



Xtratherm[®]
A **UNILIN** Company

When Self Build Becomes a Team Effort

The Self Build Guide
to achieving a practical,
affordable energy
efficient home.

xtratherm.com

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Good 'Mews' story in Dún Laoghaire, Passive House magazine, April 2019, www.passivehouseplus.ie features four 55 square metre apartments built by Dún Laoghaire-Rathdown County Council, completed December 2017 to Nearly zero energy building (nZEB) standard.

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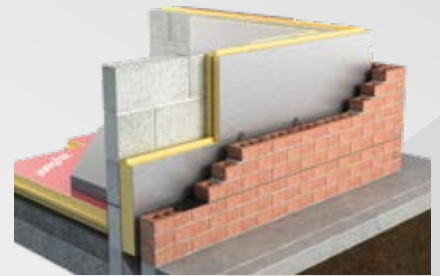
With you when building your energy efficient home.

Traditionally when you made the decision to build your own home the question of 'How energy efficient should it be?' was up there with 'What size? How many bedrooms? What finishes will I choose?' As regulations move towards Nearly Zero Energy Buildings and Passive levels, the question of efficiency has largely become mandatory, lets face it, those building their own homes want the best achievable. Your house will be greener, it will be cheaper to heat the space, the hot water and cheaper to light. However how you achieve this efficiency raises more questions... How do I get there?

This guide gives honest practical solutions to achieving an energy efficient low carbon home that works for your family.

As we state later, you only get one chance at getting the insulation correct. Insulation, just 'sits there' and quietly reduces energy consumption and running

costs, however product performance can be affected if installed incorrectly. Here we set out the main issues in getting it right first time and explain how we at Xtratherm can play our part in making your self build project a success.



Insulate Right. Ventilate Right.

Of all sectors of the construction market, the self builder is the single most focused customer that Xtratherm encounters. It's your project, your dream and your investment, you have to care.

You, the Self Builder, know the importance of research, learning and becoming your own expert. There are many methodologies on low energy build and any amount of advisors willing to advise. Ultimately it is you that will settle on an energy standard and construction specification that suits you and your family and that is how it should be.

You understand the importance of getting your insulation right - the team at Xtratherm are here to help and advise....

**When Self Build
Becomes a Team Effort.**



What targets should you aim for?

Nearly Zero

Whether NZEB or Passive levels the insulation performance targets of the building fabric, i.e. walls, floors, roof and openings are becoming standardised. Walls, around a U-Value of 0.15 W/m²K, floors around 0.12 W/m²K and roof around 0.14 W/m²K. Glazing will always be colder at somewhere between 0.80 - 1.4 W/m²K.

As with most issues - 'reasonable' works. There is a law of diminishing returns when it come to U-Values. Pushing cavities to unreasonable widths that require more and greater wall ties, with ever increasing foundations, has little benefit in terms of energy savings. Building Regulation guidance gives indicative targets for building fabric best practice looking toward nZEB or the Future Homes Standard - the table below illustrates good performance targets.



Comparison between new Part L and Future Homes Standard

	Part L 2013 ¹	Part L 2021 ²	Future Homes Standard ³	Climate Challenge 2030 ⁴
Primary Energy from SAP for lights, space and water heating	82.35	57.55	44.61	34.45
Operational energy (kWh/m ² /y) – Space heating only	40.73	42.75	17.20	18.31
Floor	0.13	0.13	0.11	0.11
External wall	0.18	0.18	0.15	0.15
Roof	0.13	0.11	0.11	0.11
Windows	1.4	1.2	0.8	1.2
Doors	1.2	1.0	1.0	1.0
Thermal bridging	0.035	0.036	0.036	0.036
Air permeability	5	5	5	5
Heating system	Gas boiler	Gas boiler	Heat pump	Heat pump
Ventilation	Natural	Natural	Natural	Natural
WWHR	Yes	Yes	N/A	N/A
PV	N/A	Yes	N/A	N/A
Embodied Carbon (kgCO ₂ e/m ²)	N/A	N/A	N/A	<500

¹Calculations based on guidance in SAP 2012 manual, ²Calculations based on guidance in SAP 10 (BETA) manual, ³Calculations based on guidance in FHS consultation document, ⁴Calculated based on the details used in Xtratherm's independent assessment of Embodied Carbon.

Prioritising the Fabric First Approach

There are a range of compliance options available to the Designer or Specifier. The Fabric First approach concentrates on achieving U-Values and Thermal Bridging detailing improvements towards Passive levels. These measures might be less dynamic than mechanical ventilation systems or additional renewable technologies, but you only get one chance at getting the insulation correct. Insulation just 'sits there' and quietly reduces energy consumption and reduces the running costs. Any technologies, ventilation systems, heating systems even double glazing has a life span.

Improvements in U-Values to around 0.15 W/m²K as illustrated, with better detailing on site to improve thermal bridging 'Y-Values' towards 0.04 simply stops heat loss.

The better the building fabric into which these technologies are placed, the better their performance.

For a comprehensive specification choice for the self builder please refer to page 13 of this Guide.

Thermal Bridging - The difference is in the detail

Like all other inputs into a building energy calculation, the way that insulation is installed to avoid thermal bridging has a numerical input into the software which is called a Y-Value.

A set of 'good practice' details have been available in the form of 'Accredited Construction Details for Part L' (ACDs) published by the Department for Communities and Local Government (DCLG) in the UK. These details are a set of design drawings for the junctions listed in Appendix K Table K1 in the SAP 2012 Manual which are most prone to heat loss. They detail, using traditionally used in UK construction methods and materials, how insulation should be installed at these critical junctions in order to improve not only the heat loss but also airtightness results. This also helps reduce the risk of condensation by ensuring surface temperatures are within a safe margin.

What is Thermal Bridging?

Thermal bridging occurs in small areas where the insulation level is reduced significantly compared with the remainder of the element. They may be 'Repeating,' 'Random,' or 'Non-Repeating.'

Where does Non-Repeating occur?

Non-repeating thermal bridges typically occur at the junctions between plane building elements, e.g. at wall / roof, wall / floor junctions, and around openings, e.g. at window jambs, sills and also corners where the continuity of the insulation is interrupted.

How is it accounted for?

Thermal bridges are calculated as a linear thermal transmittance value - PSI (Ψ) measured in W/mK. SAP is the software that is used to calculate a dwellings EPC rating. Within SAP Thermal bridging through junctions are accounted for as a 'Y-Value.'

Are all junctions accounted for within SAP?

