Bitumen Waterproofing

Hot Melt Waterproofing

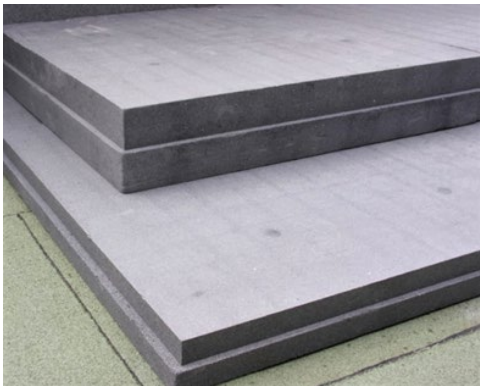
Product Data Sheet

HYTHERM HP EPS 300

High performance flat and tapered EPS insulation for inverted roofs

Axter Hytherm HP EPS 300 is an innovative high performance, expanded polystyrene (EPS) insulation offering excellent thermal performance and compression properties. It is designed for use on inverted roofs, podiums, balconies and terraces with pedestrian foot traffic. It is suitable for zero fall roofs in both uniform flat and tapered board designs.

Hytherm HP EPS 300 is used in conjunction with the Axter water flow reducing layer (WFRL) and gravel ballast, paving or green roof (extensive and bio-diverse) finishes.



Key features

- Design thermal conductivity of 0.033 W/mK
- Available in thicknesses from 50mm to 240mm (in increments of 5mm)
- High compressive strengths available
- U-values as low as 0.10W/m^{2}K possible

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- Suitable for use on flat roofs with zero falls and slope up to 10°
- Lightweight, easy to install
- Durable and rot-proof; resistant to effects of freeze/thaw
- Non-toxic, 100% recyclable BRE Green Guide A rating
- GWP <5, ODP zero
- Manufactured to BS EN 13163, ISO 14001 and ISO 9001
- Achieves Fire Class E
- KIWA Certified

Use

Hytherm HP EPS 300 (flat board or tapered) is a technologically advanced lightweight closed cell expanded polystyrene (EPS) insulation with low water absorption properties for inverted flat roof applications. It is an excellent insulating material providing consistent thermal performance over the usual temperature ranges present in buildings.

It is KIWA-certified and is available in a wide range of densities to meet the specified compression performance for applications from light traffic maintenance roofs to car parks and podiums.

An inverted roof construction places thermal insulation above the waterproof layer. This maintains the waterproof membrane at an even temperature and protects it from the damaging effects of UV radiation or the effects of the weather. The specified thermal performance of the inverted roof is achieved through the roof design and the thickness of the insulation used.

Compatibility with other materials

Hytherm HP EPS 300 is compatible with and can be laid directly on to hot melt structural and reinforced bitumen, cold applied liquid (polyurethane), mastic asphalt or single ply (PVC, TPO, EPDM) waterproofing membranes. When using in conjunction with a PVC singe ply membrane, a polyester fleece or glass-fibre separating layer must be installed between the insulation and the membrane to avoid migration of plasticiser and embrittlement of the membrane.

Tapered Insulation Designs

Hytherm HP EPS 300 is available as a tapered insulation to create the falls on the roof required to provide adequate water flow to the drainage outlets. Using the insulation layer to create the roof falls helps reduce the overall weight of the roof structure and speeds up construction.

Tapered insulation systems are designed on a project by project basis. Our service includes:

- Bespoke design to suit each individual project
- Layout drawings to assist installation
- Taper over 1200mm to create 1:80 fall
- Panel thickness 50-240mm
- Boards arrive on site marked with reference letters for easy identification
- Design based on straight falls only

Please contact Axter for further information.

Axter Water Flow Reducing Layer

The Axter water flow reducing layer (WFRL) is a vapour permeable, high performance, non-woven polypropylene flexible membrane supplied as part of the inverted roof insulation system to improve thermal performance and to help minimise:

- water flow below the insulation
- heat loss caused by rainwater cooling
- thickness of insulation required
- flotation effect
- weight of ballast required

The layer also allows water vapour from below to permeate and reduces the risk of condensation being trapped within the construction.

