable.

Water-Resistant – does not readily absorb moisture from the environment; does not promote migration of moisture.

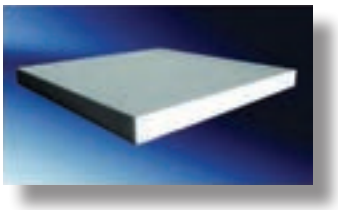
Code & System Approved – InsulFoam is recognized by ICC-ES, has numerous UL and FM approvals, and is accepted by most major membrane manufacturers.

The entire InsulFoam family of roofing products is well suited for single ply roof applications employing mechanically fastened or ballasted TPO, PVC, EPDM and CSPE as well as BUR, modified bitumen or fully adhered single ply systems utilizing a cover board.

PRODUCT SUMMARY

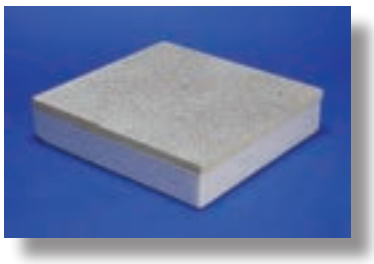
Standard Products

InsulFoam® I, II, VIII and IX



Insulfoam's standard roof insulation product offering consists of InsulFoam I, InsulFoam II, InsulFoam VIII and InsulFoam IX. These products are high-performance insulations consisting of a superior closed-cell, lightweight and resilient expanded polystyrene meeting or exceeding the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. These products have excellent dimensional stability, compressive strength and water resistant properties.

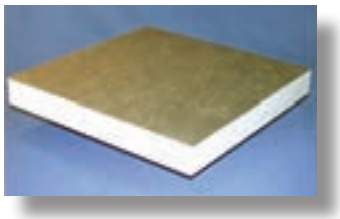
Premium Products



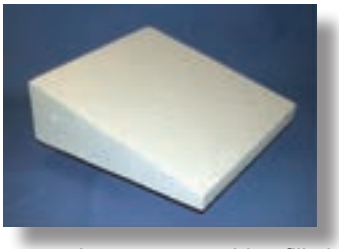
InsulFoam® HD Composite

InsulFoam HD Composite is a premium composite insulation consisting of a closed-cell, lightweight and resiliant expanded polystyrene (EPS) bonded to high-density polyisocyanurate cover board. It is an excellent choice for new or retrofit applications where high-thermal efficiency and maximum durability are desired. InsulFoam HD Composite can be used in single ply roof applications with mechanically fastened, ballasted or adhered EPDM, TPO, PVC or CSPE membranes, as well as certain low-sloped built-up and modified bitumen membrane systems. It can also be used as underlayment for metal roofing systems.

InsulFoam® SP



InsulFoam SP is an advanced roof insulation consisting of an InsulFoam VIII base with a durable and stable factory-laminated fiber glass facer. InsulFoam SP is specifically designed for mechanically fastened TPO, PVC and EPDM single ply roof systems. The unique facer eliminates the need for an additional slip sheet, resulting in significant labor savings while still providing the necessary system approvals.

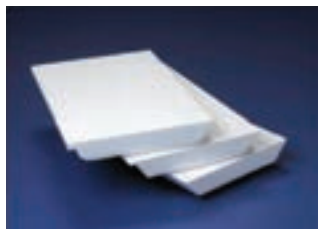


Tapered InsulFoam®

Tapered InsulFoam is cut from the same quality stock as our flat InsulFoam products. Available in thicknesses up to 40", Tapered InsulFoam is significantly more cost-effective than the competing tapered systems requiring fill pieces. Tapered InsulFoam can also be supplied as custom-cut crickets and saddles. Insulfoam employs well-trained taper design specialists throughout the country.

R-Tech®

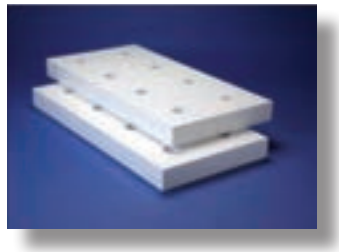
R-Tech is a high-performance roof underlayment developed specifically for use in re-cover applications. R-Tech consists of a high-quality InsulFoam core that is laminated on both sides with a polymeric facer. R-Tech comes in both 4' x 8' panels and a 200 square foot fanfold. The lightweight, user-friendly fanfold makes it ideal for re-cover applications under mechanically attached and ballasted single ply roof systems. The polymeric facer allows for the direct application of TPO, EPDM, CSPE and most PVC membranes without an additional slip sheet.



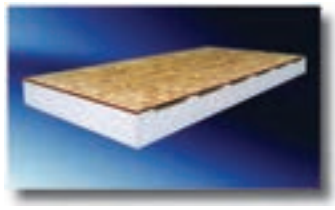
InsulFoam® FL

InsulFoam FL (Flute-Fill) is cut from the same quality stock as our flat InsulFoam products. InsulFoam FL is designed and cut to act as fill material on standing seam metal roofs in need of insulation and a roof membrane. The InsulFoam FL can be manufactured to fit virtually any deck configuration.

InsulFoam® HB



InsulFoam HB (Holey Board) is manufactured for use in lightweight insulating concrete systems consisting of cellular concrete, vermiculite or perlite. InsulFoam HB can be provided in a range of sizes, thicknesses and profiles to meet job-specific needs. InsulFoam HB is often installed in a stair-step fashion to create a tapered or sloped roof substrate.



InsulLam™ and InsulVent™

InsulLam is a composite insulation with an InsulFoam base and a factory-adhered oriented strand board (OSB). InsulLam is also available with DensDeck®, gypsum, plywood, wood fiber or perlite in lieu of the OSB. With the ability to provide an assortment of cover boards, InsulLam is compatible with most low-slope roof systems.

InsulVent is a composite insulation with an InsulFoam base, factory-adhered oriented strand board (OSB), and 1" precision-cut channels to provide venting below the OSB. These channels lower surface temperatures, making InsulVent an ideal alternative to non-vented nailbase products used in steep-slope applications. InsulVent is also suitable for use in most low-slope roofing applications.

Physical Properties

InsulFoam mechanical properties depend on two primary factors: the density of the material and the fusion, or integral bonding, of the expanded polystyrene beads. Although density plays a key roll in defining the mechanical properties, density alone does not adequately define the important characteristics and should not be the sole criteria used to specify the product. The degree of fusion achieved in the forming process is a critical factor. Insulfoam's ongoing investment in state-of-the-art manufacturing equipment and controls results in the highest quality material available. Not all expanded polystyrene products are created equally. Care should be taken to make certain the manufacturer is able and willing to certify the mechanical properties of their product will meet those prescribed for the project. For roofing systems, the most critical mechanical properties to consider are compressive strength, flexural strength, dimensional stability, water and moisture absorption and thermal value.

ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation* is the generally accepted document used to define the physical properties of expanded polystyrene used in the United States. Note that the values in this specification are the minimum properties recommended for each material type. These properties are determined using ASTM C203, *Test Method for Breaking Load and Flexural Properties of Block-Type Thermal Insulation*, ASTM C165, *Test Method for Measuring Compressive Properties of Thermal Insulations* and ASTM D1621, *Test Method for Compressive Properties of Rigid Cellular Plastics.*

Compressive Strength is required to support or resist dynamic loads (e.g. foot and construction traffic) as well as static loads (e.g. mechanical fasteners) to which typical roof systems will be exposed during the construction process and while in service. InsulFoam VIII, II and IX will best meet or exceed the desired compressive resistance for mechanically attached systems. Compressive strength increases as density increases, and depending on the product, ranges between 10 and 60 psi. InsulFoam I performs best when overlaid with a cover board or with Insulfoam's SecurePly (fibrous-glass slip sheet). Without either a cover board or SecurePly, InsulFoam I may exhibit creep when under load for extended periods of time. Compressive Strength must be considered during the design and selection process

Flexural Strength is required to ensure the product can be handled without being damaged, can span irregularities and roof deck flutes, and can resist bending forces from wind loads on the roof system. The flexural strength of the InsulFoam product increases with improved fusion and increased density.

Dimensional Stability is imperative to the long-term performance of a roof system. Inadequate dimensional stability can result in the exposure of roof membranes to stresses that can lead to splits, punctures, wrinkles and membrane delamination. InsulFoam products are among the most dimensionally-stable insulations available in the roofing industry. This dimensional stability remains even at thicknesses of 3" and above. InsulFoam products may exhibit some dimensional changes when under load or when exposed to extreme temperatures above 180 °F. The use of cover boards, light covered membranes or reflective coatings can protect the product from these exposure conditions.

Absorption indicates a product's susceptibility to take on moisture. InsulFoam products do not readily absorb moisture from the environment. All foam-plastic insulations absorb some moisture over time. However, in the long-term, InsulFoam will better retain its mechanical properties and outperform most alternative insulation materials. InsulFoam products are successfully used in Geofoam, marine and below-grade applications, as well as roofing applications.

The mechanical properties of the insulation are very important in adhered assemblies. The performance of the roof assembly depends greatly on the integrity and characteristics of the insulation. Typically, adhered single ply and built-up roofing systems will require a cover board. Insulfoam I may be used when a cover board is part of the system.

Finally, an additional factor to consider is the overall resiliency of InsulFoam products. The products not only have the ability to resist loads, but can also recover their original thickness once the load has been removed. This characteristic enables the InsulFoam products to deflect or elongate when exposed to forces such as roof-top traffic and deck or building movement from thermal expansion and contraction, and then return to their original configuration. Because InsulFoam easily accommodates irregularities in decks, substrates and existing roof systems, it provides a uniform and even base for new roofs.

PHYSICAL PROPERTIES

The physical properties provided in this manual are average values determined by Insulfoam, Insulfoam raw material suppliers and independent testing agencies. Testing results were obtained under controlled laboratory conditions and do not represent minimum standards. Insulfoam is not obligated to manufacture its products per a designer's specifications or physical standards unless agreed to in advance by Insulfoam. It is the purchaser's obligation to ensure any purchased Insulfoam materials meet a specification's physical properties.

Certification

Insulfoam must be notified at the time materials are ordered if product must be certified to meet an ASTM or other specification and/or must bear an Underwriters Laboratories, Inc (UL) or Factory Mutual (FM) label or marking. Insulfoam will perform the required tests and certify that materials meet specifications, with or without exception, upon acceptance of the order.

Typical Physical Properties of InsulFoam*

Property	Type I	Type VIII	Type II	Type IX	Type XIV	Type XV	Test Method
Nominal Density (pcf)	1.0	1.25	1.5	2.0	2.50	3.0	ASTM C303
C-Value (Conductance) BTU/(hr•ft²•°F)							ASTM C518 or ASTM C177
(per inch) @ 25° F	.230	.220	.210	.200	0.198	0.196	
(per inch) @ 40° F	.240	.235	.220	.210	0.206	0.198	
(per inch) @ 75° F	.260	.255	.240	.230	0.222	0.217	
R-Value (Thermal Resistance) (hr•ft²•°F)/BTU							ASTM C518 or ASTM C177
(per inch) @ 25° F	4.35	4.55	4.76	5.00	5.05	5.10	
(per inch) @ 40° F	4.17	4.25	4.55	4.76	4.85	5.05	
(per inch) @ 75° F	3.85	3.92	4.17	4.35	4.50	4.60	
Compressive Strength (psi, 10% deformation)	10 - 14	13 - 18	15 - 21	25 - 33	40	60	ASTM D1621
Flexural Strength (min. psi)	25	30	35	50	60	75	ASTM C203
Dimensional Stability (maximum %)	2%	2%	2%	2%	2.0	2.0	ASTM D2126
Water Vapor Permeance (max. perm., 1 inch)	5.0	3.5	3.5	2.0	2.5	2.5	ASTM E96
Water Absorption (max. % vol.)	4.0	3.0	3.0	2.0	2.0	2.0	ASTM C272
Capillarity	none	none	none	none	none	none	–
Flame Spread	< 20	< 20	< 20	< 20	< 20	< 20	ASTM E84
Smoke Developed	150 - 300	150 - 300	150 - 300	150 - 300	150-300	150-300	ASTM E84

Typical Physical Properties of R-Tech*

Property	Type I	Type VIII	Type II	Type IX	Test Method
Compressive Strength (psi, 10% deformation)	13	16	20	28	ASTM D1621
Flexural Strength (psi)	33	40	50	70	ASTM C203
Water Vapor Transmission (perms)	< 1.0	< 1.0	< 1.0	< 1.0	ASTM E96
Absorption (% vol.)	< 1.0	< 1.0	< 1.0	< 1.0	ASTM C272

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

Insulations

Product Information An effective roof insulation reduces overall energy consumption, brings about improved comfort for the building's occupants and provides an excellent substrate for a new roof system. The InsulFoam product line can satisfy these needs for virtually every type of roof system. The preceding section reviews the complete Insulfoam product line. To ensure correct selection of any roof insulation or membrane, it is recommended that a product's performance be considered.

Thermal Values of Insulfoam Products The following chart provides the InsulFoam thicknesses needed to obtain the corresponding R-Value. Over the last century, the average temperature within the contiguous United States as reported by the National Oceanic and Atmospheric Administration (NOAA) was 52.8 °F. Insulfoam generally quotes the R-Values of its products at 40 °F, which is one of the testing temperatures provided within ASTM C518. This temperature most closely reflects the average overall temperature throughout the U.S. The R-Values were determined per ASTM C518, *Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*.

R-Values and Thicknesses				
Insulfoam Type	**I**	**VIII**	**II**	**IX**
R-Value per inch	4.17	4.25	4.55	4.76
R-Value	**InsulFoam® Thicknesses**			
1.0	0.24	0.24	0.22	0.21
2.0	0.48	0.47	0.44	0.42
3.0	0.72	0.71	0.66	0.63
4.0	0.96	0.94	0.88	0.84
5.0	1.20	1.18	1.10	1.05
6.0	1.44	1.041	1.32	1.26
7.0	1.68	1.65	1.54	1.47
8.0	1.92	1.88	1.76	1.68
9.0	2.16	2.12	1.98	1.89
10.0	2.40	2.35	2.20	2.10
11.0	2.64	2.59	2.42	2.31
12.0	2.88	2.82	2.64	2.52
13.0	3.12	3.06	2.86	2.73
14.0	3.36	3.29	3.08	2.94
15.0	3.60	3.53	3.30	3.15
16.0	3.84	3.76	3.52	3.36
17.0	4.08	4.00	3.74	3.57
18.0	4.32	4.24	3.96	3.78
19.0	4.56	4.47	4.18	3.99
20.0	4.80	4.71	4.40	4.20
21.0	5.04	4.94	4.62	4.41
22.0	5.28	5.18	4.84	4.62
23.0	5.52	5.41	5.05	4.83
24.0	5.76	5.65	5.27	5.04
25.0	6.00	5.88	5.49	5.25
26.0	6.24	6.09	5.71	5.46
27.0	6.47	6.32	5.93	5.67
28.0	6.71	6.56	6.15	5.88
29.0	6.95	6.79	6.37	6.09
30.0	7.19	7.03	6.59	6.30

Warranties The owner of a low-slope roof may wish to receive a material and labor warranty that covers both the InsulFoam insulation and the membrane. InsulFoam insulations are eligible for inclusion in many membrane manufacturers' total system warranties. Contact your local Insulfoam representative for a list of membrane manufacturers with which Insulfoam is a partner.

Product Considerations

Roof insulation should perform two basic functions; it is a thermal barrier for the building's roof and a substrate for the roof system. In order to perform these functions, it should have the following basic characteristics:

- Stable thermal resistance (R-Value) to meet the long-term needs of the designer and building owner
- Resistance to damage during typical construction traffic during the installation of the roof or roof-top units (antennae, HVAC, etc.)
- Rigidity to span rib openings in metal decks and minor deck irregularities, and to support the roofing membrane
- Dimensional stability
- Resistance to moisture absorption
- Acceptable by Underwriters Laboratories and other local and national code agencies
- Meet applicable building code requirements or designer requirements

Material Storage and Handling

General Storage Recommendations

- Roofing materials can be damaged by exposure to the elements and may be susceptible to moisture retention; all material should be protected from the weather and stored in a dry location.
- Insulation that is stored outside should be covered by canvas tarpaulins that can breathe. Tarpaulins or other covers should be properly secured.
- Loose insulation material should be weighted down to prevent wind blow-off or damage.
- Materials that are stored outside should be placed on pallets or raised platforms to keep them off the ground or roof deck.

General Handling and Installation Recommendations

- Use caution when handling any roofing insulation to avoid breaking, crushing or cracking the board or its edges.
- Load or stage insulation in a manner that will minimize repetitive movement of the material.
- Install only as much insulation as can be covered by a roof system and/or made watertight by the end of each day.
- Any temporary water cut-offs or roof tie-ins should be completely removed before additional insulation is installed.

- InsulFoam insulations should be protected from solvent-based or petroleum-based adhesives and from direct contact with coal-tar products.
- InsulFoam insulations should not come in contact with asphalt at temperatures above 250 °F.
- InsulFoam insulation should not be exposed to open flames or other ignition sources.
- Any decks or substrates that require a primer should be primed at least 24 hours before the installation of InsulFoam insulations.
- Allow approximately 1/4" between InsulFoam products and any vertical surfaces or roof projections. Do not force or jam product into place.

General Tapered Insulation Recommendations

- Review the layout of Tapered InsulFoam systems before loading and installing panels.
- In cut-up areas and for complex tapered layouts, material should be laid out unattached to allow for trimming and fitting.
- The use of a chalk line is recommended to start the installation of any Tapered InsulFoam system.
- Whenever practical, Tapered InsulFoam systems should be installed starting from the thickest point and working towards the thinnest point. This will allow any trimming or cutting to be done at the drain points. This will not be feasible for factory-fabricated valley or ridge systems.
- When starting first and second rows of taper, start one of the rows with a half-length board so that joints are staggered between rows. Repeat throughout the tapered system.
- Do not dispose of any end cuts until the installation is complete. These pieces may have been figured in and required elsewhere in the system.
- End cuts should be marked with a permanent marker with the same letter or number as the piece from which they were cut.

Asphalt Recommendations

- Asphalt-applied roofing membranes are not to be installed directly to InsulFoam insulations.
- Always mop an area 6"- 8" larger than the insulation piece being installed.
- The asphalt mop should not come in contact with any previously installed insulation pieces.
- Only solid mopping of InsulFoam insulation is recommended. Spot or strip mopping is not recommended. Do not overload the mop, as asphalt will cool more slowly than normal if excessive quantities are applied.
- InsulFoam should not come in contact with asphalt at temperatures above 250 °F. A common rule-of-thumb for appropriate asphalt temperature is the lack of visible fuming of the installed asphalt.
- All insulation boards must be walked-in immediately after being placed in the mopping asphalt.
- If the board is slightly cupped, apply the cupped face downward.
- Asphalt is not recommended for InsulFoam-to-InsulFoam attachment. For these applications, contact your Insulfoam representative for recommendations on approved adhesives.
- When InsulFoam is used in a hot-asphalt system (BUR or modified bitumen), a suitable cover board is required. The membrane manufacturer should be contacted for recommendations on approved cover boards.
- The joints between the cover board and the joints of the initial layer of InsulFoam should be staggered a minimum of 6".
- Cover boards to be mopped to InsulFoam should have the asphalt applied to their bottom sides only. Asphalt should not be applied directly to the InsulFoam insulation.
- To minimize asphalt migration between insulation joints, Insulfoam recommends the use of 6" strips of an ASTM D2178 Type VI ply felt over the joints and the application of asphalt over the strips using a small mop. Asphalt should be hot enough at the point of application to bleed through the ply felt so that it will attach to the insulation. Mechanized equipment may also be available for strip application.
- An alternate means of addressing asphalt migration through insulation joints would be to apply a protection sheet (e.g. red rosin, Kraft paper) between the cover board joints and the InsulFoam insulation.

Tapered Roof Insulation

The performance risks associated with a roof that does not have positive drainage have been known in the roofing industry for many years and are covered further in the Roof Decks Section of this manual. Tapered InsulFoam offers the designer an easy and economical means of adding positive slope to virtually any building. With a trained tapered design staff at every location, Insulfoam can efficiently assist roofing professionals with recommendations on designing, ordering and installing Tapered InsulFoam insulation systems. To facilitate the installation process, Insulfoam provides detailed shop drawings for every Tapered InsulFoam project.

Tapered InsulFoam systems can be used for new, re-roof and re-cover projects. Assemblies can include complete and integral systems that incorporate sloped panels for the field of the roof as well as crickets and saddles to further assist in directing water to drainage outlets.

There are several basic elements that should be considered for every project: minimum slope required, locations of drains (internal and external), mechanical equipment, curbs, expansion and control joints, allowable overall insulation thickness (imposed by parapets or equipment curbs), and alternative system layouts. Alternative tapered layouts and additional roof drains should be considered when existing project conditions limit the performance of a system.

Tapered InsulFoam is available in six standard slopes: “A” panels have a slope of 1/8" per foot, “B” panels have a slope of 3/16" per foot, “C” panels have a slope of 1/4" per foot, “D” panels have a slope of 3/8" per foot, “E” panels have a slope of 1/2" per foot and “F” panels have a slope of 3/4" per foot. Custom slopes are available upon request. To facilitate installations, each panel is hand-labeled at the Insulfoam plant. Tapered InsulFoam panels can be provided in thicknesses up to 40" from most Insulfoam manufacturing locations.

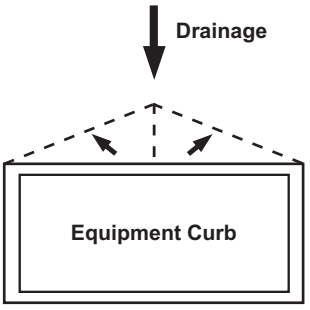
The ability to produce specific panels (up to 40" thick) for each course of insulation eliminates many of the complexities associated with those tapered insulation systems in which individual panel thickness is limited to approximately 3". With fewer pieces to handle, Tapered InsulFoam systems are significantly less labor-intensive to install. In addition, pre-cut ridge and valley panels are available. These panels are typically cut to 45° angles, though other angles can be provided upon request. Tapered InsulFoam panels can also be easily fabricated on site by the roofing mechanic.

Crickets and Saddles

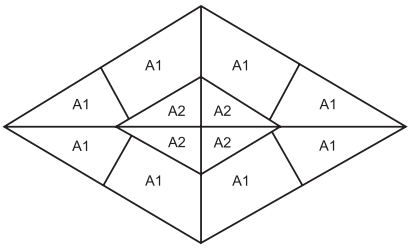
Directing water to or from specific areas of the roof can be achieved quite easily with Tapered InsulFoam cricket and saddle systems. These materials can be used with numerous other insulation systems or integrated into a total Tapered InsulFoam package.

In the roofing industry, the terms cricket and saddle are often used interchangeably. For this manual, the term saddle is defined as a relatively small, elevated area of a roof that is constructed to divert water around a chimney, curb or other projection.

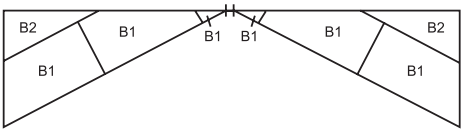
An example is given below.



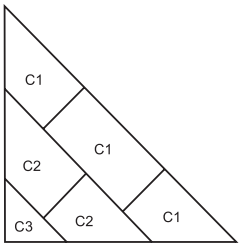
A cricket is defined as a small structure that directs surface water to drains, frequently located in a valley, and often constructed like a small hip-roof or a pyramid with a diamond shape base. Several examples are given below.



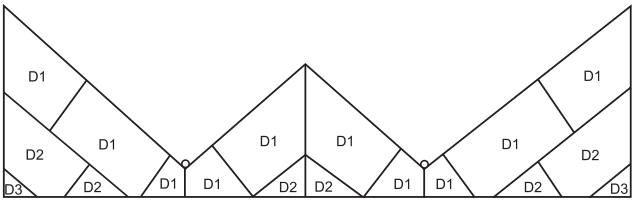
Diamonds Between Drains



Drain To Scuppers



Drain Corners



Inset Perimeter Drains

FASTENER LOAD STUDY

Component	R-Values
Outside Air Film	0.17
Single Ply Membrane	negligible
4" InsulFoam SP (R = 4.25/in. @ 40 °F)	17.00
Steel Deck	negligible
Dead Air Space	0.94
1/2" Ceiling Tile	1.40
Inside Air Film	0.61
R-Value of the Assembly = R_t=	**20.12**

The k-Value (thermal conductivity) of the InsulFoam SP is:

k = 1/4.25 or 0.236

The C-Value (thermal conductance) of the InsulFoam SP is:

C = k/Thickness = .236/4.0 or .059

The U-Value (overall transmission coefficient) of the assembly is:

U = 1/ R_t = 1/20.12 or .050

Fastener Load Study

InsulFoam insulations have been used in single ply, mechanically attached systems since their inception. Questions have been raised regarding InsulFoam's ability to resist membrane fastener loads. To address these questions, Insulfoam embarked on a study of fasteners typically used for membrane attachment and their effect on various insulation systems. Samples of the insulation systems were placed in a Dillon Compression Test Apparatus and covered with a single ply membrane. The membrane was attached to the insulation to duplicate a typical field application. Once the membrane and insulation systems were in place, a 2" membrane fastener plate was placed through the membrane. The force of the test apparatus was channeled through a 2" column onto the plate. A load was applied to the plate at a rate of 0.2 inches per minute until 120 pounds was reached. The load was recorded for a period of 72 hours.

A review of the final data showed that there was not a significant difference for the insulation systems tested. The following chart gives the insulation system tested and the average load retained for each system after the monitoring period.

Insulation System	Fastener Load
InsulFoam I	49.4 lbs.
InsulFoam I w/ SecurePly	55.5 lbs.
InsulFoam VIII	56.5 lbs.
InsulFoam SP	60.3 lbs.
InsulFoam VIII w/ SecurePly	62.1 lbs.
InsulFoam II	62.1 lbs.
InsulFoam IX	67.5 lbs.
Polyisocyanurate	50.6 lbs.

Test Conclusions

- Increased InsulFoam density improves fastener load retention.
- The addition of SecurePly to lower density InsulFoam products improves fastener load retention by 10-15%.
- Products exhibiting clamping pressures equal to or greater than those of polyisocyanurate would also be acceptable in mechanically fastened roof applications.
- InsulFoam SP or InsulFoam VIII overlaid with SecurePly are viable UL approved insulation systems. Other InsulFoam brand insulations may also be suitable under SecurePly.

For additional information, please contact the Insulfoam Technical Center or your local Insulfoam representative.

Basic Heat Flow Fundamentals

Heat is the energy associated with the random motion of molecules, atoms or smaller structural units of matter. Heat always flows from higher to lower temperatures. All materials and matter, including air, contain heat down to a temperature of absolute zero (approx. 460 °F). There is no such thing as cold! Cold is the absence of heat. When we feel cold it is not cold penetrating our clothes or structures, but rather the rapid loss of heat from our bodies. The flow of heat cannot be stopped but only slowed by the use of insulation, trapped air or heat-reflective surfaces.

Heat flows by means of conduction, convection or radiation or a combination of any or all of these.

- *Conduction* – The transfer of heat in a material due to the molecule-to-molecule transfer of kinetic energy. An example is when the handle on a skillet gets hot when the bottom of the pan is heated on the stove. With most materials, the denser the material, the higher the rate of heat flow due to conduction.
- *Convection* – The transfer of heat by physically moving the molecules from one place to another through fluid flow either in air or liquid. An example would be a forced-air heating system in a building or the heat rising from a steam or hot-water-heated pipe.
- *Radiation* – The transfer of heat through space from a very hot object through electromagnetic energy. An example would be when you feel the heat from a fireplace while standing many feet away. Another example is the heating from the sun during the day. Radiant heat is not affected by air. In a roofing system, radiation is seldom a cause of concern in heat lost.

Radiation from the sun during the day impacts the roof-top surface of a dark-colored roof membrane. In these situations, insulation is typically used to block the heat flow into the building. Another method to minimize heat flow from radiation on a roof surface is to use a reflective roof membrane or a “cool roof”. Contact the membrane manufacturer for additional “cool roof” information.

Heat Flow Terminology

Heat is measured in terms of BTUs, or British Thermal Units. A BTU is the amount of heat required to change the temperature of one pound of water by one degree Fahrenheit at sea level. An example of 1 BTU would be the energy released by a typical wood match that is allowed to burn end to end.

Thermal Conductivity, k-Value (BTU•inch/hr•ft²•°F)

Thermal conductivity, or k-Value, is the measure of the amount of heat that will be transmitted through a 1" piece of a homogenous material, per hour, per square foot, per degree Fahrenheit temperature difference. The smaller the k-Value, the better the insulator. This is the basic physical property of a material measured in the laboratory.

Thermal Resistance, R-Value (hr•ft²•°F)/BTU

Thermal resistance, or R-Value, is a material’s resistance to heat flow. The higher the R-Value, the higher the insulating value of the insulation. All materials that have the same R-Value, regardless of thickness, weight or appearance, are equal in insulating value.

Thermal Conductance, C-Value = BTU/(hr•ft²•°F)

Thermal conductance or C-Value is the measure of heat flow for any given thickness of material and is calculated as:

$$C = k/\text{Thickness}$$

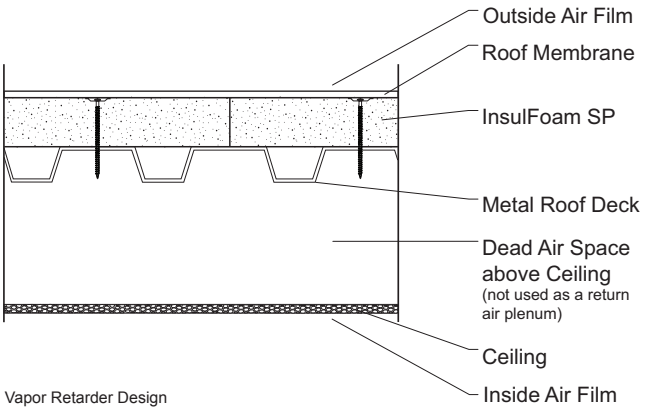
The C-Value is also equal to the reciprocal of the R-Value (C = 1/R).

Overall Coefficient of Thermal Transmission, U-Value

The overall coefficient of thermal transmission, or U-Value, is determined by adding all of the R-Values of the ceiling and roof components in the system, and taking the reciprocal value. The formula for this coefficient is:

$$U = 1/ (R1 + R2 + R3\ldots)$$

The following is an example of the use of the various heat flow terms:



Vapor Retarder Design

Remember that R-Values are cumulative. The above installation consists of a TPO membrane installed over 4 inches of InsulFoam SP that is installed directly to a metal deck. Take all of the R-Values of each component and list them in order from outside to inside. See chart on following page.

FASTENER LOAD STUDY

Component	R-Values
Outside Air Film	0.17
Single Ply Membrane	negligible
4" InsulFoam SP (R = 4.25/in. @ 40 °F)	17.00
Steel Deck	negligible
Dead Air Space	0.94
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R-Value of the Assembly = R_t=	**20.12**

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The U-Value (overall transmission coefficient) of the assembly is:

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Fastener Load Study

InsulFoam insulations have been used in single ply, mechanically attached systems since their inception. Questions have been raised regarding InsulFoam's ability to resist membrane fastener loads. To address these questions, Insulfoam embarked on a study of fasteners typically used for membrane attachment and their effect on various insulation systems. Samples of the insulation systems were placed in a Dillon Compression Test Apparatus and covered with a single ply membrane. The membrane was attached to the insulation to duplicate a typical field application. Once the membrane and insulation systems were in place, a 2" membrane fastener plate was placed through the membrane. The force of the test apparatus was channeled through a 2" column onto the plate. A load was applied to the plate at a rate of 0.2 inches per minute until 120 pounds was reached. The load was recorded for a period of 72 hours.

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Test Conclusions

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- InsulFoam SP or InsulFoam VIII overlaid with SecurePly are viable UL approved insulation systems. Other InsulFoam brand insulations may also be suitable under SecurePly.

For additional information, please contact the Insulfoam Technical Center or your local Insulfoam representative.

Roof Decks

The roof deck is the structural foundation for the roofing system. It must be designed to provide sufficient support for all dead and live loads to which it will be exposed and must provide enough resistance to racking, flexural and torsional loads to prevent any deformation that might cause a roof failure. It must be rigid, eliminate excessive positive or negative deflection under load, and have a smooth surface with no large cracks or gaps. It must also be even and securely anchored to the building structure.

Positive attachment of the roof assembly to the deck is critical. The decking material must readily accommodate the roof system's attachment method.

An inspection of the deck's condition prior to beginning roof construction should be a key part of the installation process. Everyone involved in the design and construction of the roof should participate; the owner's representative, the designer, the roof consultant, the roofing contractor and the decking contractor. Any surface irregularities, blemishes, voids, unacceptable elevation changes, etc. in the deck must be addressed prior to the roof installation.

Expansion joints should be provided in all roof decks to accommodate movement that will result from expansion and contraction of the deck or structure. These elements should allow for both vertical and horizontal movement. The entire roof assembly (membrane, flashing systems and insulation) should be terminated at all expansion joints.

Wood Nailers

Most roof membranes and deck materials require the use of wood nailers or curbs at roof penetrations, openings and building perimeters. Nailers provide both protection for the edges of insulation and a substrate for terminating roof membranes, base flashings and metals (gravel stops and edging). Nailers must be securely fastened to the roof deck or building structure. An uplift resistance of 200 lbs per lineal foot is typically recommended for nailers. Designers should provide details and specifications addressing the nailer type, grade, attachment methods and fastener schedule.

Tapered edge-strips are often used to divert water away from roof edges. Nailers should be equal in thickness to both the total thickness of the tapered edge-strip and insulation, and be wide enough to accommodate fastening of metal edges or gutters.

Roof Drainage

One of the most critical features of any roof system is its ability to drain properly. A roof membranes performance can be impacted if it is exposed to prolonged periods of standing water or ponding. Some decks are designed and installed with little or no slope. Tapered InsulFoam is one of the most effective ways to provide drainage for a roof assembly. Drainage should move all water to the drains, scuppers and gutters. The outlets should be set below the plane of the roof membrane surface at the lowest points of the roof.

Many manufacturers' warranties limit the amount of time water is allowed to pond on their membranes, as there are numerous detrimental conditions that can result from ponding water:

Freezing and Thawing This repetitive action can scour protective surfacings (granules or coatings) off the membrane, exposing the system to the harmful ultraviolet light or physically damaging the membrane itself.

Excessive Amounts of Water This can increase deck deformation, or deflection, causing the roof to retain substantial quantities of water that might exceed design expectations and possibly compromise the deck's structural integrity and/or expose the roof membrane to severe stress.

The Accumulation of Algae and Vegetation Ponding water can promote organic growth. Some materials are susceptible to attack by algae and other organisms. Over time vegetation root growth can penetrate even the thickest membrane.

Basins or Bird Baths These areas are a point of collection for dust, debris and chemicals from various sources. Prolonged accumulation of these mixtures result in thick layers of sludge. It can contain a number of agents, many of which can harm the membrane. If a sufficient quantity accumulates, deep cracks or fissures will form and can exert stresses on the membrane, which results in leakage or premature aging of the material.

In any event, ponding water will pose a greater threat to having the roof leak.

The National Roofing Contractors Association and the Midwest Roofing Contractors Association recommend that roofing systems be designed to provide drainage throughout their service life.

Insulfoam recommends that the following guidelines be followed when designing a roof:

1. Provide adequate outlets (drains, scuppers and gutters) to completely drain all standing water from the roof surface.
2. Locate outlets at the lowest points of the roof.
3. Divert water with crickets and saddles around any building element that will impede the flow of water to outlets.
4. Provide for raised edge-metal by employing tapered edge-strip at building edges.
5. When draining to the interior of the roof area, provide sumps at all drains to ensure complete removal of standing water.

All Insulfoam locations manufacture tapered roofing systems. Insulfoam will provide shop drawings for the contractor to assist with proper installation of the Tapered InsulFoam system. These systems can provide a solution for both new construction and re-roofing applications in which standing water might be expected. Contact your local Insulfoam representative for assistance with your next roof drainage problem. Also, refer to the tapered insulation information in the Roof Insulations section of the Insulfoam Roofing Manual.

Steel Decks

The most common decking material used for low slope roofing systems is currently cold-formed steel decking. These decks are made in several styles and gauges, and galvanized (G-60 or G-90) or painted finishes. When properly designed and installed, they provide a stable and economical substrate for virtually every type of commercial roofing system.

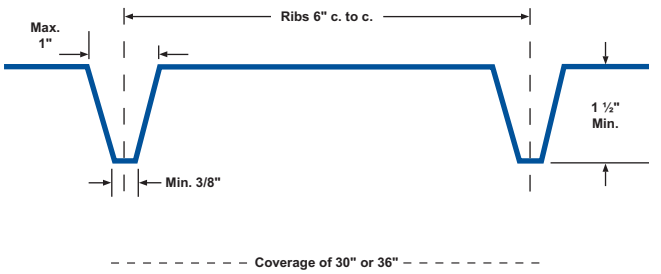
Most membrane manufacturers require that steel decks are primed and have a minimum 22-gauge thickness. Some applications require the use of galvanized steel. Steel decks are secured to the building's structural members by welding or mechanically fastening. Fastening of the side laps is often required as well; this prevents differential movement between deck panels that are exposed to roof-top traffic. If side laps are not fastened, excessive movement could damage the roofing system. The finished deck installation should result in a surface that can receive a sheathing material or insulation. These membrane substrates should be of a thickness that spans the deck flutes and provides support for any anticipated construction traffic, and in-service live and dead loads.

Steel decks are typically categorized as:

1. Narrow Rib - with a flute opening of 1" or less
2. Intermediate Rib - with a flute opening of 1" to 1 3/4"
3. Wide Rib - with a flute opening of 1 3/4" to 2 1/2"
4. Deep Rib - with a minimum flute depth of 3" and a maximum flute opening of 2 3/4"

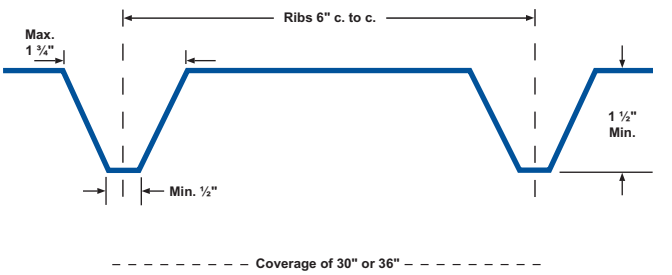
The following are typical cross-sections of types A, F, B and N decks:

Type A Roof Deck (Narrow Rib)



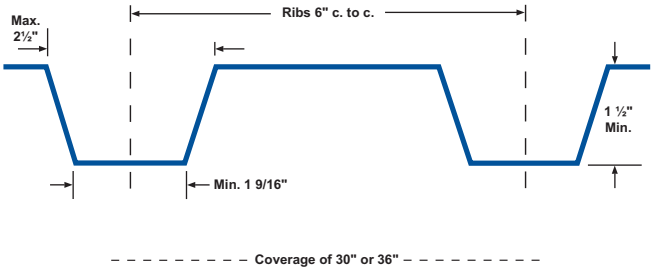
Type A roof decks are typically available in 18-, 20- and 22-gauge, with a G90 or painted finish.