No. The major critical junctions are those that account for the majority of the heat loss. However reasonable care should be taken to insulate all bridges that occur on-site to avoid condensation.



y = 0.15

(SAP Default)

The equivalent of an open 'Garage Door' 2.1m x 3.3m (6.93m²) opening.



y = 0.08

(Accredited Details)

The equivalent of an open 'Patio Door' 2.1m x 1.8m (3.78m²) opening.



y = 0.03

(Thermally Modelled Junctions)

The equivalent of an open 'Window' 1.25m x 1.25m (1.56m²) opening.

Ventilation Strategy

The Government 'recipes' for compliance limit airtightness to allow for natural ventilation to be used to achieve NZEB. Xtratherm have taken the same view. Airtight build requires mechanical ventilation. Ventilation strategies are complicated and must be designed, installed and maintained through their lifetime to ensure healthy operation.

Refer to NHBC Guidance 3.2 - *Installing an MVHR system is one way of providing ventilation, with the additional benefit of reducing energy use; however, their in-service performance can be extremely sensitive to relatively minor installation defects. Fundamental to MVHR systems achieving satisfactory in-service performance is to ensure that appropriate standards are followed, not only for the on-site installation but, importantly, right at the start of the construction process - at the design stage.*

Secondary Heating

In a number of configurations we have met the NZEB standard while including a wood burning stove. Much like ventilation, heating should reflect the owners preference, many prefer open windows - even in the depths of winter. How we use our properties influences the energy and carbon results.

Specification choice Questions for Self Build...

Traditionally when you made the decision to build your own home the question of 'How energy efficient should it be? was up there with 'What size? How many bedrooms? What finishes will I choose?'

That question of efficiency has largely become mandatory, your house will be greener, it will be cheaper to heat the space, the hot water and cheaper to light. However how you achieve this efficiency raises more questions... How do I get there?

Specification choice for the Self Builder

There is a range of compliance options available to the Designer or Specifier. The Fabric First approach concentrates on achieving U-Values and Thermal Bridging detailing improvements towards Passive levels. These measures might be less dynamic than mechanical ventilation systems or additional renewable technologies, but you only get one chance at getting the insulation correct. Insulation just 'sits there' and quietly reduces energy consumption and lowers running costs.

Other 'technologies', ventilation systems, heating systems even double glazing has a life span and will have to be maintained, repaired or replaced during the life of your home. The following topics are often discussed when our tech guys get into discussion with self builders, our team has extensive experience across a wide range of topics — they're there to help. **Perhaps we can share some of our experience and assist where we can in the planning of your new home.**

**When Self Build
Becomes a Team Effort.**



An air-tight build?

The Government 'recipe' within building guidance reaches NZEB standard with a reasonable air permeability of 5. This allows for natural instead of mechanical ventilation to be used. Pushing air tightness beyond 5 really necessitates the requirement for mechanical whole house ventilation systems which must be designed, installed and maintained professionally – it is not easy to get right.

In many constructions an Air Tight regime will be necessary to maximise the choice of renewable heating system, ensure that your Architect and Engineer are fully competent in the design and installation of the mechanical ventilation systems – maintenance is down to you.

Careful design will also be required if natural ventilation is chosen to ensure adequate background ventilation is achieved naturally and regulation standards are met. In UK we are blessed with a mild climate where most of us sleep with the windows open, it is a matter of preference.

At an Air Infiltration and Ventilation Symposium in Dublin March 2019 it was illustrated how difficult it is to get the desired performances – This study looked at properties across Europe and in the UK

www.aivc.org/resources/collection-papers/aivc-publications

Excerpt:

France: Jobert (2012) & Guyot et al. (2015)

1287 new dwellings – 68% had non-compliant ventilation systems.

All of the 21 low-energy houses to Building Regulations 2012 did not comply fully with ventilation requirements:

- 55% due to poor on-site installation
- 43% due to a poor design
- 2% due to inappropriate use/maintenance by end user

UK: Zero Carbon Hub (2016)

33 dwellings – 6 sites to Building Regulations 2010. Not one site complied with Building Regulations on ventilation.

UK: AECOM (2016)

2 in 55 new dwellings with NV complied and 1 in 25 new dwellings with MEV complied. Only 16% of MVHR were installed correctly.

Timber Frame or Traditional Block?

Any construction method can achieve NZEB standard or better. The preference is basically down to you. However in all cases, the construction process on site is the single biggest factor in achieving your energy saving goals, our advice is to walk with your Architect and Builder through the whole design and build process right to the end of the contract to ensure delivery of a quality home.

Responsible Builders will ensure detailing standards and quality is achieved through an evidence based record of good detailing as the build progresses allowing accurate calculation by the Energy Assessor and Building Control.



Having your Designer available to give guidance on site will deliver a better quality home.

Is NZEB as far as I can go?

There are many methodologies on low energy build and any amount of advisors willing to advise. NZEB can be improved upon to further cut carbon. Issues of embodied carbon should also be considered.

When building your own home, research, learn and become your own expert and settle on a standard and construction specification that suits you and your family.


Many strive to achieve Passive House Standards, the Passivhaus Trust in the UK can offer guidance and advice - passivhaustrust.org.uk

Or the UK Green Building Council can advise on embodied energy - ukgbc.co.uk



Double or Triple Glazing?

Again, NZEB standard has been achieved in the regulation examples by using double glazing which delivers a U-Value of 1.40 W/m²K. Triple glazed windows can achieve 0.80 – but even at this level this excellent glazing is still almost **8 TIMES** colder than the wall it is in and it will need replacing eventually.

 **Consider reducing glazing area, or draw your curtains on those wintery evenings!**


Heating Systems - Underfloor Heating, Radiators or Warm Air?

At NZEB levels your house will be very well insulated. So much so that overheating of the property becomes a serious issue in warm weather.

Make sure you can ‘flush’ the warm air in summer. It also means that incidental heating from cooking and large South facing windows will contribute to the

heating. In such situations, many would choose a system that responds rapidly.

Recent building regulations have given specific requirements in relation to overheating. Discuss this with your Engineer and again make sure your ventilation choice considers all these factors.

 **Make sure you can ‘flush’ the warm air in summer.**

Passive Foundation System?

You might be considering a ‘Passive’ foundation system as part of your strategy to save energy – but how do you know what you’re getting for the extra expense. The performance of the floor system is measured in 2 aspects:

1. The U-Value. We recommend around 0.10 - 0.12 W/m²K, around 150mm of insulation.

2. The PSI value, measuring the heatloss at the floor perimeter or edge. A Passive System normally acts as an insulated wrap to the underside of the wall and can get PSI values as low as 0.08, however,

so can traditional strip foundation with an Aerated or even Medium Density traditional block. Consider loading capabilities if your building higher than single storey. Also the effects of water or even contaminants leeching into such systems. Whatever you choose, thermal performance of these systems are very similar. Ask for the U-Value and PSI values achieved.

