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Plasti·Fab™ EPS PRODUCT SOLUTIONS

PlastiSpan™ Insulation

Insulation Systems for
Roofing Applications

Plasti-Fab
EPS PRODUCT SOLUTIONS

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Introduction

Plasti-Fab has provided customers with innovative expanded polystyrene (EPS) product solutions for over thirty years. Recognized as experts in the design and manufacture of EPS products for a wide variety of applications, we provide our customers with professional assistance to select the right EPS product solution for their application.

Plasti-Fab EPS products are inert to a wide range of chemicals and do not contain any CFC's, HCFC's or HFC's. Plasti-Fab PlastiSpan insulation provides constant thermal performance and is used as the insulation component in foundation, floor, wall and roof systems.

PlastiSpan insulation is used as the insulation component in a wide variety of roof assembly types, including built up, single ply, modified bitumen and standing seam roofing systems. Plasti-Fab has developed a proprietary computer program to assist customers in designing PlastiSpan sloped roof insulation systems for new and re-roofing applications that provide positive slope to drain for all types of roof layouts.

PlastiSpan insulation used in roof systems meets National and Provincial Building Code requirements for use as a component in building construction. Plasti-Fab maintains evaluation listings with the Canadian Construction Materials Centre (CCMC) that demonstrate compliance with Code requirements.

PlastiSpan insulation may be used as the insulation component in roof assemblies for either non-combustible or combustible construction. PlastiSpan insulation is listed as the insulation component in a number of Underwriters' Laboratories of Canada and Factory Mutual roof assemblies as described in this brochure.

Our national presence enables us to provide customers with local market knowledge, expertise and superior customer service. Our product experts can provide design assistance to ensure the most effective product solution is used for your application.

Our manufacturing facilities adhere to rigid quality control and testing procedures to assure conformance with customer specifications. Plasti-Fab insulation is listed in Canada and the US with accredited third party certification bodies to demonstrate compliance with applicable product standards.

The Plasti-Fab Design Manual is available to assist customers in determining how to make the best use of Plasti-Fab EPS product solutions. For additional information, contact your nearest Plasti-Fab sales office toll-free at 1-888-446-5377 or visit our website at www.plastifab.com.

Sloped Insulation

Plasti-Fab PlastiSpan sloped roof insulation is used to provide the positive slope to drain required for new and re-roofing applications. PlastiSpan sloped insulation board can be used for new and maintenance roofing projects of all sizes and is suitable for use with all types of roofing systems. Because PlastiSpan sloped insulation board is an expanded polystyrene (EPS) insulation, design thermal resistance values provided are not subject to thermal drift.

Calculation of Thermal Resistance for Sloped Insulation

The average thermal resistance for a sloped insulation layout is calculated as the value for the average insulation thickness over the entire roof. The average thermal resistance value provides a reasonable estimate of the thermal performance of the insulation component in the roof assembly.

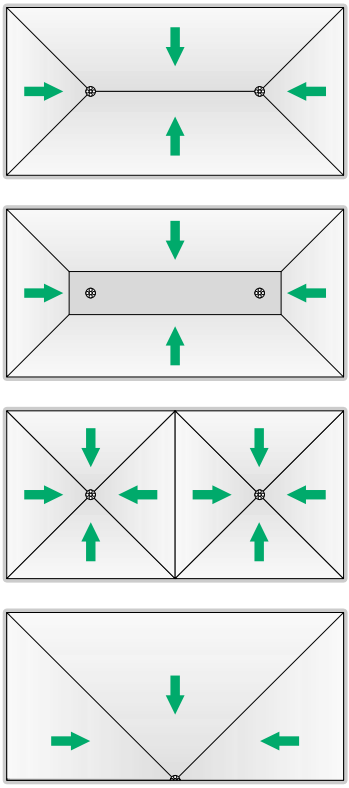
Slope to Drain

PlastiSpan sloped roof insulation is available with slopes of 1/2%, 1%, 1-1/2%, 2%, 3%, 4%, and 8% per metre (per foot). Normally, ridges and valleys necessary to provide correct drainage are supplied at 45° increments to the horizontal; however, custom angles can also be provided.