Type F Roof Deck (Intermediate Rib)



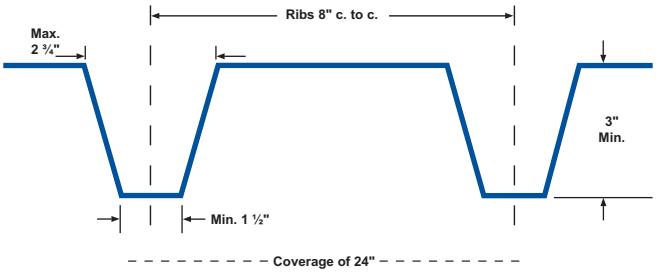
Type F roof decks are typically available in 18-, 20- and 22-gauge, with a G60 or painted finish.

Type B Roof Deck (Wide Rib)



Type B roof decks are typically available in 16-, 18-, 20- and 22-gauge, with a G60, painted or painted with white bottom finish.

Type N Roof Deck (Deep Rib)



Type N roof decks are typically available in 16-, 18-, 20- and 22-gauge, with a G60 finish.

It is recommended that roof insulation be secured to the steel deck with mechanical fasteners or adhesive systems. Some membrane manufacturers do not accept adhesive applications of insulation to steel decks. Refer to the membrane manufacturer's requirements.

InsulFoam roof insulation is used in numerous Direct-to-Deck™ applications. In these assemblies the insulation is placed directly over the steel deck. To ensure that InsulFoam performs during both the construction process and throughout the service life of the roof assembly, it is imperative that the

appropriate minimum thickness be used. The following chart lists the minimum thickness of InsulFoam required for various deck types.

METAL DECK SPANABILITY MINIMUM INSULATION THICKNESSES				
Steel Roof Deck Type	Type A	Type F	Type B	Type N
Flute Span Distance (Max)	1.00 in.	1.75 in.	2.50 in.	2.75 in.
InsulFoam I	1.25 in.	2.25 in.	3.12 in.	3.44 in.
InsulFoam VIII	1.15 in.	2.00 in.	2.88 in.	3.25 in.
InsulFoam II	1.05 in.	1.85 in.	2.63 in.	2.90 in.
InsulFoam IX	1.00 in.	1.66 in.	2.37 in.	2.60 in.
InsulFoam SP	1.00 in.	1.25 in.	1.50 in.	2.00 in.

In all applications in which a cover board, Oriented Strand Board (OSB) or a gypsum-based product, (e.g., Dens-Deck®) is used in conjunction with InsulFoam, the minimum thickness is 1.00 inch for all densities and deck types.

It is very important that the insulation be securely attached to the roof deck. Uneven or loose insulation can impact the performance of the roof membrane, and can exacerbate roof damage resulting from wind loads. When mechanical fasteners are used to attach the insulation or sheathing material, they must have a length that will permit the fastener to penetrate the steel deck by a minimum of 3/4". For multiple-layer systems, the first layer of insulation may be secured with the mechanical fasteners or a suitable adhesive and the second layer may be attached with an approved adhesive. It is also acceptable to mechanically fasten through multiple layers of insulation (InsulFoam and/or cover boards).

The required number of roof fasteners is dependant on the area of the roof being covered and the membrane being installed over the insulation.

Additional fasteners are usually required at building corners and perimeters. For more detailed design information on wind uplift resistance, refer to the Wind Loads section of ASCE/SEI Standard No. 7-05, *Minimum Design Loads for Buildings and Other Structures* provided by the American Society of Civil Engineers. For an example of a steel deck fastener and typical fastener patterns, refer to the charts at the end of this section.

Today, the use of asphalt to attach insulations directly to steel decks is rarely acceptable. This is due to historically poor wind resistance that resulted from inadequate bonding to the steel. There were numerous reasons that led to these conditions.

Two commonly cited conditions were that process oils on the steel often prevented adequate adhesion, and rapid cooling of the asphalt did not allow sufficient time for the installer to place the insulation.

Concrete Decks – Poured In Place

Poured- or cast-in-place concrete decks also provide a suitable substrate for most roof assemblies. These decks can accommodate a number of attachment methods when installed and prepared properly.

Concrete decks must be adequately cured to support roof construction traffic. Consult the designer for recommendations. The deck must be dry and have a reasonably smooth surface. Adhesive attachment of insulations may require the use of a primer to ensure an adequate bond. Consult the adhesive manufacturer's recommendations. Hot-asphalt attachment typically requires the application of a solvent-based primer prior to the application of the asphalt.

In either case, if a solvent-based primer is used, make certain it is completely dry and that all of the solvent has evaporated before applying the adhesive/asphalt and any InsulFoam insulation. The roughness of the deck will impact the quantity of adhesive or asphalt required to adequately bond the insulation.

Prior to installation of the insulation, the roofing contractor should check the dryness of the deck. If any moisture is present, the application should be delayed until the deck is dry. When hot asphalt is being used as the adhesive, the dryness of the deck can be checked by applying hot asphalt at its EVT (Equiviscous Temperature), which is printed on the package. If frothing or foaming occurs, the deck is not sufficiently dry.

There are numerous fasteners available that will permit mechanical attachment of InsulFoam insulations directly to a poured concrete deck. For an example of a concrete deck fastener and typical fastener patterns, refer to the charts at the end of this section.

Poured Gypsum Decks

Today, poured gypsum decks are not usually used for new construction. However, they can be encountered in re-roofs of existing buildings. It was not uncommon for poured gypsum decks to experience cracking over structural support members during curing. Once completely cured, they are relatively stable. Most roof membrane systems have performed well over poured gypsum decks when designed and installed correctly and allowed to completely cure (dry). There are specially designed insulation fasteners available for use with these decks. Contact a specialty fastener supplier to determine fastener frequency, patterns and acceptable deck conditions. Prior to installing any insulation over these systems, the roof designer and contractor should make certain the deck is capable of supporting and receiving the new roof assembly and related construction loads. In order to accommodate mechanical fasteners, a minimum gypsum deck thickness of 2" is typically recommended. Pull tests are recommended to determine the holding capability of the fastener. This data is used to determine the fastener frequency needed for the designed wind conditions. For an example of a gypsum deck fastener and typical fastener patterns, refer to the charts at the end of this section.

These decks were considered by many membrane manufacturers to be nailable only – meaning they were suitable to receive a nailed asphalt-coated fiber glass base sheet. These base sheets are frequently referred to as G2 base sheets, referring to their Underwriters Laboratories, Inc classification. The decks are not considered suitable for direct adhesive or hot-asphalt attachment due to their surface condition and residual moisture. Therefore, roof assemblies including insulation frequently require it to be hot-mopped or adhered to a fiber glass base sheet.

Pre-Cast Concrete Decks

Many of the recommendations for cast-in-place concrete decks also apply to pre-cast concrete decks. However, one common condition encountered with pre-cast decks is the difference in height between adjacent panels, which results from placement or variation in curvature. Any height difference must be addressed by grouting the lower panel to provide a transition capable of accommodating the roof insulation. It is strongly recommended that fill boards be used to provide an even substrate for the roof membrane in areas of differential panel height. If not addressed properly water can accumulate in low and uneven areas. Mechanical attachment to these decks is not recommended.

Pre-Cast Gypsum

Again, these types of decks are not typically used in new construction today, but can be encountered on re-roofing projects. It is very important that the original deck manufacturer's roof installation procedures and recommendations be followed closely. These decks can accommodate nailed base sheets and mechanical insulation fasteners; however, they must be of a design approved by the deck manufacturer.

Tongue and Grooved (T&G) Wood Decks

For many years, these were the decks of choice, particularly in the western part of the country. Proper design and installation, as with any decking material, is critical to the performance of the deck and subsequently the attached roof assembly. Wood is hydroscopic – it tends to absorb moisture from its environment. As wood's moisture content changes, it will expand or contract, causing movement of the deck. It is desirable to separate any deck movement from the roof membrane. Mechanically fastened insulations can provide adequate separation from these changes.

Wood decks should not be warped, cupped or have an excessive number of knots or cracks. Cover small cracks and knots with a layer of 20-gauge sheet metal or an adequate thickness of insulation. Many built-up and modified bitumen roofing membrane manufacturers recommend minimum board widths and thicknesses in order to prevent excessive deflection or other movement of the wood deck. If the wood deck has been treated with any oil or creosote, InsulFoam products must not be applied without an approved separator sheet, either red-rosin paper, fiber glass base sheet or SecurePly. This separator sheet will prevent any undesired bonding of the insulation to the wood as a result of seeping wood resins.

Plywood and Oriented Strand Board (OSB)

In most cases, engineered wood products have replaced solid wood as the standard material in building construction.

Plywood Decks Plywood is a panel that consists of multiple layers of rotary cut veneers, laminated together with alternating plies with their grain running perpendicularly to the adjacent ones. Panels used as roof-deck sheathing should meet the standard properties prescribed in U.S. Product Standard PS-1 81 (ANSI A199.1). Fire-treated plywood must be certified by the manufacturer for use in low-slope roof applications.

Oriented Strand Board Oriented Strand Board (OSB) is made by bonding relatively small wafers or chips of wood into panels consisting of multiple layers, laid perpendicularly to each other. These products should carry the American Plywood Associations (APA) label indicating that the product is CD, Exposure 1, Struc 1, with the minimum thickness recommended by the membrane manufacturer.

It is recommended that these panels NOT be abutted directly against each other. A gap, typically 1/8", is left to accommodate any movement resulting from moisture gain. If installed too tightly the roof deck can buckle at the panel joints. For this reason, the deck material should be kept dry, requiring that exposed decking be roofed as quickly as possible. In order to prevent condensation on the interior surface of the deck adequate InsulFoam insulation should be installed.

Lightweight Insulating Concrete

Lightweight insulating concrete (lightweight concrete) is a poured-in-place slurry composed of Portland cement, water, sand and aggregate or a foaming agent (cellular). These decks, when designed and installed correctly, provide a suitable foundation for most roof assemblies. In addition, they provide excellent wind and fire resistance.

One of the key features of these decks is their ability to build-in slope for the roof with multiple layers of InsulFoam. The InsulFoam in these applications is often referred to generically as holey board because of the integral voids formed into the panels. During application, the slurry migrates through these large perforations and bonds to underlying layers, forming a composite matrix of InsulFoam and lightweight concrete. Most membranes systems can be mechanically attached to these decks.

The aggregate-based lightweight concrete contains either vermiculite or perlite fillers that are employed to keep the density low and provide some insulation value. Minimum thicknesses recommended depend on numerous factors, including the membrane to be installed, the type of fasteners and the desired thermal performance. Vented decks accommodate evaporation of excess moisture from the slurry. The manufacturers of these materials permit placement over vented, or slotted, galvanized steel decking, pre-cast or poured-in-place concrete, or existing roofing systems.

The cellular lightweight concrete systems employ a foaming agent that creates small uniform bubbles in the cement mixture. These systems typically consume all free water during

the curing process, making them ideal for most roof assemblies. The manufacturer's mixing and installation procedures must be followed precisely to ensure that the system does not dry too quickly and cause severe surface cracking, or contain an amount of moisture that could impact the performance of the roof membrane.

These systems have been approved for use by Factory Mutual, and the FM Approval Guide should be consulted for approved types and fastening rates.
The use of InsulFoam HB (Holey Board) roof insulation in these systems can provide desired thermal values as an integral part of the deck assembly.

These can be highly competitive alternatives for both new construction and re-roof applications. In addition, re-roof applications over these decks can be performed without disturbing the deck material and InsulFoam insulation, eliminating expensive insulation replacement costs.

Cementitious Wood Fiber Panels

Cementitious wood fiber deck panels (e.g. Tectum®), are made from long strands of wood (historically aspen), coated with a portland cement binder. These panels exhibit excellent acoustical properties and provide an attractive surface for the interior of the building. Tectum is a registered trademark of Tectum, Inc.

Products used in roof deck applications may be made with a moisture-resistant cement binder, and have a sufficient density to support the desired live and dead loads to which the roof will be exposed. The designer should consult the deck manufacturer or the Structural Cement Fiber Products Association for design assistance.

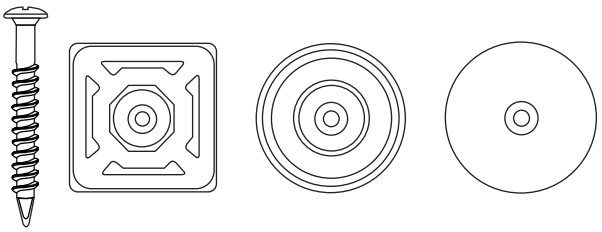
As with any building material, there are limitations that should be considered with these decks. In the past these materials were used extensively over indoor pools and gymnasiums. This often resulted in the accumulation of moisture in the deck, which adversely affected the performance of the roof membrane. Other issues can be encountered as a result of the gaps between the panels, differential heights of adjacent panels (which must be leveled) and excessive deformation over time.

Differential heights can easily be addressed with a leveling layer of InsulFoam insulation or R-Tech Fanfold Roof Underlayment, which may be mechanically fastened to the deck using specialty fasteners shown at the end of this section of the manual.

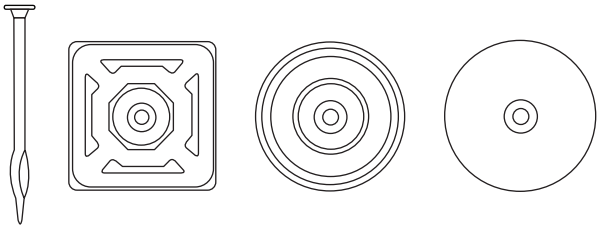
The deck manufacturer's installation recommendations must be followed closely. All leveling, mechanical attachment and protection procedures must be followed. For an example of a cementitious wood fiber deck fastener and typical fastener patterns, refer to the charts at the end of this section.

Mechanical Fasteners

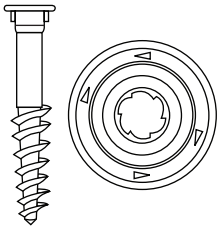
Typical Steel & Wood Deck Fastener & Plates



Typical Concrete Deck Fastener & Plates



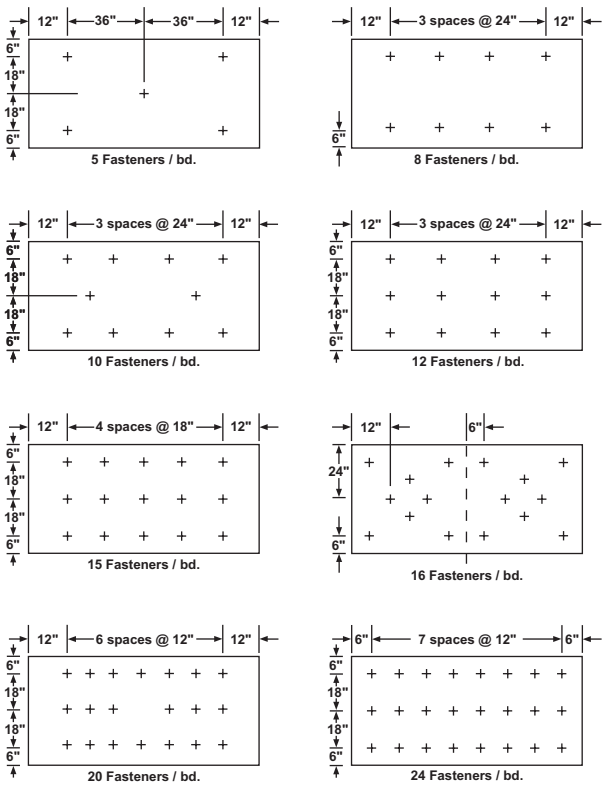
Typical Tectum®, Gypsum & Lightweight Concrete Deck Fastener & Plate



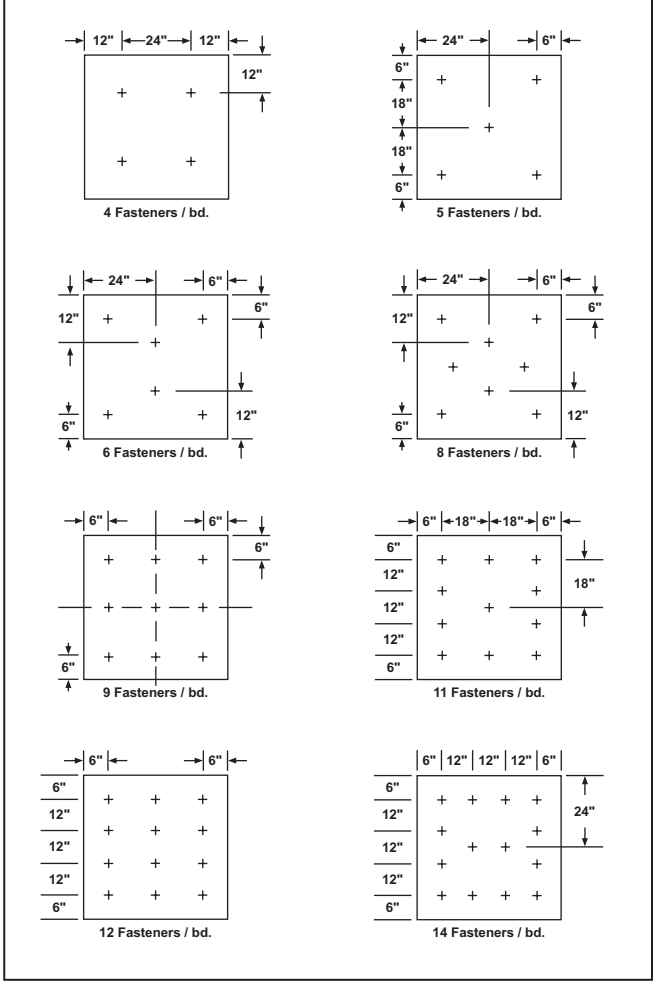
Typical Fastener Patterns

The following are typical fastener patterns for mechanically attaching InsulFoam insulation:

Fastening Patterns for 4'x8' boards



Fastening Patterns for 4'x4' boards



What is a Vapor Retarder?

A vapor retarder is defined as a material or membrane that has a permeance (perm) rating of 0.5 or less when tested in accordance with the American Society for Testing and Materials (ASTM) standard E96, *Standard Test Methods for Water Vapor Transmission of Materials*. Permeance is a measure of how quickly water diffuses through a material. Materials with a perm rating of 0.0 allow virtually no moisture diffusion.

Vapor retarders are used as part of a roof assembly to prevent moisture migration and condensation within that assembly. Moisture migration or condensation can be a concern within an occupied building and also during building construction. In all cases, the vapor retarders should be installed on the warm side of the insulation.

Types of Vapor Retarders

Vapor retarders can be classified as either bituminous or non-bituminous in make-up. Bituminous vapor retarders are typically 2 plies of a glass fiber roofing felt manufactured in accordance with ASTM D2178 Type IV. The roofing felts are applied to an approved substrate in either hot asphalt or a compatible adhesive.

Non-bituminous vapor retarders can consist of plastic sheets or films, kraft paper, kraft laminates and aluminum foil combinations. Follow the installation instructions of the vapor retarder supplier when using these products.

Unless no other alternative exists, a vapor retarder should not be installed directly to a metal deck. As vapor retarders are vulnerable to punctures or other damage from construction traffic when installed directly to a metal deck, this type of installation is usually ineffective.

Roof systems to include a vapor retarder and to be installed over a metal deck typically require a layer of low-thermal substrate (e.g. DensDeck, wood fiber) prior to the application of the vapor retarder. Contact the manufacturer to ensure the material can span the deck rib openings and to obtain general installation recommendations. Also refer to the Insulation Specifications section of the Insulfoam Roofing Manual for additional general installation considerations.

Wood, Tectum®, lightweight insulating concrete and gypsum decks should not have bituminous vapor retarders applied directly to them. A nailed, asphalt base sheet is commonly applied prior to the application of the vapor barrier. Bituminous vapor retarders can be applied directly to a primed structural concrete roof deck.

For projects that include vapor retarder installations, other trades should be notified that care should be exercised when working on or over a vapor retarder.

Determining the need for a Vapor Retarder

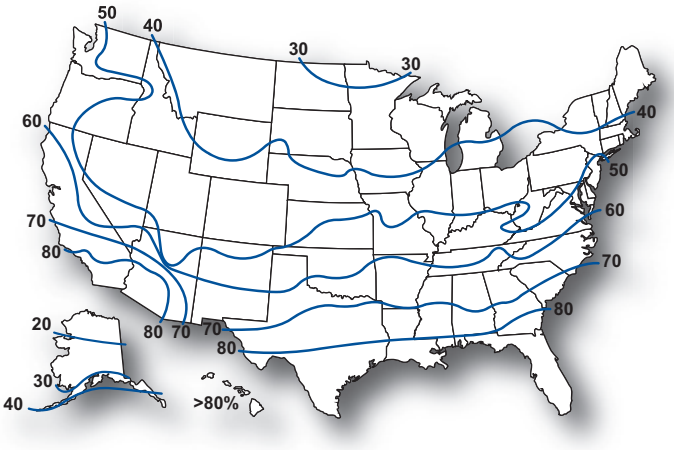
The need for a vapor retarder in the roofing system should be determined by a professional roof system designer.

There are several guidelines and methods used to determine the need for a vapor retarder.

The relative humidity and dew point temperature values are constantly changing in a normal building environment. The need for a vapor retarder, and the design values used, should be based on conservative assumptions and probable conditions.

1. A commonly used rule of thumb is to consider the inclusion of a vapor retarder when both of the following conditions are met:
   - The interior winter relative humidity is expected to be 45% or higher, and
   - The outside average January temperature is below 40 °F.

2. The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) developed an analytical method based on an indoor temperature of 68 °F. When interior relative humidity levels exceed the applicable amount on the following CRREL Map, additional consideration should be given to the use of a vapor retarder. For additional information on the CRREL method go to *www.crrel.usace.army.mil/*.



3. Another more analytical method for determining the need for a vapor retarder is to calculate the temperatures of each surface within the roof system. If the calculations show the dew point occurring inside the roof insulation layer, a vapor retarder should be considered on the warm side of the insulation. If the calculations show condensation occurring below the level where a vapor retarder can be installed, additional insulation (R-Value) or other adjustments to the building's HVAC system are required.

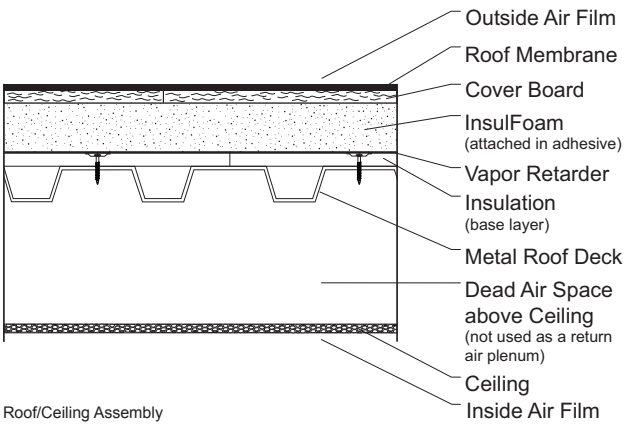
Example Calculation

The following information and example are included in this manual to provide a greater understanding of dew point calculations and theory.

Note: The R-Values of the InsulFoam products are published at 25, 40 and 75 °F. For dew point calculations, Insulfoam recommends that the designer use an R-Value that most closely represents the average temperature of the InsulFoam insulation when vapor drive is the strongest (winter time).

Known Information: A proposed office building in Colorado will have a metal deck and is to be covered with a single ply roof system incorporating 2.6" InsulFoam VIII insulation and a cover board. To accommodate the vapor retarder over the metal deck, a base layer of low-thermal insulation will be needed. The building's interior conditions are 70 °F and 50% relative humidity. The winter design temperature for this building's location is -10 °F.

The following diagram is a cross section of the building's roof/ceiling assembly:



Roof/Ceiling Assembly

To determine the dew point temperature for a given assembly, the interior temperature and relative humidity must be known. Respectively, these values are also commonly referred to as design temperature and design relative humidity.

A psychrometric chart is used to identify the dew point temperature for a set of circumstances. The following simplified psychrometric chart is provided for use with the example. The dew point temperature is located at the intersection of the appropriate design temperature column and relative humidity row.

% Internal Relative Humidity	Design Interior Temperature (°F)														
	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100
100	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100
90	30	33	37	42	47	52	57	62	67	72	77	82	87	92	97
80	27	30	34	39	44	49	54	58	64	68	73	78	83	88	93
70	24	27	31	36	40	45	50	55	60	64	69	74	79	84	88
60	20	24	28	32	36	41	46	51	55	60	65	69	74	79	83
50	16	20	24	28	33	36	41	46	50	55	60	64	69	73	78
40	12	15	18	23	27	31	35	40	45	49	53	58	62	67	71
30	8	10	14	16	21	25	29	33	37	42	46	50	54	59	62
20	6	7	7	9	13	16	20	24	28	31	35	40	43	48	52
10	4	4	5	5	6	8	9	10	13	17	20	24	27	30	34

Psychrometric Chart for Determining Dew Point

For the office building example with the 70 °F inside temperature and 50% inside relative humidity, the dew point temperature will occur at 50 °F or lower.

Unknown Information: Will the temperature at the bottom side of the vapor retarder remain warmer than the dew point temperature? In other words, is there enough insulation above the vapor retarder to keep the vapor retarder at a higher temperature than the dew point temperature of 50 °F?

Solution: The following equation is required to determine the temperature of the vapor retarder:

$$T_{vr} = T_i - \left[\left(\frac{\Sigma R_{vr}}{\Sigma R_t} \right) (T_i - T_o) \right]$$

Where:
- T_{vr} = Vapor retarder temperature
- T_i = Inside air temperature (design)
- T_o = Winter temperature (design)
- ΣR_{vr} = Total R-Value below the vapor retarder
- ΣR_t = Total R-Value of all components

Calculate the roof/ceiling assembly's overall thermal resistance (ΣR_t) as well as the thermal resistance below the vapor retarder (ΣR_{vr}).

The following table gives the roof/ceiling assembly components and their respective R-Values.

Component	R-Value of each material	R-Value below the VR
Outside Air Film	0.17	–
Roof Membrane – EPDM	0.10	–
Cover Board – 1/2" Wood fiber	1.32	–
2.6 InsulFoam VIII	11.05	–
Vapor Retarder	0.12	–
Base Insulation – 1" Wood fiber	2.78	2.78
Steel Deck	0.00	0.00
Dead Air Space above Tile	0.94	0.94
Ceiling Tile	1.40	1.40
Inside Air Film	0.61	0.61
Total Resistance:	**18.49**	**5.73**

Notes:

- With an internal design temperature of 70 °F and an external design temperature of -10 °F, the temperature of the InsulFoam VIII within the system is most closely represented by the R-Value calculated at 40 °F or 4.25 per inch.
- The thermal resistance (R-Value) of roof/ceiling assembly components can be obtained from the material manufacturer or from an energy design handbook (e.g. *ASHRAE Fundamental Handbook*).

Calculate the temperature at the vapor retarder as follows:

$$T_{vr} = 70 - \left[\left(\frac{5.73}{18.49}\right)(70 - (-10))\right]$$

$$T_{vr} = 45\ °F$$

Since the temperature at the vapor retarder is below the dew-point temperature, condensation within the system is possible.

For the example, additional insulation or thermal resistance (R-Value) would be added above the vapor retarder to raise its temperature above the dew-point temperature.

To calculate the InsulFoam VIII minimum R-Value required to raise the temperature of the vapor retarder above the dew point temperature, the following equation can be used:

$$R_{ins} = \left[\left(\frac{\sum R_{vr}(T_{dp} - T_o)}{(T_i - T_{dp})}\right) - \sum R_{ot}\right]$$

Where:
R_{ins} = Minimum InsulFoam Insulation R-Value
$\sum R_{vr}$ = Total R-Value below the Vapor Retarder
$\sum R_{ot}$ = R-Value above the Vapor Retarder from other components (cover board, membrane, air film)
T_{dp} = Dew Point Temperature (design)
T_o = Winter Temperature (design)
T_i = Inside Temperature (design)

$$R_{ins} = \left[\left(\frac{5.73\ (50 - (-10))}{70 - 50}\right) - 1.59\right]$$

$$R_{ins} = 15.6$$

The published R-Value for InsulFoam VIII is 3.92 per inch.

Therefore, for the example, the minimum thickness of InsulFoam VIII needed would be 4.0".

Considerations:

Building Code, Fire and Insurance Ratings

When a vapor retarder is to be used in a roof system, the designer needs to consider its effect on any building codes or roof system approvals (UL and FM).

When calculating the amount of insulation required above the vapor retarder, some designers may add 1-2 degrees to the dew point temperature as an additional safety factor. This approach will result in additional insulation above the vapor retarder.

The need for a vapor retarder in the roofing system should be determined by the roof system designer.

Reference the following resources for additional information on vapor retarders.

- *The NRCA Roofing and Waterproofing Manual – Fifth Edition*
- *ASHRAE Handbook of Fundamentals*
- Oak Ridge National Laboratory (ORNL)

Thermal Barriers

A thermal barrier, or fire barrier, as it relates to a roofing system and as referenced in the Insulation Specifications section of the Insulfoam Roofing Manual, is defined in Chapter 26 of the International Building Code® (IBC) as *a material that will limit the average temperature rise of the unexposed surface to not more than 250 °F after 15 minutes of fire exposure, complying with the standard time-temperature curve of ASTM E 119. The thermal barrier shall be installed in such a manner that it will remain in place for 15 minutes based on FM 4880, UL1040, NFPA286 or UL 1715*. Thermal barriers meeting this criterion are called 15-minute thermal barriers or are classified as having an index of 15. An example given by the IBC of an approved thermal barrier is a 0.5" gypsum wallboard or its equivalent.

The 15-minute time frame is considered to be a typically sufficient time for occupants to exit a building before becoming trapped or overcome by smoke from combustible materials.

The thermal barrier material should have a valid building code certification that lists a report number and date. In some cases, a local building code official will allow the use of a thermal barrier that has been tested to the satisfaction of the official, but is not certified by a code agency.

Direct-to-Deck Applications

In Section 2603.4.1.5 of the IBC, it also indicates that a thermal barrier is not required in roof systems that meet the following conditions.

For wood deck applications:

Foam plastic insulation under a roof assembly or roof covering that is installed in accordance with the code and the manufacturer's instructions shall be separated from the interior of the building by wood structural panel sheathing not less than 0.47 inch (11.9 mm) in thickness bonded with exterior glue, with edges supported by blocking, tongue-and-groove joints or other approved type of edge, or an equivalent material.

And for applications meeting the above criterion:

A thermal barrier is not required for foam plastic insulation that is part of a Class A, B or C roof-covering assembly, provided the assembly with the foam plastic insulation satisfactorily passes FM 4450 or UL 1256.

Insulfoam has passed UL 1256 with numerous roofing membrane systems. Contact your local Insulfoam representative for a list of partner membrane suppliers.

Fire Rated Roof/Ceiling Assemblies (Underwriters Laboratories' P-Designs)

Depending on a building's use, the IBC may require enhanced fire ratings for key components of that building. Structures such as schools, hospitals and emergency shelters are just a few examples of when these ratings may be required. The enhanced fire ratings are commonly referred to as hourly fire ratings, and have been tested by Underwriters Laboratories (UL). For example, a one-hour fire-rated roof/ceiling assembly would maintain its position during a fire for at least one hour. Rated roof/ceiling assemblies have been designated as P-Designs by UL. For certain assemblies, ratings are available for up to three hours. It should be noted that these P-Design roof/ceiling assemblies require strict adherence to ensure full compliance.

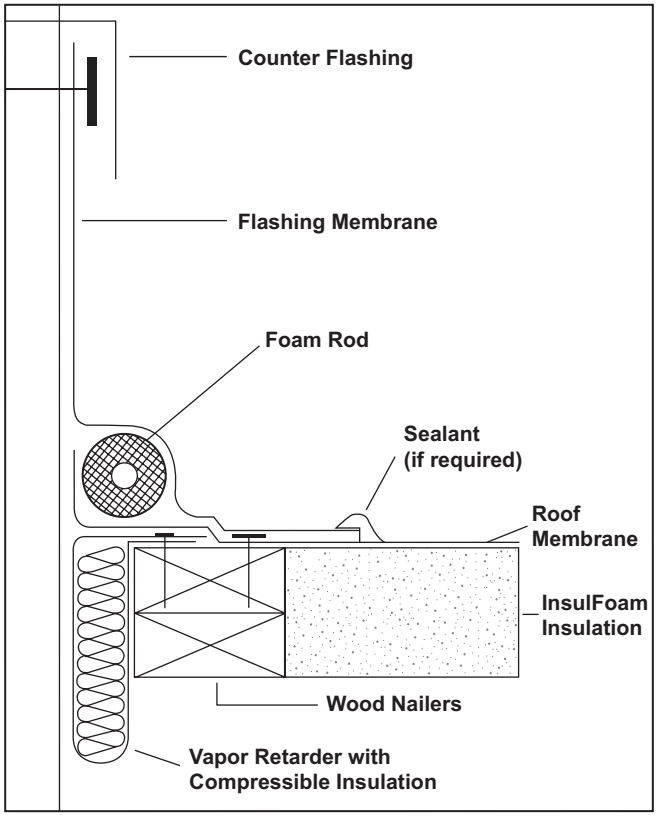
Those assemblies that allow the use of InsulFoam insulations can be found in the Codes section of the Insulfoam Roofing Manual. A complete description of these assemblies is available in the Underwriters Laboratories Directory.

What is an Expansion Joint?

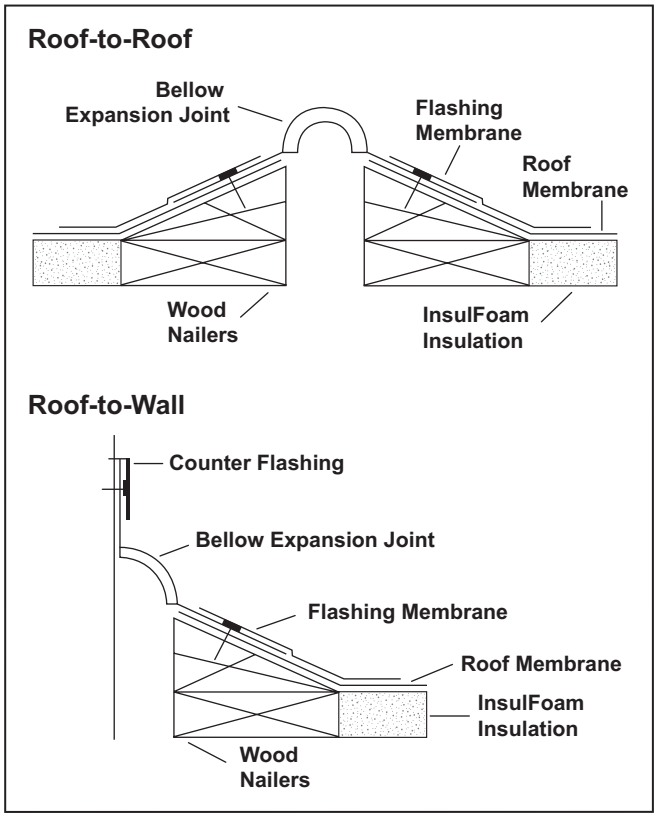
A roof expansion joint is a flexible closure used to minimize the effects of building movement or stress on a roof system. A roof designer will usually require roof expansion joints to coincide with a building's structural expansion joints or places which there could be significant movement. The following are examples of roof locations for which expansion joints should be considered:

- Where structural expansion joints are provided within the building
- Changes in deck direction or deck types
- Building designs with unusual shapes or with wings – L, U, T or E configurations
- Areas in which differential movement of vertical walls and deck can occur
- Building additions next to an existing building
- Areas requiring isolation from excessive vibration
- Buildings that can experience significant movement due to thermal conditions (i.e. a freezer building), soil conditions, high winds or seismic activity

The following are expansion joint examples:



Typical Roof-to-Wall Expansion Joint used with Single Ply Systems



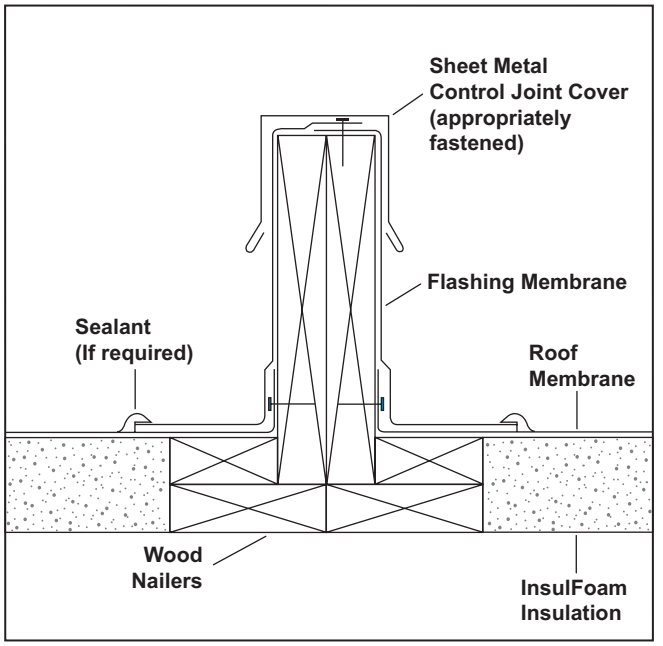
Typical Bellow Expansion Joints

What is a Control Joint?

A roof control joint's primary function is to separate roof areas or divide areas into smaller sections to facilitate maintenance or future roof replacement. Unlike an expansion joint, it is not intended to accommodate structural movement. Roof control joints are also commonly referred to as area dividers or relief joints. The following are examples of roof locations for which control joints should be considered:

- Roof systems located in areas that experience extended freeze-thaw cycles and do not have expansion joints
- Roof systems that will be re-roofed or replaced in phases
- Roof areas that have different roof systems in place

A common rule of thumb was to install a control joint at 150- to 200-foot intervals to break up large roof expanses. This practice was more critical with low-tensile organic and asbestos built-up roofing felts and may not be required with today's membrane systems. Consult with the membrane manufacturer for recommendations.