Pumped Cavities or Built-in?



Achieving better performing buildings will take more care and time to build, it will necessitate more careful detailing and consideration from your Architect, but ultimately – you save on heating bills over many years. No matter where your energy comes from – it will have to be paid for, so reduce your requirement.

Built-in insulation may not be the cheapest option, but the real benefit is that it reaches the same performances

at reduced thicknesses saving on other building material costs such as widening cavities, that calls for more wall ties, more engineering consideration, wider foundations and longer rafters.



The real benefit is that you can see it being built in. You can verify it's continuous and is being detailed in footing, corners, openings etc; you can see your investment installed correctly.

It's in the detail – who monitors build quality?



How well your house is insulated is 'scored' in the energy calculation that deems your Energy Rating. It is not just the U-Value achieved, but how the insulation was installed to create a continuous thermal protection that knits at all the junctions, insulates around openings and protects around DPCs etc. In a well insulated property, discrepancies and gaps in the insulation layer will leave gaps or cold spots that will result in mould growth, particularly in a property where the ventilation is inadequate.

Good detailing to avoid these thermal bridges delivers excellent energy savings and protection from cold spots.

This detailing should be recorded and submitted to the Energy Surveyor to improve your energy rating and give comfort to you the owner. There are a set of Accredited Construction Details (ACDs) that need to be followed to comply with Building Regulations. Your Builder is the only person that is available throughout the build to inspect and record that the ACDs are followed.



Working closely with the Designer and Xtratherm, we can deliver energy saving through better detailing, with online courses, toolbox talks and installation videos for your builder to consult.

Wood burning Stove or not?



In a number of the examples in our guide to achieving NZEB we have included the provision of a wood burning stove as the source for secondary heating in a property. This may not be practical in an urban environment, but many Self Builders see the addition of a wood burning stove as an important feature of how they heat their home and how they use their home.

Better design and technologies will never mitigate all CO₂ produced from our dwellings. How we use our homes, and the lifestyle we choose is down to ourselves.



Efficient wood burning stoves using kiln dried local timber, might be one of the choices you prefer, it can still help to achieve the NZEB standard.



1-2-1 Free Self Build Advice

Xtratherm's Technical Team is now offering Free, Friendly 1-2-1 advice for Self Builders



PLATINUM SERVICE
For Self-builders

Self Builders and their design and certification team can rely on the expertise and professional support of the whole Xtratherm team - it is not just about buying insulation products.

The Platinum Service for Self Build gives you the highest level of support from design stage to delivery of real performance on site; from calculation to installation. This Platinum Service can be availed of on projects where at least one other Xi product is used along with an Xi cavity wall system within that range achieving a U-Value of $<0.15 \text{ W/m}^2\text{K}$. The following page lists the products which apply to this service.

For further information and to register for the Platinum Service for Self Build:

<https://www.xtratherm.com/register-for-platinum-service-for-self-build/>

The Benefits

- | | |
|--|---|
| <hr/> + Free Consultation Service with project dedicated Xtratherm Technical expert | <hr/> + Pre-design Assessment of details & U-Value performance |
| <hr/> + Certified U-Value Calculations / Condensation Risk Analysis | <hr/> + Personal consultation and access to on-line training |
| <hr/> + Fabric performance specifications to achieve 'A' rated building | <hr/> + Prompt response – all project sizes |
| <hr/> + Pre-tender Xtratherm spec check | |



Innovative Products

CavityTherm

Passive Performance Built-in Cavity System

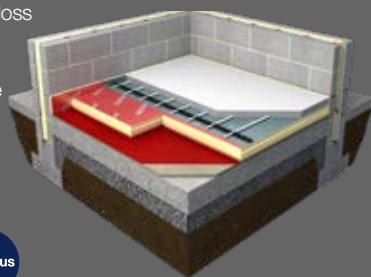
CavityTherm is an innovative built-in insulation for traditional walls that achieves passive level U-Values as low as 0.12 W/m²K with excellent thermal bridging detailing in cavities less than 150mm wide.



Hyfloor (T&G)

Engineered T&G Floor Insulation

The floor in any building is an area of considerable downward heat loss when not properly insulated. Xtratherm has developed Hyfloor (T&G) engineered tongue and grooved floor insulation as the answer to achieving lower U-Values – in a practical and robust manner.



Insulation Solutions You Can Trust

- + U-Values
- + Thermal Bridging
- + Calculations

XtroLiner Pitched Roof

Passive Performance Pitched Roof Insulation

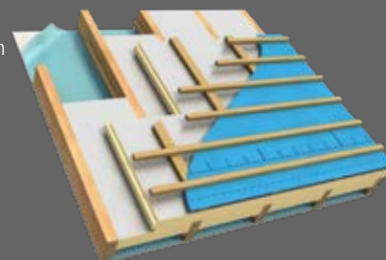
XtroLiner Pitched Roof on sloped roofs (ventilated, hybrid or warm) provides the most efficient U-Values with minimal intrusion into valuable living space. The roof construction is a critical element in the building fabric and is an area at high risk of heat loss. Using XtroLiner Pitched Roof will reduce heat loss while also delivering excellent thermal bridging details.



XtroLiner Sarking (T&G)

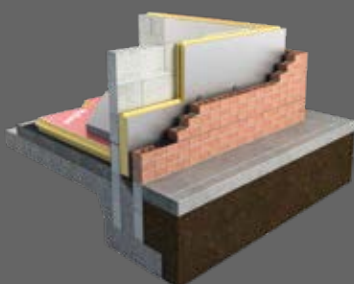
Passive Performance - Warm Roof Sarking Insulation

XtroLiner Sarking (T&G) is an engineered tongue and grooved external roof insulation system with robust facings which meets the passive U-Value of 0.15 W/m²K.



XtroLiner Cavity Wall (T&G)

XO/CW Tongue & Groove is an innovative partial fill wall cavity insulation system incorporating robust facings, engineered jointing details, preformed corners and a certified lambda of 0.021 W/mK. The XO/CW Tongue & Groove jointing offers a practical on-site solution that results in a more robust continuous layer of insulation, minimising the threat of thermal bridging and improving the overall U-value of the wall.





CavityTherm

Built-in Full Fill Cavity Walls

Xtratherm CavityTherm wall insulation board is a high performance composite board of enhanced PIR core with a lambda value of 0.021 W/mK. The boards have gas tight facings with one face bonded to a profiled HIPS skin during manufacture to provide a drainage plane.