Insulation boards are laid in a predetermined pattern using 1220 mm x 1220 mm (4 ft x 4 ft) boards to provide slope to interior drains or scuppers at the edges of the building. Even the prefabricated corners for the change of slope are provided using 1220 mm x 1220 mm (4 ft x 4 ft) boards in order to maintain uniformity in the layout.

Computer Designed Sloped Insulation Layouts

As a service to its customers, Plasti-Fab will provide computer designed sloped insulation layouts. The Plasti-Fab computerized design process allows alternate insulation slope and drain layouts to be quickly evaluated, providing customers with the most efficient and cost effective sloped insulation layout.



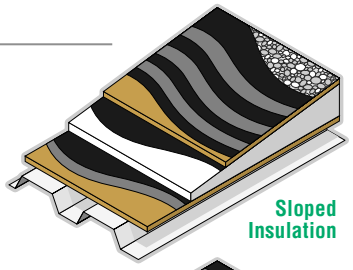
Typical Drainage Patterns

Built Up Roofing

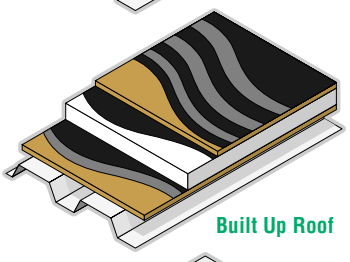
PlastiSpan sloped or flat insulation board is used extensively as the insulation component within built up roof assemblies. Built up roof assemblies have been used commonly for many years, and are suitable for new or maintenance requirements. Built up roof assemblies incorporating PlastiSpan insulation board have been tested for compliance with requirements for fire rated roof assemblies (see section on Fire Rated Assemblies).

A protection board, such as 12.7 mm (1/2") fiberboard, must be placed over the PlastiSpan insulation board prior to applying the built up roof membrane. The protection board protects the top surface of the PlastiSpan insulation from contact with the hot asphalt.

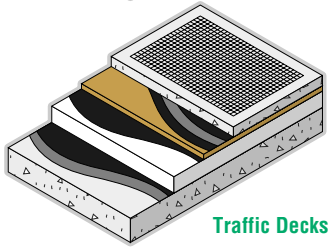
Traffic decks can be installed in the normal manner over built up roof assemblies using PlastiSpan insulation, however, as with any type of insulated roof assembly, care must be taken to ensure adequate drainage is provided at the membrane surface. As well, care must be taken at the edge of the roof, parapets and wall junctions to ensure that the membrane is not put under strain and can be kept watertight.



Sloped Insulation



Built Up Roof



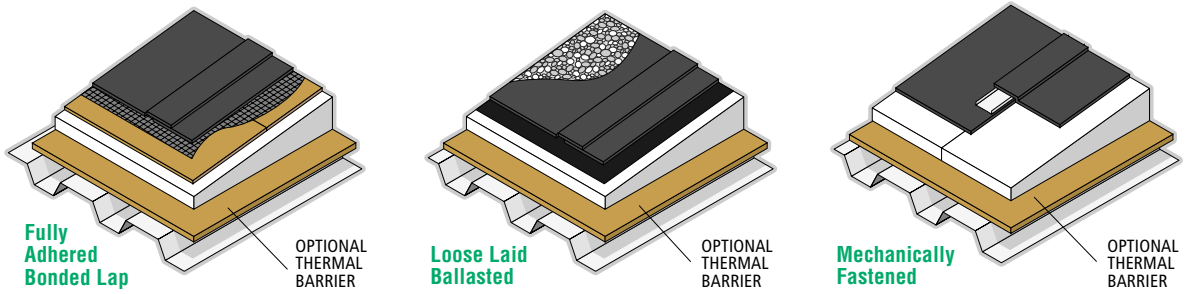
Traffic Decks

Single Ply Roofing

PlastiSpan flat or sloped insulation board can be used in combination with all types of single ply membranes. Single ply roofing systems offer the advantages of rapid installation and lightweight construction.