Typical Raised Control Joint

Code Considerations

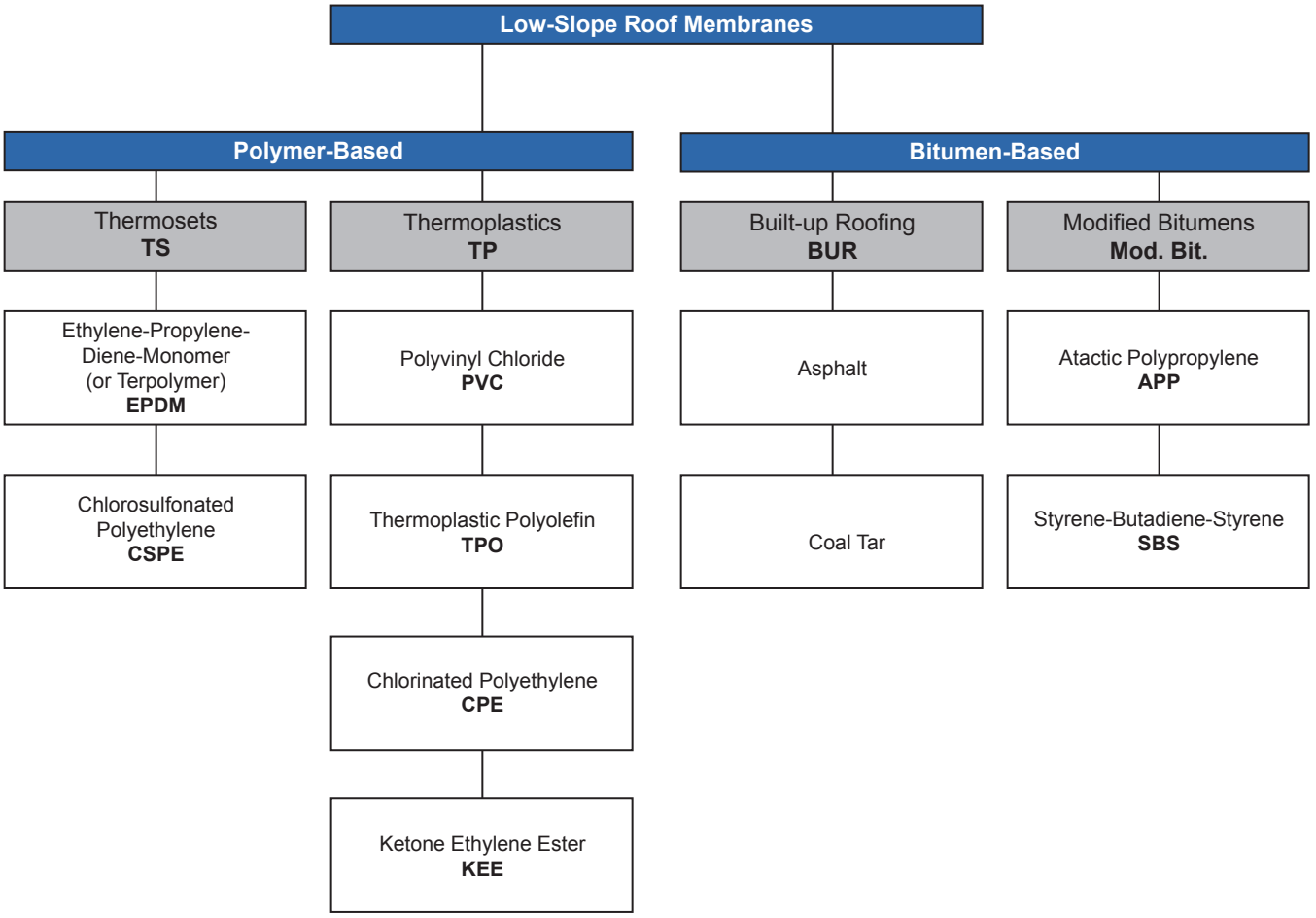
When expansion or control joints are to be used in a roof system, the designer needs to consider their effect on any building codes or roof system approvals (UL and FM).

The use of insulated expansion or control joints should be considered to maintain the roof system's thermal requirements and to reduce the possibility of condensation.

Additional Considerations

In all cases, when roof designers are considering the use of expansion or control joints, the roof membrane manufacturer should be consulted for requirements and specific construction details.

A good reference for expansion joint and control joint construction details is the *NRCA Roofing and Waterproofing Manual.*



Roof Membranes

Insulfoam's insulation and sheathing products can be used as an integral component in virtually any traditional roof membrane system. Customary application techniques and methods are used in order to accommodate the various characteristics and requirements of each.

Polymer-Based Single Ply Systems

Single ply roofing membranes are one of the most popular systems due to their flexibility, relatively easy and clean installation, lightweight and competitive price. One key feature is that they are produced in a factory to strict quality-control requirements that minimize the risks that are inherent in traditional built-up roof systems. In addition, these systems can employ light-colored, reflective roof surfaces that reduce energy consumption and potentially permit the use of smaller, less expensive heating and cooling plants.

The most limiting characteristic of these systems is that they are single ply, offering no redundancy, compared to other systems. Care must be taken to avoid damaging the membrane both during installation and once in service.

Single ply membranes are typically categorized as thermoset or thermoplastic materials. This classification is based on mechanical behavior with respect to the heating and cooling of the membrane, or more accurately, the polymer used to produce the membrane.

Thermosets

Thermoset polymers are composed of long-chain molecules that are linked together by small molecules with strong chemical bonds. This trait is often referred to as vulcanization or curing. The polymer network is so rigid that the molecules cannot move with respect to each other, even when heated. These types of materials do not soften or flow when heated, and the seams cannot be heat-welded in the field. They require the use of a sealing tape or adhesive to form a field-seam or lap.

One of the most common polymers used in these membranes is EPDM (ethylene-propylene-diene-monomer). EPDM membranes are known for their long-term weatherability and resistance to stress (caused by the expansion and contraction typically resulting from fluctuations in temperature), ultraviolet light and ozone. The membranes are available in both unreinforced and reinforced systems, the latter of which increases tear resistance. EPDM is available in black or white, with thicknesses that range from 45 mils to 90 mils, and is offered in wide sheets that may be desirable for large projects, as fewer field seams are required.

Another thermoset material is CSPE (chlorosulfonated polyethylene) also called Hypalon®, which is quite different from EPDM. It is unique in that it starts out as a thermoplastic material, but over time cures into a thermoset. This membrane can be heat-welded as long as the installation takes place prior to excessive aging or curing. CSPE has been promoted for use in harsh environments.

Hypalon® is a registered trademark of DuPont Performance Elastomers.

Thermoplastics

Thermoplastic materials are made from long-chain molecules that are held together by weak chemical bonds. When heated, the molecules slide past each other, and the material softens or flows. Upon cooling, the molecules are no longer able to slide past each other, and the material hardens. Because of this property, the seams of thermoplastic single ply membranes can be heat- or solvent-welded to form field-seams.

PVC (polyvinyl chloride) and TPO (thermoplastic polyolefins) are two of the most commonly used thermoplastic single ply membranes. These membranes include a reinforcing layer, usually polyester or fiber glass, which provides increased strength and dimensional stability. They are typically offered in white or light colors.

PVC membranes are manufactured from a combination of PVC resin, stabilizers, pigments, fillers, plasticizers, biocides and various additives. The membranes are inherently fire-resistant. Historical problems with these membranes related to the use of chemical plasticizers that ultimately evaporated (causing the membrane to become brittle and/or shrink), and have been discontinued.

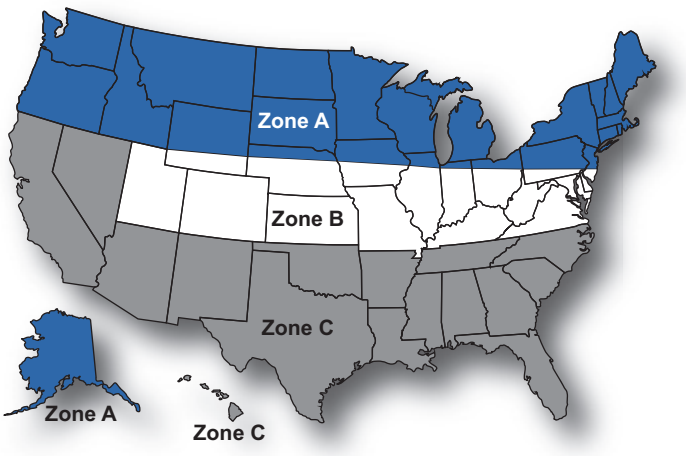
TPOs are another popular thermoplastic choice. These polymers are blends or alloys of polypropylene plastic or polyprolylene and EPR (ethylene-propylene rubber) or EPDM. TPO can be installed using a number of traditional methods, the latest of which is a self-adhesive system.

KEE (Ketone Ethylene Ester) membranes, in addition to having the typical properties exhibited by thermoplastic materials, are also inherently chemical-resistant.

PVC, TPO and KEE remain heat-weldable throughout their service life, and simplify repairs and maintenance.

Black Membrane Applications

Due to the surface temperatures that can be reached on certain un-ballasted black membrane installations, the following chart should be followed when using InsulFoam products with black membranes. Contact the Insulfoam Technical Center or your local Insulfoam representative for additional information.



Zone	Acceptable Insulation Systems
A	• R-Tech metallic w/ side up • InsulFoam SP • InsulFoam w/ SecurePly • InsulFoam w/ Cover Board
B	• R-Tech w/ metallic side up • InsulFoam SP • InsulFoam w/ Cover Board
C	• InsulFoam w/ Cover Board

Single Ply System Fastening Methods

Mechanically Fastened Systems in which the membrane is secured to the deck with screws, plates, bars or other anchoring devices, are referred to as mechanically fastened systems. The fastening method used will typically depend on the type of roof deck. Some applications may require the use of narrower sheets and more fasteners to reduce the likelihood of fastener pull-out.

In areas that are subject to high winds, the fastening system for attaching the membrane is critical. Due to the repetitive movement of the membrane and the resulting forces on the fastening system, the owner may be better served by selecting an alternative system type (e.g. fully adhered).

InsulFoam products are well suited for use with virtually all mechanically fastened single ply systems. These systems meet modeling building code requirements and achieve fire ratings required for most installations.

Fully Adhered Fully adhered systems employ a continuous layer of adhesive that firmly bonds the membrane to a substrate (either the deck or insulation). This method requires the cohesive strength of the adhesive bond to the substrate to be capable of holding the roof in place under the design conditions. Though the roofing materials can be somewhat more expensive, the actual installed cost of these systems can be very competitive.

A recent variation on these systems includes membranes that have an integral adhesive built onto the back of the membrane – these are referred to as self-adhered or peel-and-stick systems. The elimination of liquid-adhesive application can provide additional installation savings.

Care must be used in selecting adhesive systems when InsulFoam products are being used. The insulation can be damaged when exposed to petroleum- or solvent-based adhesives or primers. When these materials are used in the system, InsulFoam shall receive a cover board of wood fiber, oriented strand board, gypsum or DensDeck®. Water-based and urethane adhesives have been found to work extremely well when placed directly over InsulFoam. However, fire ratings for these systems are somewhat limited at this time.

Ballasted Ballasted single ply systems typically use aggregate (round river-washed rocks), 0.75 to 1.5 inches in diameter, installed between 10 to 12 pounds per square foot. The ballast is applied directly over loosely laid membrane and insulation. While adding ballast to a loosely laid roof is most commonly associated with EPDM, other membranes can also take advantage of this fastening method. The designer must consider both the additional weight of the ballast as well as the probability of the structures exposure to high winds. In high-wind areas, ballast can be lifted from the roof and cause damage to surrounding buildings or individuals. It should be noted that manufacturers of PVC membranes often do not permit the use of ballasted systems with their membranes. As an alternate to aggregate, concrete pavers, which can withstand freeze-thaw cycles, can be applied over a non-woven fleece pad to anchor the membrane. These systems are generally accepted as having the lowest installed cost per square foot, followed by mechanically fastened and fully adhered (excluding self-adhered) systems.

InsulFoam is an ideal insulation for use in ballasted single ply membrane systems, and has been used successfully in these applications for over twenty years.

Multi-Ply Bituminous Membranes

Built-Up Roofing Systems Conventional bituminous built-up roofing (BUR) membranes have been used for over 100 years and represent a notable portion of today's roofing market. The membrane, in essence, is fabricated in place, (not in a factory), and consists of layers of waterproofing bitumen alternating with plies of reinforcing felts, and finished with a protective surfacing. The primary feature of BUR is the redundancy offered by multiple plies. Molten bitumen is typically applied at elevated temperatures. These systems can be used very effectively with InsulFoam; however, the use of cover boards and particular application techniques is required. Refer to the Insulation Specifications section for these application techniques.

InsulFoam products are not to be used with coal tar or coal-tar bitumen membranes.

Modified Bitumen Roofing Systems Polymer modification of bitumens has enhanced the properties of classic waterproofing materials used in built-up roofing. Traditional bitumen limitations, such as elongation, slippage in hot weather and flexibility in cold weather, have been improved with this innovation. In addition, because the properties of the bitumen were altered, new application techniques were developed. These enhanced bitumens are typically combined with reinforcements or carriers that complement the properties of modified bitumen blend. This results in sheet materials that have exceptional tensile strength, tear resistance and weatherability.

SBS (Styrene-Butadiene-Styrene) modified bitumens have excellent elongation and recovery properties, permitting repetitive exposure to the cyclic stresses caused by the expansion and contraction of underlying decks or substrates. The ability to accommodate these loads minimizes the potential of premature fatigue failure of the membrane. The rubberized blend also results in improved cold-weather performance.

APP (Atactic Polypropylene) modified bitumens use plastic modifiers to improve the properties of the asphalt. These materials are typically referred to as amorphous or atactic polypropylene. The products are ideal for heat weld or propane torch applications, as the blend on the back of the sheet acts as an integral hot-melt adhesive. Often, these products are reinforced with a polyester mat that creates excellent tensile strength and flexibility.

Direct exposure to the elements and ultraviolet light can result in premature aging of modified bitumen blends, and, for that reason, they are often produced with a protective coating of ceramic roofing granules.

Bituminous System Fastening Methods

Hot-Asphalt Attachment Built-up roofing (BUR) and SBS modified bitumen systems utilize hot asphalt to bond the membrane to the underlying substrate. The application temperature of the asphalt ranges from 335 °F to 450 °F. The use of a cover board is required over InsulFoam with the use of BUR or SBS membranes. The cover board can be attached using mechanical fasteners or hot asphalt application techniques. These techniques are described in the Insulation Specifications section of this manual.

Heat Welding Heat welding techniques differ depending on the membrane and application.

Heat welding of single ply membranes typically requires the use of a hot-air gun. This tool provides a stream of air that is hot enough to soften the membrane coating. Once the material has softened sufficiently, it will bond to another sheet of the same material, or, in some instances, specially coated metal flashing. This technique is used to seal field-seams, attach perimeter and penetration membrane flashing materials to the roof membrane and attach the membrane to perimeter metal.

Heat welding of modified bitumens can employ either a propane torch or hot-air gun. Both tools are used to soften the modified bitumen blend on the sheets to allow the material to bond to itself at field laps, roof insulation, other roof substrates and properly prepared perimeter metal.

The lap or bond to the roof substrate is complete once the

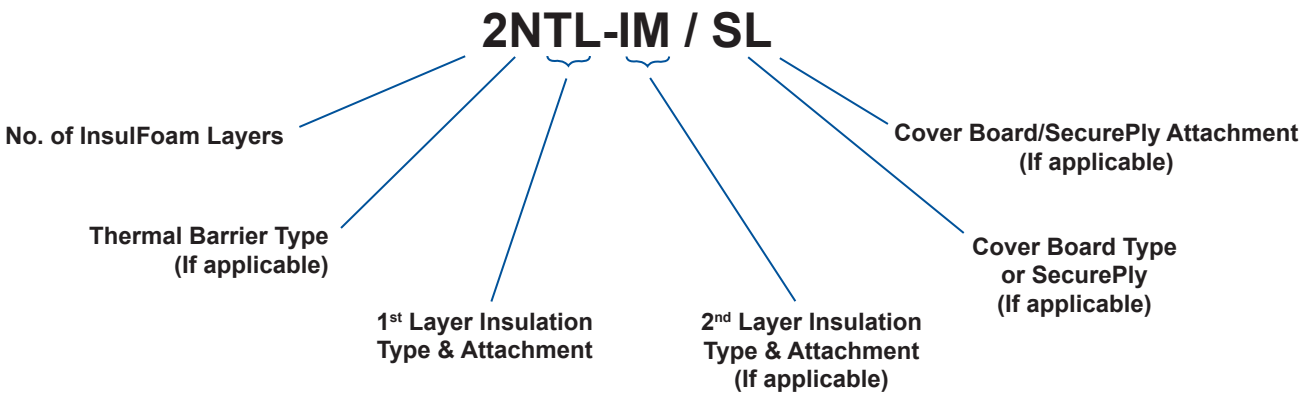
membrane material has cooled.

Cold Adhesives Virtually any of the membranes described in this section can be built or secured to the roof substrate with adhesives. Many alternatives are available, and proper selection largely depends on the roofing components employed in the system.

Organic, solvent-based bonding cements have been used very effectively for many years. Although they work well with some membranes, most solvents in these adhesives can damage InsulFoam products. When these materials are used in systems employing InsulFoam, a cover board must be used to protect the insulation. Care must also be taken in applying the adhesive. Pouring large pools of adhesive on the cover board can penetrate the cover board and damage the insulation. INSULFOAM WILL NOT ACCEPT, UNDER ANY CIRCUMSTANCES, ANY RESPONSIBILITY FOR DAMAGE TO INSULFOAM INSULATION OR SHEATHING PRODUCTS THAT IS CAUSED BY SOLVENTS FROM ADHESIVES.

A number of low-solvent, urethane and water-based adhesives are also available for use with InsulFoam insulations. These systems may also require the use of a cover board. Membrane manufacturers typically provide their own brand or specify which adhesive materials are compatible with their membrane. Refer to membrane manufacturers' recommendations.

Self-Adhered Membranes Self-adhering membranes are manufactured with an integral adhesive film on the back of the sheet that is covered with a release paper or film. They are similar in design to adhesive bandage strips. These membranes are available from single ply membrane and modified bitumen manufacturers. The sheet is installed by removing the release paper while placing the membrane over the roof insulation or substrate. Depending on the Insulfoam product being used, a cover board may be required.



No. of InsulFoam Layers	
Layers	**ID**
First	**1**
Second	**2**

Thermal Barrier	
Type	**ID**
Direct-to-Deck (none)	**N**
DensDeck	**D**
Gypsum	**G**
Perlite	**P**

1st Layer Insulation			
Type	**ID**	**Attachment**	**ID**
InsulFoam	**I**	Loose	**L**
InsulFoam SP	**S**	Adhered	**A**
InsulLam	**L**	Asphalt	**H**
Tapered InsulFoam	**T**	Mech. Fastened	**M**
R-Tech	**R**		
R-Tech Fanfold	**F**		

2nd Layer Insulation			
Type	**ID**	**Attachment**	**ID**
InsulFoam	**I**	Loose	**L**
InsulFoam SP	**S**	Adhered	**A**
InsulLam	**L**	Asphalt	**H**
Tapered InsulFoam	**T**	Mech. Fastened	**M**

Cover Board/SecurePly			
Type	**ID**	**Attachment**	**ID**
SecurePly	**S**	Loose	**L**
Wood Fiber	**W**	Adhered	**A**
DensDeck	**D**	Hot Asphalt	**H**
Gypsum	**G**	Mech. Fastened	**M**
Perlite	**P**		

Insulfoam Insulation Specifications

The following Insulfoam insulation specifications are designed to allow a specifier to easily describe a particular insulation assembly.

Key Reminders

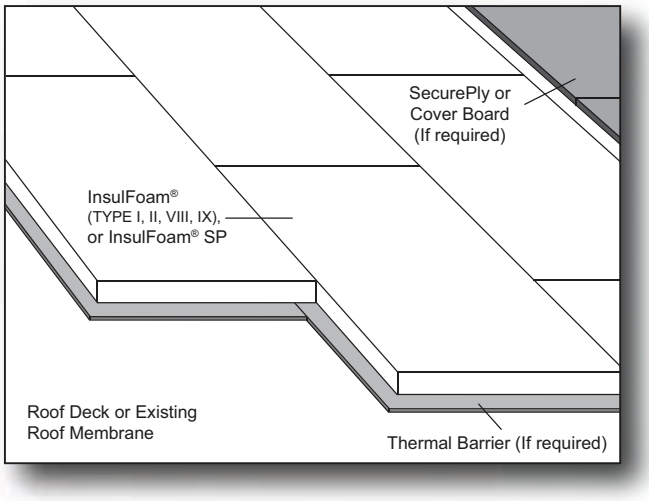
- The first number in these insulation specifications only indicates the number of layers of InsulFoam insulation (1 or 2), and does not include any thermal barrier or cover board.
- When no thermal barrier is required, the letter N is used to indicate a direct-to-deck installation.
- When no second layer of InsulFoam insulation is specified, the second set of letters are omitted.
- When no cover board or SecurePly is specified, the slash (/) and the two letters that follow it are omitted.

Examples

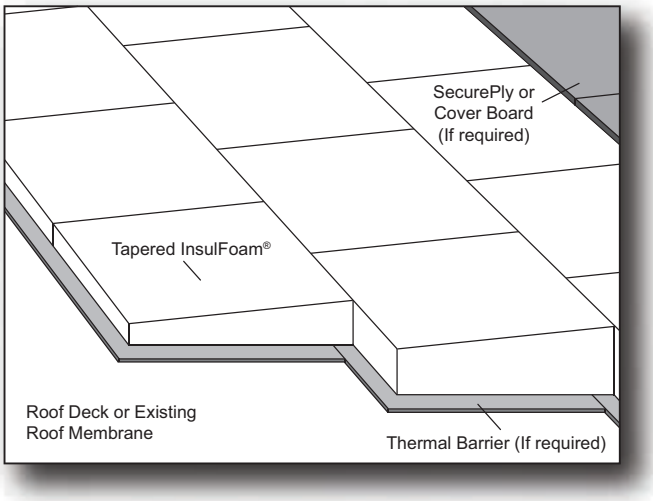
- A specification that requires a single layer of loose laid InsulFoam I, with no thermal barrier, cover board or SecurePly, would be described as 1NIL.
- A specification that requires a double layer of InsulFoam VIII (first layer is loose laid, second layer is mechanically attached), with no thermal barrier, cover board or SecurePly, would be described as 2NIL-IM.
- A specification that requires a single layer of mechanically attached Tapered InsulFoam over a gypsum thermal barrier, with a wood fiber cover board applied in asphalt, would described as 1GTM / WH.

SINGLE LAYER – LOOSE LAID

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a loose laid roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- When conditions dictate, in order to prevent wind blow-off or damage during installation, the loose laid insulation should be weighed down or tacked into place with a minimal quantity of mechanical fasteners.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	InsulFoam SP	Tapered InsulFoam
Direct-to-Deck		
1NIL	1NSL	1NTL
DensDeck Thermal Barrier		
1DIL	1DSL	1DTL
Gypsum Thermal Barrier		
1GIL	1GSL	1GTL
Perlite Thermal Barrier		
1PIL	1PSL	1PTL

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Loose Laid Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed

directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

SecurePly Installation

Some specifications require the use of a slip sheet. SecurePly should be rolled out so that it completely covers the underlying insulation. SecurePly must have 2" (minimum) side and end laps. To prevent movement from wind or roof top construction traffic, it may be necessary to tack SecurePly into place with a minimal quantity of mechanical fasteners.

When SecurePly is used in conjunction with these loose laid specifications, the insulation specification designation is to be modified with the two-letter suffix SL, to identify that SecurePly has been loosely laid over the insulation.

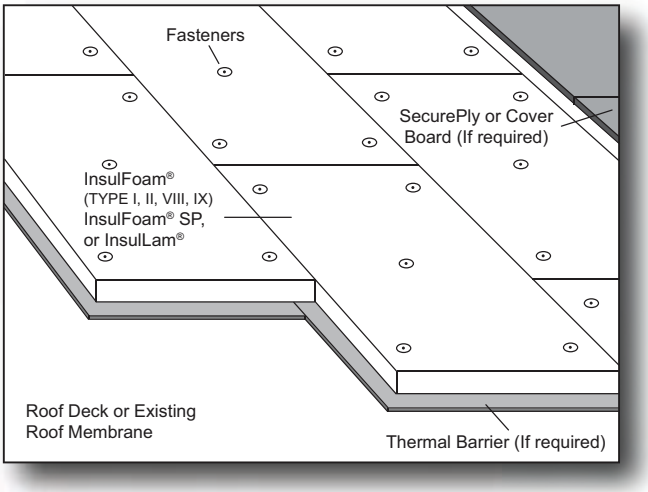
Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be loose laid or mechanically attached over loosely laid InsulFoam or Tapered InsulFoam. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

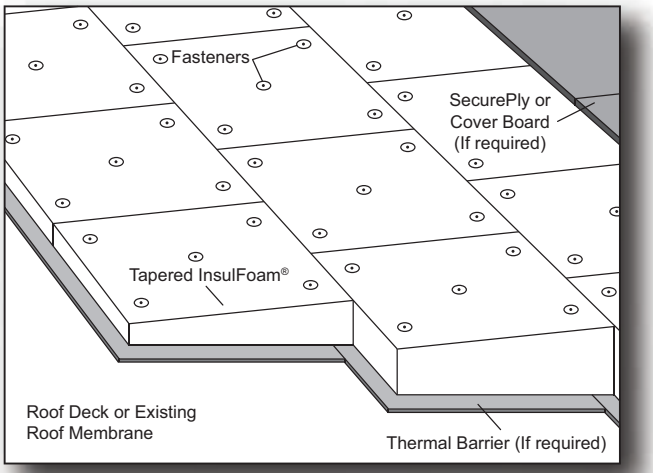
When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

SINGLE LAYER – MECHANICALLY ATTACHED

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- Insulfoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	InsulFoam SP	Tapered InsulFoam	InsulLam
Direct-to-Deck			
1NIM	1NSM	1NTM	1NLM
DensDeck Thermal Barrier			
1DIM	1DSM	1DTM	1DLM
Gypsum Thermal Barrier			
1GIM	1GSM	1GTM	1GLM
Perlite Thermal Barrier			
1PIM	1PSM	1PTM	1PLM

Note: For mechanically attached systems that incorporate a thermal barrier, cover board and/or SecurePly with InsulFoam insulation, it is possible to attach all layers to the substrate using a single fastener of sufficient length.

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Mechanically Attached Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount

prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board, and should be placed in a pattern that achieves the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

SecurePly Installation (If required)

Some specifications require the use of a slip sheet. SecurePly should be rolled out in a manner to completely cover the underlying insulation. The SecurePly must have 2" (minimum) side and end laps. To prevent movement from wind or roof top construction traffic, it may be necessary to tack SecurePly in place with a minimal quantity of mechanical fasteners.

When SecurePly is used in conjunction with these mechanically attached specifications, the insulation specification would be modified with the two-letter suffix SL, to identify that SecurePly has been loosely laid over the insulation, or SM to indicate that the fasteners have been installed through the SecurePly.

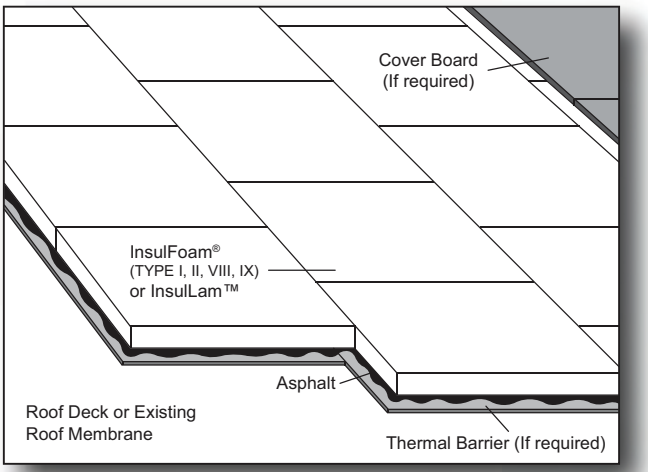
Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be mechanically attached, asphalt attached or adhered over mechanically attached InsulFoam and Tapered InsulFoam. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

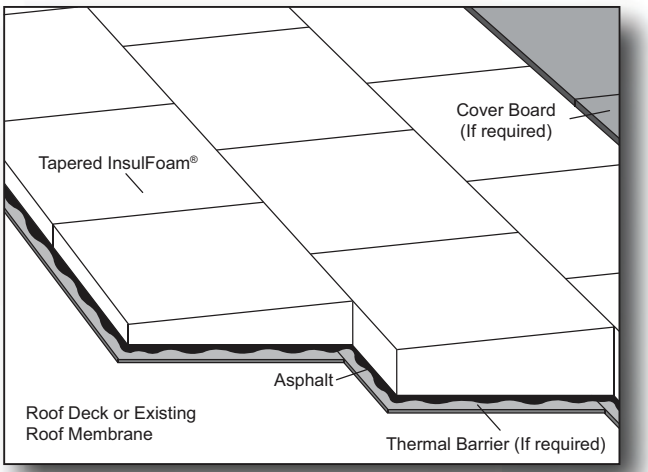
When cover boards are used in conjunction with these specifications, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specifications information.

SINGLE LAYER – ASPHALT ATTACHED

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an asphalt attached roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the asphalt.
- Concrete decks must be primed with an appropriate primer and must be sufficiently dry before applying hot asphalt.
- Asphalt attachment of insulation directly to a metal deck is not recommended.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
1NIH	1NTH	1NLH
DensDeck Thermal Barrier		
1DIH	1DTH	1DLH
Gypsum Thermal Barrier		
1GIH	1GTH	1GLH
Perlite Thermal Barrier		
1PIH	1PTH	1PLH

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Asphalt Attached Insulation

Applications requiring an InsulFoam insulation attached in hot asphalt should be installed by a roofing crew fully trained for these applications. The asphalt is to be applied only to the substrate. The InsulFoam insulation is to be installed only after the asphalt has cooled adequately.

DO NOT APPLY ASPHALT DIRECTLY TO ANY INSULFOAM OR R-TECH PRODUCTS.

Board size should be limited to 4' x 4' when using this attachment method. Apply asphalt to the substrate at a rate of 30 lbs. per square and 3" to 6" beyond the edges of the board being installed. Porous substrates may require a greater amount of asphalt. Allow the asphalt to cool up to 250 °F, but not less than 200 °F. The absence of visible smoke is a common indicator that the asphalt has sufficiently cooled. This may not be applicable at ambient rooftop temperatures below 50 °F. In addition, it may be useful to use an infrared heat gun to measure asphalt temperatures on the substrate prior to installation of the first few boards. Weather conditions, asphalt variations and crew techniques will impact the rate at which asphalt cools. The asphalt must remain hot enough to maintain its adhesive characteristics. Firmly set boards of InsulFoam into the asphalt with continuous side joints and end joints staggered a minimum of 6". Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation being used in the field of the roof. If InsulFoam is being installed over a thermal barrier or an existing layer of insulation, all joints must be offset a minimum of 6" between layers.

Cover Board Installation (If required)

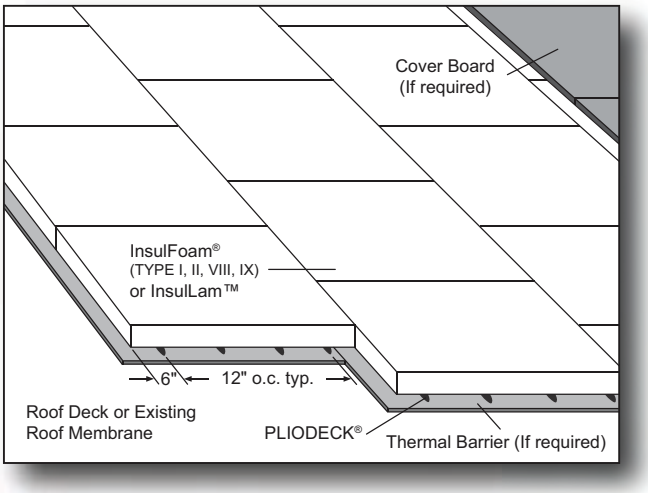
Some specifications require the use of a cover board. Cover boards may be asphalt attached or adhered over asphalt attached InsulFoam and Tapered InsulFoam. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specifications information.

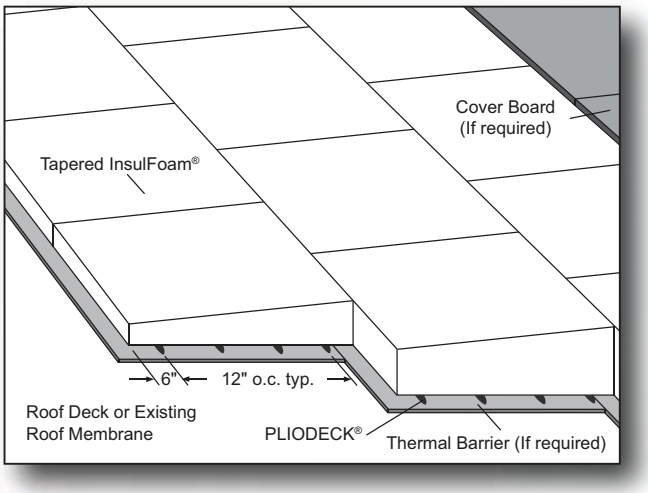
SINGLE LAYER – ADHERED

PLIODECK® Insulation Adhesive

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an adhered roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

PLIODECK Insulation Adhesive is offered by Ashland, Inc. Refer to Ashland's InfoTech™ literature for additional information on storage, handling and use of PLIODECK Insulation Adhesive.

Installation Considerations

- For optimum results, install materials when conditions (temperature, humidity and ventilation) are within the limits recommended by Ashland, Inc. Do not install products under conditions outside the adhesive manufacturer's limits.
- PLIODECK Insulation Adhesive should be applied when air and surface temperatures are 40 °F and rising.
- The PLIODECK Insulation Adhesive should be stored in a dry area, out of direct sunlight, and at a temperature between 50 °F and 80 °F. It is recommended that the adhesive be stored at 70 °F prior to application in cold weather.
- Cans of PLIODECK must not be opened until time of use. Since exposure to moisture will cure the adhesive, use all product in opened containers immediately.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the PLIODECK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.
- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
1NIA	1NTA	1NLA
DensDeck Thermal Barrier		
1DIA	1DTA	1DLA
Gypsum Thermal Barrier		
1GIA	1GTA	1GLA
Perlite Thermal Barrier		
1PIA	1PTA	1PLA

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Single Layer – Adhered with PLIODECK

Surfaces to be bonded together must be free of dirt, debris and other contaminants. When re-roofing over mineral-surfaced cap sheet, surface should be swept, power-washed or vacuumed to remove loose material. Existing roof systems that are power-washed must dry thoroughly before proceeding. Board size should be limited to 4' x 4' when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If InsulFoam is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers.

At the time of use, unscrew the cap on PLIODECK cans, remove moisture seal and attach plastic pour spouts. Mount cans to the PLIODECK applicator cart and secure tightly. If cart-mounting plates do not fit securely against cans, use pliers or channel locks to align plates properly. Adjust cans to apply adhesive beads 12" on center in the field of the roof and 6" on center on the perimeter, with the outside beads placed 6" from edge of board line. Punch a vent hole in the cans with an awl. Flip the tilting lever up to begin applying adhesive to the deck. Pace the cart speed to apply a 3/8" to 1/2" bead. In colder temperatures, adhesive will be thicker and will pour more slowly. Spouts are designed for summer application, and in cooler weather, cart pace may be increased by cutting larger openings in the spout. Cart may be pulled or pushed. Place cart lever in the down position to stop the flow of adhesive.

InsulFoam insulation must be installed as soon as adhesive beads have been applied to substrate. In 5 to 15 minutes, the adhesive will change to a cream color and begin to foam. The InsulFoam insulation may rise slightly as a result of this foaming, and is to be walked-in to ensure contact with the substrate. Repeat this process as needed to ensure a smooth insulation surface for membrane application. In cases of high moisture content and/or warped or cupped boards, it may be necessary to repeat this step several times. For warped or cupped boards, a weight should be applied to the board until the adhesive has set. It is not unusual for the adhesive to foam up through the joints of the boards. Excess foam may be trimmed away after the adhesive has set.

A roofing membrane may be applied as soon as the boards have become firmly attached to the substrate, typically after 15 to 30 minutes. Times will vary with ambient temperatures and moisture conditions. Application rates can vary. Contact Ashland, Inc. or Factory Mutual for additional information on perimeter and corner attachment requirements.

When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Insulation adhesive should be installed on the upper flanges of the deck to maintain the prescribed application rate. Installations over new metal decks may require additional cleaning to remove any oils present on the deck's surface. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

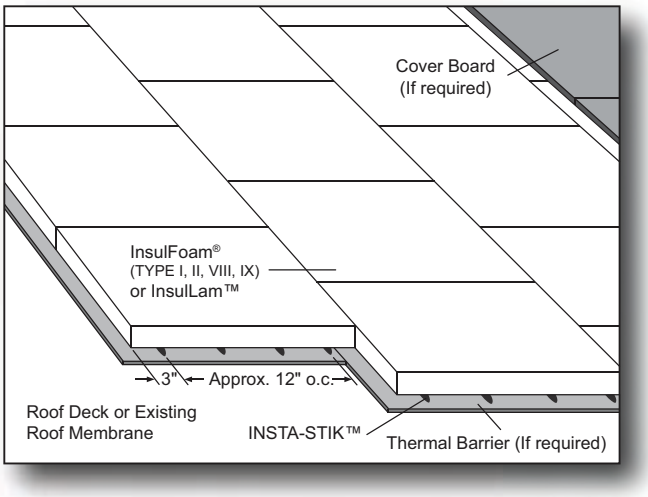
Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be adhered with PLIODECK or asphalt to InsulFoam and Tapered InsulFoam that has been adhered with PLIODECK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

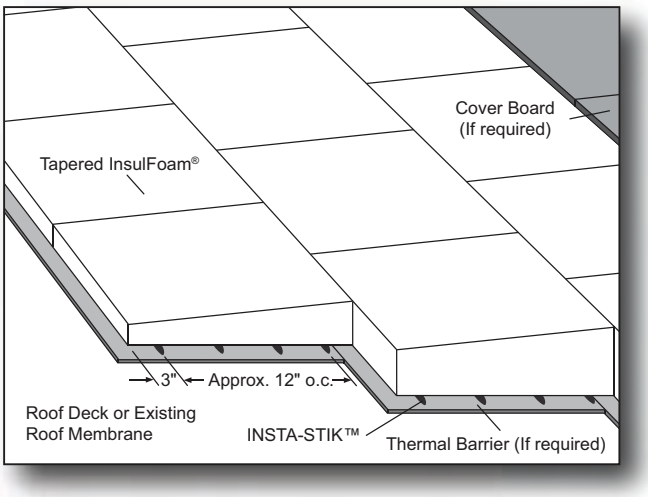
When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specifications information.

INSTA-STIK™ Quik Set Commercial Roofing Adhesive

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an adhered roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

INSTA-STIK™ Quik Set Commercial Roofing Adhesive is offered by The Dow Chemical Company (Dow). Refer to Dow Installation Procedures and Dow literature for additional information on storage, handling and use of INSTA-STIK Quik Set Commercial Roofing Adhesive.