CavityTherm achieves passive level U-Values as low as 0.12 W/m²K with excellent thermal bridging detailing in cavities less than 150mm wide.

Key Benefits

- ☒ Engineered HIPS facer provides wind driven rain protection
- ☒ Moisture redirected to outer surface
- ☒ Prepositioned slots for sloping wall ties - no creep
- ☒ Full range of accessory pieces build continuous system
- ☒ Excellent Thermal bridging values

Technical Data

Thermal Performance



Typical U-Values

CavityTherm (Inner block 100)

	100mm	125mm	150mm
Light 0.15	0.18	0.15	0.12
Med 0.33	0.19	0.15	0.13
Dense 1.13	0.19	0.16	0.13

Block Type

Values based on Brickwork outer leaf & Plasterboard on Dabs internal finish

Thermal Resistances

Thickness (mm)	R-Value* (m ² K/W)
100	4.50
125	5.70
150	6.90

* PIR only

CavityTherm	
Thermal Conductivity	0.021 (W/mK)
Length (mm)	1200
Width (mm)	450
Thickness (mm)	100, 125, 150

The CavityTherm boards have gas tight facings with one face bonded to a profiled HIPS skin during manufacture to provide a drainage plane. CavityTherm's unique profiled facing directs any moisture that might have penetrated the external wall down the protective facing and back onto the external leaf.

Thermal Bridging

To achieve good detailing, Accredited Construction Details (ACDs) should be followed during the planning, design and build process

Specification Clause

The built in wall insulation system shall be ___mm CavityTherm manufactured to EN 13165 by Xtratherm, including corner boards and ancillary detail components comprising of engineered jointed rigid Polyisocyanurate (PIR) with a lambda value of 0.021 W/mK with heavy low emissivity foil facings and engineered outer skin to achieve a U-Value of ___W/m²K for the wall element.

The board includes specifically designed rebated edge detailing on all four edges to allow the system to tightly interlock when installed.

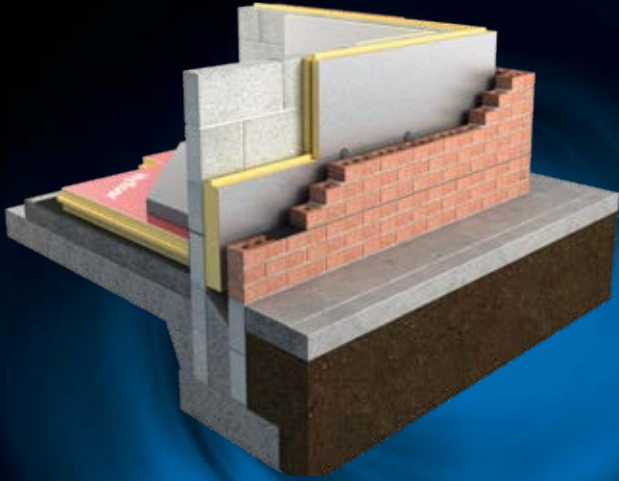
Refer to NBS clause F30 150, F30 12. To be installed in accordance with instructions issued by Xtratherm.

NBS Plus

CavityTherm Accredited Details

Acceptable Details	Block Type	100mm PSI	Default PSI
E2 Lintel	Dense 1.13	0.005	1.000
E2 Lintel	Med 0.31	0.006	1.000
E2 Lintel	Light 0.11	0.007	1.000
E3 Sill	Dense 1.13	0.003	0.080
E3 Sill	Med 0.31	0.003	0.080
E3 Sill	Light 0.11	0.003	0.080
E4 Jamb	Dense 1.13	0.003	0.100
E4 Jamb	Med 0.31	0.003	0.100
E4 Jamb	Light 0.11	0.004	0.100
E5 Ground floor	Dense 1.13	0.167	0.320
E5 Ground floor	Med 0.31	0.077	0.320
E5 Ground floor	Light 0.11	0.054	0.320
E16 Ext Corner	Dense 1.13	0.052	0.180
E16 Ext Corner	Med 0.31	0.046	0.180
E16 Ext Corner	Light 0.11	0.040	0.180

*Using 100mm CavityTherm. Psi values for other thicknesses can be requested from our technical department.



Xtroliner Cavity Wall (T&G)

Insulation for Partial Fill Cavity Walls

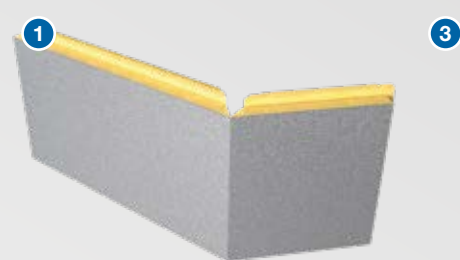
XO/CW (T&G) is an innovative partial fill wall insulation system incorporating robust facings, engineered jointing details, performed corners and a certified lambda of 0.021 W/mK.

This lower lambda improves U-Values and meets Zero Carbon standards, proving an excellent choice for passive and low energy builds. **XO/CW (T&G)** can achieve a passive U-Value of 0.15 W/m²K in a traditional cavity wall. Building with **XO/CW (T&G)**, a residual cavity is maintained, offering excellent protection against wind driven rain.

Key Benefits

- ☒ Engineered Jointing
- ☒ Corner panels and Cavity Closers: Reduced Thermal Bridging
- ☒ Clear Cavity Maintained
- ☒ Lower Lambda Value for Improved U-Values
- ☒ Robust Textured Foil

Technical Data



XO/CW (T&G)	
Length (mm)	1200
Width (mm)	450
Thickness (mm)	50, 60, 75, 80, 100

Other thicknesses may be available depending on minimum order quantity and lead time.

Property & Units	
Thermal Conductivity	0.021 (W/mK)
Compressive Strength	>120 (kPa)
Reaction to Fire	Euroclass C-s2, d0

Xtratherm CE Declaration of Performance (DoP) for this product is available for download from our website.

Note

A residual cavity is the air space that remains when XO/CW (T&G) is placed against the inner leaf of the cavity of a wall.

The recommended residual cavity width required is 50mm in accordance with agrément certification, however a reduced cavity may be permissible in certain circumstances.