Various single ply roof assemblies incorporating PlastiSpan insulation board are listed with ULC to demonstrate compliance with requirements for fire rated roof assemblies (see section on Fire Rated Assemblies). These roofing systems have many years of proven performance in both new and maintenance roof construction.

Single ply roofs may be installed loose laid and ballasted, fully or partially adhered to the substrate, or mechanically fastened. Installation can be over a single layer of flat or sloped PlastiSpan insulation or multiple layers of insulation to provide any thermal resistance required. The attachment of the insulation will be influenced by the requirement for a base for the single ply membrane to be installed.



Modified Bitumen Roofing

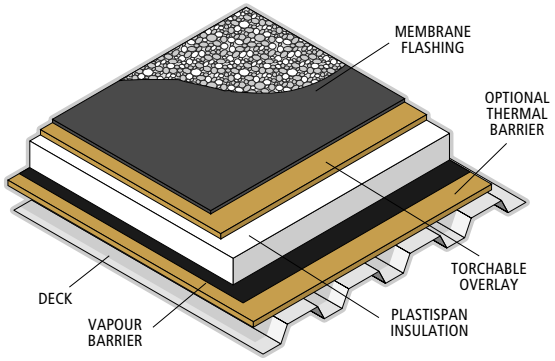
PlastiSpan flat or sloped insulation board can be used in modified bitumen roofing systems engineered to provide optimum performance in Canada's harsh climate. This type of system is suitable for either new or maintenance roofing applications.

Engineered modified bitumen roofing membranes originated in Europe in the mid-1960's and have been used successfully in Canada and the United States since approximately 1975. The popularity of modified bitumen roofing systems is increasing as more building designers and specifiers begin to specify these types of systems.

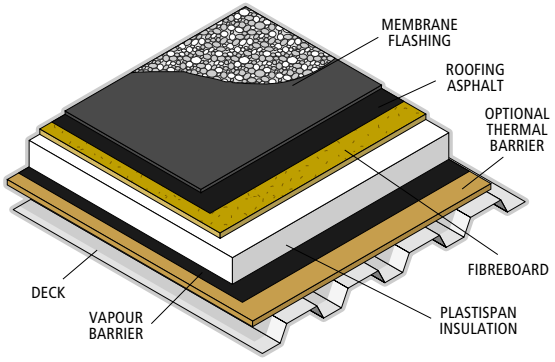
Modified bitumen membranes are most commonly attached in the following manner:

1. Mopped with hot asphalt,
2. Torched on.

When using these methods, a protection board over the top surface of the insulation board must be included in order to avoid damage. Various modified bitumen roof assemblies incorporating PlastiSpan insulation board have been tested for compliance with requirements for fire rated roof assemblies (see section on Fire Rated Assemblies).



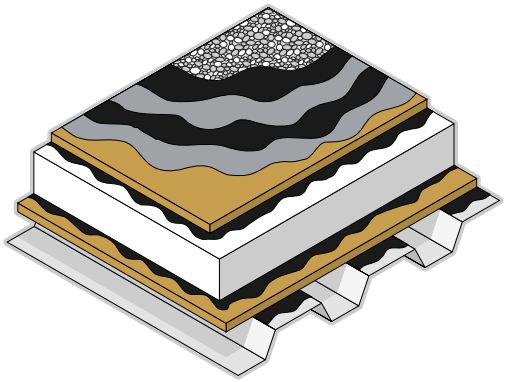
Fully Adhered Two Ply System (Torch/Torch)



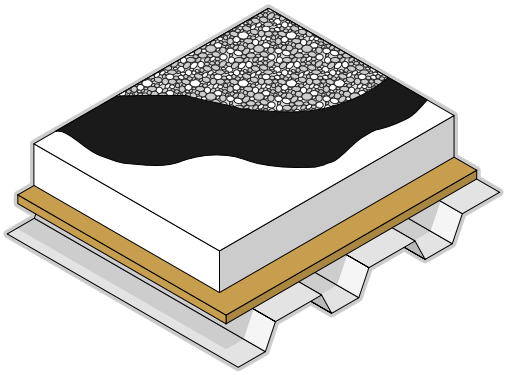
Fully Adhered Two Ply System (Mop/Torch)