Installation Considerations

- Acceptable INSTA-STIK substrates are smooth and gravel-surfaced Class 1 built-up roofs, concrete, wood, and minimum 22-gauge metal decks, and vapor retarders approved by The Dow Chemical Company. Please contact Dow at 866-583-BLUE for compatibility questions or concerns.
- For optimum results, install materials when conditions (temperature, humidity and ventilation) are within the limits recommended by Dow. Do not install products under conditions outside the adhesive manufacturer's limits.
- INSTA-STIK is not approved for application when surface or ambient temperatures are below 33 °F or above 110 °F.
- INSTA-STIK is not approved for use during inclement weather.
- INSTA-STIK is not approved for use on surfaces or decks that are wet or have standing water, frost, ice or snow.
- INSTA-STIK is packaged in a single container that should be stored between 50 °F and 75 °F. The ideal chemical temperature at the time of application is 75 °F.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the INSTA-STIK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.
- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
1NIA	1NTA	1NLA
DensDeck Thermal Barrier		
1DIA	1DTA	1DLA
Gypsum Thermal Barrier		
1GIA	1GTA	1GLA
Perlite Thermal Barrier		
1PIA	1PTA	1PLA

Single Layer – Adhered with INSTA-STIK

Before dispensing INSTA-STIK, the applicator must observe the following precautions: wear protective clothing, work gloves and protective eyewear.

All surfaces must be free of any debris, dirt, dust, grease, oil, diesel fuel and standing water before INSTA-STIK is applied. In addition, for installations directly to a new metal deck, the residual oil-shop coating must be removed with acetone, naphtha or a comparable cleaner. When re-roofing over an existing built-up roof, a licensed INSTA-STIK instructor, authorized to perform adhesion tests, must be onsite prior to the commencement of the project in order to determine compatibility. Contact The Dow Chemical Company, Roofing Technical Support Group, at least fourteen (14) days in advance for further instructions.

Board size can be up to 4' x 8' flat or 4' x 4' taper when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If InsulFoam is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers.

INSTA-STIK should be mixed prior to use by firmly holding the container on its side and agitating the contents, using a side-to-side motion for at least 15 seconds.

The dispensing wand kit is ideal for roof decks with many penetrations. Attach the dispensing hose swivel end to the cylinder valve. Tighten the connection using an open-end wrench, being careful not to over-tighten. Verify that the on/off valve on the dispensing hose is closed. The handle should be perpendicular to the valve. Attach the dispensing wand kit to the on/off valve by screwing in until it is hand-tight.

The INSTA-STIK Multi-Bead Applicator (MBA) is recommended for roof decks with open areas. The INSTA-STIK MBA uses three tanks of INSTA-STIK Quik Set Commercial Roofing Adhesive. The tanks are connected by a hose to a central inlet manifold. The INSTA-STIK MBA is rolled backward along the roof deck, as four to eight beads of adhesive flow from the center outlet tubes in a precise pattern that can be adjusted per roofing requirements. The INSTA-STIK MBA also features an ancillary manifold that can be used near the roof edge to add three interspaced beads to the pattern.

Dispense a minimum of 1 lineal foot of 3/4"–1" diameter bead of INSTA-STIK for every square foot of insulation board to be attached. A picture of a 3/4" bead is provided in the operating instructions as a guide for proper bead size.

Use a parapet wall or gutter as a straight edge guide when dispensing the first bead of INSTA-STIK. Under the normal application rate, place the first bead 3" inside the outside edge of the insulation to be attached. Apply 3 additional parallel beads approximately 12" apart, so that the fourth bead is 3" inside the opposite edge of the insulation board. The result is 4 equidistant parallel beads for each insulation board (1 lineal foot of adhesive per 1 sq. ft. of insulation). When using the MBA, open the valves to dispense 4 beads of INSTA-STIK.

The application rate can vary with roof system configuration. Additional adhesive is required around all roof penetrations and drains. An increased amount of INSTA-STIK may be required at the perimeter band of the roof, depending on the building and parapet wall heights. For application rates, refer to Table 1 in Dow's Installation Procedures for INSTA-STIK Quik Set Commercial Roofing Adhesive.

When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Apply 3/4"–1" beads of INSTA-STIK on the first full upper flange nearest the edge of the InsulFoam insulation. Continue to apply the INSTA-STIK at the prescribed rate. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

IMPORTANT: When applying INSTA-STIK, the insulation boards must be placed onto the INSTA-STIK beads before tack-free (2 to 8 minutes depending on humidity). Walk on the boards to spread the beads for maximum contact. Continue to walk on the insulation boards every 3 to 4 minutes until the insulation in firmly attached, usually within 10 to 20 minutes. Low humidity conditions will require longer cure time.

Cover Board Installation (If required)

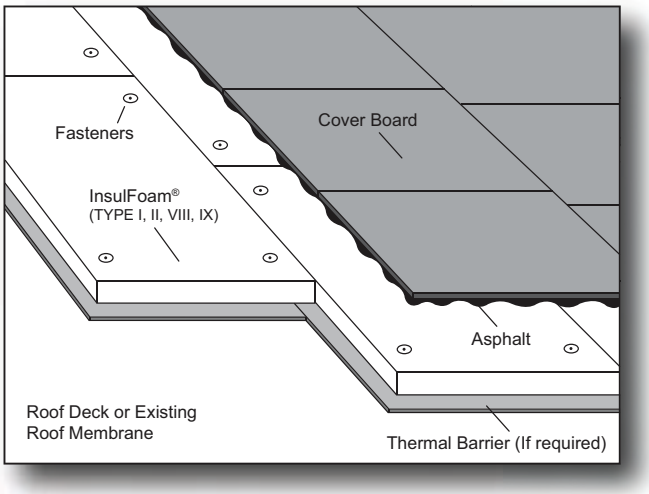
Some specifications require the use of a cover board. Cover boards may be adhered with INSTA-STIK or asphalt to InsulFoam and Tapered InsulFoam that has been adhered with INSTA-STIK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specifications information.

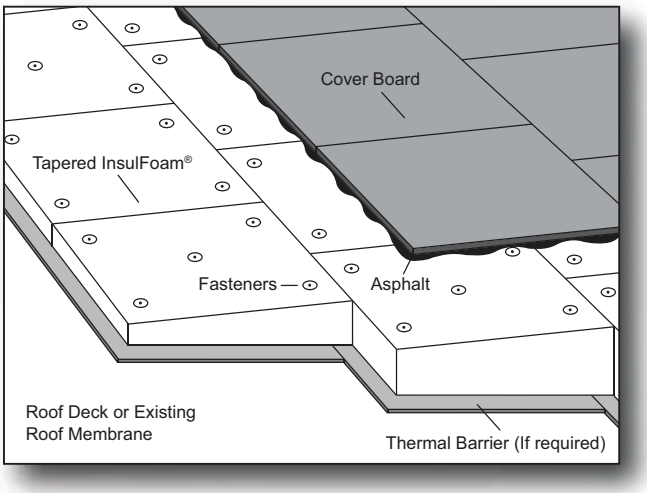
SINGLE LAYER – ALTERNATE

Mechanically Attached InsulFoam® with a Cover Board in Asphalt

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations and cover boards are shipped in a variety of packaging materials (plastic film wraps, shrouds, etc.) intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Cover boards are typically thinner than InsulFoam insulations, and are more susceptible to damage during handling and installation. Extra care should be taken to ensure that the product is installed in a useable condition.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	Tapered InsulFoam		InsulFoam	Tapered InsulFoam
Direct-to-Deck			**DensDeck**	
1NIM/WH	1NTM/WH		1DIM/WH	1DTM/WH
1NIM/DH	1NTM/DH		1DIM/DH	1DTM/DH
1NIM/PH	1NTM/PH		1DIM/PH	1DTM/PH
Gypsum Thermal Barrier			**Perlite Thermal Barrier**	
1GIM/WH	1GTM/WH		1PIM/WH	1PTM/WH
1GIM/DH	1GTM/DH		1PIM/DH	1PTM/DH
1GIM/PH	1GTM/PH		1PIM/PH	1PTM/PH

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Mechanically Attached Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a

thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board, and should be placed in a pattern that achieves the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

Asphalt Attached Cover Board

Cover boards attached in asphalt directly to an InsulFoam insulation should be installed by a roofing crew fully trained for these applications. Asphalt is to be applied only to the backside of the cover board. The cover board is to be installed only after the asphalt has cooled adequately.

DO NOT APPLY ASPHALT DIRECTLY TO ANY INSULFOAM OR R-TECH PRODUCTS.

The cover board size is to be limited to a maximum of 4' x 4' when using this attachment method. Cover board side joints are to be continuous, and end joints staggered a minimum of 12". All cover board joints are to be offset from the base layer insulation joints by a minimum of 6".

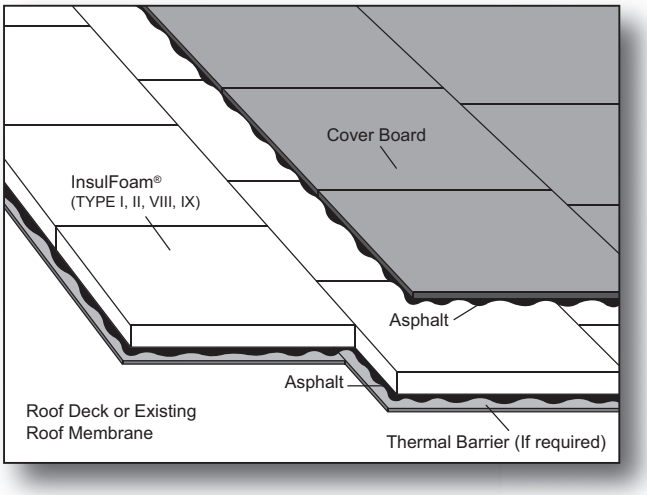
Place the hot-asphalt-compatible cover board (bottom side up, if applicable) adjacent to the area in which it will be installed. Make certain the previously installed InsulFoam insulation is protected from any over-mopped or spilled hot asphalt. Apply a continuous, firmly bonding film of asphalt to the entire back surface of the cover board at a nominal rate of 30 lbs. per square. Porous cover boards may require greater amounts of asphalt. Allow the asphalt to cool up to 250 °F, but not less than 200 °F. The absence of visible smoke is a common indicator that the asphalt has sufficiently cooled. This may not be applicable at ambient rooftop temperatures below 50 °F. The asphalt must remain sufficiently hot to maintain its adhesive characteristics. It may be useful to use an infrared heat gun to measure the asphalt temperature on the back of the first few boards installed, as weather conditions, asphalt variations and crew techniques will impact the rate at which asphalt cools. When the asphalt has cooled to within the appropriate temperature range, the back-mopped cover board is to be flipped so the asphalt is facing down, and is to be placed over the InsulFoam insulation. The installed cover boards should be lightly stepped into place and should abut tightly against adjacent boards. Joints greater than 1/2" are to be filled with the same cover board material being used.

For cold weather applications, contact the Insulfoam Technical Center for specific instructions.

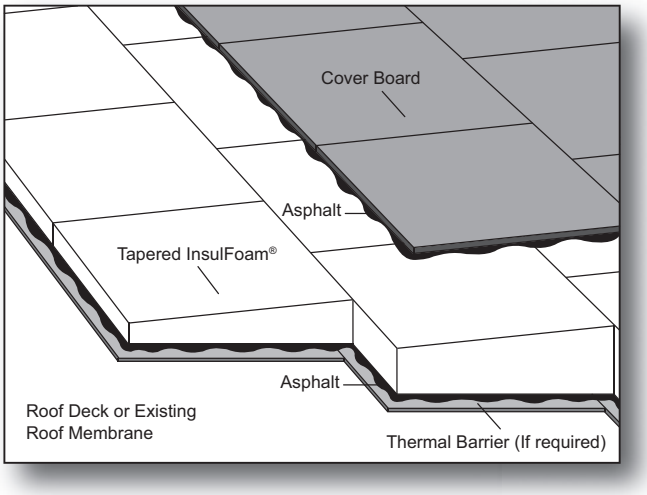
SINGLE LAYER – ALTERNATE

Asphalt Attached InsulFoam® with a Cover Board in Asphalt

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an asphalt attached insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations and cover boards are shipped in a variety of packaging materials (plastic film wraps, shrouds, etc.) intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Cover boards are typically thinner than InsulFoam insulations, and are more susceptible to damage during handling and installation. Extra care should be taken to ensure that the product is installed in a useable condition.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between Insulfoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the asphalt.
  Concrete decks must be primed with an appropriate primer and must be sufficiently dry before applying hot asphalt.
- Asphalt attachment of insulation directly to a metal deck is not recommended.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulFoam	Tapered InsulFoam
Direct-to-Deck		**DensDeck**	
1NIH/WH	1NTH/WH	1DIH/WH	1DTH/WH
1NIH/DH	1NTH/DH	1DIH/DH	1DTH/DH
1NIH/PH	1NTH/PH	1DIH/PH	1DTH/PH
Gypsum Thermal Barrier		**Perlite Thermal Barrier**	
1GIH/WH	1GTH/WH	1PIH/WH	1PTH/WH
1GIH/DH	1GTH/DH	1PIH/DH	1PTH/DH
1GIH/PH	1GTH/PH	1PIH/PH	1PTH/PH

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

Asphalt Attached InsulFoam® with a Cover Board in Asphalt

Asphalt Attached Insulation

Applications requiring an InsulFoam insulation attached in hot asphalt should be installed by a roofing crew fully trained for these applications. The asphalt is to be applied only to the substrate. The InsulFoam insulation is to be installed only after the asphalt has cooled adequately.

DO NOT APPLY ASPHALT DIRECTLY TO ANY INSULFOAM OR R-TECH PRODUCTS.

Board size should be limited to 4' x 4' when using this attachment method. Apply asphalt to the substrate at a rate of 30 lbs. per square and 3" to 6" beyond the edges of the board being installed. Porous substrates may require a greater amount of asphalt. Allow the asphalt to cool up to 250 °F but not less than 200 °F. The absence of visible smoke is a common indicator the asphalt has sufficiently cooled. This may not be applicable at ambient rooftop temperatures below 50 °F. In addition, it may be useful to use an infrared heat gun to measure asphalt temperatures on the substrate prior to installation of the first few boards. Weather conditions, asphalt variations and crew techniques will impact the rate at which asphalt cools. The asphalt must remain hot enough to maintain its adhesive characteristics. Firmly set boards of InsulFoam into the asphalt with continuous side joints and end joints staggered a minimum of 6". Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation being used in the field of the roof. If InsulFoam is being installed over a thermal barrier or an existing layer of insulation, all joints must be offset a minimum of 6" between layers.

Asphalt Attached Cover Board

Cover boards attached in asphalt directly to an InsulFoam insulation should be installed by a roofing crew fully trained for these applications. Asphalt is to be applied only to the backside of the cover board. The cover board is to be installed only after the asphalt has cooled adequately.

DO NOT APPLY ASPHALT DIRECTLY TO ANY INSULFOAM OR R-TECH PRODUCTS.

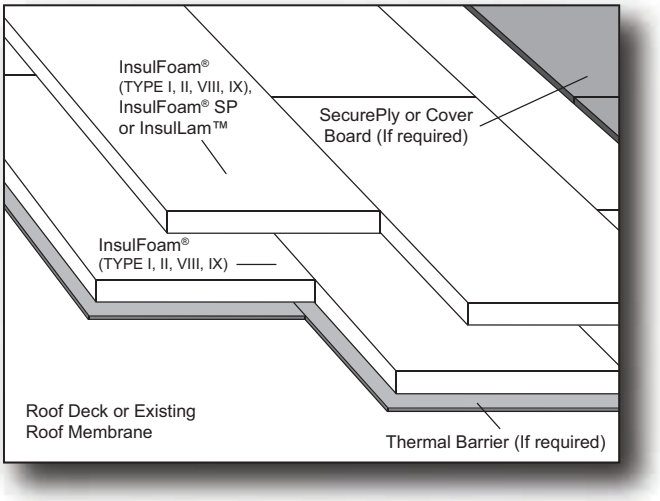
The cover board size is to be limited to a maximum of 4' x 4' when using this attachment method. Cover board side joints are to be continuous, and end joints staggered a minimum of 12". All cover board joints are to be offset from the base layer insulation joints by a minimum of 6".

Place the hot-asphalt-compatible cover board (bottom side up, if applicable) adjacent to the area in which it will be installed. Make certain the previously installed InsulFoam insulation is protected from any over-mopped or spilled hot asphalt. Apply a continuous, firmly bonding film of asphalt to the entire back surface of the cover board at a nominal rate of 30 lbs. per square. Porous cover boards may require greater amounts of asphalt. Allow the asphalt to cool up to 250 °F, but not less than 200 °F. The absence of visible smoke is a common indicator that the asphalt has sufficiently cooled. This may not be applicable at ambient rooftop temperatures below 50 °F. The asphalt must remain sufficiently hot to maintain its adhesive characteristics. It may be useful to use an infrared heat gun to measure the asphalt temperature on the back of the first few boards installed, as weather conditions, asphalt variations and crew techniques will impact the rate at which asphalt cools. When the asphalt has cooled to within the appropriate temperature range, the back-mopped cover board is to be flipped so the asphalt is facing down, and is to be placed over the InsulFoam insulation. The installed cover boards should be lightly stepped into place and should abut tightly against adjacent boards. Joints greater than 1/2" are to be filled with the same cover board material being used.

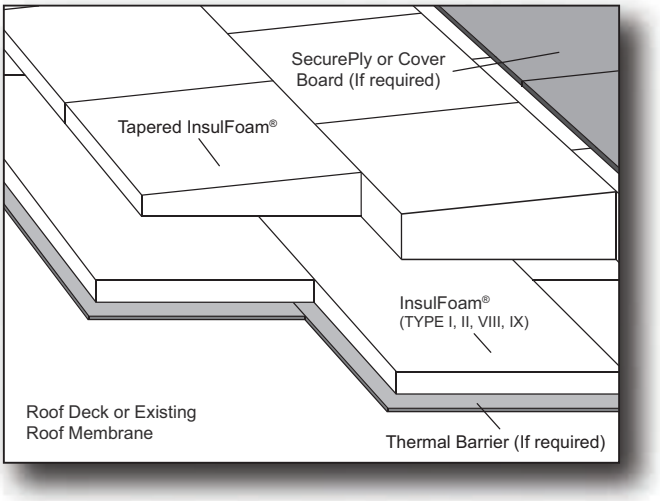
For cold weather applications, contact the Insulfoam Technical Center for specific instructions.

DOUBLE LAYER – LOOSE LAID

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a loose laid insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations are shipped in plastic film wraps, that are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- When conditions dictate, in order to prevent wind blow-off or damage during installation, the loose laid insulation should be weighed down or tacked into place with a minimal quantity of mechanical fasteners.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	InsulFoam SP	Tapered InsulFoam	InsulLam
Direct-to-Deck			
2NIL-IL	2NIL-SL	2NIL-TL	2NIL-LL
2NTL-IL	2NTL-SL		2NTL-LL
DensDeck Thermal Barrier			
2DIL-IL	2DIL-SL	2DIL-TL	2DIL-LL
2DTL-IL	2DTL-SL		2DTL-LL
Gypsum Thermal Barrier			
2GIL-IL	2GIL-SL	2GIL-TL	2GIL-LL
2GTL-IL	2GTL-SL		2GTL-LL
Perlite Thermal Barrier			
2PIL-IL	2PIL-SL	2PIL-TL	2PIL-LL
2PTL-IL	2PTL-SL		2PTL-LL

Thermal Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

1st Layer – Loose Laid Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a thermal barrier or an existing layer of insulation, all joints must be offset a minimum of 6" between layers. When installing InsulFoam insulations directly to a metal deck, the edges of

the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

2nd Layer – Loose Laid Insulation

Install InsulFoam insulation with continuous side joints and end joints staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. All joints must be offset a minimum of 6" between layers.

SecurePly Installation (If required)

Some specifications require the use of a slip sheet. SecurePly should be rolled out in a manner to completely cover the underlying insulation. The SecurePly must have 2" (minimum) side and end laps. To prevent movement from wind or roof top construction traffic, it may be necessary to tack SecurePly in place with a minimal quantity of mechanical fasteners.

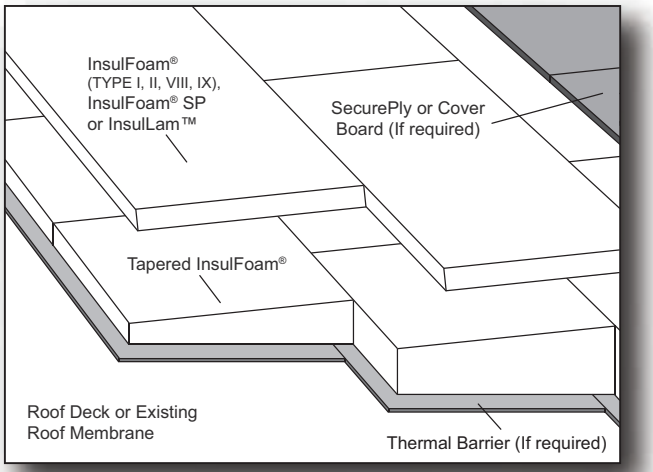
When SecurePly is used in conjunction with these loose laid specifications, the insulation specification designation is to be modified with the two-letter suffix SL to identify that SecurePly has been loosely laid over the insulation.

Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be loose laid or mechanically attached over loosely laid InsulFoam and Tapered InsulFoam. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

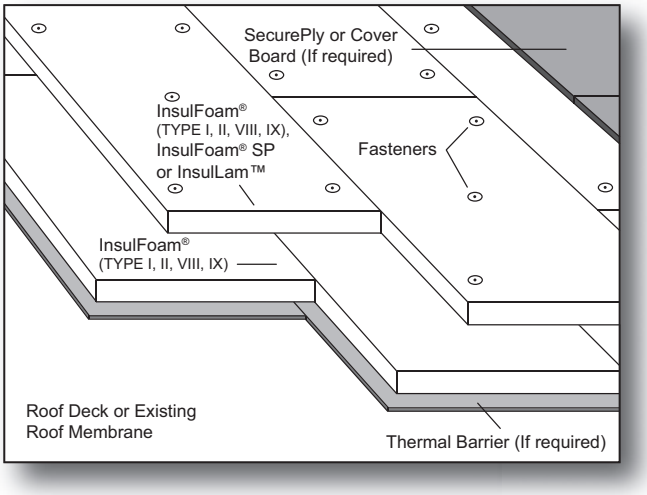
When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specifications information.

Flat Insulation – Alternate

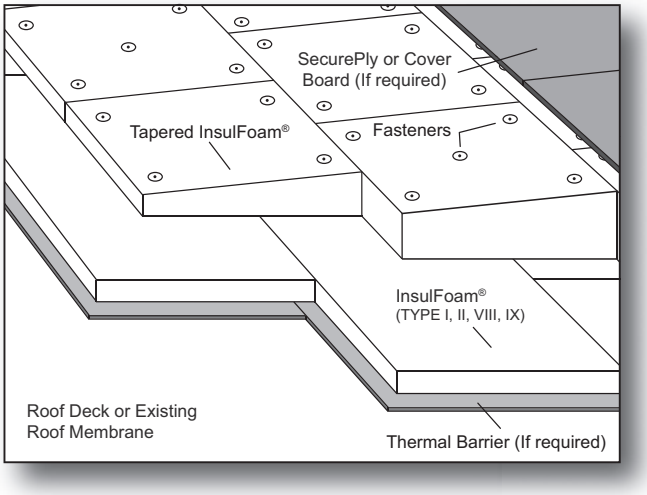


DOUBLE LAYER – MECHANICALLY ATTACHED

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- When conditions dictate, in order to prevent wind blow-off or damage during installation, the loose laid insulation should be weighed down or tacked in place with a minimal quantity of mechanical fasteners.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

InsulFoam	InsulFoam SP	Tapered InsulFoam	InsulLam
Direct-to-Deck			
2NIL-IM	2NIL-SM	2NIL-TM	2NIL-LM
2NTL-IM	2NTL-SM		2NTL-LM
DensDeck Thermal Barrier			
2DIL-IM	2DIL-SM	2DIL-TM	2DIL-LM
2DTL-IM	2DTL-SM		2DTL-LM
Gypsum Thermal Barrier			
2GIL-IM	2GIL-SM	2GIL-TM	2GIL-LM
2GTL-IM	2GTL-SM		2GTL-LM
Perlite Thermal Barrier			
2PIL-IM	2PIL-SA	2PIL-TM	2PIL-LM
2PTL-IM	2PTL-SM		2PTL-LM

Note: For mechanically attached systems that incorporate a thermal barrier, cover board and/or SecurePly with InsulFoam insulation, it is possible to attach all layers to the substrate using a single fastener of sufficient length.

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

1st Layer – Loose Laid Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used

in the field of the roof. If insulation is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

2nd Layer – Mechanically Attached Insulation

Install InsulFoam insulation with continuous side joints and end joints, staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. All insulation joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board, and should be placed in a pattern to achieve the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly.

SecurePly Installation (If required)

Some specifications require the use of a slip sheet. SecurePly should be rolled out in a manner to completely cover the underlying insulation. The SecurePly must have 2" (minimum) side and end laps. To prevent movement from wind or roof top construction traffic, it may be necessary to tack SecurePly in place with a minimal quantity of mechanical fasteners.

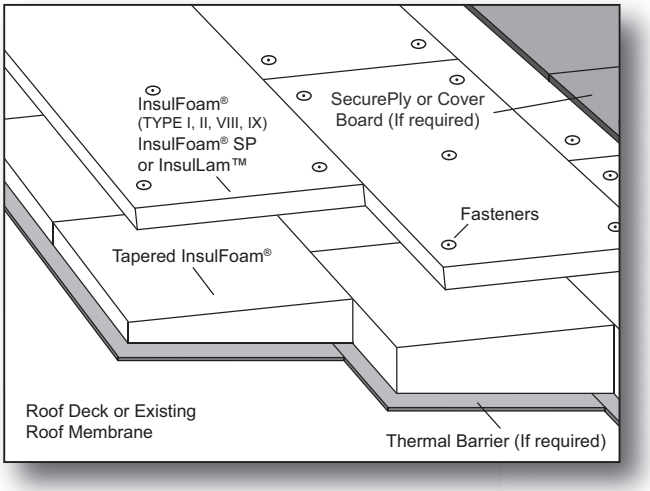
When SecurePly is used in conjunction with these mechanically attached specifications, the insulation specification would be modified with the two-letter suffix SL to identify that SecurePly has been loosely laid over the insulation, or SM to indicate fasteners have been installed through the SecurePly.

Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be mechanically attached, asphalt attached or adhered over mechanically attached InsulFoam and Tapered InsulFoam. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

When cover boards are used in conjunction with these specifications, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

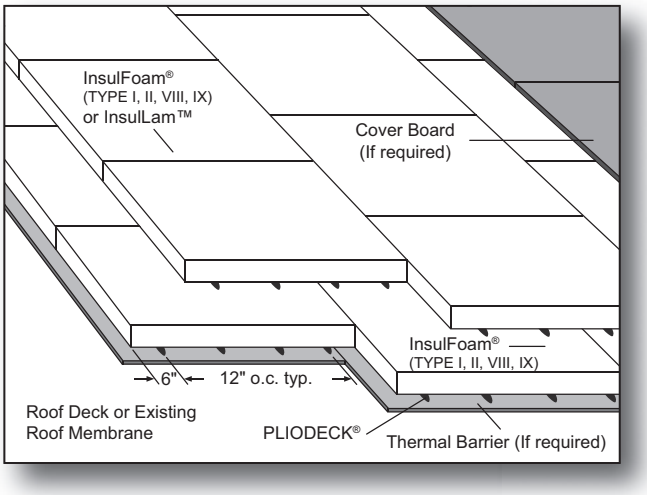
Flat Insulation – Alternate



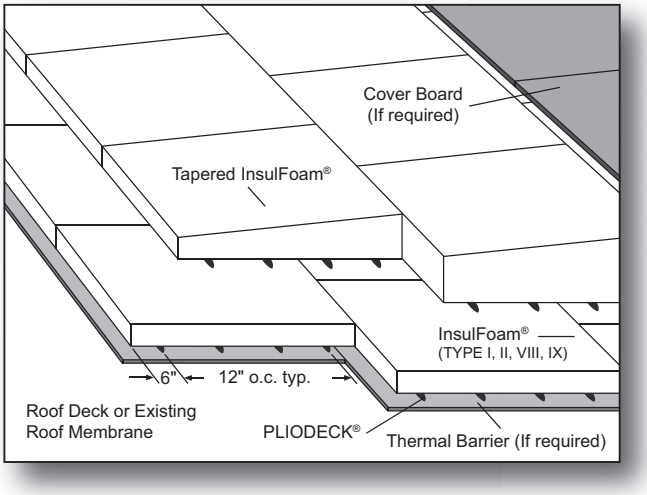
DOUBLE LAYER – ADHERED

PLIODECK® Insulation Adhesive

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an adhered roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

PLIODECK Insulation Adhesive is offered by Ashland, Inc. Refer to Ashland's InfoTech™ literature for additional information on storage, handling and use of PLIODECK Insulation Adhesive.

Installation Considerations

- For optimum results, install materials when conditions, (temperature, humidity and ventilation) are within the limits recommended by Ashland, Inc. Do not install products under conditions outside the adhesive manufacturer's limits.
- PLIODECK Insulation Adhesive should be applied when air and surface temperatures are 40 °F and rising.
- The PLIODECK Insulation Adhesive should be stored in a dry area, out of direct sunlight, and at a temperature between 50 °F and 80 °F. It is recommended that the adhesive be stored at 70 °F prior to application in cold weather.
- Cans of PLIODECK must not be opened until time of use. Since exposure to moisture will cure the adhesive, use all product in opened containers immediately.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the PLIODECK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.
- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

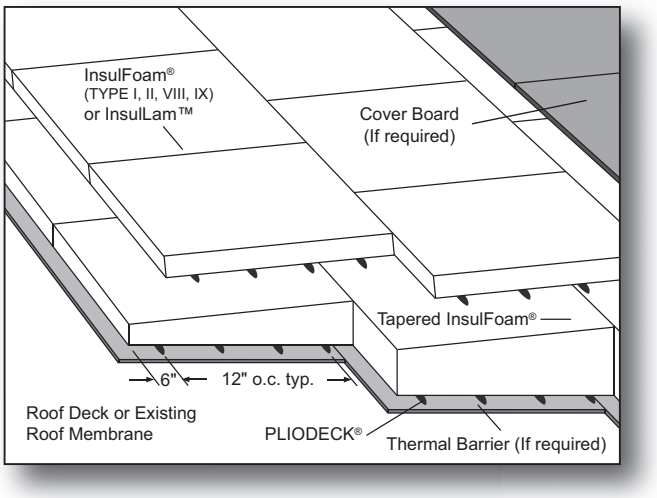
InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

PLIODECK® Insulation Adhesive

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
2NIA-IA	2NIA-TA	2NIA-LA
2NTA-IA		2NTA-LA
DensDeck Thermal Barrier		
2DIA-IA	2DIA-TA	2DIA-LA
2DTA-IA		2DTA-LA
Gypsum Thermal Barrier		
2GIL-IM	2GIA-TA	2GIA-LA
2GTA-IA		2GTA-LA
Perlite Thermal Barrier		
2PIA-IA	2PIA-TA	2PIA-LA
2PTA-IA		

Flat Insulation – Alternate



Thermal Barrier (If Required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

1st Layer – Adhered with PLIODECK

Surfaces to be bonded together must be free of dirt, debris and other contaminants. When re-roofing over mineral-surfaced cap sheet, surface should be swept, power-washed or vacuumed to remove loose material. Existing roof systems that are power-washed must dry thoroughly before proceeding. Board size should be limited to 4' x 4' when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If InsulFoam is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers.

At the time of use, unscrew the cap on PLIODECK cans, remove moisture seal and attach plastic pour spouts. Mount cans to the PLIODECK applicator cart and secure tightly. If cart-mounting plates do not fit securely against cans, use pliers or channel locks to align plates properly. Adjust cans to apply adhesive beads 12" on center in the field of the roof and 6" on center on the perimeter, with the outside beads placed 6" from edge of board line. Punch a vent hole in the cans with an awl. Flip the tilting lever up to begin applying adhesive to the deck. Pace the cart speed to apply a 3/8" to 1/2" bead. In colder temperatures, adhesive will be thicker and pour more slowly. Spouts are designed for summer application, and in cooler weather, cart pace may be increased by cutting larger openings in the spout. Cart may be pulled or pushed. Place cart lever in the down position to stop the flow of adhesive.

InsulFoam insulation must be installed as soon as adhesive beads have been applied to substrate. In 5 to 15 minutes, the adhesive will change to a cream color and begin to foam. The InsulFoam insulation may rise slightly from the surface as a result of this foaming, and is to be walked-in to ensure contact with the substrate. Repeat this process as needed to ensure a smooth insulation surface for membrane application. In cases of high moisture content and/or warped or cupped boards, it may be necessary to repeat this step several times. For warped or cupped boards, a weight should be applied to the board until the adhesive has set. It is not unusual for the adhesive to foam up through the joints of the boards. Excess foam may be trimmed away after the adhesive has set.

When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Insulation adhesive should be installed on the upper flanges of the deck to maintain the prescribed application rate. Installations over new metal decks may require additional cleaning to remove any oils present on the deck's surface. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

Additional layers of insulation may be applied as soon as the boards have become firmly attached to the substrate, typically after 15 to 30 minutes. Times will vary with ambient temperatures and moisture conditions. Application rates can vary. Contact Ashland, Inc. or Factory Mutual for additional information on perimeter and corner attachment requirements.

2nd Layer – Adhered with PLIODECK

Surfaces to be bonded together must be free of dirt, debris and other contaminants. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints

PLIODECK® Insulation Adhesive

greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. All joints must be offset a minimum of 6" between layers.

PLIODECK should be prepared and applied as indicated in the 1st Layer directions.

InsulFoam insulation must be installed as soon as adhesive beads have been applied to the substrate.

Roofing membrane may be applied as soon as the boards have become firmly attached to the substrate, typically after 15 to 30 minutes. Times will vary with ambient temperatures and moisture conditions. Application rates can vary. Contact Ashland, Inc. or Factory Mutual for additional information on perimeter and corner attachment requirements.

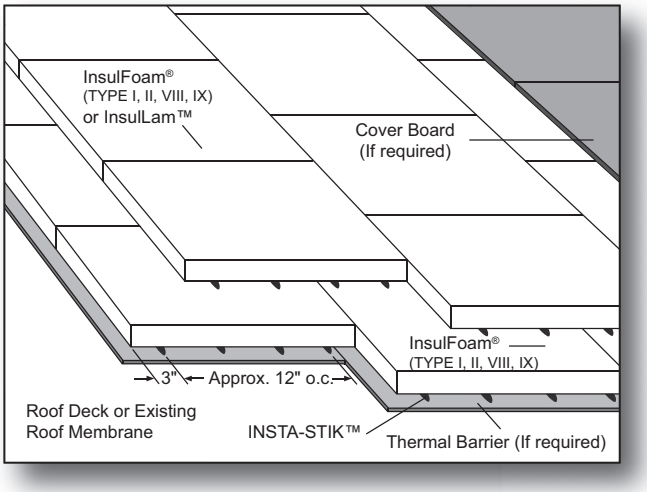
Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be adhered with PLIODECK or asphalt to InsulFoam and Tapered InsulFoam that has been adhered with PLIODECK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

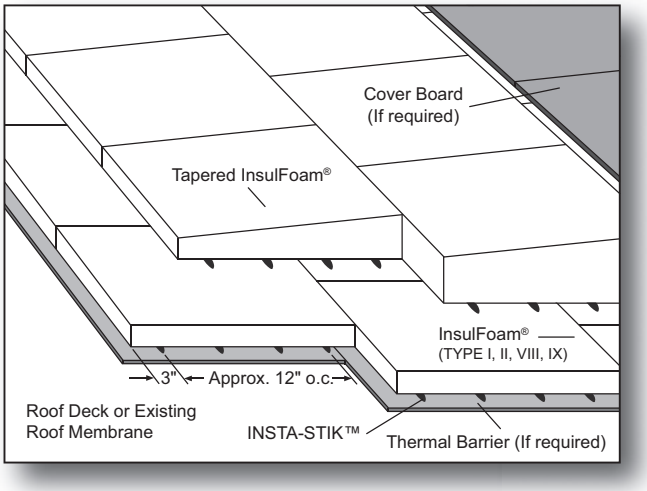
When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

INSTA-STIK™ Quik Set Commercial Roofing Adhesive

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support an adhered roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

INSTA-STIK™ Quik Set Commercial Roofing Adhesive is offered by The Dow Chemical Company (Dow). Refer to Dow Installation Procedures and Dow literature for additional information on storage, handling and use of INSTA-STIK Quik Set Commercial Roofing Adhesive.

Installation Considerations

- Acceptable INSTA-STIK substrates are smooth and gravel surfaced Class 1 built-up roofs, concrete, wood, minimum 22-gauge metal decks, and vapor retarders approved by The Dow Chemical Company. Please contact Dow at 866-583-BLUE for compatibility questions or concerns.
- INSTA-STIK is not approved for application when surface or ambient temperatures are below 33 °F or above 110 °F.
- INSTA-STIK is not approved for use during inclement weather.
- INSTA-STIK is not approved for use on surfaces or decks that are wet or have standing water, frost, ice or snow.
- INSTA-STIK is packaged in a single container that should be stored between 50 °F and 75 °F. The ideal chemical temperature at the time of application is 75 °F.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the INSTA-STIK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.
- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

DOUBLE LAYER – ADHERED

INSTA-STIK™ Quik Set Commercial Roofing Adhesive

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
2NIA-IA	2NIA-TA	2NIA-LA
2NTA-IA		2NTA-LA
DensDeck Thermal Barrier		
2DIA-IA	2DIA-TA	2DIA-LA
2DTA-IA		2DTA-LA
Gypsum Thermal Barrier		
2GIL-IM	2GIA-TA	2GIA-LA
2GTA-IA		2GTA-LA
Perlite Thermal Barrier		
2PIA-IA	2PIA-TA	2PIA-LA
2PTA-IA		

Thermal Barrier (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. Thermal barriers must be securely attached to the roof deck. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

1st Layer – Adhered with INSTA-STIK

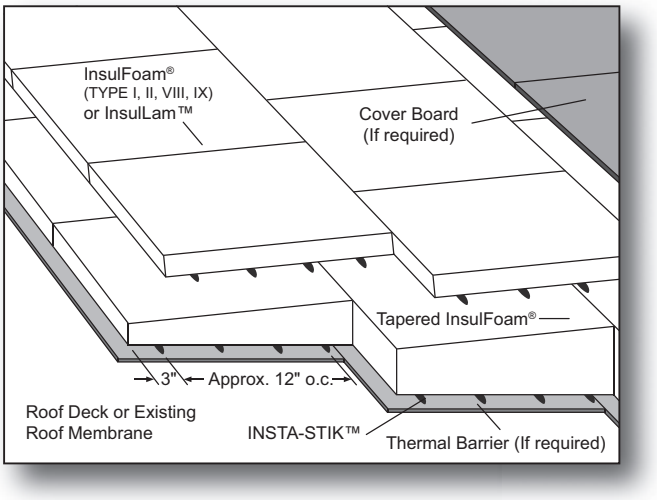
Before dispensing INSTA-STIK, the applicator must observe the following precautions: wear protective clothing, work gloves and protective eyewear.

