



## Ravago Buildings Solutions

# XENERGY™ SL

Product overview, performance and references



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# XENERGY™ SL

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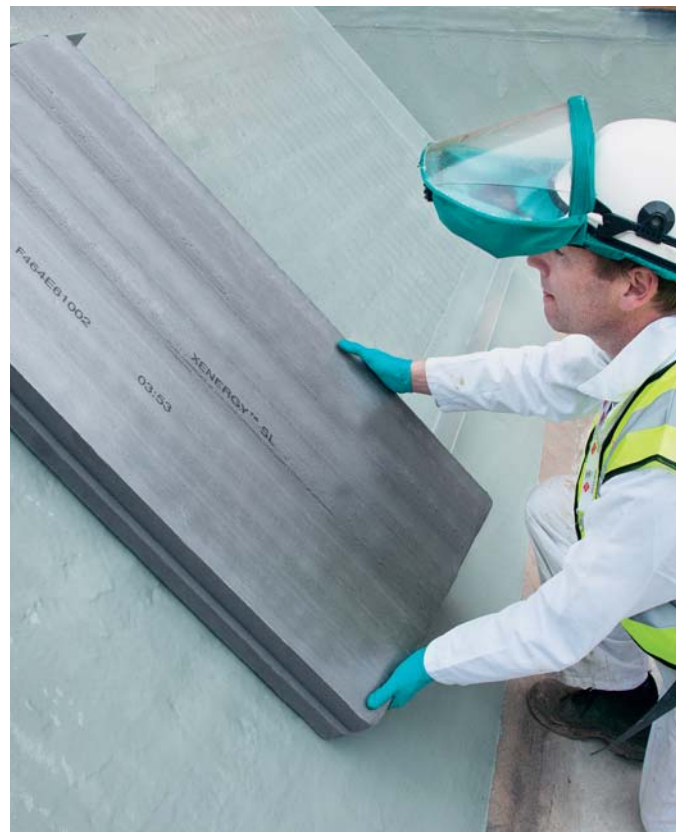
- Significantly improved lambda values with up to 11% better insulation performance



  
**0.032 W/m.K**



- The proven features of STYROFOAM™ XPS - durability, reliability and strength
- Incorporates infra-red 'blockers' which improve thermal resistance by scattering and reflecting heat radiation
- Reduced thickness offering greater design possibilities, including lower parapet heights
- Flame retarded, enhancing safety and protection on construction sites



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# A proud heritage in UK construction

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Since the 1940s, STYROFOAM XSP thermal insulation products have played a key role in the UK construction sector.

Constantly innovating to satisfy ever more demanding building and engineering project specifications, STYROFOAM XPS products deliver the thermal performance and strength you require - for the lifetime of the structure.

In particular, STYROFOAM XPS products has continued to invest heavily to meet the demands of architects and specifiers who are seeking improved

lambda values for inverted roof insulation.

More effective insulation performance enables reduced thickness of materials, meaning greater design possibilities, including lower parapet heights.

## **XENERGY™ - the new standard for inverted roof insulation**

Responding to the market, XENERGY™ SL has been arrived, a flame retarded extruded polystyrene (XPS) which replaces the STYROFOAM ROOFMATE™ SL product.

Having successfully piloted XENERGY™ SL, this XPS roof insulation product is now being produced at Ravago Buildings Solutions's production site – with domestic UK manufacture further increasing its appeal to specifiers.

XENERGY™ SL has attained a coveted Green Guide Rating A+ by BREEAM and continue to offer insulation that enables construction of energy efficient buildings.

XENERGY™ SL was launched to meet demand from architects and specifiers for a product with improved thermal performance of inverted roof insulation.

## **About XENERGY™**

XENERGY™ SL has been formulated with the addition of infra-red 'blockers' or particles which are finely dispersed and incorporated into the extruded cell walls.

The particles scatter and reflect heat radiation resulting in reduced heat transfer during winter to keep a building warm, as well as in summer to keep it cool.

Designed specifically for roofing applications, XENERGY™ SL offers declared thermal conductivity of 0.032 W/mK in thicknesses of 120mm, 140mm, 160mm, 180mm, 200mm and 205mm compared to 0.036 W/mK in the same thicknesses of ROOFMATE™ SL, resulting in an 11% improvement in insulation performance.

In addition to its function as a thermal insulation which helps to deliver Code for Sustainable Housing credits, XENERGY™ SL has a Global Warming Potential (GWP) of less than five.

The process of extruding foamed polystyrene results in a material with uniformly small, closed cells, a smooth 'skin' and an unrivalled set of properties which make it the choice of specifiers in a wide range of demanding insulation applications.

