

## **ORI ROOF**

Extruded polystyrene rigid foam with skin, colored blue throughout, according to ASTM standard C578-95, as manufactured by Oriental Polystyrene (OriFoam)

Material thickness shall be according to the drawings and have the following properties:

1. Thermal conductivity of 0.028 W/m<sup>o</sup>K (0.2 Btu.in/ft<sup>2</sup>.h.<sup>o</sup>F) when tested at 10°C (50°F) in accordance with or ASTM C 518.
2. Compressive strength of 410 kPa (60 psi) average, when tested according to ASTM D 1621.
3. Water absorption of <3% in volume average when tested in accordance with ASTM D 272.
4. Water vapor permeability of 1.1 perm-inch average when tested in accordance with ASTM E 96 00.
5. Edge Treatment Ship lap or Butt Edge.

## **BROCHURE OF EXTRUDED POLYSTYRENE**

### ***Insulation, why?***

Increasing energy costs and availability problems emphasize the need for immediate energy conservation even in the oil producing countries. An effective way of saving energy is to improve the thermal insulation of buildings. This is particularly important in hot climates where the energy demand for cooling by air conditioning is very high. In addition to the need for energy saving, high insulation standards are justified by improved comfort levels and increased building life. A well-insulated building will have a higher value.

## **Product Description**

ORIFOAM thermal insulation boards are manufacture by the ORIENTAL POLYSTYRENE PRODUCTS CO LLC. Through advance processes, products and application research and development work has taken place various countries. Today, a variety of grades of ORIFOAM INSULATION BOARDS manufactured for many applications and industries, is available in various sizes and with various edge treatments.

Extruded polystyrene foam is used in many parts of the world under widely differing climatic conditions. For example, use in the Middle East at ambient temperatures of more than +40°C (+104°F), while, at the other extreme, Orifoam boards has been used in Alaska to protect the delicate permafrost at temperatures as low as -50°C (-58°F) along 200 km of gravel road servicing the Trans Alaska Oil Pipeline.

Orifoam Thermal sheets are manufactured by a continuous extrusion process which imparts a characteristic closed cell structure giving the product its unique physical properties. Extruded polystyrene rigid foam has a high resistance to water absorption and good mechanical properties. The manufacturing process, combined with inherent qualities of the inert

component thermo plastic material gives Orifoam predictable long-term performance and high insulating value.

PRODUCT	DESCRIPTION	APPLICATIONS	BOARD DIMENSIONS
<b>ORI-ROOF</b>	Extruded Polystyrene rigid foam with skin	Thermal insulation board for:- - Roofs - Floors - Perimeter <sup>1</sup>	<p>Ori-Roof with shi lap edges            Thickness: 20,30, 40, 50, 60, 75, 80, 90,100 <b>MM</b>            Width: 600 <b>MM</b>            (covering dimension)            Length: 1250 <b>MM</b> (covering dimension)</p> <p>Ori-Roof without shi lap edges (butt edge) Thickness: 20, 25, 30, 40, 50, 60, 75, 80, 100 <b>MM</b> Width 600 <b>MM</b>            Length 1250 <b>MM</b>            Other thicknesses are available upon request</p> <p>CFC &amp; HCFC Free</p>
		Blowing Agent	

## SPECIFICATION

Extruded polystyrene rigid foam with skin, colored blue throughout, according to ASTM standard C578-95, as manufactured by Oriental Polystyrene (OriFoam)

Material thickness shall be according to the drawings and have the following properties:

1. Thermal conductivity of 0.028 W/m K 10.19 Btu.in/ft'.h.°F) when tested at 10°C (50°F) in accordance with or ASTM C 518.

2. Compressive strength of 410 kPa (160 psi) average, when tested according to ASTM D 1621.
3. Water absorption of <3% in volume average when tested in accordance with ASTM D 272.
4. Water vapor permeability of 1.1 perm-inch average when tested in accordance with ASTM E 96 00.
5. Edge Treatment Ship lap or Butt Edge.

## **The Upside-Down Roof Concept**

The upside-down roof concept is as simple to use, as it is effective. With a conventional roof, the waterproofing membrane is laid above the thermal insulation, but with the upside-down roof, the sequence is reversed. The roofing membrane is laid directly onto the roof deck, followed by ORIROOF boards with shiplap edges as an insulating layer, with separation layer laid over it, and then the final layer can be gravel or paving slabs.

The efficiency of the upside-down roof concept has been proven in extensive tests and in practical application over periods exceeding 40 years in Europe, Canada and the USA and 25 years in the Middle East.

Up to the present over 300 million square meters of Ori-Roof boards have been laid using the upside-down roof concept in Europe and over 30 million square meters in the Middle East.

Advantages of Oriroof with Ship Lap Edges:

In the upside-down roof, the insulation material is exposed to temperature extremes, thermal cycling, mechanical stresses (e.g. live loads, construction site traffic), and high relative humidity.

The insulation material must be able to withstand such conditions and should, therefore, possess the following characteristics:

1. Closed-cell and homogeneous structure
2. Negligible low moisture absorption
3. Long-term high insulation efficiency
4. Good mechanical strength
5. Resistance to ageing and rotting
6. Good dimensional stability
7. High resistance to thermal cycling

Numerous laboratory tests and testimonials from the markets shows that Ori Roof meets all these requirements.