All surfaces must be free of any debris, dirt, dust, grease, oil, diesel fuel and standing water before INSTA-STIK is applied. In addition, for installations directly to a new metal deck, the residual oil-shop coating must be removed with acetone, naphtha or a comparable cleaner. When re-roofing over an existing built-up roof, a licensed INSTA-STIK instructor, authorized to perform adhesion tests, must be onsite prior to the commencement of the project in order to determine compatibility. Contact The Dow Chemical Company, Roofing Technical Support Group at least fourteen (14) days in advance for further instructions.

Board size can be up to 4' x 8' flat or 4' x 4' taper when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If InsulFoam is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers.

INSTA-STIK should be mixed prior to use by firmly holding the container on its side and agitating the contents, using a side-to-side motion for at least 15 seconds.

Flat Insulation – Alternate



The dispensing wand kit is ideal for roof decks with many penetrations. Attach the dispensing hose swivel end to the cylinder valve. Tighten the connection using an open-end wrench, being careful not to over-tighten. Verify that the on/off valve on the dispensing hose is closed. The handle should be perpendicular to the valve. Attach the dispensing wand kit to the on/off valve by screwing in until it is hand-tight.

The INSTA-STIK Multi-Bead Applicator (MBA) is recommended for roof decks with open areas. The INSTA-STIK MBA uses three tanks of INSTA-STIK Quik Set Commercial Roofing Adhesive. The tanks are connected by a hose to a central inlet manifold. The INSTA-STIK MBA is rolled backward along the roof deck, as four to eight beads of adhesive flow from the center outlet tubes in a precise pattern that can be adjusted per roofing requirements. The INSTA-STIK MBA also features an ancillary manifold that can be used near the roof edge to add three interspaced beads to the pattern.

Dispense a minimum of 1 lineal foot of 3/4"–1" diameter bead of INSTA-STIK for every square foot of insulation board to be attached. A picture of a 3/4" bead is provided in the Dow operating instructions as a guide for proper bead size.

Use a parapet wall or gutter as a straight edge guide when dispensing the first bead of INSTA-STIK. Under the normal application rate, place the first bead 3" inside the outside edge of the insulation to be attached. Apply 3 additional parallel beads approximately 12" apart, so that the fourth bead is 3" inside the opposite edge of the insulation board. The result is 4 equidistant parallel beads for each insulation board (1 lineal foot of adhesive per 1 sq. ft. of insulation). When using the MBA, open the valves to dispense 4 beads of INSTA-STIK.

The application rate can vary with roof system configuration. Additional adhesive is required around all roof penetrations and drains. An increased amount of INSTA-STIK may be required at the perimeter band of the roof, depending on the building and parapet wall heights. For application rates, refer to Table 1 in Dow's Installation Procedures for INSTA-STIK Quik Set Commercial Roofing Adhesive.

When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Apply 3/4"–1" beads of INSTA-STIK on the first full upper flange nearest the edge of the InsulFoam insulation. Continue to apply the INSTA-STIK at the prescribed rate. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

IMPORTANT: When applying INSTA-STIK, the insulation boards must be placed onto the INSTA-STIK beads before tack-free (2 to 8 minutes depending on humidity). Walk on the boards to spread the beads for maximum contact. Continue to walk on the insulation boards every 3 to 4 minutes until the insulation in firmly attached, usually within 10 to 20 minutes. Low humidity conditions will require longer cure times.

2nd Layer – Adhered with INSTA-STIK

All surfaces must be free of any debris, dirt, dust, grease, oil, diesel fuel and standing water before INSTA-STIK is applied. Board size can be up to 4' x 8' when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. All joints must be offset a minimum of 6" between layers.

INSTA-STIK should be prepared and applied as indicated in the 1st Layer directions.

IMPORTANT: When applying INSTA-STIK, the insulation boards must be placed onto the INSTA-STIK beads before tack-free (2 to 8 minutes depending on humidity). Walk on the boards to spread the beads for maximum contact. Continue to walk on the insulation boards every 3 to 4 minutes until the insulation in firmly attached, usually within 10 to 20 minutes. Low humidity conditions will require longer cure times.

Cover Board Installation (If required)

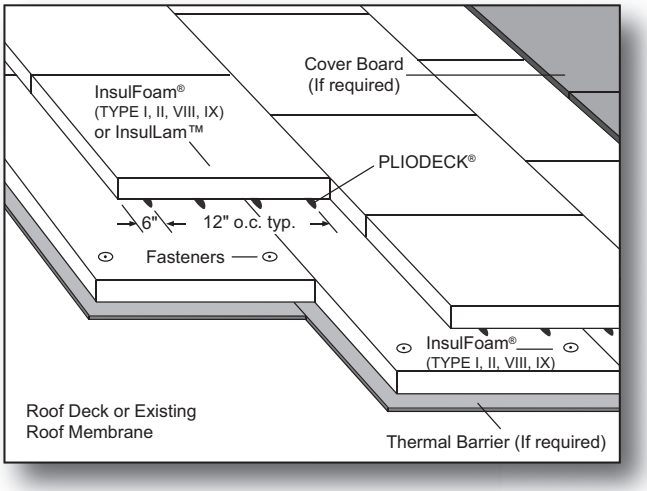
Some specifications require the use of a cover board. Cover boards may be adhered with INSTA-STIK or asphalt to InsulFoam and Tapered InsulFoam that has been adhered with INSTA-STIK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

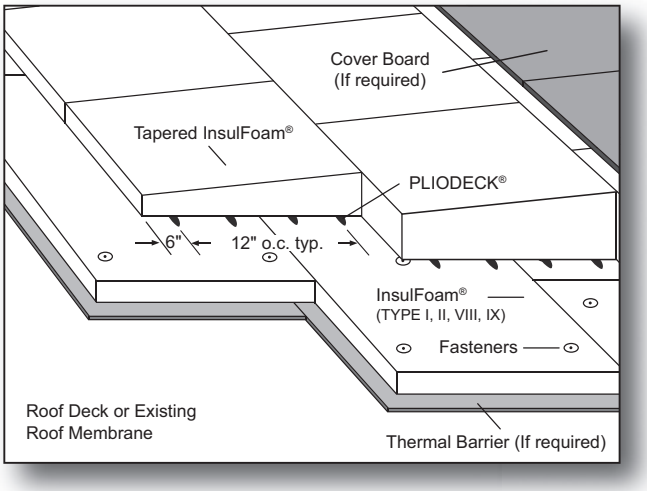
DOUBLE LAYER – ALTERNATE

1st Layer Mechanically Attached; 2nd Layer Adhered with PLIODECK®

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

PLIODECK Insulation Adhesive is offered by Ashland, Inc. Refer to Ashland's InfoTech™ literature for additional information on storage, handling and use of PLIODECK Insulation Adhesive.

Installation Considerations

- For optimum results, install materials when conditions, (temperature, humidity and ventilation) are within the limits recommended by Ashland, Inc. Do not install products under conditions outside the adhesive manufacturer's limits.
- PLIODECK Insulation Adhesive should be applied when air and surface temperatures are 40 °F and rising.
- The PLIODECK Insulation Adhesive should be stored in a dry area, out of direct sunlight, and at a temperature between 50 °F and 80 °F. It is recommended that the adhesive be stored at 70 °F prior to application in cold weather.
- Cans of PLIODECK must not be opened until time of use. Since exposure to moisture will cure the adhesive, use all product in opened containers immediately.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the PLIODECK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.

InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.

- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- Insulfoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

1st Layer Mechanically Attached; 2nd Layer Adhered with PLIODECK®

Insulation Specifications

InsulFoam	Tapered InsulFoam	InsulLam
Direct-to-Deck		
2DIM-IA	2DIM-TA	2DIM-LA
2DTM-IA		2DTM-LA
DensDeck Thermal Barrier		
2XIM-IA	2XIM-TA	2XIM-LA
2XTM-IA		2XTM-LA
Gypsum Thermal Barrier		
2GIM-IA	2GIM-TA	2GIM-LA
2GTM-IA		2GTM-LA
Perlite Thermal Barrier		
2PIM-IA	2PIM-TA	2PIM-LA
2PTM-IA		2PTM-LA

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

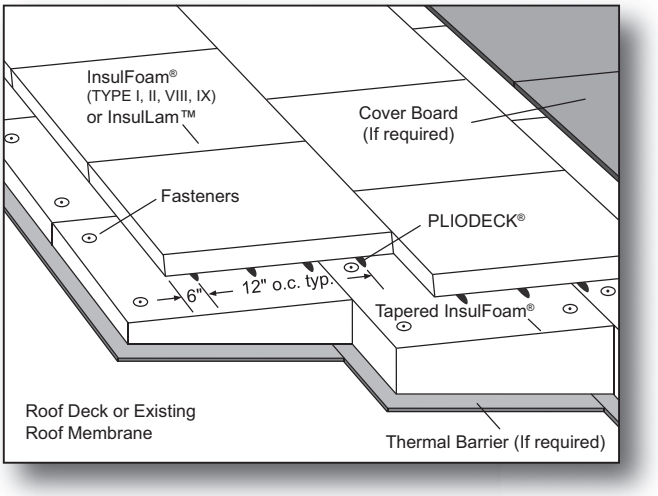
1st Layer – Mechanically Attached

Install InsulFoam insulation with continuous side joints and end joints, staggered so they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a thermal barrier or an existing layer of insulation, all joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board and should be placed in a pattern to achieve the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

2nd Layer – Adhered with PLIODECK

Surfaces to be bonded together must be free of dirt, debris and other contaminants.

Flat Insulation – Alternate



Board size should be limited to 4' x 4' when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If InsulFoam is being installed over a thermal barrier, an existing layer of insulation, or under a cover board, all joints must be offset a minimum of 6" between layers.

At the time of use, unscrew the cap on PLIODECK cans, remove moisture seal and attach plastic pour spouts. Mount cans to the PLIODECK applicator cart and secure tightly. If cart-mounting plates do not fit securely against cans, use pliers or channel locks to align plates properly. Adjust cans to apply adhesive beads 12" on center in the field of the roof and 6" on center on the perimeter, with the outside beads placed 6" in from edge of board line. Punch a vent hole in the cans with an awl. Flip the tilting lever up to begin applying adhesive to the deck. Pace the cart speed to apply a 3/8" to 1/2" bead. In colder temperatures, adhesive will be thicker and pour more slowly. Spouts are designed for summer application, and in cooler weather, cart pace may be increased by cutting larger openings in the spout. Cart may be pulled or pushed. Place cart lever in the down position to stop the flow of adhesive.

InsulFoam insulation must be installed as soon as adhesive beads have been applied to substrate. In 5 to 15 minutes, the adhesive will change to a cream color and begin to foam. The InsulFoam insulation may rise slightly as a result of this foaming, and is to be walked-in to ensure contact with the substrate. Repeat this process as needed to ensure a smooth insulation surface for membrane application. In cases of high moisture content and/or warped or cupped boards, it may be necessary to repeat this step several times. For warped or cupped boards, a weight should be applied to the board until the adhesive has set. It is not unusual for the adhesive to foam up through the joints of the boards. Excess foam may be trimmed away after the adhesive has set.

DOUBLE LAYER – ALTERNATE

1st Layer Mechanically Attached; 2nd Layer Adhered with PLIODECK®

A roofing membrane may be applied as soon as the boards have become firmly attached to the substrate, typically after 15 to 30 minutes. Times will vary with ambient temperatures and moisture conditions. Application rates can vary. Contact Ashland, Inc. or Factory Mutual for additional information on perimeter and corner attachment requirements.

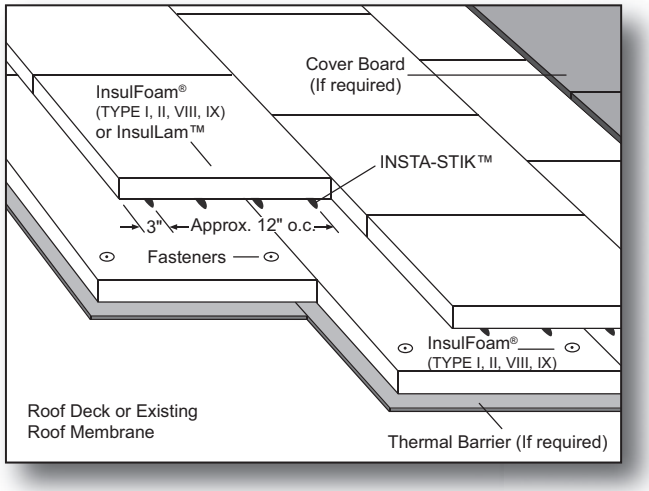
Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be adhered with PLIODECK or asphalt to InsulFoam and Tapered InsulFoam that has been adhered with PLIODECK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

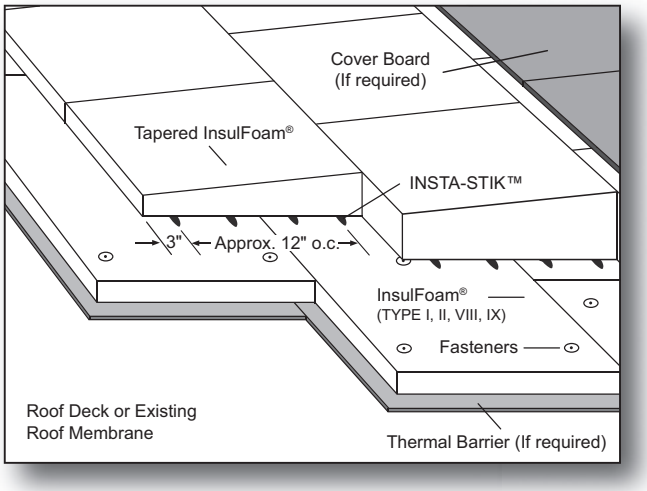
When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

1st Layer Mechanically Attached; 2nd Layer Adhered with INSTA-STIK™

Flat Insulation



Tapered Insulation



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached insulation roof assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

INSTA-STIK™ Quik Set Commercial Roofing Adhesive is offered by The Dow Chemical Company (Dow). Refer to Dow Installation Procedures and Dow literature for additional information on storage, handling and use of INSTA-STIK Quik Set Commercial Roofing Adhesive.

Installation Considerations

- Acceptable INSTA-STIK substrates are smooth and gravel surfaced Class 1 built-up roofs, concrete, wood, and minimum 22-gauge metal decks, and vapor retarders approved by The Dow Chemical Company. Please contact Dow at 866-583-BLUE for compatibility questions or concerns.
- For optimum results, install materials when conditions, (temperature, humidity and ventilation) are within the limits recommended by Dow. Do not install products under conditions outside the adhesive manufacturer's limits.
- INSTA-STIK is not approved for application when surface or ambient temperatures are below 33 °F or above 110 °F.
- INSTA-STIK is not approved for use during inclement weather.
- INSTA-STIK is not approved for use on surfaces or decks that are wet or have standing water, frost, ice or snow.
- INSTA-STIK is packaged in a single container that should be stored between 50 °F and 75 °F. The ideal chemical temperature at the time of application is 75 °F.
- When windy conditions exist, weights should be used to prevent the insulation boards from moving prior to the INSTA-STIK curing or setting.
- Applications over uneven substrates may require that the insulation boards be scored or slit to obtain full contact with the adhesive.
- InsulFoam insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- Insulfoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- Review the layout of all Tapered InsulFoam systems before loading and installing panels.
- For re-cover applications, care should be taken to ensure no moisture is trapped in the existing or new roof system.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

DOUBLE LAYER – ALTERNATE

1st Layer Mechanically Attached; 2nd Layer Adhered with INSTA-STIK™

Insulation Specifications

InsulFoam	Tapered InsulFoam	
Direct-to-Deck		
2DIM-IA	2DIM-TA	2DIM-LA
2DTM-IA		2DTM-LA
DensDeck Thermal Barrier		
2XIM-IA	2XIM-TA	2XIM-LA
2XTM-IA		2XTM-LA
Gypsum Thermal Barrier		
2GIM-IA	2GIM-TA	2GIM-LA
2GTM-IA		2GTM-LA
Perlite Thermal Barrier		
2PIM-IA	2PIM-TA	2PIM-LA
2PTM-IA		2PTM-LA

Thermal Barrier Installation (If required)

Some designs require the use of a thermal barrier between the insulation and occupied areas of the building. For guidance, consult local building codes, the membrane manufacturer and the Thermal Barrier information in the Insulfoam Roofing Manual.

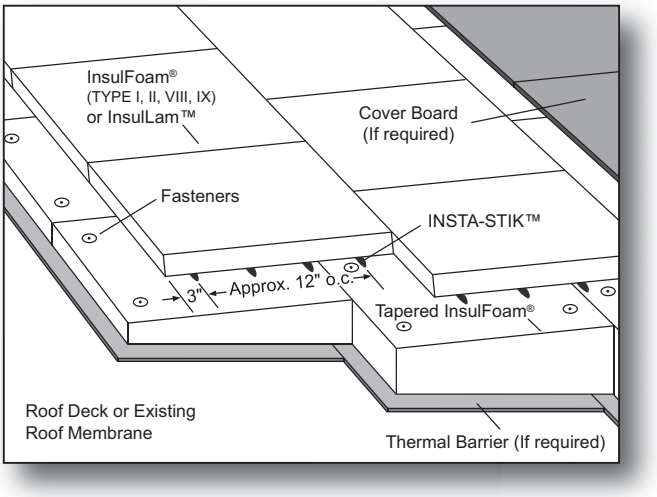
1st Layer – Mechanically Attached

Install InsulFoam insulation with continuous side joints and end joints staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If insulation is being installed over a thermal barrier or an existing layer of insulation, all joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board, and should be placed in a pattern to achieve the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly. When installing InsulFoam insulations directly to a metal deck, the edges of the insulation parallel to the deck ribs must be solidly supported and centered on the ribs. Additionally, for metal deck installations, ensure that the insulation has a thickness that is adequate to span the rib openings. For acceptable minimum thicknesses of InsulFoam installed directly over metal decks, refer to the Roof Decks section in the Insulfoam Roofing Manual.

2nd Layer – Adhered with INSTA-STIK

Before dispensing INSTA-STIK, the applicator must observe the following precautions: wear protective clothing, work gloves and protective eyewear.

Flat Insulation – Alternate



All surfaces must be free of any debris, dirt, dust, grease, oil, diesel fuel and standing water before INSTA-STIK is applied.

Board size can be up to 4' x 8' when using this attachment method. Insulation side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. All joints must be offset a minimum of 6" between layers.

INSTA-STIK should be mixed prior to use by firmly holding the container on its side and agitating the contents, using a side-to-side motion for at least 15 seconds.

The dispensing wand kit is ideal for roof decks with many penetrations. Attach the dispensing hose swivel end to the cylinder valve. Tighten the connection using an open-end wrench, being careful not to over-tighten. Verify that the on/off valve on the dispensing hose is closed. The handle should be perpendicular to the valve. Attach the dispensing wand kit to the on/off valve by screwing in until it is hand-tight.

The INSTA-STIK Multi-Bead Applicator (MBA) is recommended for roof decks with open areas. The INSTA-STIK MBA uses three tanks of INSTA-STIK Quik Set Commercial Roofing Adhesive. The tanks are connected by a hose to a central inlet manifold. The INSTA-STIK MBA is rolled backward along the roof deck, as four to eight beads of adhesive flow from the center outlet tubes in a precise pattern that can be adjusted per roofing requirements. The INSTA-STIK MBA also features an ancillary manifold that can be used near the roof edge to add three interspaced beads to the pattern.

Dispense a minimum of 1 lineal foot of 3/4"–1" diameter bead of INSTA-STIK for every square foot of insulation board to be attached. A picture of a 3/4" bead is provided in the Dow operating instructions as a guide for proper bead size.

Use a parapet wall or gutter as a straight edge guide when dispensing the first bead of INSTA-STIK. Under the normal application rate, place the first bead 3" inside the outside edge of the insulation to be attached. Apply 3 additional parallel beads approximately 12" apart, so that the fourth bead is 3"

inside the opposite edge of the insulation board. The result is 4 equidistant parallel beads insulation board (1 lineal foot of adhesive per 1 sq. ft. of insulation). When using the MBA, open the valves to dispense 4 beads of INSTA-STIK.

The application rate can vary with roof system configuration. Additional adhesive is required around all roof penetrations and drains. An increased amount of INSTA-STIK may be required at the perimeter band of the roof, depending on the building and parapet wall heights. For application rates, refer to Table 1 in Dow's Installation Procedures for INSTA-STIK Quik Set Commercial Roofing Adhesive.

IMPORTANT: When applying INSTA-STIK, the insulation boards must be placed onto the INSTA-STIK beads before tack-free (2 to 8 minutes depending on humidity). Walk on the boards to spread the beads for maximum contact. Continue to walk on the insulation boards every 3 to 4 minutes until the insulation in firmly attached, usually within 10 to 20 minutes. Low humidity conditions will require longer cure times.

Cover Board Installation (If required)

Some specifications require the use of a cover board. Cover boards may be adhered with INSTA-STIK or asphalt to Insul-Foam and Tapered InsulFoam that has been adhered with INSTA-STIK. For cover board installation procedures, refer to the Cover Board Specification information in the Insulfoam Roofing Manual.

When cover boards are used in conjunction with this specification, the insulation specification would be modified with a two-letter suffix to identify the cover board type and attachment method. Refer to the Cover Board Specification information.

COVER BOARD SPECIFICATIONS

General

These specifications are intended for use over InsulFoam insulation systems that require a cover board. Acceptable cover board materials for InsulFoam insulations are: DensDeck®, wood fiber, perlite and gypsum. These specifications are provided to serve as guidelines for designers and installers.

Installation Considerations

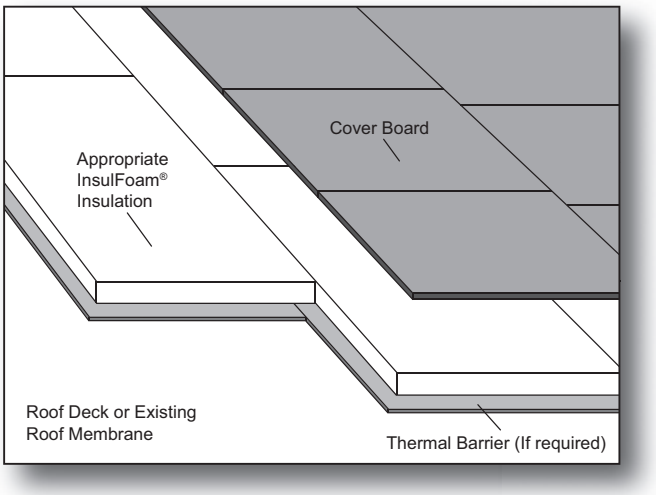
- Cover boards are available with a variety of packaging materials (plastic film wraps, shrouds, etc.) intended for temporary protection during shipping. All cover board material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- Allow approximately 1/4" space between the cover board and vertical surfaces or roof projections and penetrations. Do not force or jam cover boards into place.
- Cover boards are typically thinner than InsulFoam insulations, and are more susceptible to damage during handling and installation. Extra care should be taken to ensure that the product is installed in a useable condition.
- Cover board size should be limited to 4' x 4' for asphalt and adhesive applications.
- Proper staging of material on the roof can significantly impact a crew's productivity as well as their ability to install material in an acceptable manner. Care should be taken in the placement of material.

Cover Board (Suffix) Specifications

Cover board specification designations are added as a suffix to the base insulation specification using a back-slash (/) and a two-letter descriptor. For example, a single layer of InsulFoam mechanically fastened direct to a metal deck is designated as 1NIM. If the same specification requires the use of an asphalt attached, wood fiber cover board over the InsulFoam, the specification would be modified to 1NIM/ WH.

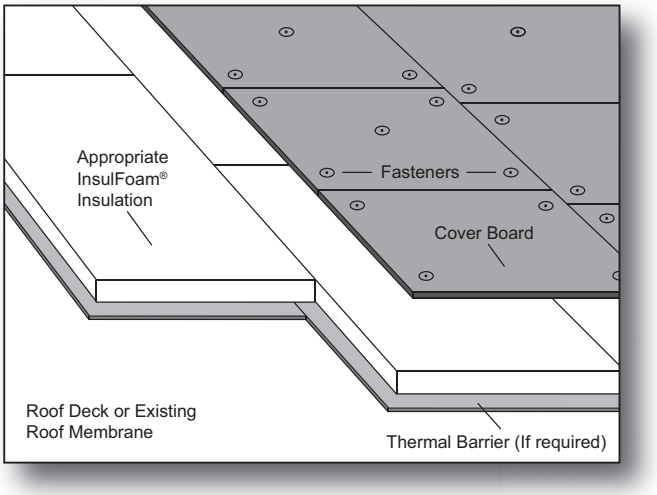
The following chart indicates the possible additions to the insulation specifications when a cover board is incorporated into the insulation systems.

	DensDeck	Wood Fiber	Perlite	Gypsum
Loose Laid	/DL	/WL	/PL	/GL
Adhesive Attached	/DA	/WA	/PA	/GA
Asphalt Attached	/DH	/WH	/PH	/GH
Mechanically Attached	/DM	/WM	/PM	/GM



Loose Laid Cover Boards

Install the cover board with continuous long joints (or side joints if a 4' x 4' board) and end joints staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Cover boards should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same cover board material that is being used in the field of the roof. All cover board joints are to be offset from the base layer insulation joints by a minimum of 6". When conditions dictate, in order to prevent wind blow-off or damage during installation, the loose laid insulation system should be weighed down or tacked in place with a minimal quantity of mechanical fasteners.

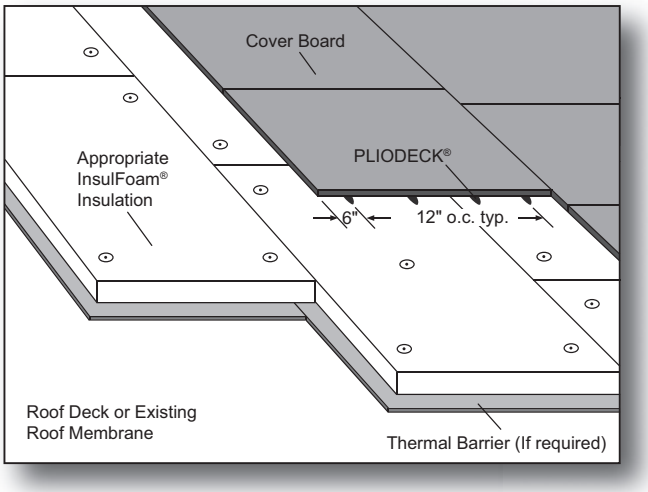


Mechanically Attached Cover Boards

Install the cover board with continuous long joints (or side joints if a 4' x 4' board) and end joints staggered so that they are offset by a minimum of 12" from the end joints in adjacent rows. Cover boards should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same cover board material that is being used in the field of the roof.

All cover board joints are to be offset from the base layer insulation joints by a minimum of 6". Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the cover board, and should be placed in a pattern to achieve the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly.

Note: For mechanically attached insulation systems that incorporate a thermal barrier and/or a layer of InsulFoam insulation with the cover board, it is possible to attach all layers to the substrate using a single fastener of sufficient length.



PLIODECK® Attached Cover Boards

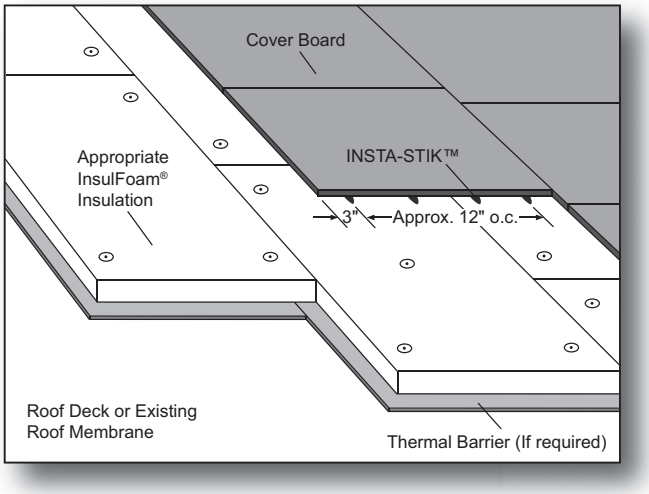
Surfaces to be bonded together must be free of dirt, debris and other contaminants. Cover board size should be limited to 4' x 4' when using this attachment method. Cover board side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same cover board material that is being used in the field of the roof. All cover board joints are to be offset from the base layer insulation joints by a minimum of 6".

At the time of use, unscrew the cap on PLIODECK cans, remove moisture seal and attach plastic pour spouts. Mount cans to the PLIODECK applicator cart and secure tightly. If cart-mounting plates do not fit securely against cans, use pliers or channel locks to align plates properly. Adjust cans to apply adhesive beads 12" on center in the field of the roof and 6" on center on the perimeter, with the outside beads placed 6" in from edge of board line. Punch a vent hole in the cans with an awl. Flip the tilting lever up to begin applying adhesive to the deck. Pace the cart speed to apply a 3/8" to 1/2" bead. In colder temperatures, adhesive will be thicker and pour more slowly. Spouts are designed for summer application, and in cooler weather, cart pace may be increased by cutting larger openings in the spout. Cart may be pulled or pushed. Place cart lever in the down position to stop the flow of adhesive.

Cover boards must be installed as soon as adhesive beads have been applied to substrate. In 5 to 15 minutes, the adhesive will change to a cream color and begin to foam. The cover board may rise slightly as a result of this foaming, and is to be walked-in to ensure contact with the substrate. Repeat this process as needed to ensure a smooth surface for membrane application. In cases of high moisture content and/or warped or cupped boards, it may be necessary to repeat this step several times. For warped or cupped boards, a weight should be applied to the board until the adhesive has set. It is not unusual for the adhesive to foam up through the joints of the boards. Excess foam may be trimmed away after the adhesive has set.

A roofing membrane may be applied as soon as the boards have become firmly attached to the substrate, typically after 15 to 30 minutes. Times will vary with ambient temperatures and moisture conditions. Application rates can vary. Contact Ashland, Inc. or Factory Mutual for additional information on perimeter and corner attachment requirements.

For additional information on storage, handling and use of PLIODECK Insulation Adhesive, refer to Ashland's InfoTech™



INSTA-STIK™ Attached Cover Boards

Before dispensing INSTA-STIK Quik Set Commercial Roofing Adhesive, the applicator must observe the following precautions: wear protective clothing, work gloves and protective eyewear.

All surfaces must be free of any debris, dirt, dust, grease, oil, diesel fuel and standing water before INSTA-STIK is applied. Cover board size should be limited to 4' x 4' when using this attachment method. Cover board side joints are to be continuous, and end joints staggered a minimum of 12". Joints greater than 1/2" should be filled with the same cover board material that is being used in the field of the roof. All cover board joints are to be offset from the base layer insulation joints by a minimum of 6".

INSTA-STIK should be mixed prior to use by firmly holding the container on its side and agitating the contents, using a side-to-side motion for at least 15 seconds.

The dispensing wand kit is ideal for roof decks with many penetrations. Attach the dispensing hose swivel end to the cylinder valve. Tighten the connection using an open-end wrench being careful not to over-tighten. Verify that the on/off valve on the dispensing hose is closed. The handle should be perpendicular to the valve. Attach the dispensing wand kit to the on/off valve by screwing in until it is hand-tight.

The INSTA-STIK Multi-Bead Applicator (MBA) is recommended for roof decks with open areas. The INSTA-STIK MBA uses three tanks of INSTA-STIK Quik Set Commercial Roofing Adhesive. The tanks are connected by a hose to a central inlet manifold. The INSTA-STIK MBA is rolled backward along the roof deck as four to eight beads of adhesive flow from the center outlet tubes in a precise pattern that can be adjusted per roofing requirements. The INSTA-STIK MBA also features an ancillary manifold that can be used near the roof edge to add three interspaced beads to the pattern.

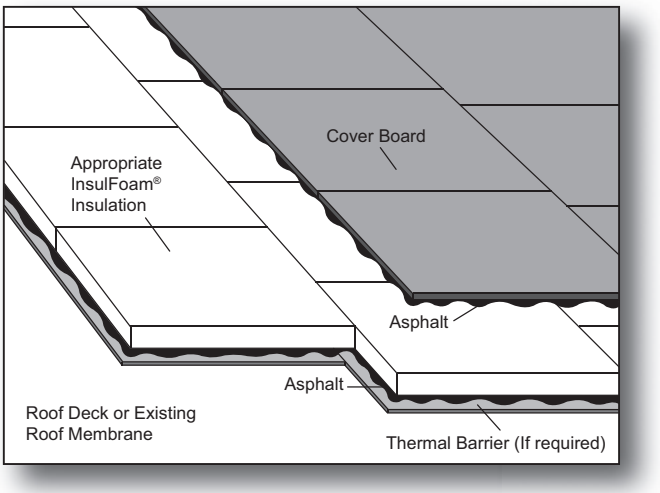
Dispense a minimum of 1 lineal foot of 3/4"–1" diameter bead of INSTA-STIK for every square foot of cover board to be attached. A picture of a 3/4" bead is provided in the INSTA-STIK MBA operating instructions as a guide for proper bead size.

Use a parapet wall or gutter as a straight edge guide when dispensing the first bead of INSTA-STIK. Under the normal application rate, place the first bead 3" inside the outside edge of the insulation to be attached. Apply 3 additional parallel beads approximately 12" apart, so that the fourth bead is 3" inside the opposite edge of the cover board. The result is 4 equidistant parallel beads (16 lineal feet) for each 4' x 4' insulation board. When using the MBA, open the valves to dispense 4 beads of INSTA-STIK.

The application rate can vary with roof system configuration. Additional adhesive is required around all roof penetrations and drains. An increased amount of INSTA-STIK may be required at the perimeter band of the roof, depending on the building and parapet wall heights. For application rates, refer to Table 1 in Dow's Installation Procedures for INSTA-STIK Quik Set Commercial Roofing Adhesive.

IMPORTANT: When applying INSTA-STIK, the cover boards must be placed onto the INSTA-STIK beads before tack-free (2 to 8 minutes depending on humidity). Walk on the boards to spread the beads for maximum contact. Continue to walk on the cover boards every 3 to 4 minutes until the insulation in firmly attached, usually within 10 to 20 minutes. Low humidity conditions will require longer cure times.

Refer to Dow's Installation Procedures and literature and the applicable Insulfoam/INSTA-STIK insulation specification for additional information on storage, handling and use of INSTA-STIK Quik Set Commercial Roofing Adhesive.



Asphalt Attached Cover Boards

Cover boards attached in asphalt directly to InsulFoam insulations should be installed by a roofing crew fully trained for these applications. Asphalt is to be applied only to the backside of the cover board. The cover board is to be installed only after the asphalt has cooled adequately.

DO NOT APPLY ASPHALT DIRECTLY TO ANY INSULFOAM OR R-TECH PRODUCTS.

The cover board size is to be limited to a maximum of 4' x 4' when using this attachment method. Cover board side joints are to be continuous, and end joints staggered a minimum of 12". All cover board joints are to be offset from the base layer insulation joints by a minimum of 6".

Place the hot-asphalt-compatible cover board (bottom side up, if applicable) adjacent to the area in which it will be installed. Make certain that the previously installed InsulFoam insulation is protected from any over-mopped or spilled hot asphalt. Apply a continuous, firmly bonding film of asphalt to the entire back surface of the cover board at a nominal rate of 30 lbs. per square. Porous cover boards may require greater amounts of asphalt. Allow the asphalt to cool to 250 °F, but not less than 200 °F. The absence of visible smoke is a common indicator the asphalt has sufficiently cooled. This may not be applicable at ambient rooftop temperatures below 50 °F. The asphalt must remain sufficiently hot to maintain its adhesive characteristics. It may be useful to use an infrared heat gun to measure the asphalt temperature on the back of the first few boards installed. Weather conditions, asphalt variations and crew techniques will impact the rate at which asphalt cools. When the asphalt has cooled to within the appropriate temperature range, the back-mopped cover board is to be flipped so that the asphalt is facing down, and is to be placed over the InsulFoam insulation. The installed cover boards should be lightly stepped into place and should abut tightly against adjacent boards. Joints greater than 1/2" are to be filled with the same cover board material that is being used in the field of the roof.

For cold weather applications, contact the Insulfoam Technical Center for specific instructions.

Re-roofing

A large portion of the commercial/industrial roofing market involves installing roof systems on existing buildings. The two options available to a roof designer are either a complete or partial tear-off or a re-cover.

Complete tear-off, the most conservative re-roofing approach, means removing the existing roof system down to the building's structural deck. This approach ensures that all wet or damaged insulation is removed, and allows for a thorough inspection of the substrate to confirm its type and condition. Refer to the insulation specifications in the Insulfoam Roofing Manual when incorporating InsulFoam insulations in a complete tear-off application.

Partial tear-off typically means removing the existing roof system's membrane and allowing all or a portion of the insulation system to remain. This less conservative approach allows for an inspection of the existing insulation system to verify its condition. Any wet or damaged insulation could be replaced at this time. However, it may not allow for verification of the structural deck's condition. Refer to the insulation specifications in the Insulfoam Roofing Manual when incorporating InsulFoam insulations in a complete tear-off application.

Re-cover, the least conservative re-roofing approach, means that the existing roof system is left in place, and a new roof system is placed on top. Refer to the insulation specifications and the re-cover specifications (if using R-Tech) when incorporating InsulFoam insulations in a re-cover application.

The decision to perform a re-cover or tear-off should be made by a design professional who represents the building owner. When a re-cover or partial tear-off approach is taken, it is critical that any wet or damaged components of the existing roof system are removed.

To ensure a successful installation, there are basic considerations to be given any re-roof project:

- All wet or damaged materials must be removed.
- It must be possible to positively attach the new roof system to the substrate.
- The structure must be able to support the weight of the new roof system.
- Local codes should be consulted to ensure that re-cover applications are allowed.
- Consider the addition of Tapered InsulFoam or roof drains in order to improve the overall drainage of the roof system.

