Ravago
BUILDING SOLUTIONS

RAVATHERM™ XPS X

Insulating inverted flat roofs with Ravatherm XPS X ULTRA 300 SL

ULTRA Brochure Version 8 20260209
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BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 21/5923

MADE IN BRITAIN®
All Ravatherm XPS X products are Made in Britain

About Ravatherm XPS X ULTRA 300 SL

Ravatherm XPS X ULTRA 300 SL is used for insulating inverted green and blue roofs*, as well as terrace roofs, car park decks and refurbishments. The extrusion process gives it a uniform structure of closed cells and a smooth skin, creating a material with low water absorption (<0.7% according to BS EN 12087:2013). It uses an HFO blowing agent and has been formulated with the addition of infrared 'blockers' or particles, finely dispersed in the cell walls. These scatter and reflect heat radiation, helping to keep a building warm in winter and cool in summer.

Ravatherm XPS X ULTRA 300 SL has an ozone depleting potential (ODP) of zero and a Global Warming Potential of less than one.

Ravatherm XPS X ULTRA 300 SL has a declared thermal conductivity of 0.027 W/m.K. The boards can be supplied in a wide variety of thicknesses according to project requirements and desired thermal performance.

Ravatherm XPS X ULTRA 300 SL can be cut using hand tools.

The product can be used in conjunction with the Ravatherm XPS X MK filter/water-flow-reducing layer between the insulation and the ballast layer, forming the Ravatherm XPS X MK system. Adding Ravatherm XPS X MK water flow reducing layer over the insulation before placing ballast or paving on spacers, means most of the rainwater flows above the insulation, minimising rainwater cooling of the water proofing layer. (see appendix page 9)

A Declaration of Performance (DoP) for Ravatherm XPS X ULTRA 300 SL can be found at: www.ravagobuildingsolutions.co.uk

Performance summary

- Declared thermal conductivity of 0.027 W/m.K in thicknesses of 70mm, 80mm, 105mm, 130mm, 145mm, 175mm & 205mm
- Closed cell structure for load-bearing applications, rated for;
  - 300kPa compressive stress (according to BS EN 826:2013)
  - 110kPa compressive creep (2% deformation after 50 years according to BS EN 1606:2013)
- Has low water absorption (<0.7% according to BS EN 12087:2013), is temperature stable from -50 to 75°C, and <5% dimensional stability (according to BS EN 1604:2013)
- Can be cut using hand tools.
- ULTRA 300 SL boards are BBA certified for use within an inverted roof system - certificate number 21/5923

*Green, blue and brown roof applications are outside the scope of the BBA certificate

Please contact technical.uk.rbs@ravago.com to request information on a system provider or roofing contractor stockist to suit your individual project.

Constructing an inverted roof

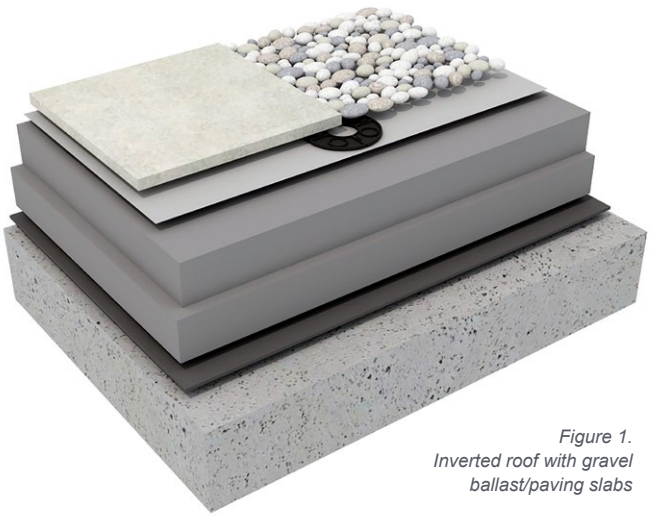

Figure 1.
Inverted roof with gravel ballast/paving slabs

Figure 2.
Inverted blue roof (outside the scope of the BBA certificate)