Thermal Performance

Typical U-Values

Table 1

U-Value calculations to EN ISO:6946
XO/CW (T&G) Insulation for Partial Fill Cavity Walls

- Plasterboard Dot & Dab
- 100mm Inner Leaf Blockwork
- XO/CW (T&G)
- Low E Unventilated Cavity
- 100mm outer Leaf Blockwork
- 19mm Sand/Cement Render

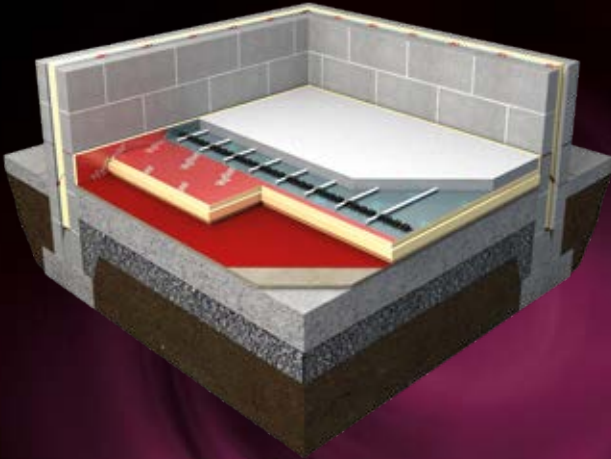
Wet plaster finish: increase insulation thickness by 5mm
Wall ties taken as S/S wire at 3 ties per m²

		Thickness (mm)				
Block Lambda		50	60	75	80	100
0.11		0.23	0.21	0.18	0.17	0.15
0.51		0.27	0.24	0.20	0.19	0.16
1.13		0.27	0.24	0.21	0.20	0.17

1
The Xtratherm Cavity Wall System includes an optional pre-formed corner panel (XO/CRN) that folds to 90 degrees to effectively insulate a corner junction that is normally vulnerable to thermal bridging and cold spots.

2
The XO/CW (T&G) tongue and groove jointing offers a practical on-site solution that results in a more robust continuous layer of insulation, minimising the threat of thermal bridging and improving the overall U-value of the wall.

3
The low emissivity foil facing on XO/CW (T&G) improves the thermal performance of the wall. The residual cavity is the most effective method of preventing wind-driven rain penetrating a wall from the outside.



Hyfloor (T&G)

Insulation for Ground Supported and Suspended Floors

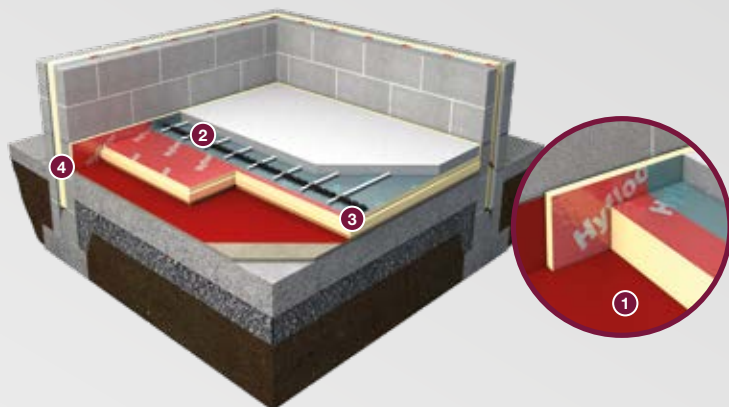
The floor in any building is an area of considerable downward heat loss when not properly insulated. Xtratherm has developed Hyfloor engineered tongue and groove floor insulation as the answer to achieve lower U-Values – in a practical and robust manner. Hyfloor has a superior thickness to performance ratio, allowing the lower targets required under Building Regulations to be achieved with minimum thickness.

**NEW AND
IMPROVED**
0.021 W/MK
LAMBDA VALUE

Key Benefits

- ☒ Excellent 0.021 W/mK Lambda value
- ☒ Robust Tongue & Groove Jointing
- ☒ High Compressive Strength
- ☒ Suitable for Underfloor Heating
- ☒ Perimeter Strips for Robust Detailing
- ☒ Reduced Insulation Thickness

Technical Data



XT/HYF (T&G)	
Length (mm)	2400
Width (mm)	1200
Thickness (mm)	75, 100, 125, 150

Other thicknesses may be available depending on minimum order quantity and lead time.

Property & Units	
Thermal Conductivity	0.021 (W/mK)
Compressive Strength	>140 (kPa)
Reaction to Fire	NPD

Xrathern CE Declaration of Performance (DoP) for this product is available for download from our website.

Specification Clause

The floor insulation shall be Xrathern Thin-R Plus XT/HYF (T&G) manufactured to EN 13165 by Xrathern, comprising a rigid Polyisocyanurate (PIR) core between low emissivity gas tight facings. The XT/HYF (T&G) __ _mm with Agrément certified Lambda value of 0.021 W/mK to achieve a U-Value of __ _W/m²K for the floor element. To be installed in accordance with instructions issued by Xrathern.

Xrathern PIR achieves an A + rating under the BRE Green Guide.

Refer to NBS clause M10 290, M10 40, M13 260, M13 40



Thermal Bridging

To achieve good detailing, Accredited Construction Details (ACDs) should be followed during the planning, design and build process.

Xrathern PSI Values* Using Accredited Details			
Acceptable Details	Block Type	100mm PSI	Default PSI
E5 Ground floor	Dense 1.13	0.167	0.320
E5 Ground floor	Med 0.31	0.077	0.320
E5 Ground floor	Light 0.11	0.054	0.320

*Using 150mm Hyfloor. Psi values for other thicknesses can be requested from our technical department.

1

The Hyfloor (T&G) tongue and groove jointing offers a practical on-site solution that results in a more robust continuous layer of insulation, minimising the threat of thermal bridging.

2

Hyfloor (T&G) is lightweight and suitable for use with underfloor heating. Thanks to its thickness to performance ratio, it allows for reduced insulation thickness. The boards should be laid staggered in a break bonded pattern and fitted tightly at edges and around any service penetrations.

3

These boards provide the most efficient means of floor insulation. It has the strength and thermal properties required to reach the high performance U-Values asked for in the Building Regulations.

4

Good detailing at the wall/floor junction is essential to reduce thermal bridging. By placing an upstand of Xrathern Perimeter strip (XT/STR) insulation 25mm thick around the external and internal wall/floor junctions, a robust detail is created.