Re-cover Consideration

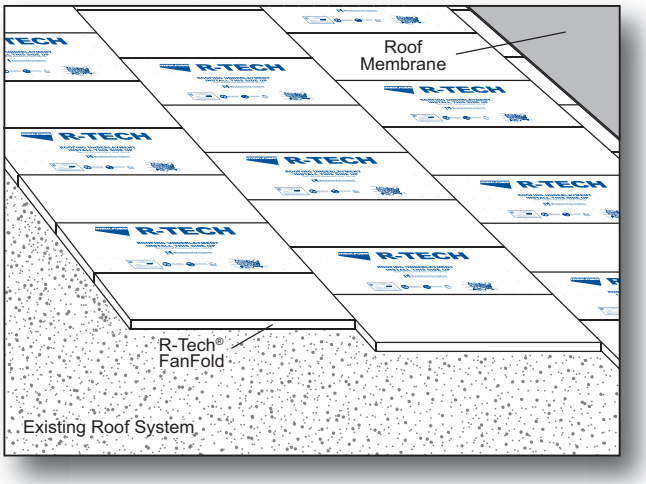
Insulfoam's R-Tech Fanfold Underlayment has been specifically designed for re-cover installations. The following are just a few of the advantages that R-Tech has over other cover boards:

- *Labor Savings* R-Tech Fanfold comes in 200-sq.-ft. bundles, and is lightweight enough that the average roof mechanic can carry an R-Tech bundle under each arm (a total of 4 squares). Competing 4' x 8' re-cover products would require 12 sheets to cover 4 squares.
- *User-Friendly* The R-Tech manufacturing process ensures that it will lay flat during installation, eliminating the thermoplastic roof system seam-welding issues that are experienced with other fanfold products.
- *Versatile* The unique polymeric-laminate facers allow single ply membranes, including PVC, to be installed directly over R-Tech, without additional slip sheets or divorcement. Consult the PVC membrane manufacturer.
- *Cost-Effective* R-Tech is typically less expensive than other re-cover products, requires fewer fasteners per square foot, and is easier to handle.
- *Proven Performance* The same fundamental chemistry has been in use since the mid-1950's, so the actual performance of the product is well known.
- *Water-Resistant* R-Tech Fanfold Roof Sheathing does not readily absorb moisture from the environment, and will not deteriorate in the presence of moisture like most other re-cover boards.

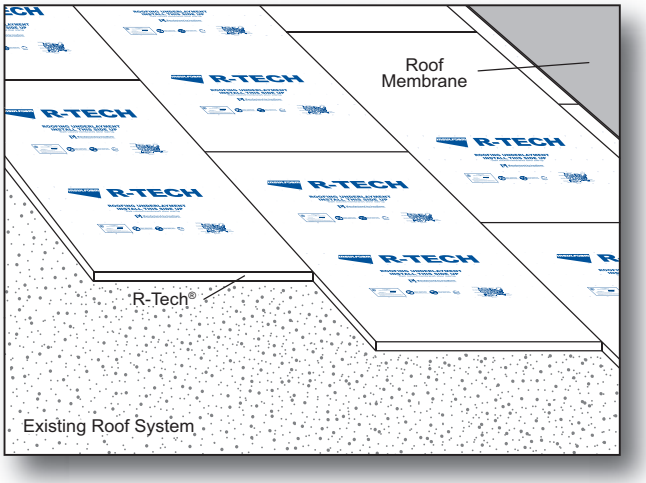
R-TECH® LOOSE LAID

Re-Cover Specification

R-Tech Fanfold



R-Tech 4' x 8'



General

This specification is intended for use over any substrate suitable to receive and support a loose laid roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- R-Tech insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- When conditions dictate, in order to prevent wind blow-off or damage during installation, the loose laid R-Tech should be weighed down or tacked in place with a minimal quantity of mechanical fasteners.
- InsulFoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- When used with dark colored membranes, the R-Tech should be installed with the metallic side facing up.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.
- Prior to a re-cover, consideration should be given to adding roof drains, crickets or saddles to facilitate positive drainage.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

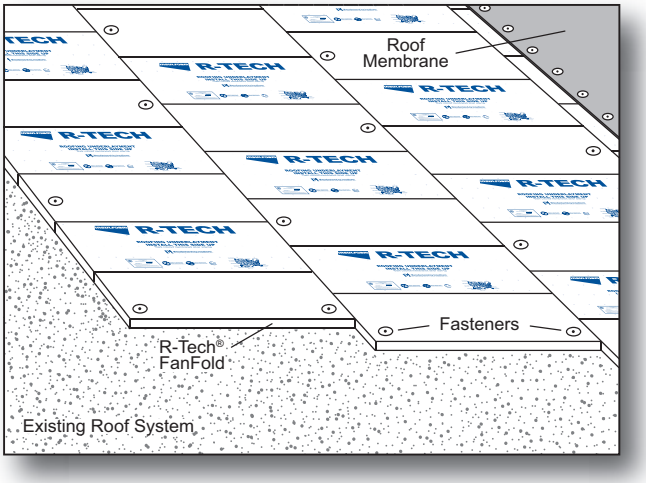
R-Tech	R-Tech Fanfold
Loose Laid	
1NRL	1NFL

Loose Laid Insulation

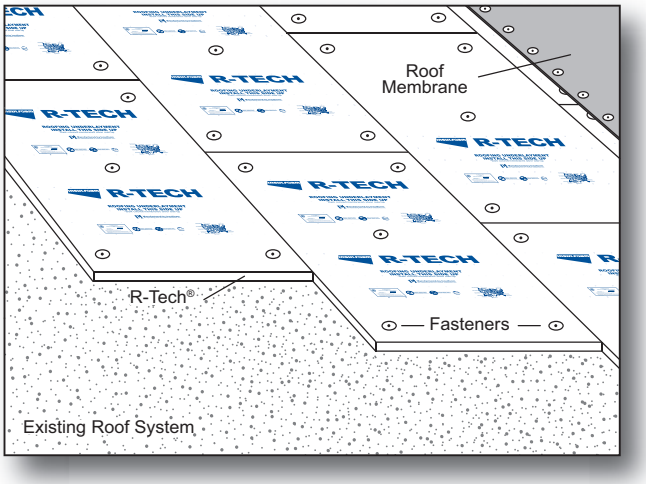
Install R-Tech insulation with continuous side joints, and end joints staggered so they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If R-Tech is being installed over an existing layer of insulation, all joints must be offset a minimum of 6" between layers.

Re-Cover Specification

R-Tech Fanfold



R-Tech 4' x 8'



General

This specification is intended for use over any substrate suitable to receive and support a mechanically attached roof insulation assembly and subsequent roof membrane. It is provided to serve as a guideline for designers and installers.

Installation Considerations

- R-Tech insulations are shipped in plastic film wraps, which are intended for temporary protection during shipping. All material should be protected from the elements and stored in a dry location.
- Install only as much insulation as can be covered by a roof membrane system, and/or made watertight by the end of each day.
- Insulfoam insulations should not be exposed directly to solvent-based or petroleum-based adhesives and sealants.
- Allow approximately a 1/4" space between InsulFoam insulation and vertical surfaces or roof projections. Do not force or jam product into place.
- When used with dark colored membranes, the R-Tech should be installed with the metallic side facing up.
- For re-cover applications, care should be taken to ensure that no moisture is trapped in the existing or new roof system.
- Prior to a re-cover, consideration should be given to adding roof drains, crickets or saddles to facilitate positive drainage.

InsulFoam insulations are compatible with most membrane systems; however, we recommend consultation with the membrane manufacturer for any limitations or approvals for use with their products.

Insulation Specifications

R-Tech	R-Tech Fanfold
Mechanically Attached	
1NRM	1NFM

Mechanically Attached Insulation

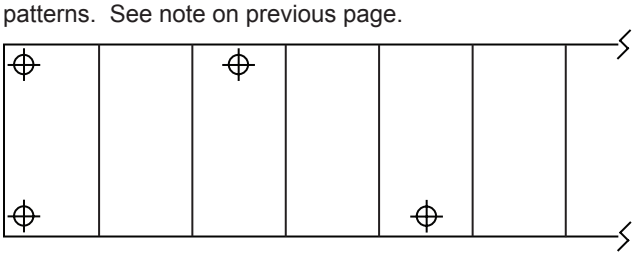
Install R-Tech insulation with continuous side joints, and end joints staggered so they are offset by a minimum of 12" from the end joints in adjacent rows. Insulation should abut tightly against adjacent boards. Joints greater than 1/2" should be filled with the same insulation that is being used in the field of the roof. If R-Tech is being installed over an existing layer of insulation, all joints must be offset a minimum of 6" between layers. Use an approved mechanical fastener of sufficient length to penetrate into or through the deck by the amount prescribed for the specific fastener. Fasteners should never be closer than 6" from the edges of the insulation board, and should be placed in a pattern to achieve the desired approval. Use appropriate insulation plates with the fasteners. Care must be taken to avoid over-driving or under-driving the fastener and plate assembly.

Note: Some membrane manufacturers may require a higher density of fasteners for their warranted systems. Consult the membrane manufacturer for specific requirements.

Re-Cover Specification

Fastening Considerations

The following fastening pattern is just one of several suitable patterns. See note on previous page.



For the above pattern, one fastener is to be placed at each corner of the R-Tech's leading and trailing edges, and thereafter at a rate of one fastener every 12 square feet, placed on alternating sides of the sheet.

For a complete listing of roofing codes go to www.Insulfoam.com.
Click on *Roofing Applications* and select *Technical Information.*

Single Ply Systems

Single Ply- Mechanically Attached

***Class A**
***Deck:** **Combustible or Non-Combustible**
***System:** **Single Ply- Mechanically Attached**
Barrier Board: 1/2" (min.) gypsum board or 1/4" (min.) DensDeck.
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech; any thickness, any density.
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Mechanically Attached**
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech, InsulLam, InsulVent; any thickness, any density. InsulFoam/wood fiber or InsulFoam/perlite; factory-laminated or field-applied.
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Mechanically Attached**
Insulation: InsulFoam SP; any thickness, any density, mechanically attached.
Membrane: Any UL-Classified PVC, TPO, CSPE or reinforced Carlisle Sure Seal; max. 60 mil.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Mechanically Attached**
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech; any thickness, any density.
Slip Sheet: SecurePly
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Mechanically Attached**
Insulation: InsulFoam HD Composite, any thickness, any density.
Membrane: Any UL-Classified EPDM, CPE, CSPE, PVC, NBP, TPA, EIP, or TPO.
Surfacing: See membrane listing.
Note: Classification (A, B or C) will be the same as the classification for the membrane when applied directly over polyisocynaurate insulation. The maximum incline can not exceed 1/2:12

***Class A**
Deck: **Combustible**
***System:** **Single Ply- Mechanically Attached**
Insulation: InsulFoam HD Composite, any density, 1-½" (min.), over any UL Classified Insulfoam EPS, 3" (min).
Membrane: Any UL Classified EPDM, PVC, TPO, CSPE, CPE, NBP, TPA or EIP.
Surfacing: See membrane listing.
Note: Classification (A,B or C) will be the same as the classification for the membrane when applied directly over polyisocyanurate insulation. The maximum incline cannot exceed 1/2:12.

Single Ply- Ballasted Systems

***Class A**
***Deck:** **Combustible or Non-Combustible**
***System:** **Single Ply-Ballasted**
Insulation: InsulFoam EPS, Tapered InsulFoam, InsulFoam HD Composite, R-Tech, InsulLam, InsulVent, InsulFoam SP; any thickness, any density.
Membrane: Any UL-Classified membrane system.
Surfacing: River bottom stone – 1000 lb/sq. min.

Single Ply- Adhered Systems

***Class A**
***Deck:** **Combustible or Non-Combustible**
***System:** **Single Ply- Adhered**
Barrier Board: 1/2" (min.) gypsum board or 1/4" (min.) DensDeck.
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech; any thickness, any density.
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Adhered**
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech, InsulLam, InsulVent; any thickness, any density.
InsulFoam/wood fiber or InsulFoam/perlite; factory-laminated or field-applied.
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Adhered**
Insulation: InsulFoam SP; any thickness, any density, mechanically attached.
Membrane: GAF Material Corp. EverGuard Freedom TPO or Genflex Roofing System's GenFlex Peel & Stick TPO, max. 60 mil, self-adhered.
Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Single Ply- Adhered**
Insulation: InsulFoam HD Composite, any thickness, any density.
Membrane: Any UL-Classified EPDM, CPE, CSPE, PVC, NBP, TPA, EIP, or TPO.
Surfacing: See membrane listing.
Note: Classification (A, B or C) will be the same as the classification for the membrane when applied directly over polyisocynaurate insulation. The maximum incline can not exceed 1/2:12

Single Ply- Adhered Systems ***(continued)***

***Class A**
***Deck:** **Combustible**
***System:** **Single Ply- Adhered**
Insulation: InsulFoam HD Composite, any density, 1-½" (min.), over any UL Classified Insulfoam EPS, 3" (min).
Membrane: Any UL Classified EPDM, PVC, TPO, CSPE, CPE, NBP, TPA or EIP.
Surfacing: See membrane listing.
NOTE: Classification (A,B or C) will be the same as the classification for the membrane when applied directly over polyisocyanurate insulation. The maximum incline cannot exceed 1/2:12.

Bituminous Systems

Self-Adhered Modified Bitumen

***Class A**
***Deck:** **Combustible or Non-Combustible**
***System:** **Self-Adhered Modified Bitumen**
Barrier Board: 1/4" (min.) G-P Gypsum DensDeck® or 1/2" (min.) gypsum board with 6" offset to plywood joints.
Insulation: InsulFoam EPS, Tapered InsulFoam, InsulFoam SP, InsulFoam HD Composite; any thickness, any density.
Membrane:
1. Polyglass Elastoflex SA V FR Base self-adhered/Polyglass Elastoflex SA V FR.
2. Polyglass Elastoflex SA V FR Base self-adhered/Polyglass Elastoflex VG FR.
3. Soprema EPS Flam Stick self-adhered Sopralene Flam 180 FR+ Granular/ Sopralene Flam 250 FR+ Granular.
4. Soprema EPS Flam Stick FR self-adhered/ Sopralene Flam 180 FR+ Granular/ Sopralene Flam 250 FR+ Granular.

Surfacing: See membrane listing.

***Class A**
***Deck:** **Non-Combustible**
***System:** **Self-Adhered Modified Bitumen**
Insulation: InsulFoam EPS, Tapered InsulFoam, InsulFoam SP, InsulFoam HD Composite, InsulLam, InsulVent; any thickness, any density. InsulFoam/wood fiber or InsulFoam perlite; factory-laminated or field-applied.
Membrane:
1. Polyglass Elastoflex SA V FR Base self-adhered/Polyglass Elastoflex SA V FR.
2. Polyglass Elastoflex SA V FR Base self-adhered/Polyglass Elastoflex VG FR.
3. Ridglass Roofgard HD self-adhered Roofgard Blasé-Ply G/Ridglass Roofgard FR G.
4. Soprema EPS Flam Stick self-adhered Sopralene Flam 180 FR+ Granular/ Sopralene Flam 250 FR+ Granular.
5. Soprema EPS Flam Stick FR self-adhered/ Sopralene Flam 180 FR+ Granular/ Sopralene Flam 250 FR+ Granular.

Surfacing: See membrane listing.

Modified Bitumen

***Class A**
***Deck:** **Non-Combustible**
***System:** **Modified Bitumen**
Insulation: InsulFoam EPS, Tapered InsulFoam, R-Tech, InsulLam, InsulVent; any thickness, any density.
InsulFoam/wood fiber or InsulFoam/perlite; factory-laminated or field-applied.
Membrane: Any UL-Classified Modified Bitumen.
Surfacing: See membrane listing.

BUR Membrane

***Class A**
***Deck:** **Combustible or Non-Combustible**
***System:** **BUR Membrane**
Insulation: InsulFoam EPS, Tapered InsulFoam. R-Tech, InsulLam, InsulVent; any thickness, any density.
InsulFoam/wood fiber or InsulFoam/perlite; factory-laminated or field-applied.
Membrane: 3-5 plies UL-Classified
A. Type 15 (organic)
B. G1 or G2 (fiberglass)
Surfacing:
A. 400 lbs. roofing gravel/square
B. 400 lbs. crushed stone/square
C. 300 lbs. crushed slag/square
D. Type G3 mineral surfaced cap sheet

Maintenance and Repair

***Class A, B or C**
Deck: **Combustible or Non-Combustible**
Existing
Roof System: Class A, B or C built-up smooth surface, cap sheet or gravel surfaced, gravel may be removed.
Insulation: InsulFoam EPS, R-Tech or R-Tech Fanfold; any thickness, any density.
Membrane: Any UL-Classified EPDM, TPO, PVC, CPE, CSPE, CR, NBP, EIP, EP, PIB or TPA.
Surfacing: River bottom stone (3/4"-1 1/2" dia.) at a min. 900 lbs./square.

***Class A, B or C**
Deck: **Combustible or Non-Combustible**
Existing
Roof System: Class A, B or C built-up smooth surface, cap sheet or gravel surfaced (gravel maintained) to retain the existing Classification.
Insulation: InsulFoam SP; any thickness, any density, mechanically attached.
Membrane: Any UL-Classified TPO, PVC or CSPE max. 60 mil., mechanically attached.
Surfacing: See membrane listing.

***Class A, B or C**
Deck: **Non-Combustible**
Existing
Roof System: Class A, B or C built-up smooth surface, cap sheet or gravel surfaced, gravel may be removed.
Insulation: InsulFoam EPS, R-Tech or R-Tech Fanfold; max. 1" thickness, any density.
Membrane: Mechanically attach one of the following:
A. Conklin “Hi-Crown” (CSPE)
B. Burke “358” (CSPE)
C. Stevens Hypalon
D. Seaman Fibertite (EIP)
E. Duro-Last (PVC)
Surfacing: See membrane listing.

***Class A, B or C**
Deck: **Non-Combustible**
Existing
Roof System: Class A, B or C built-up smooth surface, cap sheet or gravel surfaced(gravel maintained) to retain existing classification.
Insulation: InsulFoam EPS, R-Tech or R-Tech Fanfold; max. 1" thickness, any density.
Membrane: Mechanically attach one of the following:
Any UL-Classified EPDM, TPO, PVC, CSPE, EIP, TPA or CPA.
Surfacing: See membrane listing.

***Class A, B or C**
Deck: **Non-Combustible**
Existing
Roof System: Class A, B, or C
Insulation: InsulFoam HD Composite, any thickness, any density.
Membrane: Any UL-Classified EPDM, CPE, CSPE, PVC, NBP, TPA, EIP, or TPO.
Surfacing: See membrane listing.
Note: Classification (A, B or C) will be the same as the classification for the membrane when applied directly over polyisocynaurate insulation. The maximum incline can not exceed 1/2:12

*Contact Insulfoam Representative or consult UL Roofing Materials Guide for more specific listing information.

UL Roof Constructions

InsulFoam EPS Roof Insulations also qualify for the following UL Roof Constructions, as specified in the UL Roofing Materials Guide.
Const. No. 219
Const. No. 237
Const. No. 374
Const. No. 412
Const. No. 419
Const. No. 421
Const. No. 458
Const. No. 631
Const. No. 666
Const. No. 667
Const. No. 669

UNDERWRITERS LABORATORIES HOURLY P-DESIGNS

P225
- Steel Deck
- 5/8" Gypsum WallBoard
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P230
- Steel Deck
- 5/8" Gypsum WallBoard
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P231
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P235
- IRMA-EPS above
- Class A, B, C Roof Cover

P238
- Steel Deck
- Min. 1" Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P246
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P250
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P251
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P253
- Cement Fiber Deck
- InsulFoam EPS
- Class A, B, C Roof Cover

P254
- Steel Deck
- 5/8" Gypsum Wall Board
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P255
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, with or without holes, max. 3"
- Class A, B, C Roof Cover

P259
- Steel Deck
- 5/8" Gypsum Wall Board
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P261
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P262
- Cement Fiber Deck
- InsulFoam EPS
- Class A, B, C Roof Cover

P264
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P269
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P302
- Steel Deck
- 5/8" Gypsum Wall Board
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P404
- IRMA-EPS above
- Class A, B, C Roof Cover

P410
- Steel Deck
- Insulating Concrete with InsulFoam Holy Board, max. 8"
- Class A, B, C Roof Cover

P411
- Steel Deck
- Insulating Concrete with InsulFoam Holy Board, max. 8"
- Class A, B, C Roof Cover

P501
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P503
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P508
- Steel Deck
- 5/8" Gypsum Wall Board
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P509
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P510
- Steel Deck
- 5/8" Gypsum Wall Board
- 1"-thick Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P511
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P513
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P514
- Steel Deck
- 5/8" Gypsum Wall Board
- 1" Mineral Fiber Board
- InsulFoam EPS
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P515
- Steel Roof Truss
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS
- Class A, B, C Roof Cover

Note: Two layers 5/8" gypsum wall board to underside of truss.

P519
- Steel Deck
- 5/8" Gypsum Wall Board
- 1" Mineral Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P520
- Steel Deck
- Insulating Concrete with InsulFoam Holey Board, max. 8"
- Class A, B, C Roof Cover

P521

- Steel Truss System
- Steel Deck
- 1/2" Gypsum Wall board
- InsulFoam EPS, min. 1"-thick, no max. thickness
- Class A, B, C Roof Cover

Note: One layer 5/8" gypsum wall board to underside of truss.

P525

- Steel Truss System
- Steel Deck
- 1/2" Gypsum Wall Board
- InsulFoam EPS, min. 1"-thick, no max. thickness
- Class A, B, C Roof Cover

Note: One layer 5/8" gypsum wall board to underside of truss.

P527

- Steel Truss System
- Steel Deck
- 1/2" Gypsum Wall Board
- Insulfoam EPS, min. 1"-thick, no max. thickness
- Class A, B, C Roof Cover

Note: One layer 5/8" gypsum wall board to underside of truss.

P529

- Steel Truss System
- Steel Deck
- 1/2" Gypsum Wall Board
- InsulFoam EPS, min. 1"-thick, no max. thickness
- Class A, B, C Roof Cover

Note: One layer 5/8" gypsum wall board to underside of truss.

P701

- Steel Roof Deck
- Spray-applied under-deck fireproofing
- 5/8" Gypsum Wall Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P708

- Precast Concrete Units
- Spray-applied under-deck fireproofing
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P710

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P713

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P717

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P719

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1" min., no max. thickness
- Class A, B, C Roof Cover

P725

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P731

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P732

- Spray applied under-deck fire proofing
- Steel Deck
- 5/8" Gypsum Board
- Carlisle Fast 100 adhesive
- Insulfoam EPS-min 1.0" thick, no max overall thickeness, max density 2.5pcf
- Class A, B, C Roof Cover

P734

- Spray applied under-deck fire proofing
- Steel Deck
- Sheathing Material-Carlisle Waterproofing
- 5/8" Gypsum Board
- Carlisle Fast 100 adhesive
- Insulfoam EPS-min 1.0" thick, max density 2.5pcf
- Class A, B, C Roof Cover

P735

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P739

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P741

- Spray applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Board
- Insulfoam EPS-min 1.0" thick, no max overall thickness, max density 2.5pcf
- Class A, B, C Roof Cover

P743

- Spray applied under-deck fireproofing
- Steel Deck
- Vapor retarder
- 5/8" Gypsum Board
- Insulfoam EPS- 1-8" thick, max density 2.5pcf
- Class A, B, C Roof Cover

P801

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P803

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, 1-8"-thick
- Class A, B, C Roof Cover

P810

- Spray-applied under-deck fireproofing
- Precast Concrete Units
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P814

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, no max. thickness
- Class A, B, C Roof Cover

P815

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, no max. thickness
- Class A, B, C Roof Cover

UNDERWRITERS LABORATORIES HOURLY P-DESIGNS

P825

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS, no max. thickness
- Class A, B, C Roof Cover

P828

- Spray-applied under-deck fireproofing
- Steel Deck
- 5/8" Gypsum Wall Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P840

- Spray applied under-deck fireproofing
- Steel Deck
- 5/8” Gypsum Board
- Insulfoam EPS-min 1.0” thick, max density 2.5pcf
- Class A, B, C Roof Cover

P902

- Spray-applied under-deck fireproofing
- Insulating Concrete, 1-8"
- InsulFoam Holey Board, max. thickness 8"
- Class A, B, C Roof Cover

P904

- Precast Concrete Units
- 1-3/4" Mineral & Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P905

- Precast Concrete Units
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P909

- Precast Concrete Units
- 1-3/4" Mineral & Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P910

- Precast Concrete Units
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P912

- Precast Concrete Units
- 1-3/4" Mineral & Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P913

- Precast Concrete Units
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P915

- Precast Concrete Units
- 1-3/4" Mineral & Fiber Board
- InsulFoam EPS
- Class A, B, C Roof Cover

P916

- Precast Concrete Units
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P919

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P920

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P921

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P922

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness 8"
- Class A, B, C Roof Cover

P923

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P925

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P928

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P929

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P930

- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

P936

- Spray-applied under-deck fireproofing
- Steel Deck
- Insulating Concrete
- InsulFoam Holey Board, max. thickness varies
- Class A, B, C Roof Cover

Note: Many systems may allow a vapor retarder. Final determination on acceptability for use must be determined per Underwriters Laboratories Fire Resistance Directory, Volume 1.

FM Listings

Insulated Metal Deck;
Single Ply Roof Cover

Approvals Fire-Class-1; Uplift – 1-60 or 1-90

First Layer of Insulation: Min. 3/4" perlite, Min. 5/8" gypsum or Min. 1/2" DensDeck; loose laid over a metal deck.

InsulFoam Insulations: InsulFoam I, II, VIII, IX and Tapered InsulFoam. Thicknesses of 1-8".

Cover Board: 1/2" - 1" wood fiber

Attachment: For 1-60, the entire insulation system is fastened to the deck at a rate of 1 fastener per 2 square feet. For 1-90, the wood fiber is field-or factory-adhered to the InsulFoam.

Roof System: Any FM approved single ply roof system.

Insulated Metal Deck;
Bituminous Roof Cover

Approvals Fire-Class-1; Uplift – 1-60 or 1-90 First Layer of Insulation: 3/4" perlite attached with 3 fasteners per 2' x 4' board, or 5/8" Type X gypsum or 1/2" DensDeck fastened with 8 fasteners per 4' x 8' board.

InsulFoam Insulations: InsulFoam I, II, VIII, IX and Tapered InsulFoam. Thicknesses of 1-8". Insulation is applied in asphalt that has cooled to 225 °F. See appropriate Insulfoam insulation specification.

Cover Board: 1/2" - 1"-thick wood fiber is applied to the InsulFoam EPS. The cover board is back-mopped with hot asphalt and then allowed to cool to 225 °F. Cover board is placed on InsulFoam. See appropriate Insulfoam insulation specification.

Roof System: Built-up Roof – minimum 3 plies.

Insulated Concrete or Gypsum Decks;
Bituminous Roof Cover

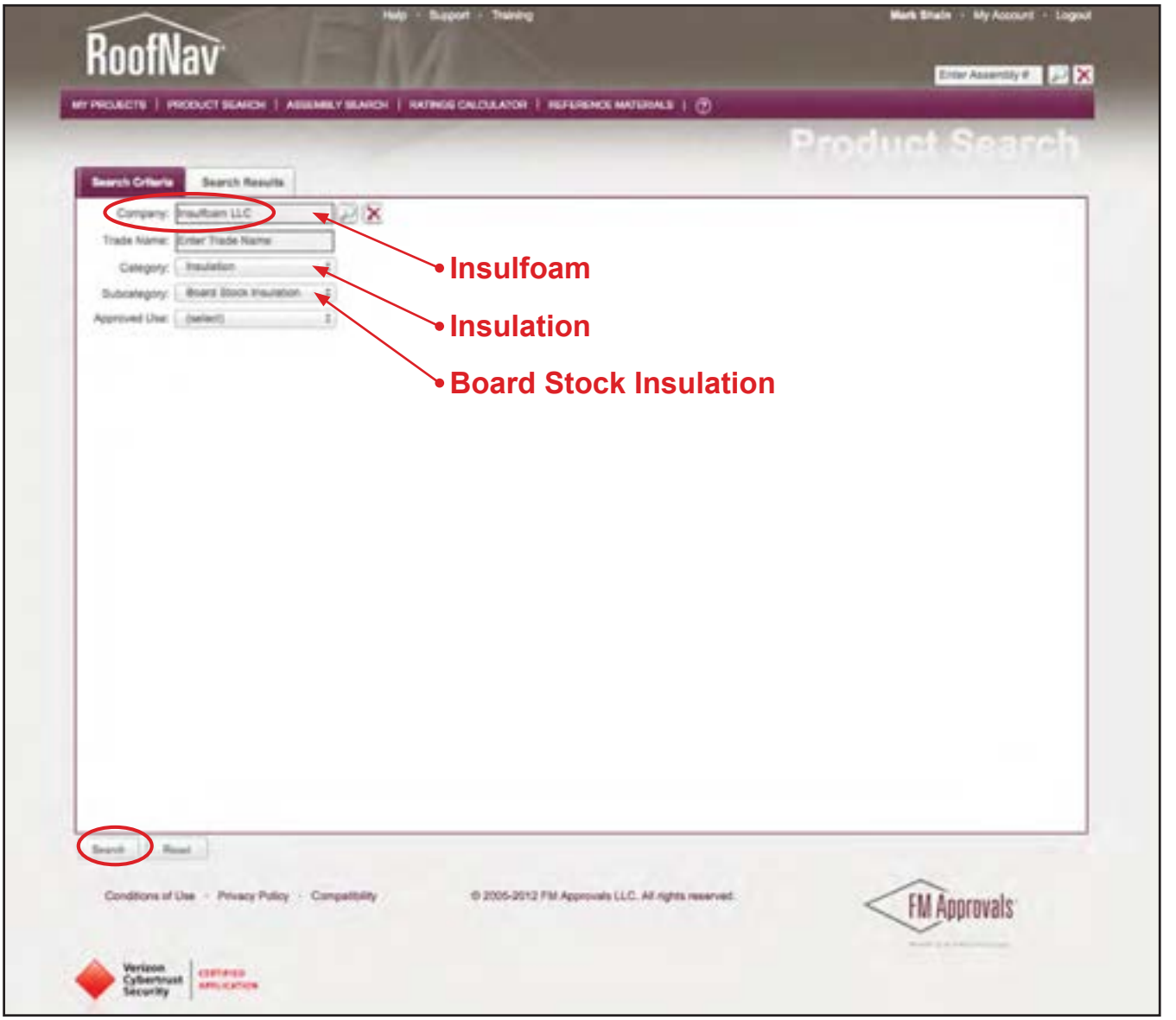
Approvals Fire-Class-1; Uplift – 1-60 or 1-90 InsulFoam Insulations: InsulFoam I, II, VIII, IX and Tapered InsulFoam. Thicknesses of1-8". Applied in asphalt that has cooled to 225 °F. See appropriate Insulfoam insulationspecification.

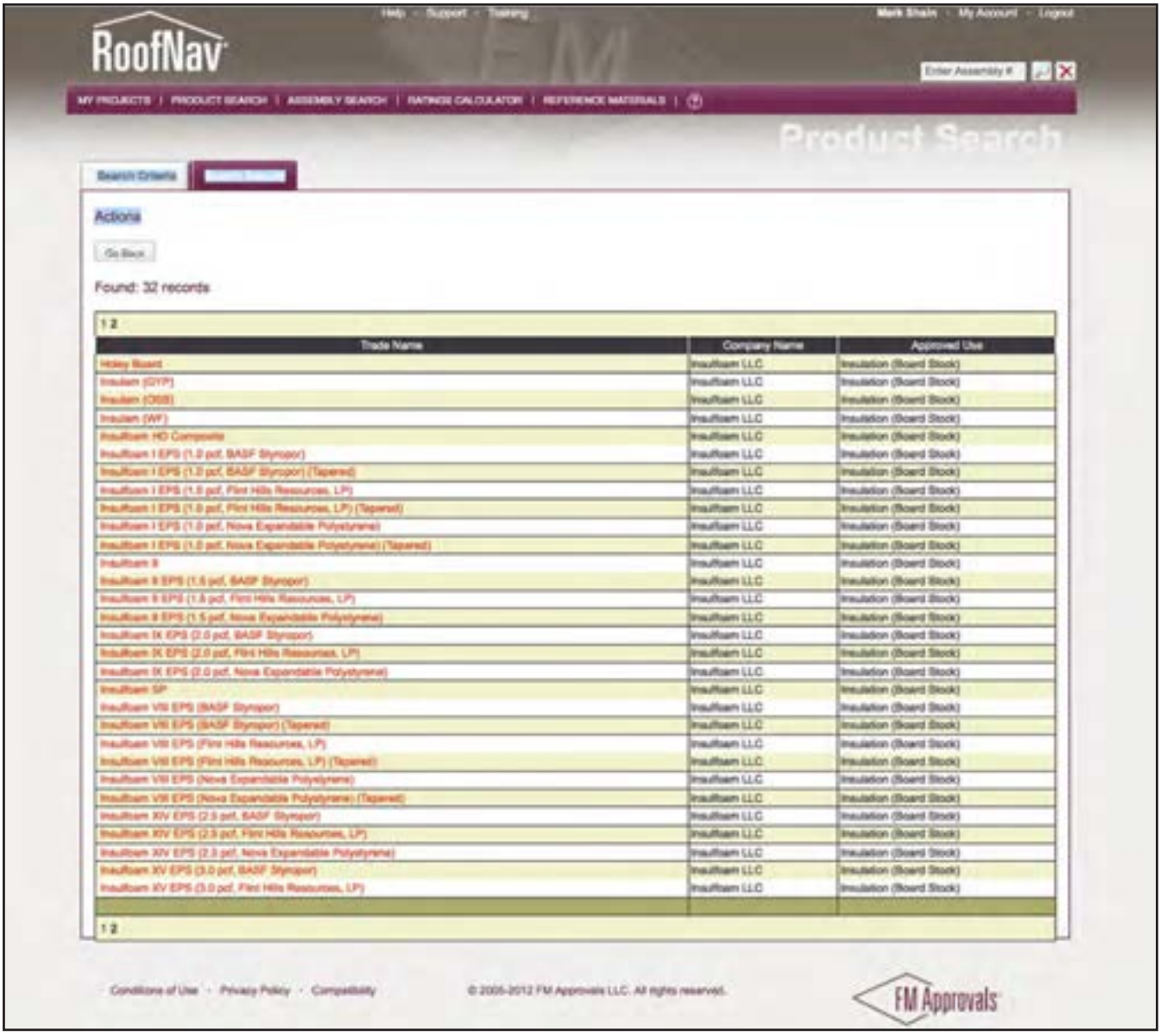
Cover Board: 1/2" - 1" thick wood fiber is applied to the InsulFoam EPS. The cover board is back-mopped with hot asphalt and then allowed to cool to 225 °F. Cover board is placed on InsulFoam. See appropriate Insulfoam insulation specification. As an alternate, InsulFoam and wood fiber may be factory laminated.

Roof System: Built-up Roof – minimum 3 plies.

FACTORY MUTUAL LISTINGS

The screenshots on the following two pages illustrate how FM listings may be accessed by visiting www.Roofnav.com




RoofNav
Help · Support · Training
Mark Shain · My Account · Logout
MY PROJECTS | PRODUCT SEARCH | ASSEMBLY SEARCH | RATINGS CALCULATOR | REFERENCE MATERIALS |
Enter Assembly #
Product Search
Search Criteria
Actions
Go Back
Found: 32 records
1 2
Trade Name
Company Name
Approved Use
Insulfoam LLC
Insulation (Board Stock)
1 2
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INSULFOAM PACKAGING

Overview

The information contained in this section is intended to provide basic packaging information for the InsulFoam brand roof insulation products and general shipping policies.

For local or regional policy exceptions, please contact your local Insulfoam representative.

Note: The terms “units” and “bundles” can be used interchangeably.

Minimum Orders

The minimum material value of any InsulFoam order is $75.00.

General Policies

- Except as noted below, all products are sold in full unit (bundle) quantities as shown in the proceeding pages of this section.
- Broken units will be charged at the full unit price, plus a $25.00 per broken unit repackaging charge.
- Fuel surcharges may apply.

Insulfoam will provide less than full unit/bundle quantities for individual board sizes for:

- Tapered/cricket orders of 4000 board feet or more, shipped to a single location.
- Any supplemental or replacement materials for a project that originally met the minimum tapered/cricket order requirements.

Pick-Up, Will-Call & Delivered Orders

Contact your local Insulfoam sales representative for policies applicable to the Insulfoam plant serving your area.

Typical Truckload Quantities

Flat Beds (45 ft.)

Flat/Tapered InsulFoam Insulation

- Units or bundles are nominally 48" high.
- 24 units or bundles per truck
- Approx. 37,000 board feet per truck

Vans (53 ft.)

Flat/Tapered Insulation

- Units or bundles are nominally 48" high.
- 26 – 4' x 8' units or bundles per van
- 52 – 4' x 4' units or bundles per van
- Approx. 40,000 board feet per van

R-Tech – 4' x 8' bundles

- R-Tech units are nominally 24" high.
- 52 bundles per van
- Approx. 40,000 board feet per van

R-Tech Fanfold

- 3/8" Fanfold – 16 units/pallet, 26 pallets/truck, 832 squares/van
- 1/2" Fanfold – 12 units/pallet, 26 pallets/truck, 624 squares/van
- 3/4" Fanfold – 8 units/pallet, 26 pallets/truck, 416 squares/van

Packaging & Handling

Unless otherwise indicated, all products are packaged with stretch-wrap films. The ends of most units are not wrapped, and, if stored outside, should be protected from the elements.

InsulFoam brand roof insulation products can be provided with protective shrouds. An additional charge of $1.50 for each 4' x 8' shroud and an additional $1.00 for each 4' x 4' shroud will apply.

Please see the Roof Insulations section of the Insulfoam Roofing Manual for additional storage and handling considerations.

InsulFoam Flat Stock

4' x 4' Panels					
Thickness (inches)	Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
1/2	4	4	8	96	768
3/4	4	4	12	64	768
1	4	4	16	48	768
1 1/2	4	4	24	32	768
2	4	4	32	24	768
2 1/2	4	4	40	19	760
3	4	4	48	16	768
3 1/2	4	4	56	13	728
4	4	4	64	12	768
4 1/2	4	4	72	10	720
5	4	4	80	9	720
5 1/2	4	4	88	8	704
6	4	4	96	8	768
6 1/2	4	4	104	7	728
7	4	4	112	6	672
7 1/2	4	4	120	6	720
8	4	4	128	6	768
8 1/2	4	4	136	5	680
9	4	4	144	5	720

4' x 8' Panels					
Thickness (inches)	Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
1/2	4	8	16	96	1536
3/4	4	8	24	64	1536
1	4	8	32	48	1536
1 1/2	4	8	48	32	1536
2	4	8	64	24	1536
2 1/2	4	8	80	19	1520
3	4	8	96	16	1536
3 1/2	4	8	112	13	1456
4	4	8	128	12	1536
4 1/2	4	8	144	10	1440
5	4	8	160	9	1440
5 1/2	4	8	176	8	1408
6	4	8	192	8	1536
6 1/2	4	8	208	7	1456
7	4	8	224	6	1344
7 1/2	4	8	240	6	1440
8	4	8	256	6	1536
8 1/2	4	8	272	5	1360
9	4	8	288	5	1440

Note: Roofing Flat Stock units (bundles) are nominally 48 inches high.