#### **Advantages of the Upside-Down Roof Concept:**

- The waterproofing membrane is protected from extreme thermal stresses, high ultraviolet exposure as well as from mechanical stresses occurring during construction and subsequent use.
- The life expectancy of the waterproofing membrane is substantially increased.
- Maintenance costs are significantly reduced.

Temperature measurements have shown that the waterproofing membrane in the *Upside-down* roof is much better protected against temperature peaks than in the conventional flat roof.

The significantly reduced temperature variation at the roofing membrane in the upside-down roof reduces the ageing of the membrane and thus prolongs its service life.

1. The Oriental Polystyrene Products Company firmly believes that it is in everyone's interest: client, architect and contractor, that the specialist roofing contractor responsible for laying the waterproofing membrane carries out the total upside-down roof build up.

2. It is advisable to ensure that the total build up is completed as soon as the waterproofing membrane is laid.

### ***Dark Membrane, Loose-Laid and Ballasted***

In loose-laid, ballasted applications, the dark roofing membrane over the foam is exposed to direct sunlight until the ballast is installed. This direct exposure prior to ballasting may vary from a few hours to a few weeks.

Orifoam experience has shown that when the foam is exposed to both sunshine and an outdoor air temperature over 32°C (90°F), distortion of the foam can occur in as little as 30 minutes.

To prevent this phenomenon from occurring, the following precautionary measure can be taken.

During hot weather, temporarily place white opaque polyethylene film on top of the dark single ply membrane to keep it cool until the ballast can be placed. The film can be held down with tires or other temporary ballast. The film can be reused by moving it along as the permanent ballast is installed. This film should keep the membrane well below the maximum use temperature of the foam insulation.

## **INSTALLATION**

### **Protection layer**

The protection layer against ultraviolet radiation, wind uplift and buoyancy, usually consists of gravel with a corn diameter of 15-30 mm (5/3" – 1 1/4").

In order to achieve a sufficient degree of protection against ultraviolet radiation, the gravel layer should have a minimum depth of 50 mm (2")

Instead of gravel, paving slabs with a minimum thickness of 40 mm (1-1/2") can be installed when using 50 mm (2") thick Ori-Roof boards. For each 10 mm (3/8") increase in Ori-Roof thickness the paving slab thickness should be increased by 5 mm (3/16").

The wind uplift resistance of upside-down roofs is considered equal to loose-applied conventional flat-roof constructions with similar surface protection.

In particularly exposed areas, paving slabs should be applied instead of gravel, either along the perimeter of the roof (min. 2 m wide or over the entire surface).

## **DRAINAGE**

With the normal gravel-topped specification, water percolates down through the gravel, over and between the insulation boards, until it reaches the waterproofing membrane where it then drains off to the roof outlets. On terrace decks, water will drain from the top surface of the terrace and Ori-Roof and from the roof membrane.

The draining outlet should, therefore, have a connection at the membrane level, and at the top terrace and **Ori-Roof** top surface levels.

The slope should be in accordance with general roofing practices and should be designed with a minimum fall of 1:40.

### **Separation Layer**

A water permeable filter synthetic fabric, preferably of non-woven polyester or polypropylene base (136 gr/m<sup>2</sup> to 200 gr/m<sup>2</sup> etc.) should be installed with a 30 cm. overlap on top of **Ori Roof** boards. The filter fabric will prevent fine particles of gravel, which might damage the membrane, from being washed down into the board joints and below the **Ori Roof** boards

**Filter fabric with sufficient long-term strength will also help to prevent buoyancy problems in case of unequal gravel distribution or reduced gravel depth.**

### **Installation of Ori-Roof Insulation Boards**

Ori-Roof boards should be applied loose, with tight staggered joints over the waterproofing membrane.

## Waterproofing Membrane

The waterproofing membrane should be of good quality, non-rotting material.

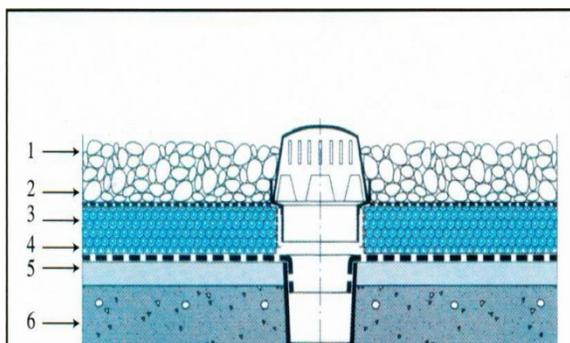
In order to protect single layer high-polymeric membranes from mechanical damage caused by rough concrete surfaces, a protection sheet should be installed underneath.

Roofing membranes containing solvents, which could attack Ori-Roof plastic foam, should not be used.

Ori-Roof boards should not be laid directly over microscopic materials such as rag based felt.

Roof Insulation sheet manufacturers, membrane manufacturers and other experts should be consulted for suitable membrane specifications.

The roof-deck surface should be smooth to prevent damage of the waterproofing membrane.



## **Roof Drainage**

1.Gravel layer 15-30mm  
(5/8"-1 1/4")

2.Separation layer ( Typar )

3.Roofmate SL

4.Waterproofing membrane

5.Screed to fall

6.Concrete roof deck