Thermal Performance

Typical U-Values

Table 1
U-Value calculations to EN ISO:6946
XT/HYF (T&G) Insulation for Ground Supported Floors

- 65mm screed
- Separating layer Polythene sheet
- Insulation with Perimeter strips
- DPM 1200 gauge Polythene or Radon barrier
- Concrete slab

Perimeter/Area Ratio

Thickness (mm)	Perimeter/Area Ratio					
	0.40	0.50	0.60	0.70	0.80	0.90
75mm	0.19	0.20	0.20	0.21	0.21	0.21
100mm	0.15	0.16	0.16	0.17	0.17	0.17
125mm	0.13	0.13	0.14	0.14	0.14	0.14
150mm	0.11	0.12	0.12	0.12	0.12	0.12

Table 2

U-Value calculations to EN ISO:6946 XT/HYF (T&G)
Insulation for Beam and Block Suspended Floor

- 65mm screed
- Separating Layer Polythene sheet
- Insulation with Perimeter strips
- DPM 1200 gauge Polythene or Radon barrier
- Beam and Block Suspended Floor

Perimeter/Area Ratio

Thickness (mm)	Perimeter/Area Ratio					
	0.40	0.50	0.60	0.70	0.80	0.90
75mm	0.19	0.19	0.20	0.20	0.20	0.21
100mm	0.15	0.16	0.16	0.16	0.16	0.17
125mm	0.13	0.13	0.13	0.14	0.14	0.14
150mm	0.11	0.11	0.12	0.12	0.12	0.12

Thermal Resistances

Thickness (mm)	R-Value (m ² K/W)
75	3.55
100	4.75
125	5.95
150	7.10

Resistance 'R' Values

The resistance value of any thickness of Xrathern insulation can be ascertained by simply dividing the thickness of the material (in metres) by its agrément declared lambda value, for example: Lambda 0.021 W/mk and thickness 75mm -> 0.075/0.021 -> R-Value = 3.55. In accordance with EN 13165, R-Values should be rounded down to the nearest 0.05 (m²K/W).

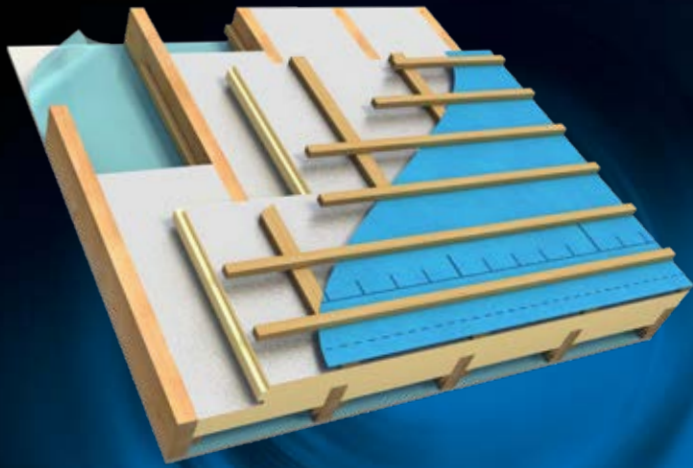
Table 3

U-Value calculations to EN ISO:6946
XT/HYF (T&G) Insulation for Hollow Core Suspended Floor

- 65mm screed
- Separating Layer Polythene sheet
- Insulation with Perimeter strips
- DPM 1200 gauge Polythene or Radon barrier
- 150mm Suspended Hollow Core floor

Perimeter/Area Ratio

Thickness (mm)	Perimeter/Area Ratio					
	0.40	0.50	0.60	0.70	0.80	0.90
75mm	0.19	0.19	0.20	0.20	0.20	0.21
100mm	0.15	0.16	0.16	0.16	0.16	0.17
125mm	0.13	0.13	0.13	0.14	0.14	0.14
150mm	0.11	0.11	0.12	0.12	0.12	0.12



XtroLiner Sarking (T&G)

Insulation for Sarking Warm Roof Construction

XtroLiner Sarking is an engineered tongue and grooved external roof insulation system with robust facings which meets the passive U-Value of 0.15 W/m²K. Using XtroLiner Sarking improves detailing, speeds up the installation process and provides a uniform plane to detail more effectively.

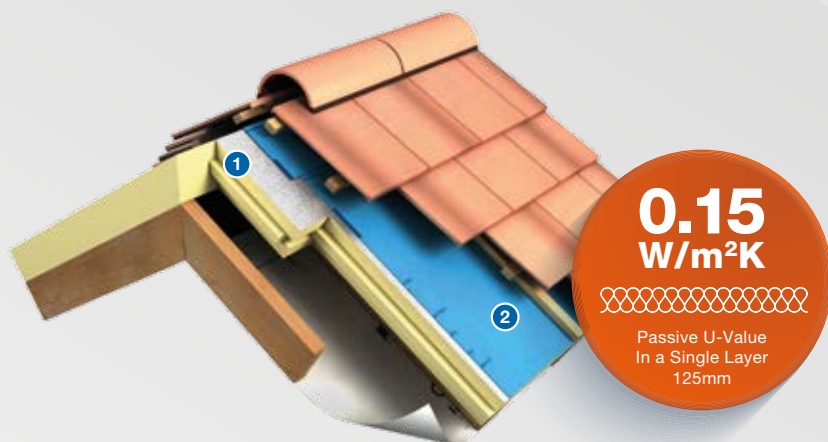
Creating a warm roof reduces the normal amount of junctions prone to thermal bridging greatly improving the thermal performance of the roof.

Key Benefits

- ☒ Robust Tongue & Groove Jointing
- ☒ Avoids Intrusion into Living Area
- ☒ Excellent U-Value in roofs
- ☒ Reduced Thermal Bridging
- ☒ Reduced Risk of Condensation

Technical Data

Thermal Performance



XO/SK (T&G)	
Length (mm)	2400
Width (mm)	1200
Thickness (mm)	75, 100, 125

Other thicknesses may be available depending on minimum order quantity and lead time.

Property & Units	
Thermal Conductivity	0.021 (W/mK)
Compressive Strength	>150 (kPa)
Reaction to Fire	Euroclass C-s2, d0

Xtratherm CE Declaration of Performance (DoP) for this product is available for download from our website.

Specification Clause

The pitched roof Sarking insulation shall be Xtratherm Xtroliner XO/SK (T&G) manufactured to EN 13165 by Xtratherm, comprising a rigid modified Polyisocyanurate (PIR) core with textured robust low emissivity foil facings and engineered T&G jointing. The XO/SK (T&G) ___ mm with Lambda value of 0.021 W/mK to achieve a U-Value of ___ W/m²K for the roof element. To be installed in accordance with instructions issued by Xtratherm.

Xtratherm PIR achieves an A+ rating under the BRE Green Guide.