Length (m)	Width (m)	Area per roll (m^2)	Water vapour resistance to BS EN ISO 12572 (MNs/g)
100	3	300*	0.011

*Not allowing for overlap (300mm)

The water flow reducing layer is loose laid over the insulation with 300mm overlaps. It is turned up at all roof penetrations and upstands to a height to ensure it finishes above the level of the ballast or paving.

Hytherm HP EPS 300 flat and tapered insulation

Product Characteristics and Performance

Properties	HYTHERM ECO EPS (Grade to BS EN 13163, EPS 200)
Colour	Grey
Dimensions - Flat Board	
Board size mm	1200 x 1200 with 15mm rebated edge Board coverage 1.44m^2
Board thickness mm (available in 5mm increments)	Single thickness 50mm to 240mm
Dimensions - Tapered Board	
Board size mm	1200 x 600 with 15mm rebated edge Board coverage 0.72m^2
Single thickness (available in 5mm increments)	50 - 240 mm
Fall	1:80
Taper	Over the 1200 dimension

Properties	HYTHERM ECO EPS (Grade to BS EN 13163, EPS 200)
Thermal Properties	
Inverted roofs Declared thermal conductivity W/mK	0.033
Inverted roofs with Green (extensive / bio-diverse) roof finish Declared thermal conductivity W/mK	0.035
Mechanical Properties	
Design load at 10% nominal compression (kN/m^2)	300
Design load at 1% nominal compression (kN/m^2)	120
Design loads for long term compressive creep (kN/m^2)	90
Bending strength kN/m^2	450
Moisture Properties	
Long term water absorption by immersion to BS EN 12087	$\leq$ 1%
Long term water diffusion by immersion to BS EN 12088	$\leq$ 1%
Fire Performance	
Classification to BS EN 13501-1	Euroclass E (BS EN 13501-1)

HYTHERM HP EPS 300 – Technical and design guidance:

Compressive strength

Hytherm HP EPS 300 is resistant to loads associated with light maintenance traffic on roofs and to pedestrian foot traffic on roofs, podiums, balconies and terraces. Other options are available for higher loading requirements – please contact Axter for assistance.

Where paving slabs are to be placed over the insulation on paving supports, point loads must be calculated to provide an equivalent uniformly distributed load (see the example below):

Example Point Load Calculation

The 1% compressive strength value should be used when designing roofs with pedestrian traffic or other temporary imposed loads.

Roof Load on Paving Slabs = 1.0 kN	Convert paving slab weight to kN = 16 x 0.00981 = 0.157kN
Paving slabs – 450 x 450 x 40mm	Roof load on one slab = 1.157kN
Weight of one paving slab – 16kg	Area of one support pad = 3.142 x (0.075^2) = 0.0176m^2
Circular corner support for paving slab – 150mm diameter (one per corner)	Load on Hytherm ECO EPS inverted roof through paving slab support = 1.157kN ÷ 0.0176m^2 = **65.74k N/m^2**
Therefore Hytherm ECO EPS would be specified having a design load of 90 kN.m^2 at 1% nominal compression.	

Long term compressive creep

On a roof on which water tanks, air handling units and other similar heavy plant is permanently installed imposing extra load on the insulation, the calculation should allow for compressive creep. The design load to use for Hytherm HP EPS 300 for this application is 30% of the 10% compressive strength figure, resulting in less than 2% compression in the insulation boards over 50 years.

U-values

The table below shows average thickness of the Hytherm HP EPS 300 range required to achieve U-values from 0.25 W/m^{2}K to 0.10 W/m^{2}K. The calculation is based on an inverted roof construction of 150mm reinforced concrete roof slab, hot melt waterproofing, Hytherm HP EPS 300 insulation, Axter WFRL, drainage factor fx= 0.001 and average rate of precipitation (P) ≤ 3.000 (mm/day).