Fire Rated Assemblies

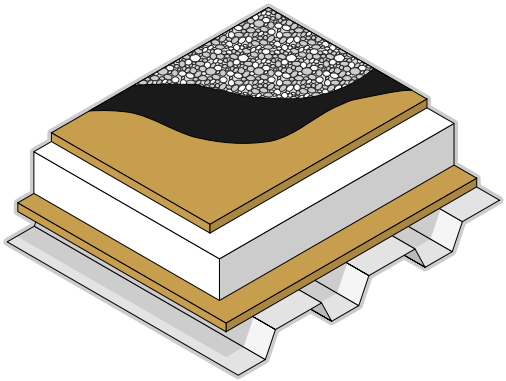
PlastiSpan insulation board may be used as the insulation component in roof assemblies for either non-combustible or combustible construction. Part 3 of the National Building Code of Canada (NBC) defines requirements for the use of foamed plastic insulation, such as PlastiSpan insulation, in both types of construction.



ULC Roof Construction C7



ULC Roof Construction C12A



ULC Roof Construction C12B

Roof Deck Assemblies
Fire Exposure Under Roof Deck

Requirements for metal roof deck assemblies supporting combustible insulation materials that form part of a building required to be of non-combustible construction are outlined in NBC Article 3.1.14.2. Sentence 3.1.14.2.(1) provides requirements applicable to metal roof assemblies meeting the conditions of acceptance of CAN/ULC-S126-M, "Standard Method of Test for Fire Spread Under Roof-Deck Assemblies." PlastiSpan insulation board is included as a listed insulation component in roof deck constructions C7, C12A, C12B and C38 tested to CAN/ULC-S126-M as described in the Underwriters' Laboratories of Canada (ULC) List of Materials and Equipment.

Use of PlastiSpan insulation is also permitted in metal roof deck assemblies under NBC Sentence 3.1.14.2.(2) which waives the requirements of Sentence 3.1.14.2. (1) if either of the two conditions below are satisfied:

1. A thermal barrier consisting of not less than 12.7 mm (1/2") thick gypsum board is located beneath the insulation board.
2. The building is sprinklered and monitored throughout.

Fire-Rated Roof Deck Assemblies

ULC tests roof assemblies based on the type of fire exposure. Components used in roof assemblies are assessed using CAN/ULC-S101-M for fire exposure originating within a building and using CAN/ULC-S107-M for external fire exposure with specific tested roof assemblies listed in the ULC List of Materials and Equipment.

ULC test a full-scale roof system for fire originating inside a building. The severity of exposure is classed in terms of 1 hour, 1-1/2 hour, or 2 hour Fire Resistance rating. Should a 2 hour fire rated roof assembly be required it would be achieved using the appropriate thickness of concrete or gypsum decks. Test standards demonstrate listed roof constructions will not contribute materially to flame spread on the underside when subjected to a controlled standardized fire exposure. PlastiSpan insulation board is listed as a component within ULC design numbers R210 and R222.

For external fire exposure, roof assemblies are tested in combination with specific roof coverings and are given a Class A, B or C rating based upon severity of the fire exposure. PlastiSpan insulation board is a listed insulation component in combination with a wide variety of roof coverings.

FM Approval

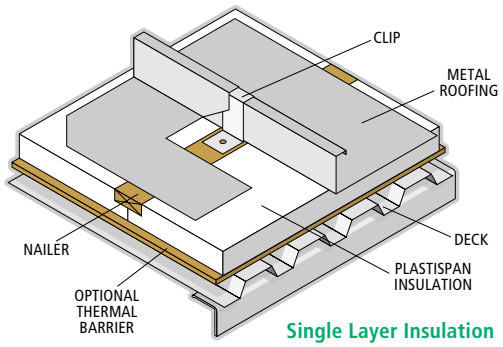
PlastiSpan insulation is approved by FM Global Technologies for use in a variety of approved roof combinations. The latest FM Approval Guide details approved roof construction combinations including PlastiSpan insulation for Class 1 fire exposure as well as 1-60 or 1-90 wind uplift requirements.