Refer to NBS clause P10, 140, K11 695, K11 55



Typical U-Values

Table 1

U-Value calculations to EN ISO:6946
XO/SK (T&G) Insulation for Sarking
Warm Roof Construction

Warm Roof

U-Value	Over rafters	Between rafters
0.11	100mm	100mm
0.15	75mm	75mm

Rafters taken at 400mm centres

- Breather Membrane
- XO/SK over Rafters to reduce thermal bridging
- XO/PR between Rafters
- Vapour Control
- Plasterboard

Thermal Resistances

Thickness (mm)	R-Value (m² K/W)
75	3.55
100	4.75
125	5.95

Resistance 'R' Values

The resistance value of any thickness of Xtratherm insulation can be ascertained by simply dividing the thickness of the material (in metres) by its lambda value, for example: Lambda 0.021 W/mk and thickness 125mm -> 0.125/ 0.021 -> R-Value = 5.95. In accordance with EN 13165, R-Values should be rounded down to the nearest 0.05 (m²K/W).

1

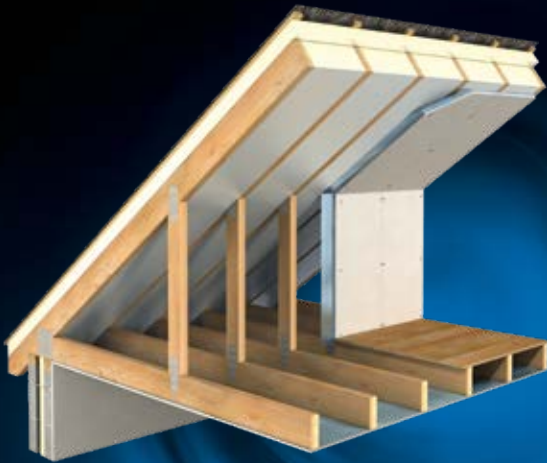
The XO/SK (T&G) tongue and groove jointing offers a practical on-site solution that results in a more robust continuous layer of insulation, minimising the threat of thermal bridging and improving the overall U-Value of the roof.

2

Detailing with vapour permeable membranes and vapour control membranes can be more accurately achieved with insulation in a single plane.

Note:

Adding an additional layer of Xtratherm XO/PR between the counter battens minimises fixing length and improves the overall U-Value of the roof.



XtroLiner Pitched Roof

Insulation for Pitched Roof

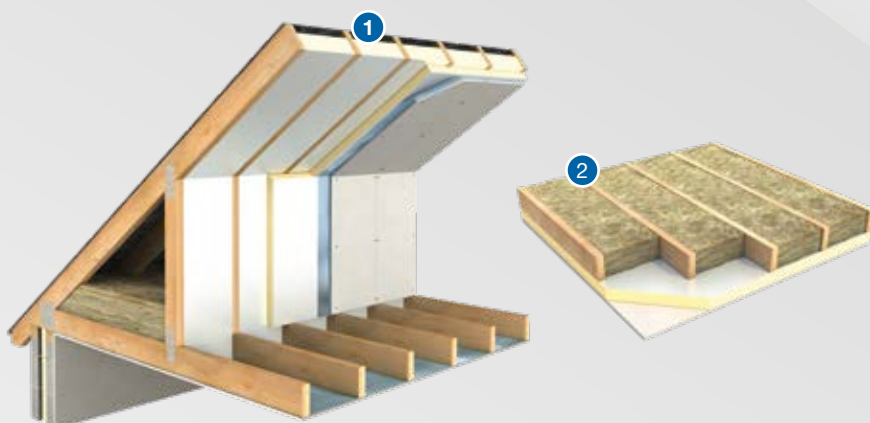
XtroLiner Pitched Roof on sloped roofs (ventilated, hybrid or warm) provides the most efficient U-Values with minimal intrusion into valuable living space. The roof construction is a critical element in the building fabric and is an area at high risk of heat loss. Using this product will reduce heat loss while also delivering excellent thermal bridging details.

Warm Roof construction is a particularly effective way of insulating complex roofs. Insulating above - or above and between - the roof timbers ensures that the structure is kept at or near the internal environmental conditions, reducing thermal stress and condensation risk.

Key Benefits

- ☒ Reduces Intrusion into Living Area
- ☒ Reduced Risk of Condensation
- ☒ Robust Foil Facings
- ☒ Lightweight and Easy to Install
- ☒ Reduced Thermal Bridging

Technical Data



XO/PR	
Length (mm)	2400
Width (mm)	1200
Thickness (mm)	25, 30, 40, 50, 60, 70, 75, 80, 100, 120

Other thicknesses may be available depending on minimum order quantity and lead time.

Property & Units	
Thermal Conductivity	0.021 (W/mK)
Compressive Strength	>150 (kPa)
Reaction to Fire	Euroclass C-s2, d0

Xrathern CE Declaration of Performance (DoP) for this product is available for download from our website.

Specification Clause

The pitched roof insulation shall be Xrathern XtroLiner XO/PR manufactured to EN 13165 by Xrathern, comprising a rigid modified Polyisocyanurate (PIR) core with textured robust low emissivity foil facings. The XO/PR ___mm with Agrément certified Lambda value of 0.021 W/mK to achieve a U-Value of ___W/m²K for the roof element. To be installed in accordance with instructions issued by Xrathern.

Xrathern PIR achieves an A+ rating under the BRE Green Guide.

Refer to NBS clause P10 140, K11 695, K11 55



In every roof space where cold water tanks or other fitted appliances or services occur, the Contractor must construct a permanent boarded walkway from the roof access point to the tank ball valve position and/or the appliance location. This walkway should be supported above the first layer of insulation to prevent any compaction of insulation below the walkway.

1
In a conventional ventilated roof a 50mm clear ventilation gap should be maintained between the insulation and the roofing felt. In certain instances where a vapour permeable membrane is used instead of standard roofing felt, the ventilation gap may be dispensed with. Refer to manufacturer's guidelines.

2
In a ceiling, typically fibre glass is placed between and over the joists – this hides the top of the joist and may lead to health and safety concerns when the roof space is being accessed. The thermal bridge which occurs through the joists can be addressed by placing a layer of XO/PR to the underside, before the plasterboard is fixed. Xrathern XT/TL Drylining boards can also be used. This allows for the roof space to be accessed in a safe manner leaving the top of the joists exposed, which allows the roof space to be used for storage.

Note:
Alternatively, a layer of insulation - covered with chipboard or OSB board - can also be placed over the joists. Xrathern Walk-R offers a ready made solution for this application.