Key features include:

- Low thermal conductivity - minimising the board thickness needed to achieve a specific U-value, thus allowing the designer greater flexibility
- High compressive strength - in load-bearing applications, the closed cell structure gives the foam greater rigidity and makes it highly resistant to compression
- Low water absorption - XENERGY™ SL has natural resistance to rain, snow, frost and water vapour which makes it an exceptionally stable material, which retains its initial insulation performance and physical integrity in exposed conditions over the very long term. It was this unusual property that made the inverted warm flat roof concept possible, an idea pioneered by Ravago Buildings Solutions
- User-friendliness - XENERGY™ SL is easily worked with normal hand tools
- Hygiene - XENERGY™ SL boards have low susceptibility to rot, meaning mould or fungal growth is minimised. They are clean, odourless and free from irritating dust.

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# Developing your XENERGY™ solution

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As a world-class producer of thermal insulation products, Ravago Buildings Solutions can provide help, advice and information in order to help you achieve the solutions you're looking for. XENERGY™ SL is available in a number of different thicknesses which are designed to meet the performance requirements of specific applications. Each construction project has its own unique combination of insulation requirements, and developing an insulation project specification can be a time consuming process.

XENERGY™ SL is a product for insulating inverted roofs. The boards are highly resistant to the conditions encountered on flat roofs, including wide fluctuations in temperature and repeated freeze/thaw cycles.

This insulation is intended for use on heavyweight decks (e.g. reinforced concrete) with a ballast layer of gravel or concrete slabs. It can also be used in the XENERGY™ MK system which brings together XENERGY™ SL and a vapour-permeable separation layer, XENERGY™ MK.

The rainwater cooling effect (caused by rainwater flowing between the insulation and waterproofing membrane) requires an increase in insulation thickness in order to meet BS EN ISO 6946.

However, this increase can be substantially reduced by using the XENERGY™ MK system, which helps to minimise the heat loss due to rainwater cooling and therefore the amount of insulation required. Its rot resistance also makes it ideal for insulating green roofs.

## Meeting environmental standards

Concern about ozone depletion in the stratosphere has led to international agreements to phase out the use of ozone depleting chemicals.

All XENERGY™ SL products are hydrochlorofluorocarbon (HCFC) free and comply with the requirements of EC Regulation No 2037/2000 (1 October 2000) on substances which deplete the ozone layer.

XENERGY™ SL products use carbon dioxide as the main blowing agent - the Ozone Depletion Potential (ODP) is zero and the Global Warming Potential (GWP) is less than five.

XENERGY™ SL is manufactured at the company's Kings Lynn production site, reducing the road miles to UK construction sites.

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# Characteristics and performance

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## Surface characteristics

Ravago Buildings Solutions XENERGY™ SL boards are grey. All boards have a smooth homogeneous skin on both sides.

## Fire

Information on aspects of fire performance of extruded polystyrene in building applications is given in BS 6203:2003, 'Guide to fire characteristics and fire performance of expanded and extruded polystyrene materials (EPS and XPS) used in building applications'. XENERGY™ SL products contain a flame retardant additive to inhibit accidental ignition from a small fire source. XENERGY™ SL is, however, combustible and if exposed to an intensive fire may burn rapidly. During shipment, storage, installation and use XENERGY™ SL products 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 product in its end use state under actual fire conditions. XENERGY™ SL products should, when installed, be adequately protected from direct exposure to fire. XENERGY™ SL products achieve Euroclass E (reaction to fire).

## Temperature

Polystyrene products will melt when brought into direct contact with high temperature heat sources: for XENERGY™ SL boards the recommended maximum continuous working temperature is 75°C.

## Water/moisture

XENERGY™ SL is:

- highly resistant to water absorption
- very resistant to the passage of water vapour
- highly resistant to repeated freeze/thaw cycles.

## Biological

XENERGY™ SL has a low susceptibility to rot, and mould or fungal growth is therefore minimised.

## Chemical

XENERGY™ SL boards are compatible with most commonly occurring construction materials such as lime, cement, plaster, anhydrous gypsum, solvent-free bituminous compounds, water-based wood preservatives, as well as alcohols, acids and alkalis. Certain organic materials such as solvent-based wood preservatives, coal tar and derivatives (creosote), paint thinners and common solvents (e.g. acetone, ethyl acetate, petrol, toluene and white spirit) will attack XENERGY™ SL, resulting in softening, shrinkage and possible dissolution, with a consequent loss of performance.

The use of solvent-free adhesives is advised. Compatibility with XENERGY™ SL should be checked with the adhesive suppliers.