Standing Seam Roofing

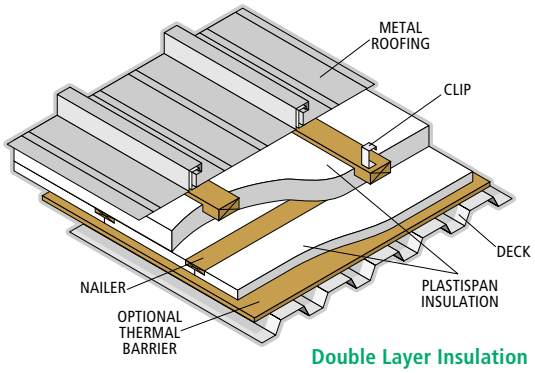
Metal standing seam roof systems incorporating PlastiSpan insulation provide an energy efficient option for a wide range of applications. The exterior metal surface can include a variety of profiles and colours to suit many architectural requirements and the system offers the added advantage of installation at any temperature.

Modern metal roof designs incorporate a number of different design concepts. The standing seams are often roll-formed on the jobsite and include a sealant placed in the seam. The roof system is held down with clips that are incorporated into the standing seams and have a slotted hole for attachment to provide for expansion/contraction of the roof assembly.

The use of PlastiSpan insulation board within the metal roof assembly provides a uniform insulation layer with the required thermal resistance. The insulation can be laid over a light gauge steel deck incorporating a thermal barrier or vapour barrier where required. An air barrier is recommended in the roof system in order to avoid the movement of air through the system. Standing seam roofs are applied to sloped roof construction where the required slope is provided by the roof structure itself.



Single Layer Insulation



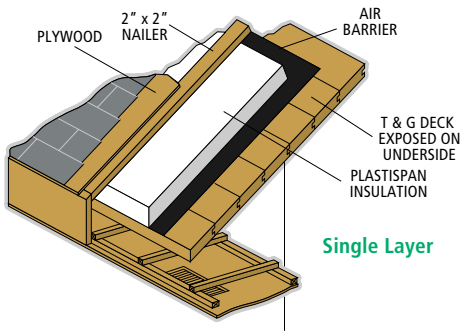
Double Layer Insulation

Cathedral Ceiling Insulation

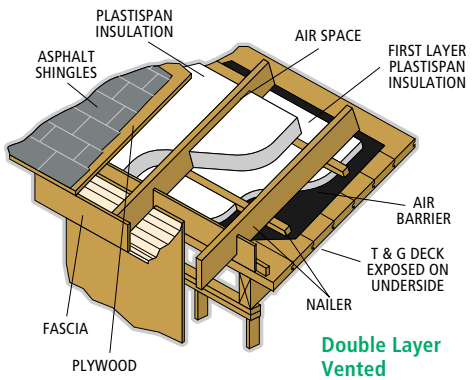
The roof is the area of highest heat loss in buildings. In order to conserve energy and to make buildings more comfortable, building codes stipulate higher thermal resistances (R-Values) for the roof area compared to other building components.

Cathedral ceiling designs incorporate architectural features such as roof joist assemblies finished on the inside face with gypsum board. However, construction methods that require installation of the insulation in the space between roof joists may not always allow space for sufficient insulation.

As an alternative, a single or double layer of PlastiSpan insulation board can be installed above the roof deck to provide more consistent insulation coverage and a roof assembly with a higher effective R-Value. As well, the desired interior architectural finish choice can be selected including timber frame construction incorporating a tongue and groove deck left exposed on the interior.