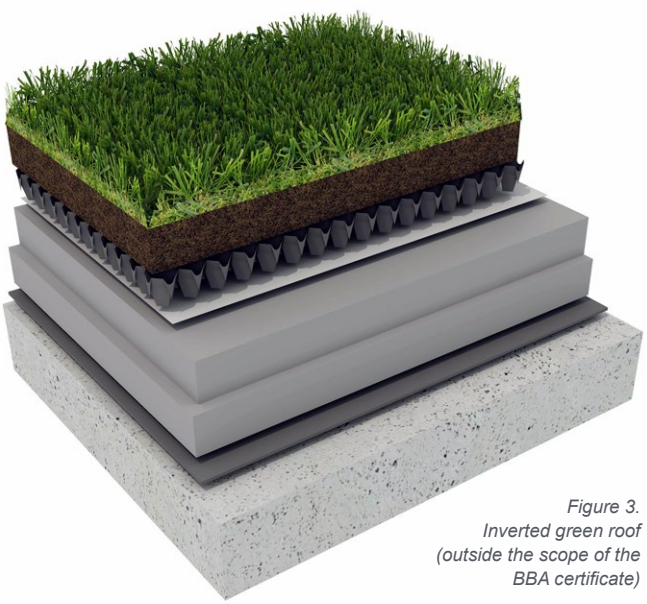

Figure 3.
Inverted green roof (outside the scope of the BBA certificate)

- Ravatherm XPS X ULTRA 300 SL's range of thicknesses (70mm - 205mm) allows thermal performance to be matched to project requirements. Its boards provide a base for the ballast layer and its shiplapped edges ensure interlock between boards, reducing thermal bridging.
- Inverted roof constructions can be categorised as heavyweight or lightweight by reference to the form of building construction involved. If the structure incorporates a concrete slab, consideration should be given to designing the slab to support the load of 80-120 kg/m^2 imposed by a ballasted inverted roof system.

Basic principles

Roof waterproofing

The inverted roof concept can be used with a wide range of waterproofing materials, including mastic asphalt, built-up bitumen felt, hot melt modified bitumen, PU based systems and single ply polymeric membranes. Seek advice from manufacturers on compatibility of their waterproofing materials with Ravatherm XPS X ULTRA 300 SL.

Thermal performance

Table 1 shows the thickness of insulation required to achieve a range of U-values. In an inverted roof construction, some rainwater (BBA Information Bulletin Number 4 specifies that 2.5% should be used as the minimum factor) will run off beneath the insulation boards and in doing so, may draw heat from the deck (Section 7 and Annex F.4 of BS EN ISO 6946: 2017).

This 'rainwater cooling effect' requires an increase in insulation thickness in accordance with BS EN ISO 6946:2017. However, this increase can be substantially reduced by using the Ravatherm XPS X MK water flow reducing layer (WFRL).

Condensation

The inverted roof construction can help to mitigate the risk of condensation in an existing building by keeping the roof structure and the waterproof layer above the dew point temperature.

Where a building is likely to have a high level of humidity, as in the case of swimming pools or commercial kitchens, a condensation risk assessment should be undertaken by a suitably qualified professional. A method for calculating the risk of interstitial condensation is given in BS EN ISO 13788:2012.

The thermal capacity of a roof will impact cooling caused by rainwater run-off.

Fire

Inverted roofs ballasted with incombustible material, such as aggregate or paving slabs achieve the external fire rating of $B_{roof}(t4)$ which make the roof unrestricted with respect to proximity to a relevant boundary under Approved Document B of the Building Regulations.

Ravatherm XPS X ULTRA 300 SL is classified Euroclass E according to BS EN 13501-1:2018.

U-value	0.17	0.15	0.14	0.12	0.10
Ravatherm XPS X ULTRA 300 SL	160	175	200	235*	275*

Table 1: Required Ravatherm XPS X ULTRA 300 SL thickness (mm) to meet U-values (W/m^{2}K) using the Ravatherm XPS X MK system

Roof build-up:
Ballast (aggregate/pavers)
Ravatherm XPS X MK
Ravatherm XPS X ULTRA 300 SL
Geotextile separation layer (if required)
Hot melt waterproofing
Reinforced concrete deck 200mm

Rainwater cooling penalty calculated to BS EN ISO 6946:2017 Annex D4, p=3mm/day

**2 layers of insulation required*

Edge details

Upstands at parapets and abutments should be protected by Ravatherm XPS X UB 300 or Ravatherm SW A2 Upstand boards, which both include a 6mm fibre cement layer. These boards must be set vertically and secured by an apron flashing.

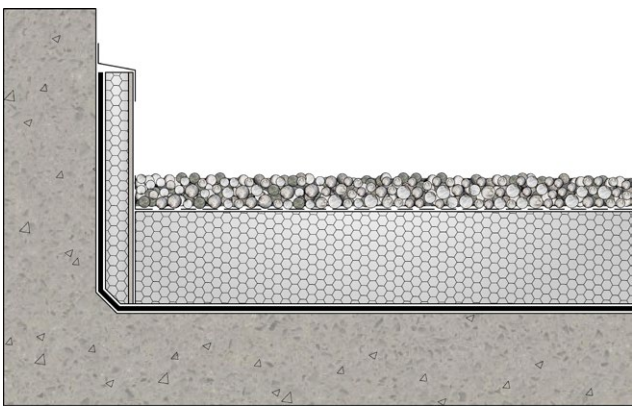

Figure 4. Inverted roof – detail at upstand

Extending the insulation in this way affords a consistent level of protection and helps to avoid thermal bridging. Apron flashings should be carried to at least 150mm above the surface of the ballast.