R-Tech Fanfold Roof Underlayment

2 Square Bundle* (4' x 50') – BFT					
Thickness (inches)	Width (feet)	Length (feet)	BFT per Piece	Pieces per Pallet	BFT per Bundle
3/8	4	50	75	16	1200
1/2	4	50	100	12	1200
3/4	4	50	150	8	1200
2 Square Bundle (4' x 50') – SQFT					
Thickness (inches)	Width (feet)	Length (feet)	SQFT per Piece	Pieces per Pallet	SQFT per Bundle
3/8	4	50	200	16	3200
1/2	4	50	200	12	2400
3/4	4	50	200	8	1600

*** Product can be ordered in one-square bundles packaged in twice the pallet count (same BFT and SQFT quantities).**

R-Tech - 4' x 8' Panels

4' x 8' Panels							
Thickness (inches)	Width (feet)	Length (feet)	BFT per Piece	SQFT per Piece	Pieces per Bundle	BFT per Bundle	SQFT per Bundle
1/2	4	8	16	32	48	768	1536
3/4	4	8	24	32	32	768	1024
1	4	8	32	32	24	768	768
1 1/2	4	8	48	32	16	768	512
2	4	8	64	32	12	768	384
2 1/2	4	8	80	32	10	800	320
3	4	8	96	32	8	768	256
3 1/2	4	8	112	32	7	784	224
4	4	8	128	32	6	768	192

Tapered A, C and E Panels

A Panels – 1/8" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
A1	0*	1/2	1/4
A2	1/2	1	3/4
A3	1	1 1/2	1 1/4
A4	1 1/2	2	1 3/4
A5	2	2 1/2	2 1/4
A6	2 1/2	3	2 3/4
A7	3	3 1/2	3 1/4
A8	3 1/2	4	3 3/4
A9	4	4 1/2	4 1/4
A10	4 1/2	5	4 3/4
A11	5	5 1/2	5 1/4
A12	5 1/2	6	5 3/4

*** Zero (0) dimensions are a nominal 1/8" actual.**

4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	5	154	770
4	4	12	64	768
4	4	20	38	760
4	4	28	26	728
4	4	36	20	720
4	4	44	16	704
4	4	52	14	728
4	4	60	12	720
4	4	68	10	680
4	4	76	10	760
4	4	84	8	672
4	4	92	8	736

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	10	154	1,540
4	8	24	64	1,536
4	8	40	38	1,520
4	8	56	26	1,456
4	8	72	20	1,440
4	8	88	16	1,408
4	8	104	14	1,456
4	8	120	12	1,440
4	8	136	10	1,360
4	8	152	10	1,520
4	8	168	8	1,344
4	8	184	8	1,472

C Panels – 1/4" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
C1	0*	1	1/2
C2	1	2	1 1/2
C3	2	3	2 1/2
C4	3	4	3 1/2
C5	4	5	4 1/2
C6	5	6	5 1/2
C7	6	7	6 1/2
C8	7	8	7 1/2
C9	8	9	8 1/2
C10	9	10	9 1/2
C11	10	11	10 1/2
C12	11	12	11 1/2

*** Zero (0) dimensions are a nominal 1/8" actual.**

4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	9	84	756
4	4	24	32	768
4	4	40	18	720
4	4	56	12	672
4	4	72	10	720
4	4	88	8	704
4	4	104	6	624
4	4	120	6	720
4	4	136	4	544
4	4	152	4	608
4	4	168	4	672
4	4	184	4	736

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	18	84	1,512
4	8	48	32	1,536
4	8	80	18	1,440
4	8	112	12	1,344
4	8	144	10	1,440
4	8	176	8	1,408
4	8	208	6	1,248
4	8	240	6	1,440
4	8	272	4	1,088
4	8	304	4	1,216
4	8	336	4	1,344
4	8	368	4	1,472

E Panels – 1/2" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
E1	0*	2	1
E2	2	4	3
E3	4	6	5
E4	6	8	7
E5	8	10	9
E6	10	12	11
E7	12	14	13
E8	14	16	15
E9	16	18	17
E10	18	20	19
E11	20	22	21
E12	22	24	23

*** Zero (0) dimensions are a nominal 1/8" actual.**

4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	17	44	748
4	4	48	16	768
4	4	80	8	640
4	4	112	6	672
4	4	144	4	576
4	4	176	4	704
4	4	208	2	416
4	4	240	2	480
4	4	272	2	544
4	4	304	2	608
4	4	336	2	672
4	4	368	2	736

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	34	44	1,496
4	8	96	16	1,536
4	8	160	8	1,280
4	8	224	6	1,344
4	8	288	4	1,152
4	8	352	4	1,408
4	8	416	2	832
4	8	480	2	960
4	8	544	2	1,088
4	8	608	2	1,216
4	8	672	2	1,344
4	8	736	2	1,472

Tapered B, D and F Panels

B Panels – 3/16" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
B1	0*	3/4	3/8
B2	3/4	1 1/2	2 1/4
B3	1 1/2	2 1/4	1 7/8
B4	2 1/4	3	2 5/8
B5	3	3 3/4	3 3//8
B6	3 3/4	4 1/2	4 1/8
B7	4 1/2	5 1/4	4 7/8
B8	5 1/4	6	5 5/8
B9	6	6 3/4	6 3/8
B10	6 3/4	7 1/2	7 1/8
B11	7 1/2	8 1/4	7 7/8
B12	8 1/4	9	8 5/8

* Zero (0) dimensions are a nominal 1/8" actual.

4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	7	110	770
4	4	18	42	756
4	4	30	24	720
4	4	42	18	756
4	4	54	14	756
4	4	66	10	660
4	4	78	8	624
4	4	90	8	720
4	4	102	6	612
4	4	114	6	684
4	4	126	6	756
4	4	138	4	552

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	14	110	1,540
4	8	36	42	1,512
4	8	60	24	1,440
4	8	84	18	1,512
4	8	108	14	1,512
4	8	132	10	1,320
4	8	156	8	1,248
4	8	180	8	1,440
4	8	204	6	1,224
4	8	228	6	1,368
4	8	252	6	1,512
4	8	276	4	1,104

D Panels – 3/8" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
D1	0*	1 1/2	3/4
D2	1 1/2	3	2 1/4
D3	3	4 1/2	3 3/4
D4	4 1/2	6	5 1/4
D5	6	7 1/2	6 3/4
D6	7 1/2	9	8 1/4
D7	9	10 1/2	9 3/4
D8	10 1/2	12	11 1/4
D9	12	13 1/2	12 3/4
D10	13 1/2	15	14 1/4
D11	15	16 1/2	15 3/4
D12	16 1/2	18	17 1/4

* Zero (0) dimensions are a nominal 1/8" actual.

4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	13	58	754
4	4	36	20	720
4	4	60	24	1,440
4	4	84	8	672
4	4	108	6	648
4	4	132	4	528
4	4	156	4	624
4	4	180	4	720
4	4	204	2	408
4	4	228	2	456
4	4	252	2	504
4	4	276	2	552

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	26	58	1,508
4	8	72	20	1,440
4	8	120	24	2,880
4	8	168	8	1,344
4	8	216	6	1,296
4	8	264	4	1,056
4	8	312	4	1,248
4	8	360	4	1,440
4	8	408	2	816
4	8	456	2	912
4	8	504	2	1,008
4	8	552	2	1,104

F Panels – 3/4" per foot

Panel Designation	From (inches)	To (inches)	Average Thickness (inches)
F1	0*	3	1 1/2
F2	3	6	4 1/2
F3	6	9	7 1/2
F4	9	12	10 1/2
F5	12	15	13 1/2
F6	15	18	16 1/2
F7	18	21	19 1/2
F8	21	24	22 1/2
F9	24	27	25 1/2
F10	27	30	28 1/2
F11	30	33	31 1/2
F12	33	36	34 1/2

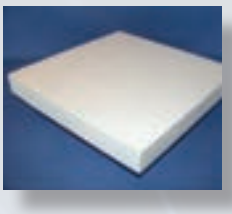
* Zero (0) dimensions are a nominal 1/8" actual.

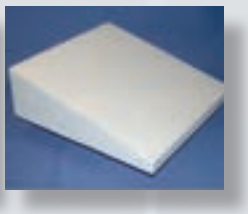
4' x 4' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	4	25	30	750
4	4	72	10	720
4	4	120	6	720
4	4	168	4	672
4	4	216	2	432
4	4	264	2	528
4	4	312	2	624
4	4	360	2	720
4	4	408	2	816
4	4	456	2	912
4	4	504	1	504
4	4	552	1	552

4' x 8' Panels				
Width (feet)	Length (feet)	BFT per Piece	Pieces per Bundle	BFT per Bundle
4	8	50	30	1,500
4	8	144	10	1,440
4	8	240	6	1,440
4	8	336	4	1,440
4	8	432	2	864
4	8	528	2	1,056
4	8	624	2	1,248
4	8	720	2	1,440
4	8	816	2	1,632
4	8	912	2	1,824
4	8	1,008	1	1,008
4	8	1,104	1	1,104

Insulfoam
ENGINEERED ROOFING INSULATION

InsulFoam® I, II, VIII, IX, XIV and XV
Flat and Tapered EPS Roofing Insulation

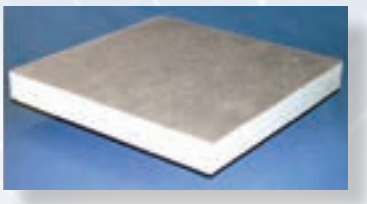




Application
All roofing and reroofing applications. Tapered panels used for increasing slope for additional drainage.

Characteristics
Available in compressive strengths from 10-60 psi, flat thicknesses of ½" to 40", and tapered start thicknesses of ⅛" to maximum thicknesses of 40"; multiple slopes available.

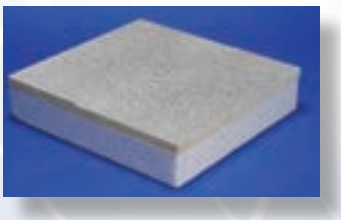
InsulFoam SP
InsulFoam with a Factory-laminated Glass Facer



Application
For recover or new applications, approved for single-ply roof systems without an additional slip sheet on non-combustible decks.

Characteristics
Available in thicknesses 1½" - 7", 4'x4' and 4'x8' panels.

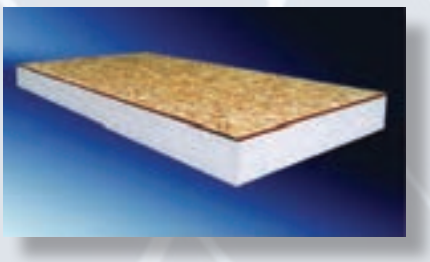
InsulFoam HD Composite
½" High Density Polyiso Bonded to InsulFoam



Application
For new construction or recover applications approved for single-ply roof systems.

Characteristics
Available with ½" 100 psi high density polyiso bonded to InsulFoam in compressive strengths from 10-60 psi, thicknesses 1½" - 6", 4'x4' and 4'x8' panels.

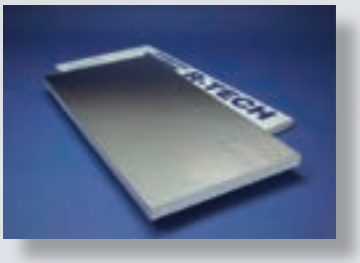
InsulLam™
Composite EPS Insulation



Application
High performance nailbase insulation for use in commercial and residential roof applications.

Characteristics
Standard substrates include OSB, Plywood, Gypsum and other cover boards, 4'x4', 4'x8' panels are available in thicknesses of 1½" – 7". Also available vented as InsulVent.

R-Tech®
Recover Roof Insulation



Application
For recover applications, approved for use under single-ply roof systems without the use of a slip-sheet.

Characteristics
4'x8' panels in thicknesses of ⅜" - 1".

R-Tech®
Fanfold Underlayment

Application
For recover applications, approved for use under single-ply roof systems without the use of a slip-sheet. EPDM is acceptable in the northern US.

Characteristics
Available in 200 sq. ft. fanfold bundles with thicknesses of ⅜", ½", or ¾".

InsulFoam FL
Flute Fill

Application
Recover insulation for existing metal roof profiles.

Characteristics
Available in taper, straight, or custom-cut profiles to fit any metal roofing system.

InsulFoam HB
Holey Board

Application
For use in lightweight concrete systems.

Characteristics
Typically provided in 2' x 4' panels in thicknesses from ¾" to 20".

Codes and Approvals
Extensive Code Approvals

INSULFOAM A CARLISLE COMPANY **19727 57th Avenue East · Puyallup, WA 98375 800.248.5995 • Fax: 253.383.7100**

Description

InsulFoam I is a versatile insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS). InsulFoam I meets or exceeds the requirements of ASTM C578, Type I, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam I has a nominal density of 1.0 lb/ft^3. In addition, InsulFoam I offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

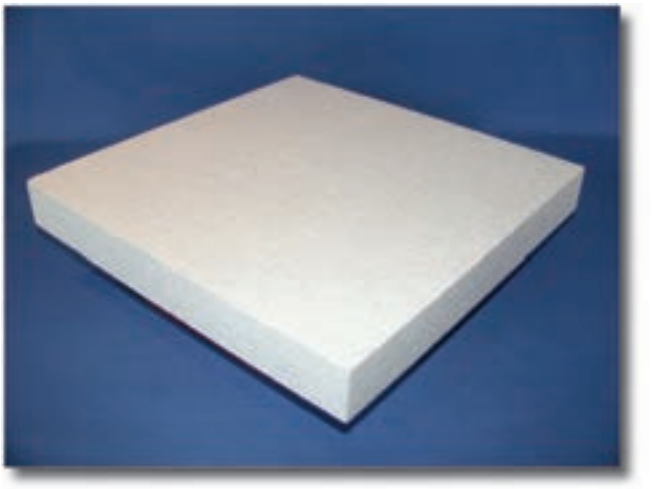
InsulFoam I is a quality EPS product and is used in numerous building construction applications.

Roofing: InsulFoam I is well-suited for single ply roof applications that employ mechanically fastened or ballasted TPO, PVC, EPDM and CSPE, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards or slip sheets. Please consult local building codes and membrane manufacturers for system requirements.

Other Construction Applications: InsulFoam I is used in assorted building applications, including pre-stressed and pre-cast structural concrete panels, metal roof flute-fill, siding backer board, building sheathing, roads and bridge fill, below-slab and perimeter insulation, and numerous other geofoam applications.

Advantages

- *Environmentally Friendly.* It contains no formaldehyde or ozone-depleting HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water Resistant.* InsulFoam I does not readily absorb moisture from the environment.
- *Code Approvals.* InsulFoam I is recognized by the International Code Council Evaluation Service (ICC-ES), and has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.



Sizes

InsulFoam I is typically available in 4' x 4' and 4' x 8' sizes with thickness from 1/4" to 40", and is readily available in custom lengths and widths with little to no impact on lead time. It is also available in tapered panels.

Typical Tested Physical Properties*

Property	Test Method	Value
Density (nom. pcf)	ASTM C303	1.00
C-Value (Conductance) - per inch BTU/(hr•ft²•°F) @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	0.230 0.240 0.260
R-Value (Resistance) - per inch (hr•ft²•°F)/BTU @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	4.35 4.17 3.85
Compressive Strength (psi, 10% deformation)	ASTM D1621	10-14
Flexural Strength (min. psi)	ASTM C203	25
Dimensional Stability (maximum %)	ASTM D2126	2.0
Water Vapor Permeance (max. perm., 1 inch)	ASTM E96	5.0
Water Absorption (max. % vol.)	ASTM C272	4.0
Capillarity	–	none
Flame Spread	ASTM E84	< 20
Smoke Developed	ASTM E84	150-300

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

InsulFoam® VIII

Description

InsulFoam VIII is a premium insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS). InsulFoam VIII meets or exceeds the requirements of ASTM C578, Type VIII, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam VIII has a nominal density of 1.25 lb/ft^3. In addition, InsulFoam VIII offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

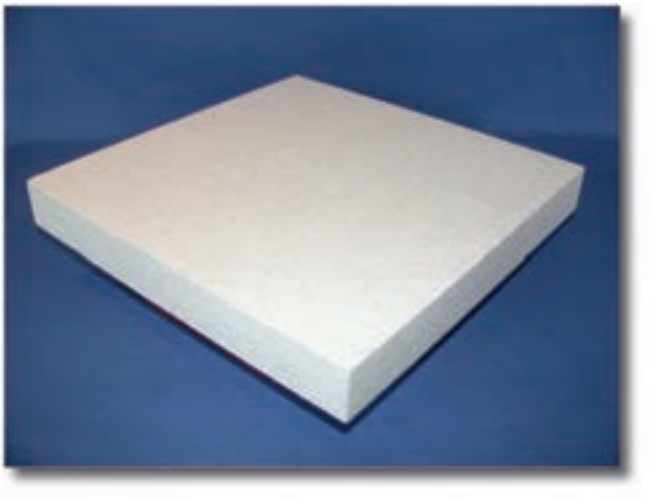
InsulFoam VIII is a premium EPS product and is used in numerous building construction applications.

Roofing: InsulFoam VIII is well-suited for single ply roof applications that employ mechanically fastened or ballasted TPO, PVC, EPDM and CSPE, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards or slip sheets. Please consult local building codes and membrane manufacturers for system requirements.

Other Construction Applications: InsulFoam VIII is used in assorted building applications, including pre-stressed and pre-cast structural concrete panels, metal roof flute-fill, siding backer board, building sheathing, roads and bridge fill, below-slab and perimeter insulation, and numerous other geofoam applications.

Advantages

- *Environmentally Friendly.* It contains no formaldehyde or ozone-depleting CFCs or HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* InsulFoam VIII does not readily absorb moisture from the environment.
- *Code Approvals.* InsulFoam VIII is recognized by the International Code Council Evaluation Service (ICC-ES), and has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.



Sizes

InsulFoam VIII is typically available in 4' x 4' and 4' x 8' sizes with thickness from 1/4" to 40", and is readily available in custom lengths and widths with little to no impact on lead time. It is also available in tapered panels.

Typical Tested Physical Properties*

Property	Test Method	Value
Density (nom. pcf)	ASTM C303	1.25
C-Value (Conductance) - per inch BTU/(hr•ft²•°F) @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	0.220 0.235 0.255
R-Value (Resistance) - per inch (hr•ft²•°F)/BTU @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	4.55 4.25 3.92
Compressive Strength (psi, 10% deformation)	ASTM D1621	13-18
Flexural Strength (min. psi)	ASTM C203	30
Dimensional Stability (maximum %)	ASTM D2126	2.0
Water Vapor Permeance (max. perm., 1 inch)	ASTM E96	3.5
Water Absorption (max. % vol.)	ASTM C272	3.0
Capillarity	–	none
Flame Spread	ASTM E84	< 20
Smoke Developed	ASTM E84	150-300

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

Description

InsulFoam II is a high-performance insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS). InsulFoam II meets or exceeds the requirements of ASTM C578, Type II, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam II has a nominal density of 1.5 lb/ft^3. In addition, InsulFoam II offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

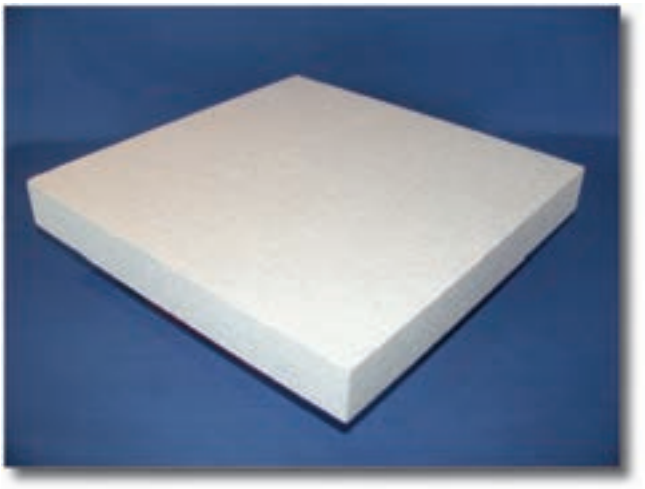
InsulFoam II is a high-performance EPS product and is used in numerous building construction applications.

Roofing: InsulFoam II is well-suited for single ply roof applications that employ mechanically fastened or ballasted TPO, PVC, EPDM and CSPE, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards or slip sheets. Please consult local building codes and membrane manufacturers for system requirements.

Other Construction Applications: InsulFoam II is used in assorted building applications, including pre-stressed and pre-cast structural concrete panels, metal roof flute-fill, siding backer board, building sheathing, roads and bridge fill, below-slab and perimeter insulation, and numerous other geofoam applications.

Advantages

- *Environmentally Friendly.* It contains no formaldehyde or ozone-depleting HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* InsulFoam II does not readily absorb moisture from the environment.
- *Code Approvals.* InsulFoam II is recognized by the International Code Council Evaluation Service (ICC-ES), and has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.



Sizes

InsulFoam II is typically available in 4' x 4' and 4' x 8' sizes with thickness from 1/4" to 40", and is readily available in custom lengths and widths with little to no impact on lead time. It is also available in tapered panels.

Typical Tested Physical Properties*

Property	Test Method	Value
Density (nom. pcf)	ASTM C303	1.50
C-Value (Conductance) - per inch BTU/(hr•ft²•°F) @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	0.210 0.220 0.240
R-Value (Resistance) - per inch (hr•ft²•°F)/BTU @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	4.76 4.55 4.17
Compressive Strength (psi, 10% deformation)	ASTM D1621	15-21
Flexural Strength (min. psi)	ASTM C203	35
Dimensional Stability (maximum %)	ASTM D2126	2.0
Water Vapor Permeance (max. perm., 1 inch)	ASTM E96	3.5
Water Absorption (max. % vol.)	ASTM C272	3.0
Capillarity	–	none
Flame Spread	ASTM E84	< 20
Smoke Developed	ASTM E84	150-300

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

InsulFoam® IX

Description

InsulFoam IX is a high-performance insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS). InsulFoam IX meets or exceeds the requirements of ASTM C578, Type IX, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam IX has a nominal density of 2.0 lb/ft^3. In addition, InsulFoam IX offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

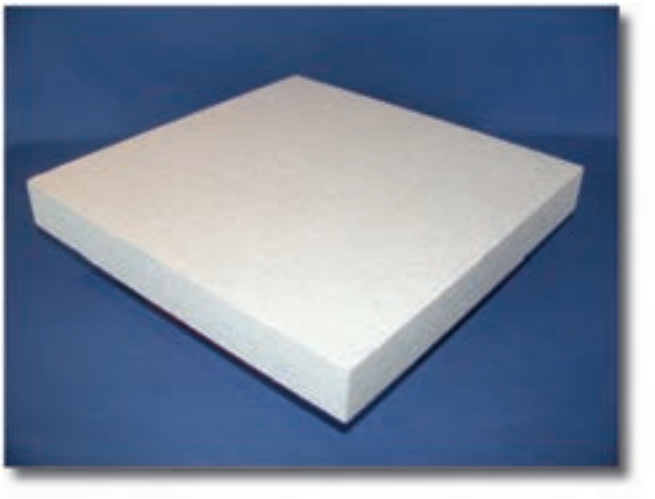
InsulFoam IX is a high-performance EPS product and is used in numerous building construction applications.

Roofing: InsulFoam IX is well suited for single ply roof applications that employ ballasted, mechanically fastened TPO, PVC, EPDM and CSPE with a slip sheet, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards. Please consult local building codes and membrane manufacturers for system requirements.

Other Construction Applications: InsulFoam IX is used in assorted building applications, including pre-stressed and pre-cast structural concrete panels, metal roof flute-fill, siding backer board, building sheathing, roads and bridge fill, below-slab and perimeter insulation, and numerous other OEM applications.

Advantages

- *Environmentally Friendly.* It contains no formaldehyde or ozone-depleting CFCs or HCFCs, may contain recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* InsulFoam IX does not readily absorb moisture from the environment.
- *Code Approvals.* InsulFoam IX is recognized by the International Code Council Evaluation Service (ICC-ES) and has numerous code approvals. Please contact your local Insulfoam representative for details.



Sizes

InsulFoam IX is typically available in 4' x 4' and 4' x 8' sizes with thickness from 1/4" to 40", and is readily available in custom lengths and widths with little to no impact on lead time. It is also available in tapered panels.

Typical Tested Physical Properties*

Property	Test Method	Value
Density (nom. pcf)	ASTM C303	2.00
C-Value (Conductance) - per inch BTU/(hr•ft²•°F) @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	0.200 0.210 0.230
R-Value (Resistance) - per inch (hr•ft²•°F)/BTU @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	5.00 4.76 4.35
Compressive Strength (psi, 10% deformation)	ASTM D1621	25-33
Flexural Strength (min. psi)	ASTM C203	50
Dimensional Stability (maximum %)	ASTM D2126	2.0
Water Vapor Permeance (max. perm., 1 inch)	ASTM E96	2.0
Water Absorption (max. % vol.)	ASTM C272	2.0
Capillarity	–	none
Flame Spread	ASTM E84	< 20
Smoke Developed	ASTM E84	150-300

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

Tapered InsulFoam®

Description

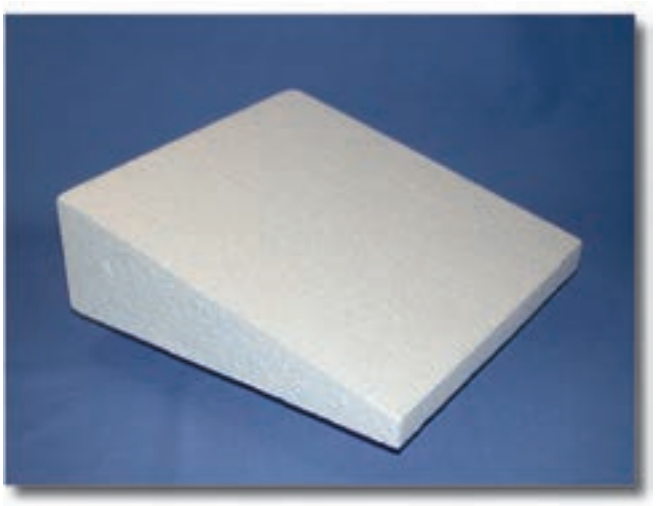
Tapered InsulFoam is a high-performance insulation consisting of a superior closed-cell, lightweight expanded polystyrene (EPS). Tapered InsulFoam is cut from the same high-quality stock as our flat InsulFoam products, and meets or exceeds the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. Tapered InsulFoam offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

Tapered InsulFoam is well-suited for single ply roof applications that employ ballasted, mechanically fastened TPO, PVC, EPDM and CSPE with a slip sheet, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards. Consult local building codes and membrane manufacturers for system requirements.

Advantages

- *Labor Savings.* There are no complicated filler panel systems. Tapered InsulFoam can be installed in a single layer for thicknesses up to 40", and is significantly more cost-effective than extruded polystyrene, perlite and isocyanurate tapered systems.
- *Promotes Positive Drainage.* Tapered InsulFoam is the ideal insulation for both new construction and re-roofing projects in which positive slope is desired or ponded water is a concern.
- *Environmentally Friendly.* It contains no formaldehyde or ozone-depleting HCFCs, may contain recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an InsulFoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* Tapered InsulFoam does not readily absorb moisture from the environment.
- *Code Approvals.* Tapered InsulFoam is recognized by the International Code Council Evaluation Service (ICC-ES), and has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for approval information.



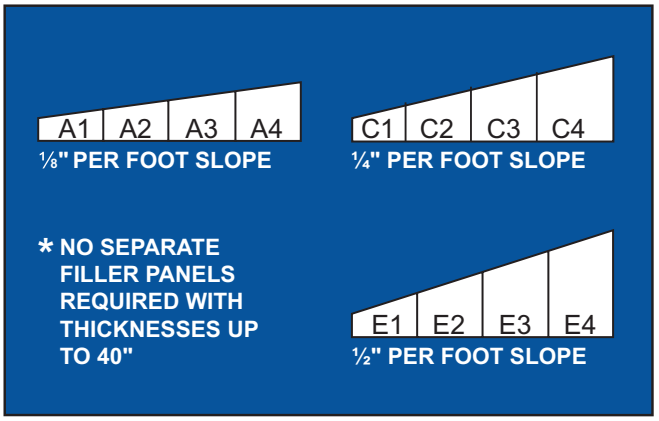
Sizes

Tapered InsulFoam is available in 4' x 4' and 4' x 8' panels with a starting thickness from 0 (1/8" actual) to a maximum end thickness of 40" in a single layer. There are no limitations to available slope per foot.

Typical Tested Physical Properties

For typical tested physical properties, please refer to the corresponding flat InsulFoam Data Sheet.

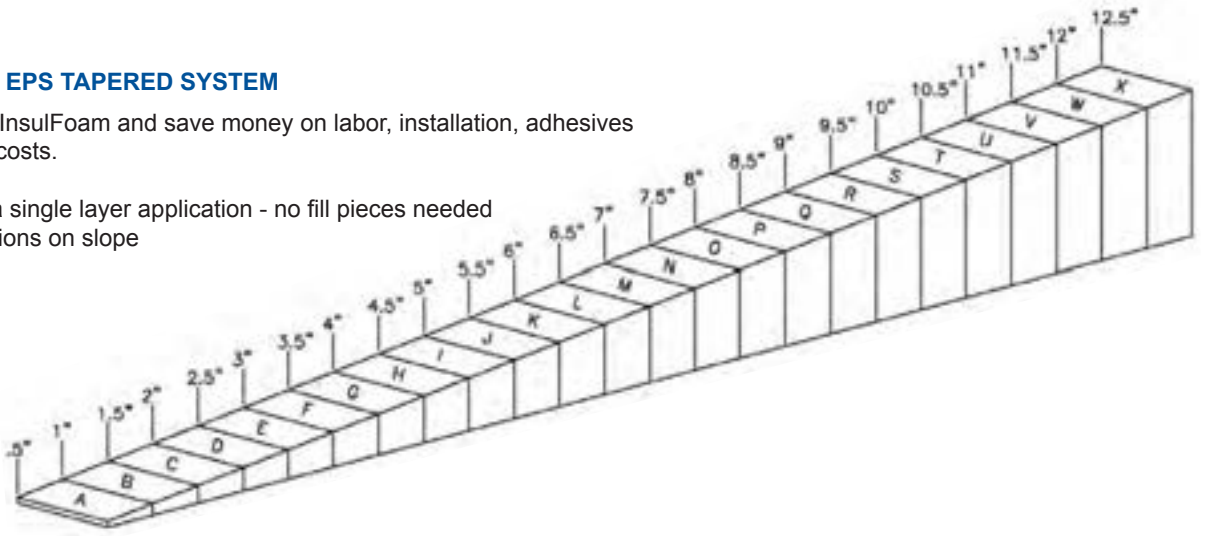
Profiles



INSULFOAM EPS TAPERED SYSTEM

Use Tapered InsulFoam and save money on labor, installation, adhesives and material costs.

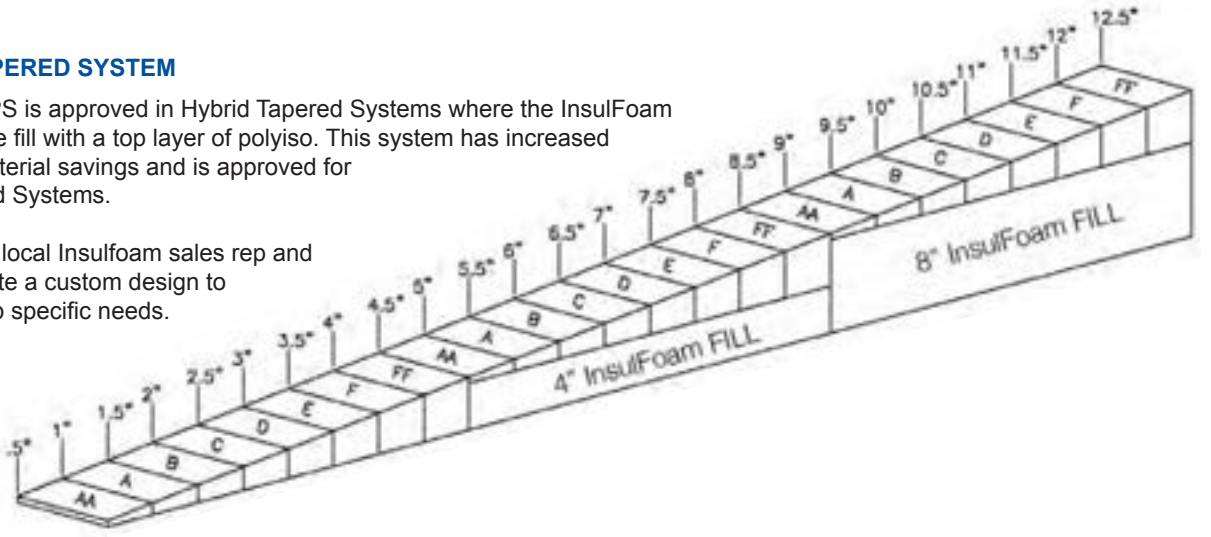
- 0-40” in a single layer application - no fill pieces needed
- no limitations on slope



HYBRID TAPERED SYSTEM

Insulfoam EPS is approved in Hybrid Tapered Systems where the InsulFoam is used as the fill with a top layer of polyiso. This system has increased labor and material savings and is approved for Fully Adhered Systems.

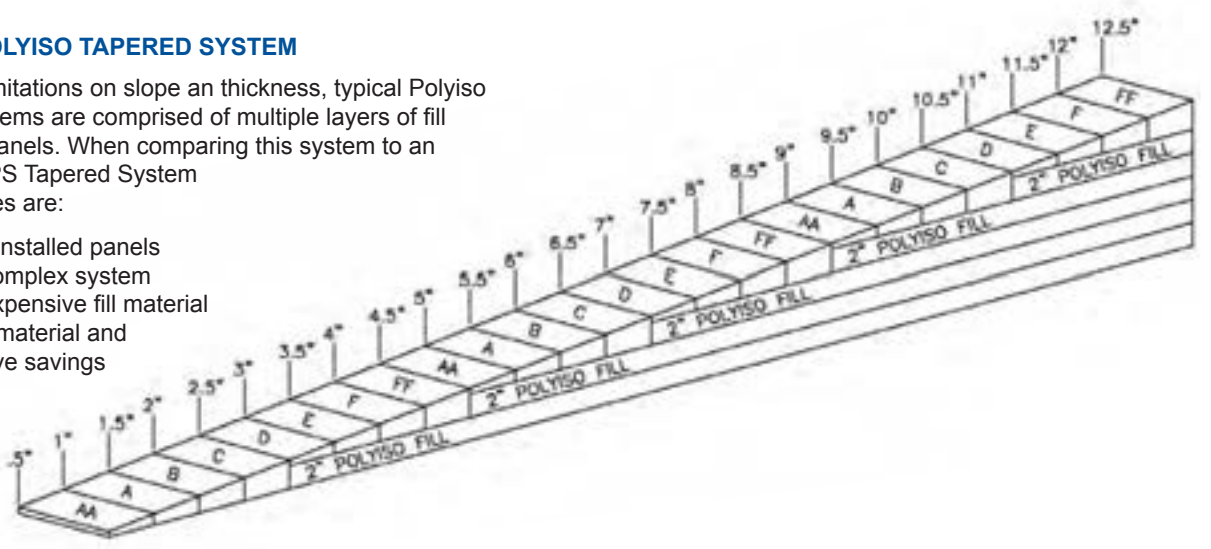
Contact your local Insulfoam sales rep and they will create a custom design to meet your job specific needs.



TYPICAL POLYISO TAPERED SYSTEM

Due to the limitations on slope an thickness, typical Polyiso Tapered Systems are comprised of multiple layers of fill and sloped panels. When comparing this system to an Insulfoam EPS Tapered System the differences are:

- Fewer installed panels
- Less complex system
- Less expensive fill material
- Labor, material and adhesive savings



InsulFoam® SP

Description

InsulFoam SP is an advanced roof insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS) with a durable and stable, factory-laminated fiber glass facer. InsulFoam SP has a nominal density of 1.25 lb/ft^3 (pcf), and meets or exceeds the requirements of ASTM C578, Type VIII, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. In addition, InsulFoam SP offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

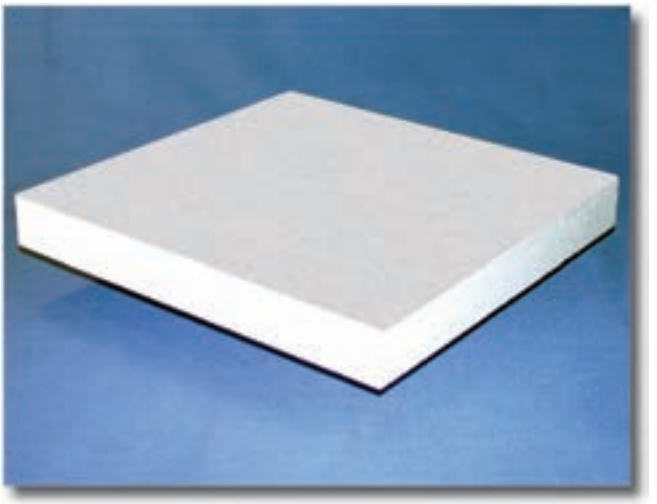
InsulFoam SP is specifically designed for low-sloped roof applications that employ mechanically fastened or ballasted TPO, PVC, EPDM and CSPE, as well as low-sloped built-up, modified bitumen and fully adhered single ply roofs that incorporate cover boards or slip sheets. Please consult local building codes and membrane manufacturers for system requirements.

Advantages

- *Labor Savings*. With a factory-laminated facer, InsulFoam SP saves labor time and reduces overall project costs, when incorporated into a roofing system that would otherwise require a slip sheet.
- *Code Approvals:* InsulFoam SP is recognized in the International Code Council Evaluation Service (ICC-ES), and has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.
- *Environmentally Friendly:* It contains no formaldehyde or ozone-depleting HCFCs, contains up to 25% recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Water-Resistant.* InsulFoam SP does not readily absorb moisture from the environment.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.

Sizes

InsulFoam SP is available in several standard thicknesses, and is made with Type VIII expanded polystyrene with a nominal density of 1.25 pcf. Non-standard sizes may be ordered; however, they are subject to availability and special pricing, and may have longer lead times than standard InsulFoam SP.