Single Layer



Double Layer Vented

PlastiSpan Insulation Properties

MATERIAL PROPERTIES	TEST METHOD	METRIC (SI) UNITS	CAN/ULC-S701			IMPERIAL UNITS	CAN/ULC-S701		
			TYPE 1	TYPE 2	TYPE 3		TYPE 1	TYPE 2	TYPE 3
Thermal Resistance [1] Minimum	ASTM C 518	$\frac{m^2 \cdot °C}{W}$	0.65	0.70	0.74	$\frac{ft^2 \cdot hr \cdot °F}{BTU}$	3.75	4.04	4.27
Compressive Resistance Minimum @ 10% Deformation	ASTM D 1621	kPa	70	110	140	psi	10	16	20
Flexural Strength Minimum	ASTM C 203 Procedure B	kPa	170	240	300	psi	25	35	44
Water Vapour Permanence [2] Maximum	ASTM E 96	$\frac{ng}{Pa \cdot s \cdot m^2}$	300	200	130	perms	5.2	3.5	2.3
Dimensional Stability Maximum	ASTM D 2126 7 days @ 70 ± 2° C	% linear change	1.5	1.5	1.5	% linear change	1.5	1.5	1.5
Water Absorption Maximum	ASTM D 2842	% by volume	6.0	4.0	2.0	% by volume	6.0	4.0	2.0
Limiting Oxygen Index [3] Minimum	ASTM D 2863	%	24	24	24	%	24	24	24

NOTES: 1. Thermal resistance measured at mean temperature of 24°C (75°F) for 25 mm (1 inch) thick material.

2. Values quoted are maximum for 25 mm (1 inch) thick material. Lower values will result for thicker materials.

3. PlastiSpan insulation board has a maximum Flame Spread Rating of 290 and a Smoke Developed Rating greater than 500 for minimum thickness of 25 mm classified in accordance with CAN/ULC–S102.2M.

For more information on Plasti-Fab EPS Product Solutions, consult the following brochures:

Roof & Deck Insulation

- ☐ Roof & Deck Insulation: Selection, Application & Specification
- ☐ Built Up Roofing
- ☐ Cathedral Ceilings
- ☐ Fire Rated Roof Assemblies
- ☐ Single Ply Roofing
- ☐ Sloped Roof Insulation
- ☐ Standing Seam Roofing

Building Insulation

WALL INSULATION

- ☐ Wall Insulation: Selection, Application & Specification
- ☐ Commercial / Industrial Applications
- ☐ Exterior Insulation Finish Systems
- ☐ Exterior Insulation Sheathing New or Retrofit Construction
- ☐ Interior Systems
- ☐ PlastiSpan M Insulation
- ☐ Precast Concrete Wall Panels
- ☐ Rain Screen (Cavity) Walls

FLOOR INSULATION

- ☐ Floor Insulation: Selection, Application & Specification
- ☐ Floor Insulation Systems
- ☐ Insulation for Radiant Floor Heating Systems
- ☐ Split Floor Slabs

FOUNDATION INSULATION

- ☐ Foundation Insulation: Selection, Application & Specification
- ☐ Exterior and Interior Foundation Walls
- ☐ Exterior Perimeter Foundation Insulation Systems
- ☐ Frost Protected Shallow Foundation
- ☐ GeoDrain Foundation Insulation Board

ICE RINKS

- ☐ Ice Rink Slab Insulation

Concrete Formwork

- ☐ Advantage ICF System
- ☐ Enermizer ICF System

Mechanical Insulation

- ☐ Cold Storage Applications
- ☐ Pipe and Vessel Insulation

Roof & Wall Panels

- ☐ PlastiSpan SIP System

Buoyancy Systems

- ☐ Buoyancy Systems: Selection, Application & Specification
- ☐ Floating Dock or Marina
- ☐ Floating Rafts

Geotechnical Engineered Applications

- ☐ Geotechnical Engineered Applications: Selection, Application & Specification
- ☐ GeoSpan Compressible Fill Material
- ☐ GeoSpec Lightweight Fill Material for Landscape Applications
- ☐ GeoSpec Lightweight Fill Material for Road Embankments
- ☐ GeoVoid Compressible Fill Material
- ☐ Utilities Insulation

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