## Sunlight

Protect XENERGY™ SL from prolonged exposure to sunlight to prevent degradation of the surface of the board.

## Durability

When properly installed, XENERGY™ SL boards have a service life comparable with that of the building or structure.

## Environmental

XENERGY™ SL is non bio-degradable and does not present an environmental hazard.

## Disposal

Where circumstances allow, XENERGY™ SL can be:

- recycled
- disposed of as landfill
- incinerated to recover the energy content.

# Product overview

Table 1: Common properties of XENERGY™ products

Properties	Standard	Unit	Value
Specific heat	—	kJ/kgK	1.4
Coefficient of linear thermal expansion	BS 4370: Part 3: 1988:Method 13	mm/mK	0.07
Working temperature range	—	°C	-50 to +75
Fire classification: reaction to fire	BS EN 13164 + BS EN 13501: Euroclass E		

# Product data tables

## Declared thermal resistance ( $R_p$ ) - $m^2.K/W$

Thickness mm	XENERGY™ SL
50	1.65
80	2.60
100	3.15
120	3.75
140	4.35
160	5.00
180	5.60
200	6.25
205	6.40



Extruded polystyrene foam XPS (EN13164) - HFC free - grey color				
Property	Standard	Unit	Value	EN code
Thermal conductivity Declared value <sup>1)</sup>				
Thickness <60 mm	BS EN 13164	W/mK	0.030	$\lambda_D$
60-80 mm	BS EN 13164	W/mK	0.031	$\lambda_D$
>80 mm	BS EN 13164	W/mK	0.032	$\lambda_D$
Mechanical properties				
Compressive strength or compressive stress at 10% deformation (90 days)	BS EN 826	kPa	300	CS(10\Y)
Compressive creep (design load) max 2% deflection after 50 years <sup>2)</sup>	BS EN 1606	kPa	110	CC(2/1.5/50) $\sigma_c$
Hygrometric properties				
Long term water absorption by immersion (28 days)	BS EN 12087	Vol-%	≤0.7	WL(T)
Long term water absorption by diffusion dN ≥50 mm to <80 mm	BS EN 12088	Vol-%	≤2	WD(V)
dN ≥80 mm	BS EN 12088	Vol-%	≤1	WD(V)
Freeze/thaw, after 300 cycles	BS EN 12091	Vol-%	≤1	FTCD
Dimensions and tolerances				
Thickness	BS EN 823	mm	50, 80, 100, 120, 140, 160, 180, 200, 205	T
Width	BS EN 822	mm	600	-
Length	BS EN 822	mm	1250	-
Other properties				
Reaction to fire	BS EN 13501-1	-	E	Euroclass
Linear thermal expansion coefficient	-	mm/m.K	0.07	-
Maximum service temperature	-	°C	+75	-
Capillarity	-	-	0	-
Density	BS EN 1602	kg/m <sup>3</sup>	34	-
Surface	-	-	skin	-
Edge profile	-	-	shiplap	-
<b>EN designation code: T1-CS(10\Y)300-CC(2/1.5/50)1 10<sup>2)</sup>-WL(T)0.7-WD(V)1,2<sup>3)</sup>-FTCD1-DS(70,90)-DLT(2)5</b>				

1) Declared thermal conductivity  $\lambda_D$  according to EN 13164 (§ 4.2.1; Annex A; Annex C.2 and C.4.1)

2) for thickness ≥80mm

3) varies with thickness

## Authority

XENERGY™ SL is manufactured under the BS EN ISO 9001:2008 Quality Management System (BSI certificate Q05968). Ravago Buildings Solutions also operates an Environmental Management System, which has accomplished ISO 14001:2004 (BSI Certificate EMS 547690). XENERGY™ SL products comply with -

BS EN 13164: 2012+A1:2015 Thermal insulation products for buildings. Factory made extruded polystyrene foam (XPS) products. Products of extruded polystyrene (XPS) - specification.



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# Useful references

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## Building regulations

- Approved Document A: (Structural safety)
- Approved Document B – Fire Safety:  
Volume 1 – Dwellinghouses
- Approved Document B – Fire Safety:  
Volume 2 – Buildings other than dwellinghouses
- Approved Document C – Site preparation and resistance to contaminants and moisture
- Approved Document L1A: Conservation of fuel and power in new dwellings
- Approved Document L2A: Conservation of fuel and power in new buildings other than dwellings
- Approved Document L1B: Conservation of fuel and power in existing dwellings
- Approved Document L2B: Conservation of fuel and power in existing buildings other than dwellings
- Technical Handbooks to Building Standards Scotland Regulations