InsulFoam SP standard sizes are as follows:

	Thickness	Width	Length	Pieces/Bundle
Re-cover	1.0"	4'	8'	36
R-19	4.5"	4'	8'	8
R-20	4.75"	4'	8'	8
R-25	5.9"	4'	8'	5
R-30	7.0"	4'	8'	5

Typical Tested Physical Properties*

Property	Test Method	Value
Density (nom. pcf)	ASTM C303	1.25
C-Value (Conductance) - per inch BTU/(hr•ft²•°F) @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	0.220 0.235 0.255
R-Value (Resistance) - per inch (hr•ft²•°F)/BTU @ 25 °F @ 40 °F @ 75 °F	ASTM C518 or ASTM C177	4.55 4.25 3.92
Compressive Strength (psi, 10% deformation)	ASTM D1621	13-18
Flexural Strength (min. psi)	ASTM C203	30
Dimensional Stability (maximum %)	ASTM D2126	2.0
Water Vapor Permeance (max. perm., 1 inch)	ASTM E96	3.5
Water Absorption (max. % vol.)	ASTM C272	3.0
Capillarity	–	none
Flame Spread	ASTM E84	< 20
Smoke Developed	ASTM E84	150-300

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

INSULFOAM®
A CARLISLE COMPANY

R-Tech®

Recover Roof Insulation

Description

R-Tech Recover Roof Insulation is a high-performance rigid insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS) with advanced polymeric laminate facers. R-Tech comes with a factory-adhered white facer and a metallic-reflective facer. The foam core of R-Tech is the same high-quality as our InsulFoam® brand insulations and meets or exceeds the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.* In addition, R-Tech has excellent dimensional stability, compressive strength and water-resistant properties. R-Tech is an ENERGY STAR® qualified insulation and contributes towards LEED points.

Uses

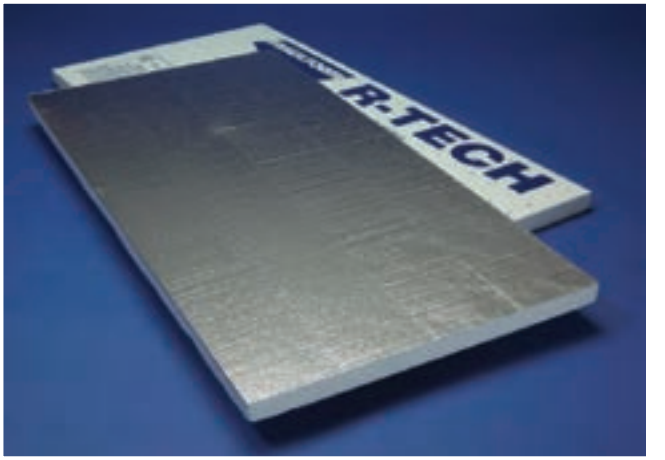
Ideal as a separator board over existing roof systems when re-roofing under mechanically attached single-ply roof membranes.

Advantages

- *Cost-Effective:* R-Tech is the most cost-effective 1" separator board available and is typically 25-30% less expensive than 1" Iso.
- *Code Approved:* R-Tech has numerous recover listings with Underwriters Laboratories. The use of 1" R-Tech within mechanically fastened recover applications will maintain the fire rating of the existing roof system. Please refer to UL's Roofing Materials Directory or contact your Insulfoam representative for additional information.
- *Versatile:* The unique polymeric facers allow single-ply membranes, including PVC, to be installed directly over R-Tech without additional slip sheets or divorcement.
- *Water Resistant and Completely Inorganic:* R-Tech does not readily absorb moisture nor does it promote the migration of moisture into the insulation. In addition, R-Tech contains no organic facers or by-products so it is not subject to rotting or deteriorating in the presence of moisture.
- *User Friendly:* Lightweight and easy to field-fabricate.
- *Jobsite Durability:* With a polymeric facer on either side of the R-Tech, it is an extremely flexible and durable insulation

Installation Recommendations

- Consult the membrane manufacturer for specific installation and fastening requirements.



Sizes

R-Tech Recover Roof Insulation is available in nominal thicknesses of 3/8" - 1" in 4'x4' and 4'x8' panels. Custom thicknesses and lengths available upon request.

Typical Physical Properties* of R-Tech Recover Roof Insulation

Property	R-Tech 15 psi	R-Tech 20 psi	Test Method
Compressive Strength (psi@10% deformation)	15 psi	20 psi	ASTM D1621
C-Value (conductance) BTU/hr•ft²•F Per inch @25° F Per inch @40° F Per inch @75° F	 0.220 0.235 0.255	 0.210 0.217 0.238	ASTM C518 or C177
R-Value (Thermal resistance) BTU/hr•ft²•F Per Inch @25° F Per Inch @40° F Per Inch @75° F	 4.54 4.25 3.92	 4.76 4.60 4.20	ASTM C518 or C177
Dimensional Stability (maximum %)	< 2%	< 2%	ASTM D2126
Water Vapor Transmission (perms)	< 1.0	< 1.0	ASTM E96
Absorption (% volume)	<1.0	< 1.0	ASTM C272

* Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam

R-Tech® Fanfold

Roof Underlayment

Description

R-Tech Fanfold Roof Underlayment is a high-performance sheathing consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS) with advanced polymeric laminate facers. The core of R-Tech is the same high-quality as our InsulFoam® brand insulations, and meets or exceeds the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. In addition, R-Tech has excellent dimensional stability, compressive strength and water resistant properties.

Uses

R-Tech Fanfold Roof Underlayment is ideal in recover applications, and is well-suited for single-ply roof applications that employ mechanically fastened or ballasted TPO, PVC, EPDM and CSPE membranes. Consult local building codes and membrane manufacturers for system requirements.

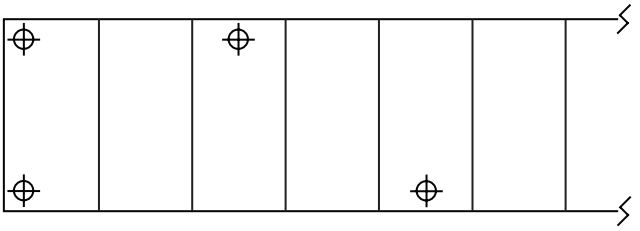
Advantages

- *Labor Savings.* R-Tech Fanfold comes in 200-sq. ft. bundles, and is lightweight enough that the average roof mechanic can carry an R-Tech bundle under each arm (a total of 4 squares). Competing 4' x 8' recover products would require 13 sheets to cover 4 squares.
- *User Friendly.* The R-Tech manufacturing process ensures that it will lay flat during installation, eliminating the thermoplastic roof system seam-welding issues that are experienced with other fanfold products.
- *Versatile.* The unique polymeric laminate facers allow single-ply membranes, including PVC, to be installed directly over R-Tech without additional slip sheets or divorcement.
- *Cost-Effective.* R-Tech is typically less expensive than other recover products, requires fewer fasteners per square foot, and is easier to handle.
- *Environmentally Friendly.* It contains no formaldehyde or HCFCs, may contain recycled material, and has a foam core that is 100% recyclable.
- *Proven Performance.* The same fundamental chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* R-Tech is hydrophobic (does not readily absorb moisture) and does not promote the migration of moisture into the insulation.
- *Code Approvals.* R-Tech has numerous recover listings with Underwriters Laboratories. Please refer to UL's Roofing Materials Directory or contact your Insulfoam representative for additional information.

Sizes

R-Tech Fanfold Roof Underlayment is available in nominal thicknesses of 3/8", 1/2" and 3/4" with the 4' x 50' fanfold (2 squares). Individual panel sizes within the fanfold bundle are 2' x 4'. R-Tech is also available in 4' x 8' units.

Installation Recommendations



- One fastener is to be placed at each corner of the leading and trailing edges, and thereafter at a rate of one fastener every 12 square feet placed on alternating sides of the sheet.
- Fasteners are to be 6" from the board's edge.
- When used with dark colored membranes, R-Tech should be installed with the silver or metallic side facing up.

Note: Some membrane manufacturers may require a higher density of fasteners for their warranted systems. Consult the membrane manufacturer for specific requirements.

Typical Physical Properties of R-Tech*					
Property	**Type I**	**Type VIII**	**Type II**	**Type IX**	**Test Method**
Compressive Strength (psi, 10% deformation)	13	16	20	28	ASTM D1621
Flexural Strength (psi)	33	40	50	70	ASTM C203
Water Vapor Transmission (perms)	< 1.0	< 1.0	< 1.0	< 1.0	ASTM E96
Absorption (% vol.)	< 1.0	< 1.0	< 1.0	< 1.0	ASTM C272
Typical Physical Properties of InsulFoam (foam core)*					
Property	**Type I**	**Type VIII**	**Type II**	**Type IX**	**Test Method**
Nominal Density (pcf)	1.0	1.25	1.5	2.0	ASTM C303
C-Value (Conductance) BTU/(hr•ft²•°F) @ 25° F (per inch) @ 40° F @ 75° F	 .23 .24 .26	 .22 .235 .255	 .21 .22 .24	 .20 .21 .23	ASTM C518 or ASTM C177
R-Value (Thermal Resistance) (hr•ft²•°F)/BTU @ 25° F (per inch) @ 40° F @ 75° F	 4.35 4.17 3.85	 4.54 4.25 3.92	 4.76 4.55 4.17	 5.00 4.76 4.35	ASTM C518 or ASTM C177
Compressive Strength (psi, 10% deformation)	10 - 14	13 - 18	15 - 21	25 - 33	ASTM D1621
Flexural Strength (psi)	25 - 30	32 - 38	40 - 50	55 - 75	ASTM C203
Dimensional Stability (maximum %)	< 2%	< 2%	< 2%	< 2%	ASTM D2126
Water Vapor Transmission (perms)	2.0 - 5.0	1.5 - 3.5	1.0 - 3.5	0.6 - 2.0	ASTM E96
Absorption (% vol.)	< 4.0	< 3.0	< 3.0	< 2.0	ASTM C272
Capillarity	none	none	none	none	–
Flame Spread	< 20	< 20	< 20	< 20	UL 723
Smoke Developed	150 - 300	150 - 300	150 - 300	150 - 300	UL 723

***Properties are based on data provided by resin manufacturers, independent test agencies and Insulfoam.**

InsulFoam® HD Composite

Description

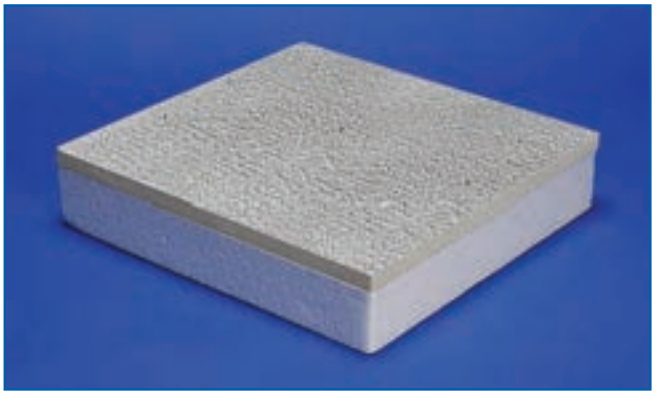
InsulFoam HD Composite is a premium composite insulation consisting of a closed-cell, lightweight and resilient expanded polystyrene (EPS) bonded to high-density polyisocyanurate cover board. The InsulFoam HD Composite EPS foam core is cut from the same high quality stock as our InsulFoam brand roofing insulation and upon request will meet or exceed the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.* The polyisocyanurate cover board is manufactured at ½" thickness and 100 psi compressive strength. The InsulFoam is available in compressive strengths from 10 - 60 psi and densities from 1 - 3 pcf. InsulFoam HD Composite is an excellent choice for new or retrofit applications where high-thermal efficiency and maximum durability are desired.

Uses

InsulFoam HD Composite is acceptable for single ply roof applications that employ mechanically fastened, ballasted or adhered EPDM, TPO, PVC or CSPE membranes, as well as certain low-sloped built-up and modified bitumen membrane systems. InsulFoam HD Composite is not approved for hot mopping or torching of BUR or Modified Bitumen systems. Some peel and stick systems are approved. Contact your local Insulfoam representative for approval. InsulFoam HD Composite can also be used as an underlayment for metal roofing systems. InsulFoam HD Composite is not a structural panel, and is suitable only for installation over fully supported structural decks. Consult the roof manufacturer for additional guidelines.

Advantages

- *System-Enhancing.* The use of InsulFoam HD Composite in low-slope applications may make a roof system eligible for an enhanced warranty from the membrane manufacturer. InsulFoam HD Composite provides additional resistance to misuse, abuse and adverse weather conditions, such as high winds and hail, that is not available with traditional foam insulations. Severe Hail Resistance.
- *Environmentally Friendly.* The InsulFoam HD Composite core contains no formaldehyde or ozone-depleting HCFCs and contains recycled material. The InsulFoam is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.



- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* The InsulFoam HD Composite core does not readily absorb moisture from the environment.

Sizes

InsulFoam HD Composite is available in 4' x 8' sizes with overall thickness from 1.5" to 6", and is available in custom lengths and widths with little to no impact on lead time.

R-Values

TYPICAL THICKNESSES AND THERMAL VALUES FOR INSULFOAM HD COMPOSITE

Nominal Thicknesses (including 1/2" HD ISO)	1.5"	2.0"	3.0"	4.0"	5.0"	6.0"
R-Value*						
@ 25 °F	6.85	9.02	13.38	17.72	22.08	26.42
@ 40 °F	6.67	8.76	12.93	17.10	21.27	25.44
@ 75° F	6.37	8.30	12.13	15.98	19.83	23.68

* Value based on InsulFoam I. Higher R-Values available using InsulFoam VIII, II or IX.

Installation Recommendations

- Under mechanically attached membranes the InsulFoam HD Composite should be installed using a minimum of 5 fasteners, with insulation plates, per 4' x 8' board prior to placement and fastening of roof membrane. Adhered membrane installation requires attachment to the deck with EPS compatible roof insulation adhesives or fastened with a minimum of 1 fastener every two square feet. Recommended fastening patterns are available in the Insulfoam Roofing Manual.

InsulFoam® HB

Description

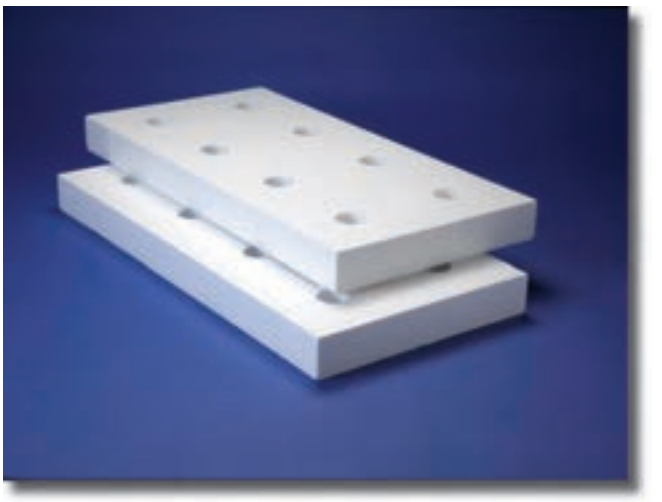
InsulFoam HB (Holey Board) is a high-performance insulation consisting of a superior closed-cell, lightweight expanded polystyrene (EPS) with factory-applied holes. InsulFoam HB is cut from the same high quality stock as our flat InsulFoam products and, when requested, will meet or exceed the requirements of ASTM C578, Type I, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam HB is typically provided with 6 or 8 holes per board. InsulFoam HB offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

InsulFoam HB is specifically manufactured for use in lightweight insulating concrete systems that consist of cellular concrete, vermiculite or perlite. InsulFoam HB is fully encapsulated in the insulating concrete, and usually serves as the primary insulation in a roof system. InsulFoam HB can also be installed in a stair-step fashion to aid in creating a sloped or tapered system. Consult local building codes and lightweight insulating concrete deck manufacturers for system requirements.

Advantages

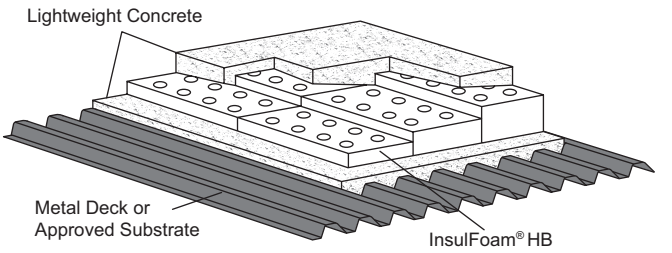
- *Versatile.* InsulFoam HB can be manufactured in a range of sizes, thicknesses and profiles to meet job-specific needs.
- *Reduces Weight.* The inclusion of InsulFoam HB within lightweight insulating concrete applications reduces the dead weight of a structure.
- *Environmentally Friendly.* InsulFoam HB contains no formaldehyde or ozone-depleting CFCs or HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* InsulFoam HB does not readily absorb moisture from the environment.
- *Code Approvals.* InsulFoam HB has numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.



Sizes

InsulFoam HB is typically provided in 2' x 4' boards with thickness from 3/4" to 20", and is readily available in custom lengths and widths with little to no impact on lead time. It is also available in tapered panels.

Typical InsulFoam HB Installation



Notes:

- This diagram is not to scale.
- The deck profile and type may vary by market and project.
- The number of holes per InsulFoam HB panel may vary by market and project.

Description

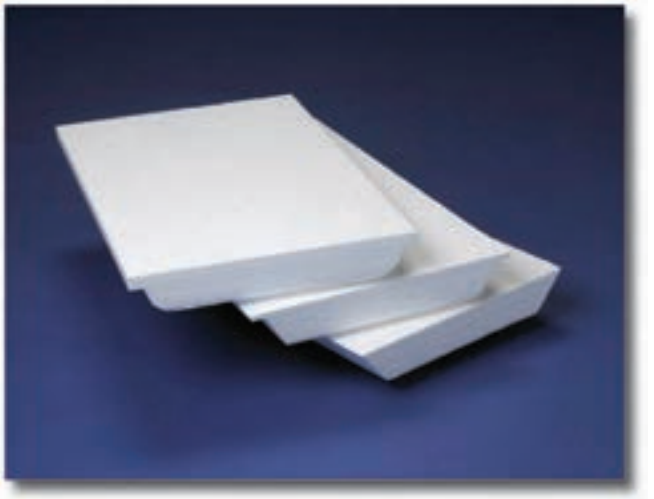
InsulFoam FL (Flute-Fill) is a custom-made, high-performance insulation consisting of a superior closed-cell, lightweight expanded polystyrene (EPS). InsulFoam FL is cut from the same high quality stock as our flat InsulFoam products and, upon request, will be manufactured to meet or exceed the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. InsulFoam FL offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant properties.

Uses

InsulFoam FL is specifically manufactured for use over standing seam metal roof systems that are to be re-covered with new roof systems. InsulFoam FL can be taper-cut or square-cut to fit in the bottom of the metal roof system's flutes. InsulFoam FL can also be profile-cut to match the shape of the existing metal roof. Consult local building codes and the new roof system manufacturer for system requirements.

Advantages

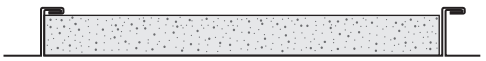
- *Versatile*. InsulFoam FL can be manufactured in a range of sizes, densities, thicknesses and profiles to meet any job-specific needs.
- *Cost-Effective*. InsulFoam FL reduces concerns with flute spanability and minimizes the need for additional insulation. Minimizing the use of insulation above the flutes also reduces the possible need to raise curbs and other rooftop units.
- *Environmentally Friendly.* InsulFoam FL contains no formaldehyde or ozone-depleting CFCs or HCFCs, contains recycled material, and is 100% recyclable if ever removed and replaced.
- *Stable R-Value*. Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Water-Resistant*. InsulFoam FL does not readily absorb moisture from the environment.
- *Proven Performance*. The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.



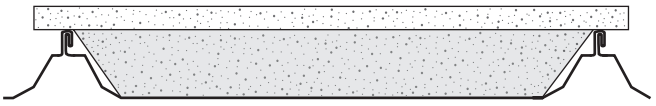
Sizes

InsulFoam FL is custom-manufactured for each specific application, and is readily available in a variety of lengths, widths and shapes to meet virtually any job condition.

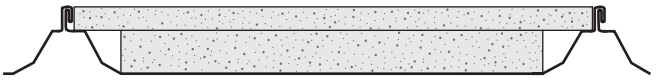
Typical Metal Roof Cross Sections



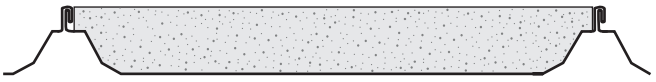
Square-Cut in Vertical Leg



Taper-Cut with InsulFoam SP



Square-Cut



Profile-Cut

Description

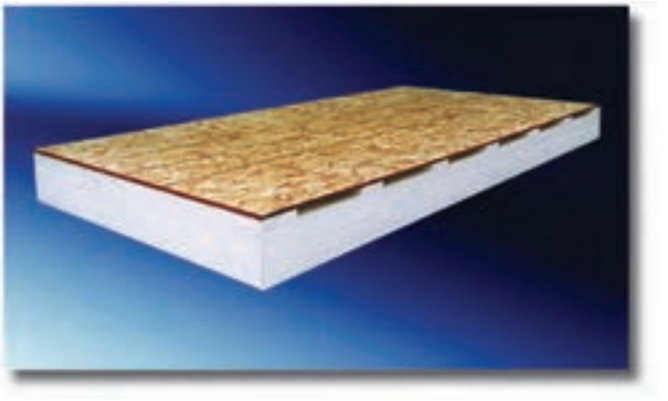
InsulVent is a superior composite insulation consisting of a closed-cell, lightweight and resilient expanded polystyrene (EPS) bonded to an APA/TECO-rated oriented strand board (OSB) or plywood. The InsulVent foam core comes with standard 1/2", 3/4" or 1" precision-cut channels. Depending on the ventilation requirements, the channels can be cut to the requested size increase or reduce air flow. The foam core is cut from the same high-quality stock as our InsulFoam® brand roof insulations and, upon request, will meet or exceed the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. The OSB is available in nominal thicknesses of 7/16" and 5/8". The plywood is available in a nominal thickness of 5/8". InsulVent has excellent dimensional stability, compressive strength and water resistant properties.

Uses

InsulVent is a high performance nailbase insulation and is well-suited for steep-slope installations. InsulVent is an ideal substrate for shingle, metal, tile and slate roof systems. When shingle manufacturers require additional venting of an insulated substrate, the InsulVent channels (running just below the roof substrate, from the eaves to the ridges) allow heat and moisture to escape. Appropriate venting must be provided at ridges and eaves. InsulVent is well-suited for vaulted and cathedral ceilings. **InsulVent is not a structural panel, and is suitable only for installation over fully supported structural decks.** Consult the roof manufacturer for additional guidelines.

Advantages

- *Versatile.* InsulVent is available in a wide variety of thicknesses. The venting channels are also available in varying widths and depths.
- *Environmentally Friendly.* The InsulFoam core contains no formaldehyde or ozone-depleting CFCs or HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value*. Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* The InsulFoam core does not readily absorb moisture from the environment.



- *Code Approvals.* Insulfoam products are recognized by the International Code Council Evaluation Service (ICC-ES), and have numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.

Sizes

InsulVent is available in 4' x 8' sizes with overall thickness from 3.0" to 7", and is readily available in custom lengths and widths with little to no impact on lead time. The precision–cut channels are a standard 1/2", 3/4" or 1" depth, but are also available in other depths.

R-Values

TYPICAL THICKNESSES AND THERMAL VALUES FOR INSULVENT					
Nominal Thicknesses (including 7/16" OSB)		3.0"	4.0"	5.0"	6.0"
Depth of Vented Air Space	**R-Value**				
1/2 inch	@ 75 °F @ 40 °F	8.90 9.60	12.80 13.80	16.60 17.90	20.50 22.10
3/4 inch	@ 75 °F @ 40 °F	8.20 8.80	12.10 13.00	15.90 17.10	19.80 21.30
1 inch	@ 75 °F @ 40 °F	7.40 8.00	11.30 12.20	15.10 16.30	19.00 20.50

* Values are based on the use of a Type I InsulFoam. Greater R-Values will be obtained if higher density material used.

Installation Recommendations

- Install InsulVent with venting channels parallel to roof slope.
- A minimum of 8 fasteners per 4' x 8' panel should be used when attaching InsulVent to either 22-gauge (min.) metal decks or 1" wood decks. A minimum of 12 fasteners per board should be used when attaching to 1/2" wood decks. Recommended fastening patterns are available in the Insulfoam Roofing Manual. Contact the roof manufacturer for additional recommendations.
- InsulVent joints should be staggered while ensuring venting channels remain aligned.

Description

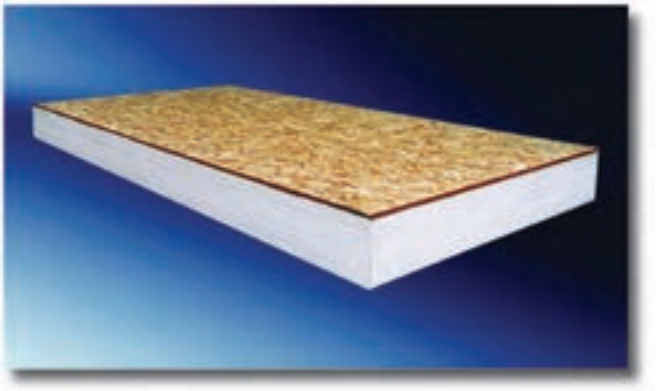
InsulLam™ is a premium composite insulation consisting of a closed-cell, lightweight and resilient expanded polystyrene (EPS) bonded to an APA/TECO-rated oriented strand board (OSB) or plywood. The InsulLam foam core is cut from the same high-quality stock as our InsulFoam® brand roof insulations and, upon request, will meet or exceed the requirements of ASTM C578, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. The OSB is available in nominal thicknesses of 7/16" and 5/8". The plywood is available in a nominal thickness of 5/8". InsulLam has excellent dimensional stability, compressive strength and water resistant properties. InsulLam can also be manufactured with an assortment of other cover boards.

Uses

InsulLam is a high performance nailbase insulation, and is an excellent substrate for a variety of steep-and-low slope roof systems. InsulLam is acceptable for single ply roof applications that employ mechanically fastened, ballasted or adhered EPDM, TPO, PVC or CSPE membranes, as well as low-sloped built-up and modified bitumen membrane systems. InsulLam is also well-suited for vaulted and cathedral ceilings. InsulLam can also be used as an underlayment for shingle, tile, slate and metal roofing systems. **InsulLam is not a structural panel, and is suitable only for installation over fully supported structural decks.** Consult the roof manufacturer for additional guidelines.

Advantages

- *System-Enhancing.* The use of InsulLam in low-slope applications may make a roof system eligible for an enhanced warranty from the membrane manufacturer. InsulLam provides an additional resistance to misuse, abuse and adverse weather conditions, such as high winds and hail, that is not available with traditional foam insulations.
- *Environmentally Friendly.* The InsulFoam core contains no formaldehyde or ozone-depleting CFCs or HCFCs, contains recycled material, and is 100% recyclable if ever removed or replaced.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over its entire service life. There is no thermal drift, so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known.
- *Water-Resistant.* The InsulFoam core does not readily absorb moisture from the environment.



- *Code Approvals.* Insulfoam products are recognized by the International Code Council Evaluation Service (ICC-ES), and have numerous Underwriters Laboratory and Factory Mutual Approvals. Please contact your local Insulfoam representative for details.

Sizes

InsulLam is available in 4' x 8' sizes with overall thickness from 1.5" to 7", and is readily available in custom lengths and widths with little to no impact on lead time.

R-Values

TYPICAL THICKNESSES AND THERMAL VALUES FOR INSULLAM					
Nominal Thicknesses (including 7/16" OSB)		3.00"	4.00"	5.00"	6.00"
R-Value	@ 75 °F	10.50	14.40	18.20	22.10
	@ 40 °F	11.30	15.50	19.60	23.80

* Values are based on the use of a Type I InsulFoam. Greater R-Values will be obtained if higher density material used.

Installation Recommendations

- Install InsulLam insulation with continuous side joints and end joints staggered so they are offset by a minimum of 12" from the end joints in adjacent rows.
- A minimum of 8 fasteners per 4' x 8' panel should be used when attaching InsulLam to either 22-gauge (min.) metal decks or 1" wood decks. A minimum of 12 fasteners per board should be used when attaching to 1/2" wood decks. Recommended fastening patterns are available in the Insulfoam Roofing Manual. Contact the roof manufacturer for additional recommendations.

InsulFoam XIV and XV.

The Proven Choice for High Density, High Performance External Insulation Applications.

Applications

- Plaza Decks
- Inverted Roof Membrane Assemblies (IRMA)
- Garden Roofs

Product Characteristics

InsulFoam XIV	40 psi	2.5 pcf
InsulFoam XV	60 psi	3.0 pcf

- Thicknesses 0 to 40"
- Custom lengths, widths and shapes available
- Water Absorption per ASTM C272 < 2% by volume

Features and Benefits

- Ease of installation: lightweight, no need for heavy equipment, cuts easily with hot wire or saw
- Environmentally friendly: 100% recyclable, no HCFCs or formaldehyde, will not sustain mold or mildew growth, maintenance free
- Long term, stable thermal resistance
- Contributes towards LEED Certification Credits
- Water Resistant: InsulFoam does not readily absorb moisture from the environment
- Ten state-of-the-art manufacturing facilities
- Full service Technical Department

Codes and Approvals

- Extensive code approvals
- Manufactured to meet or exceed *ASTM C 578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

Call today for a quote on your next high performance job!

INSULFOAM®
A CARLISLE COMPANY

ENGINEERED EPS
Versatile - Durable - Sustainable

www.insulfoam.com
800.248.5995

Insulfoam Corporate Headquarters
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Puyallup, WA 98375 · **Fax: 253.383.7100**

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Insulfoam EPS

Versatile - Durable - Sustainable

The Insulfoam Advantage

- Ten strategically placed manufacturing facilities
- Exclusive focus on construction, roofing and geofoam products and their applications
- Leaders in new product development and code approvals
- Unmatched breadth of construction product offering
- Customer service driven

Attributes

- Contributes towards LEED Certification Credits
- 100% recyclable
- Manufactured using post-consumer and post-industrial materials
- Energy Star® approved
- Compliant with ASHRAE standards
- Free of HCFCs, dyes, and formaldehyde
- Insect and mold resistant

Applications

- Roofing – new construction and retrofit
- Interior and Exterior Wall Systems
- Under-Slab
- Below-Grade
- Geofoam - Lightweight void fill
- Exterior Insulation and Finish Systems (EIFS)
- Specialty Applications
- SIPS by Premier Building Systems

Roofing - New and Retrofit

Cavity Wall Application

SIPS by Premier Building Systems

Geofoam - Lightweight Void Fill

The U.S. Green Building Council (USGBC) has developed a nationally accepted system to rate the design, construction and operation of buildings. The USGBC's Leadership in Energy and Environmental Design (LEED) is a standard that recognizes the life-cycle cost of construction and helps to guide and distinguish high-performance commercial and institutional projects. The LEED rating system allows designers and building owners to acquire credits by meeting certain conditions pertaining to the use of sustainable, energy-efficient and environmentally-friendly products and systems. Buildings can become LEED Certified by achieving certain point levels. There are four levels of certification. Using R-Tech® and InsulFoam® products in building designs can assist in obtaining LEED credits in several categories.

Listed below are the categories where Insulfoam products may assist in achieving LEED credits. A brief description of the credit is also included.

MATERIALS & RESOURCES (MR CREDITS)

MR Credit 2.1 & 2.2 – *Construction Waste Management: Divert 50% or 75% From Disposal*

(2 points possible)

Purpose: Recycle and/or salvage at least 50% (1 point) or 75% (2 points) of non-hazardous construction and demolition debris. Insulfoam can receive and reuse uncontaminated polystyrene removed from rehabilitated buildings and the scrap generated on new construction projects.

MR Credit 3.1 & 3.2 – *Materials Reuse: 5% or 10%*

(2 points possible)

Purpose: Use salvaged, refurbished or reused materials so the sum of these materials, based on cost, constitutes at least 5% (1 point) or 10% (2 points) of the total value of materials on the project to reduce demand for virgin material and minimizing generation of waste. Insulfoam Roof Insulation is suitable for and often reused in new roof systems at the end of the original roof system's life.

MR Credit 4.1 & 4.2 – *Recycled Content 10% or 20%*

(2 points possible)

Purpose: Increase demand for building products that incorporate recycled content of at least 10% (1 point) or 20% (2 points), thereby reducing impacts resulting from extraction and processing of virgin materials.

Insulfoam can provide product suitable for use in several different construction applications with up to a 25% pre-consumer recycled content.

MR Credit 5.1 & 5.2 – *Regional Materials*

(2 points possible - 1 point for 10% & 2 points for 20%)

Purpose: Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. From some of its locations, Insulfoam can provide products that include only components extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value.

SUSTAINABLE SITES (SS CREDITS)

SS Credit 7.2 – *Heat Island Effect: Roof*

(1 point possible)

Purpose: Reduce heat islands to minimize impact on microclimate and habitat. The credit requires the use of a reflective roofing material or the use of a roof garden. Although this credit does not relate solely to insulation, Insulfoam insulation can be used in roof systems with reflective membranes and in garden roof assemblies to help reduce the urban heat island effect.

ENERGY & ATMOSPHERE (EA CREDITS)

EA Credit 1 – *Optimize Energy Performance*

(10 points possible)

Purpose: Reduce the negative environmental impact resulting from excessive energy use by demonstrating a measurable improvement in the building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments). This credit encompasses the entire building. An increase in the R-value of the Insulfoam insulations used in the roof, wall and below-grade systems of a project would contribute to this credit.

EA Credit 5 – *Measurement & Verification*

(1 point possible)

Purpose: Provide for the ongoing accountability of building energy consumption over time by developing and implementing a Measurement & Verification Plan. Although this credit does not relate solely to insulation, proper R-value provided by the Insulfoam products will contribute to the overall energy savings and the subsequent accounting of building energy consumption.

To access the *Green Building Rating System for New Construction and Renovations*, visit www.usgbc.org.

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Insulfoam

Material Data Safety Sheet

I. *PRODUCT INFORMATION* *Effective date 6/20/07*

Product :	Insulfoam Molded EPS Products, R-TECH
Synonyms :	Molded Expanded Polystyrene (MEPS)
Product Grades :	Type I, VIII, II, IX, XIV and XV (modified)
Chemical Family :	Polystyrene Thermoplastic
CAS Registry No. :	9003536
CAS Name :	Benzene, Ethenyl, Homopolymer
Formula :	$(C_8 H_8)$ n
TSCA Inventory Status :	Listed

Hazard Rating

0 = Minimal	3 = Serious
1 = Slight	4 = Severe
2 = Moderate	

Health	0
Fire	2
Reactivity	0

Contact:

Insulfoam
19727 57th Avenue East
Puyallup, Washington 98375
(253) 271-3056 FAX (253) 383-7100

II. *INGREDIENTS*

Hazardous Components:	***CAS Registry No..:***	***Approx. Weight Percentage:***
Pentane	109660	<2%
Bromine Flame Retardant	3194-55-6	<1%
Polymeric Film		1-3%
Non-Hazardous Components:	***CAS Registry No.:***	***Approx. Weight Percentage:***
Polystyrene	9003536	>92%

III. *PHYSICAL DATA*

Form :	Rigid, cellular foam blocks, boards and shapes	***Specific Gravity (Water = 1) :***	<1
Color :	White	***Volatile by Volume :***	<1.8% (Pentane & Water)
Odor :	Very slight pentane	***Vapor Pressure :***	N/A
Boiling Point :	N/A	***Vapor Density (Air = 1) :***	N/A
Melting Point :	N/A (Softening begins @ 160º F)	***Evaporation Rate :***	None
		Solubility in Water :	Insoluble
		Density :	0.6 pcf to 3.0 pcf

IV. *FIRE & EXPLOSION DATA*

Flash Pt. and Method Used :	610º F min. (ASTM D1929)
Special Fire-Fighting Instructions :	Use approved self-contained breathing apparatus respirator and personal protective clothing (turn out gear).
Extinguishing Media :	Water fog, carbon dioxide, dry chemical, foam
Autoignition Temperature :	850º F min.
Unusual Fire & Explosion Hazards :	If exposed to fire, high heat will develop and may produce dense, black smoke. Dust generated by fabrication (ie. sanding, sawing, etc.) will increase fire hazard and should be handled accordingly.

V. *REACTIVITY DATA*

Stability (Conditions to Avoid) :	Stable. Avoid fire and high temperatures.
Incompatibility (Materials to Avoid) :	Will dissolve in most organic solvents and some insecticides, aldehydes and amines.
Hazardous Decomposition :	CO, CO_2, H_2O and Hydrogen Bromides
Hazardous Polymerization :	None.

Principal Health Hazards and Signs & Symptoms of Exposure		***First Aid***	
Eye Contact :	Dust or particles may cause mechanical eye irritation and/or injury.	***Eyes :***	Rinse with clean water. Remove foreign particles with clean, lint-free cloth. Obtain medical treatment if pain, blinking, tears or redness persists.
Inhalation :	Dust from mechanical fabrication may cause upper respiratory irritation. Fumes from hot-wire cutting can also cause upper respiratory irritation.	***Inhalation :***	If overcome by exposure, remove to fresh air. Provide oxygen and artificial respiration. Get medical attention.
Skin Contact :	None. May produce slight skin irritation in a few individuals.	***Skin :***	Not expected to present skin hazard. Wash exposed areas with mild soap and water. Consult physician if irritation persists.
Ingestion :	Biological inert. May act as an obstruction if swallowed.	***Ingestion :***	Not expected to present significant ingestion hazard. Consult physician if swallowed.
Carcinogenicity :	None.		
Safety Precautions:	Use positive ventilation. Mechanical fabrication, sanding, etc. requires the use of safety glasses or goggles and dust mask.		

VII. *EMPLOYEE PROTECTION*

Personal Protection Equipment

Respiratory Protection :	Use approved dust mask when sawing or sanding.
Skin Protection :	Wear gloves and/or sleeves if sensitivity is noted.
Eye Protection :	Use approved safety glasses/goggles when sawing or sanding.
General Control Measures :	Use positive ventilation. Wear safety glasses/goggles and dust mask if mechanical fabrication is to take place.

VIII. *SPILL OR LEAK PROCEDURE*

Spill, Leak or Release Procedures :	Normal good housekeeping should be observed. Material can be swept or picked up and placed into a suitable container for disposal.
Reportable Quantity :	None.
Disposal Method :	Recycle, incinerate (WTE) or land-fill per local and state regulations.

IX. *SPECIAL PRECAUTIONS*

Storage and Handling :	Expanded Polystyrene is considered to be combustible, and adequate protection from sources of ignition should be taken.
Transportation Requirements :	Not a D.O.T. Hazardous Material.

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(253) 271-3056 FAX (253) 383-7100

MSDS 085

Emergency Telephone Number CHEMTREC 1-800-424-9300 (This number is available days, nights, weekends & holidays.)

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