Thermal Performance

Typical U-Values

Table1
U-Value calculations to EN ISO:6946
XO/PR Insulation for Pitched Roof

Hybrid Roof			
XtroLiner Thickness		Rafter Centres	
Between	Under	600mm	400mm
120mm	25mm*	0.16	0.17
120mm	40mm*	0.14	0.15
120mm	60mm*	0.12	0.13

*Insulation thickness only

- Hybrid Roof**
- Approved Breather Membrane 25mm Void
 - XO/PR between Rafters
 - XO/PR under Rafters to reduce thermal bridging
 - Vapour Control Layer
 - Plasterboard

Table2
U-Value calculations to EN ISO:6946
XO/PR Insulation for Pitched Roof

Warm Roof			
XtroLiner Thickness		Rafter Centres	
Between	Under	600mm	400mm
N/A	100mm	0.18	0.18
N/A	120mm	0.16	0.16
75mm	75mm	0.14	0.14
75mm	100mm	0.14	0.12

- Warm Roof**
- Breather Membrane
 - XO/PR over Rafters to reduce thermal bridging
 - XO/PR between Rafters
 - Vapour Control
 - Plasterboard

Thermal Resistances

Thickness (mm)	R-Value (m ² K/W)
25	1.15
30	1.40
40	1.90
50	2.35
60	2.85
70	3.30
75	3.55
80	3.80
100	4.75
120	5.70

Resistance 'R' Values
The resistance value of any thickness of Xrathern insulation can be ascertained by simply dividing the thickness of the material (in metres) by its agrément declared lambda value, for example: Lambda 0.021 W/mk and thickness 120mm -> 0.120/ 0.021 -> R-Value = 5.70. In accordance with EN 13165, R-Values should be rounded down to the nearest 0.05 (m²K/W).

It's a complicated subject and there are still questions you might need to ask. Where can you get an honest, competent answer?

Each member of the Technical Team is there to help you with any technical issues you might have, give them a call, you'll find them easy to talk to.

Our Technical Team provides technical services throughout the UK from our group headquarters in Navan, Ireland. Their experience and expertise has been built through our engagement with the UK construction industry for over 20 years.

Internal Technical Team



Danny Kearney



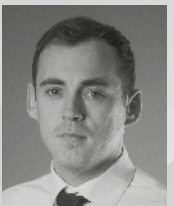
Mark Magennis



Paschal Gallagher



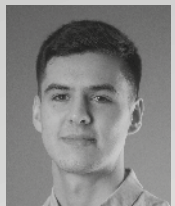
Conor Sheppard



Francis Rilley



Marc Walsh



Alessandro Martinis



Gratas Drevinskas

Meet the team who can help you with your project

Technical Team: Tel 0371 222 1055

Expect More **KNOWLEDGE**

At Xtratherm we understand the importance of giving our customers the best technical advice.

We have taken the unique industry step of training every one of our technical team that deals directly with our customers, to the highest industry standards of competency in U-Value calculation and condensation risk analysis. We have Thermal Bridging covered also under the BRE/NSAI Thermal modelling competency scheme, using the most comprehensive 3D software available.

Our team and products are certified in the UK and Ireland and through the following certifications bodies:

- BRE Thermal bridging modelling competency certification
- NSAI Thermal modelling competency scheme
- TIMSA-BBA competency scheme for U-Value calculation and condensation risk analysis
- BBA and NSAI certification of the Xtratherm insulation boards
- SAP and DEAP energy assessment

Our technical team can also provide:

- Thermal calculations
- Technical advice on building regulations in the UK and Ireland
- Technical papers on a variety of topics
- Certified CPD Presentations
- BIM modelling
- NBS Specifications
- Educational resources for technical secondary and tertiary colleges



The **Xtratherm** Innovation Centre

The Xtratherm Innovation Centre has been developed to assist construction professionals in understanding the principles of specifying and achieving on-site, best practice insulation standards for new dwellings, commercial envelope solutions and refurbishment projects.



Get in touch

Dedicated
Technical Team:
UK: 0371 222 1055

Thermal Calculations, Technical
Advice or to arrange a technical visit:
info@xtratherm.com



**PLATINUM
SERVICE**
For Self-builders

The Platinum Service gives you the highest level of support from design stage to delivery of real performance on site.

Francis and Alessandro - Part of your Technical Team

FREE
One-to-one advice for
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Xtratherm provides a range of high performance insulation products and a full technical support and advice service, helping you to achieve a cost effective, passive standard new home.

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www.xtratherm.com/register-for-platinum-service-for-self-build



“Our new home,
our future, we
want lower fuel
bills and reduced
carbon footprint -
**we want to get
it right”**

The Sustainable Solution

Specifying Xtratherm is a real commitment to minimising energy consumption, harmful CO² emissions and their impact on the environment. Using our products is one of the most effective ways to reduce energy consumption – in fact, after just eight months the energy they save far outweighs the energy used in their production. In addition, our manufacturing facilities operate to an ISO 14001 certified Environmental Management System.

The BRE Green Guide

The 2008 Green Guide to Specification produced by the BRE gives Xtratherm Insulation products a rating of A or A+. Green Guide ratings are used to gain credits in BREEAM (BRE Environmental Assessment Method) for non-residential buildings, and under 'Mat 4 – Insulation' the first credit requires the building to have an Insulation Index of 2 or greater – only achievable if the weighted average rating of the insulation is A or A+. This shows that all our products have been made with materials that have been responsibly sourced. The standard sets out organisational governance, supply chain management and environmental and social aspects that are verified and ensure responsible sourcing of materials.

Responsible Sourcing

Xtratherm has BES 6001 certification for responsible sourcing. The second BREEAM credit under that category is based on responsibly-sourced materials – at least 80% of the total insulation used in roofs, walls, ground floors and services must meet any of tier levels 1 to 6 in the BREEAM table of certification schemes. Our Environmental Management System is certified under EN ISO 14001, and our raw materials come from companies with similarly-certified EMS (copies of all certificates are available for BREEAM assessments). This level of responsible sourcing meets tier level 6 in the BREEAM table.

Global Warming and Ozone Depletion

All Xtratherm Insulation products use CFC- and HCFC-free materials, and are manufactured using a blowing agent with a low GWP and zero ODP.

Good workmanship and appropriate site procedures are necessary to achieve expected thermal and airtightness performance. Installation should be undertaken by professional tradespersons. The example calculations are indicative only, for specific U-Value calculations contact Xtratherm Technical Support. Xtratherm technical literature, Agrément certifications and Declarations of Performance are available for download on the Xtratherm website. The information contained in this publication is, to the best of our knowledge, true and accurate at the time of publication but any recommendations or suggestions which may be made are without guarantee since the conditions of use are beyond our control. Updated resources may be available on our websites. All images and content within this publication remain the property of Xtratherm.

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ISO 9001 | Quality Management Systems

ISO 14001 | Environmental Management



Xtratherm, part of UNILIN group.