U Value	Hytherm HP EPS 300 Inverted roof application Thickness (mm)	Hytherm HP EPS 300 Inverted green roof Thickness (mm)
0.25	125	135
0.24	130	140
0.23	140	145
0.22	145	150
0.21	150	160
0.20	160	165
0.19	165	175
0.18	175	185
0.17	185	195
0.16	195	210
0.15	210	220
0.14	225	235
0.13	240	255
0.12	260	275
0.11	285	300
0.10	310	330

Sustainability

Properties	HYTHERM ECO EPS (Grade to BS EN 13163, EPS 200)
EPS Rating: BRE Green Guide The BRE Green Guide to Specification (www.bre.co.uk/greenguide/) provides guidance on how to make the best environmental choices when selecting construction materials and components.	A
Ozone Depletion Potential (ODP)	Zero
Global Warming Potential (GWP)	< 5
Hytherm HP EPS 300 is manufactured in factories which are ISO14001 certified.	
Manufacturing process utilises steam; 'blowing agents' detrimental to the environment are never used in the production of this material.	
Hytherm HP EPS 300 is 100% recyclable.	

Biological Properties

Hytherm HP EPS 300 is non-biodegradable and will be expected, therefore, to last the lifetime of the building into which it is incorporated. It is non-toxic and inert and can safely be used in areas of planting. There is no occurrence of leachate with EPS. EPS will not sustain mould growth and offers no nutrient value to insects or vermin.

Installation

Hytherm HP EPS 300 boards are lightweight and easy to install. There are no requirements for special PPE when installing or cutting the insulation.

The Hytherm HP EPS 300 boards are loose laid over the waterproofing with no requirement to adhere or mechanically fix the boards The Water Flow Reducing Layer (WRFL) is laid over the insulation. Gravel ballast and/or paving slabs are used to secure the insulation to the deck.

Roof slab/deck surfaces

The roof slab/deck surface must be level, even and as dry as possible to reduce the risk of high levels of condensation once the insulation and weatherproofing are installed. For further information on condensation control and air and vapour control layers, refer to BS 6229:2018 and BS 5250:2011+A1:2016.

Existing decks must be free of loose chippings and any defects made good before the waterproofing is installed in accordance with the manufacturer's instructions.

The waterproofing system can be a hot melt structural system, reinforced bitumen membrane (RBM), cold applied polyurethane liquid, mastic asphalt or single ply (PVC, TPO, EPDM). Where a PVC single ply waterproofing membrane is used, a polyester fleece or glass-fibre separating layer must be installed between the insulation and the membrane.

Insulation

Hytherm HP EPS 300 inverted roof insulation is installed loose laid over the waterproofing, ensuring all overlap joints are tightly butted together. Boards are laid in a staggered pattern starting from the point of access to the roof.

Water Flow Reducing Layer (WFRL)

The Axter WFRL is loose laid with unsealed laps over the insulation running across the fall of the roof, overlapped by a minimum of 300 mm in the downward direction of the roof slope. The membrane is turned up at all roof penetrations and upstands to a height to ensure it finishes above the level of the ballast or paving and turned downwards at drainage outlets.

The WFRL should be covered as soon as possible with the designed finish according to the project specification.

The GRO (Green Roof Guide) should be referred to when designing and specifying the waterproofing design of a living (extensive green and bio-diverse) roof.

Hytherm HP EPS 300 products are compatible with all common building materials. Direct contact with hydrocarbons and strong solvents should be avoided. A suitable membrane such as polythene sheet may be used to separate Hytherm HP EPS 300 from such substances.

The use of chemicals (for example weed killers) should be checked for compatibility with the insulation, WFRL and waterproofing membrane, contact Axter for assistance.

Material safety data is available from Axter Ltd.

Accreditation

KIWA	See KIWA certificate no BAR-19-098-S-A-UK. Hytherm HP EPS 300 boards have been tested and approved for use in inverted roof with pedestrian traffic, balconies, terraces, extensive green and brown roof constructions with zero falls and slopes up to 10°.
NHBC	NHBC accept the use of these insulation boards provided they are installed, used and maintained In accordance with the third party certification in relation to NHBC Standards Chapter 7.1 Flat Roofs and Balconies.
CE Marking	This product is CE marked in accordance with BS EN 13163:2012. DOP available on request.
Quality	Hytherm HP EPS 300 is manufactured in production facilities certified to ISO 9001.
Environmental	Hytherm HP EPS 300 is manufactured in production facilities certified to ISO 14001.
Compliance	Hytherm HP EPS 300 conforms to the required properties as defined in BS EN 13162:2012 – Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products-Specification, including compliance with BS 3837 Part 1.