Kerbs, including those at verges and rooflights, should be high enough to contain the insulation and the ballast. Ravatherm XPS X ULTRA 300 SL boards should be fitted tight against kerbs.

Ravatherm SW A2 Upstand board achieves a reaction to fire classification of Euroclass A2-s1, d0 and has been designed to meet the more stringent requirements relating to attachments to the external walls of relevant buildings over 11m in height within Approved Document B. With any project for Relevant Buildings, approval for product use should be sought from the project fire engineer or building control.

Installation methods/sequence

1. Inspect the roof to ensure it is clean. Plan the installation sequence and the layout of Ravatherm XPS X ULTRA 300 SL boards.
2. Lay the separating layer (if required) over the waterproof layer; lap all edges by 200-300mm, at perimeters and penetrations turn up above the installed thickness of the insulation.
3. Lay Ravatherm XPS X ULTRA 300 SL insulation boards in brick bond pattern with shiplap edges pushed together firmly.

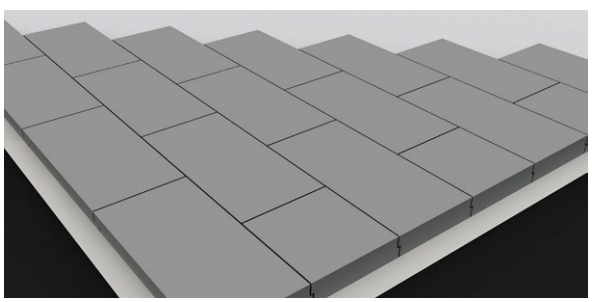

Figure 5.

4. Fit Ravatherm XPS X ULTRA 300 SL boards neatly around penetrations. Cut boards with a sharp knife or fine-toothed saw.

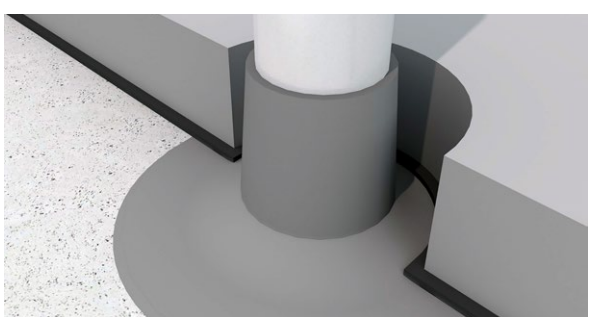

Figure 6.

5. Insulate upstands with Ravatherm XPS X UB300 or Ravatherm SW A2 Upstand boards (as specified) and cover with an apron flashing.

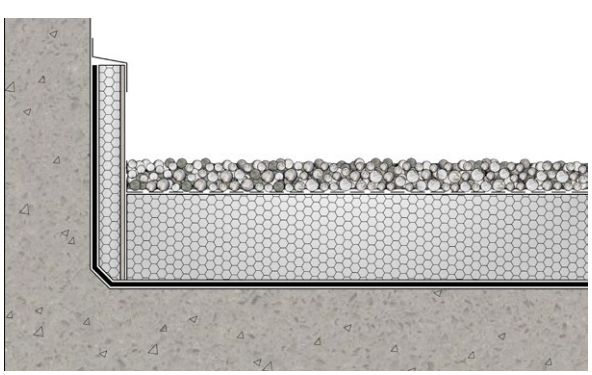

Figure 7.

6. Lay Ravatherm XPS X MK at right angles to the slope starting at bottom of slope and overlapping sequentially with 300mm laps.

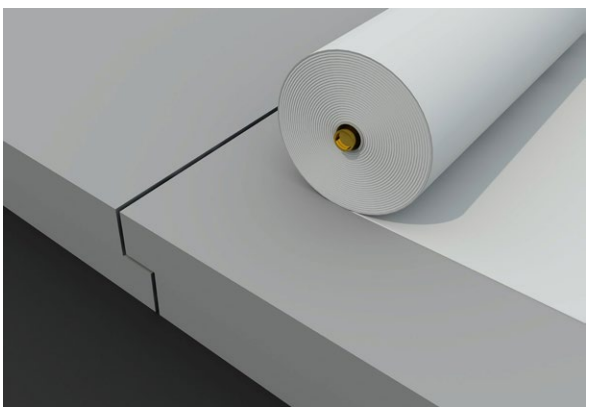

Figure 8.