## BRE publications

- Thermal insulation: avoiding risks BR 262: 2002
- Conventions for U-value calculations
  - B.Anderson BR443: 2006
- BRE Building Elements: Foundations, basements and external works, 2002
- BRE Building Elements: Floors and flooring, 2nd edition, 2003
- BRE Building Elements: Roofs and roofing, 3rd edition, 2009
- BRE Digest 295: Stability under wind load of looselaid external roof insulation boards
- BRE Digest 311. Wind scour of gravel ballast on roofs
- BRE IP 1/06. Assessing the effects of thermal bridging at junctions and around openings

## British Standards

- BS 476-10: 2009: Fire tests on building materials and structures. Guide to the principles, selection, role and application of fire testing and their outputs
- BS 476-21: 1987: Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction
- BS 476-3: 2004: Fire tests on building materials and structures. Classification and method of test for external fire exposure to roofs
- BS 5250: 2011: Code of practice for control of condensation in buildings
- BS EN 1995-1-1:2004+A2: 2014: Eurocode 5: Design of timber structures. General. Common rules and rules for buildings
- BS 6203: 2003 Guide to fire characteristics and fire Performance of expanded polystyrene materials (EPS and XPS) used in building applications
- BS 6229:2003 Flat roofs with continuously supported coverings. Code of practice
- BS EN 1991-1-1: 2002: Eurocode 1. Actions on structures. General actions. Densities, self-weight, imposed loads for buildings
- BS EN 1991-1-3: 2003: Eurocode 1. Actions on structures. General actions. Snow loads
- BS EN 1991-1-4: 2005+A1: 2010: Eurocode 1. Actions on structures. General actions. Wind actions
- BS 8000-0: 2014: Workmanship on construction sites. Introduction and general principles
- BS 8000-4: 1989: Workmanship on building sites. Code of practice for waterproofing.
- BS 8102: 2009: Code of practice for protection of below ground structures against water from the ground
- BS 8103-1: 2011: Structural design of low rise buildings. Code of practice for stability, site investigation, foundations, precast concrete floors and ground floor slabs for housing
- BS EN 1992-1-1: 2004: Eurocode 2: Design of concrete structures. General rules and rules for buildings
- BS 8201: 2011: Code of practice for installation of flooring of wood and wood-based panels
- BS 8204-1: 2003+A1: 2009: Screeds, bases and in situ floorings. Concrete bases and cementitious levelling screeds to receive floorings. Code of practice
- BS 8218: 1998: Code of practice for mastic asphalt roofing

### **European standards**

- BS EN 12056-3: 2000: Gravity drainage systems inside buildings. Roof drainage, layout and calculation
- BS EN 13164: 2012+A1: 2015: Thermal insulation products for buildings. Factory made extruded polystyrene foam (XPS) products. Specification
- BS EN 13501-1: 2007+A1: 2009: Fire classification of construction products and building elements. Classification using test data from reaction to fire tests
- BS EN ISO 13370: 2007: Thermal performance of buildings. Heat transfer via the ground. Calculation methods
- BS EN ISO 13788: 2012: Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface Humidity and interstitial condensation. Calculation method
- BS EN ISO 13789: 2007: Thermal performance of buildings. Transmission and ventilation heat transfer coefficients. Calculation method

### **International standards**

- BS EN ISO 6946: 2007: Building components and building elements. Thermal resistance and thermal transmittance. Calculation method

### **Other publications**

- CIBSE Guide A: Environmental design 2015
- DEFRA/DTLR Robust Details - Limiting thermal bridging and air leakage: Robust Construction details for dwellings and similar buildings. 2002
- BBA information bulletin 4 2012
- Guidance Document – Basement for dwellings. The Basement Information Centre.

## Recommendations

XENERGY™ products contain a flame retardant additive to inhibit accidental ignition from a small fire source. XENERGY™ is however, combustible and if exposed to an intensive fire may burn rapidly.

During shipment, storage, installation and use XENERGY™ products 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. XENERGY™ products 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 Buildings Solutions with the use of XENERGY™ products. Any drawings offered by Ravago Buildings Solutions are meant only to illustrate various possible applications and should not be taken as a basis for design. Since Ravago Buildings Solutions is a materials supplier and exercises no control over the installation of XENERGY™ products, no responsibility is accepted for such drawings and recommendations.

In particular, no responsibility is accepted by Ravago Buildings Solutions for the systems in which XENERGY™ products are used or the method of application by which they are installed. The legal obligations of Ravago Buildings Solutions in respect of any sale of XENERGY™ products shall be determined solely by the terms of the respective sales contract.

**Ravago Building Solutions**

**[www.ravatherm.com](http://www.ravatherm.com)**

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