At upstands and penetrations turn up the filter layer so it finishes above the surface of the ballast.

At drainage outlets neatly cut and turn down the filter layer to discharge water at the outlet positions.

7. Lay paving slabs on supports around roof perimeters and penetrations as required.
8. Lay the ballast layer progressively. Work on an advancing front away from the point of access so all ballast material is carried across a protected waterproof layer.

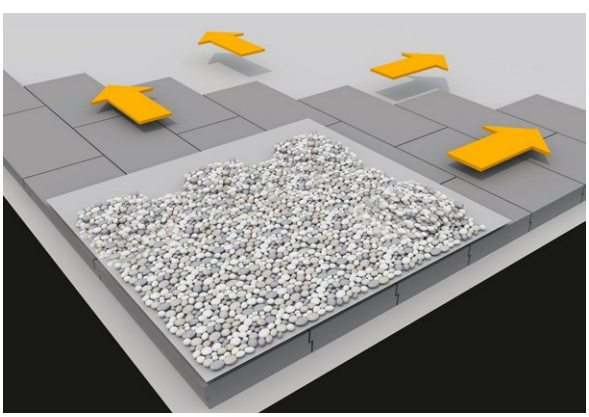

Figure 9.

Key points

- Do not proceed if roof deck has not been prepared to receive insulation.
- Careful setting-out before installation begins will reduce cutting and wastage
- Take care not to over-stress any area of the roof while distributing the ballast
- Use scaffold boards when barrowing materials over Ravatherm XPS X ULTRA 300 SL boards.

Ravatherm XPS X ULTRA 300 SL

- Thicknesses: 70mm, 80mm, 105mm, 130mm, 145mm, 175mm & 205mm
- Board size: 1250 x 600mm
- Edge profile: shiplap
- Design loading: 110 kN/m^2
- Reaction to fire: Euroclass E according to BS EN 13501-1:2018
- Working temperature range: -50°C to +75°C.

Further advice:

- Do not lay insulation until roof is clear of other substrates
- Clean off all dirt and debris from base
- Lay separation layer as required
- Set out to minimise cutting and avoid small cut pieces at perimeters and penetrations
- Loose lay boards, tightly butted and to brick pattern, cut cleanly to fit closely around projections, upstands, rainwater outlets, etc
- On completion of laying ensure boards have no surface damage, and do not exhibit springing, flexing or rocking
- Secure boards against wind uplift as soon as practicable
- Lay Ravatherm XPS X MK.

Disclaimer

Ravatherm XPS X ULTRA 300 SL contains a flame retardant additive to inhibit accidental ignition from a small fire source. Ravatherm XPS X ULTRA 300 SL is however, combustible and if exposed to an intensive fire may burn rapidly.

During shipment, storage, installation and use Ravatherm XPS X ULTRA 300 SL should not be exposed to flames or other ignition sources.

Fire classification is based on small scale tests, which may not reflect the reaction of the products in its end use state under actual fire conditions.

Ravatherm XPS X ULTRA 300 SL should, when installed, be adequately protected from direct exposure to fire.

Recommendations about the methods, use of materials and construction details are given as a service to designers and contractors. These are based on the experience of Ravago with the use of Ravatherm XPS X ULTRA 300 SL.

Any drawings are meant only to illustrate various possible applications and should not be taken as a basis for design.

Since Ravago Building Solutions is a materials supplier and exercises no control over the installation of Ravatherm XPS X ULTRA 300 SL, no responsibility is accepted for such drawings and recommendations.

In particular, no responsibility is accepted by Ravago for the systems in which Ravatherm XPS X ULTRA 300 SL is used or the method of application by which they are installed. The legal obligations of Ravago in respect of any sale of Ravatherm XPS X ULTRA 300 SL shall be determined solely by the terms of the respective sales contract.

For technical enquiries, email:
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Appendix

The Ravatherm XPS X MK system

Ravatherm XPS X MK is a geotextile membrane that is water vapour permeable. Used in conjunction with Ravatherm XPS X as a waterflow reducing layer, it reduces heat loss through the ‘rainwater cooling effect’ and reduce the volume of insulation required to meet a thermal specification.

Ravatherm XPS X MK prevents rainwater from reaching the waterproofing layer, thereby reducing the rainwater cooling effect caused by rainwater flowing between the insulation and waterproofing membrane.

Installation

Ravatherm XPS X MK should be loose laid over the insulation, at right angles to the slope with 300mm laps running down the slope. This will allow the ballast, 20/40 aggregate, to counter board flotation to be reduced to 50mm. At upstands and penetrations Ravatherm XPS X MK should be turned up to finish above the surface of the ballast.

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