Xtratherm®
More than insulation

A practical guide to NZEB

Effective solutions
to achieving NZEB standard in Ireland

www.xtratherm.ie

Contents

Xtratherm®

Practical solutions to achieving NZEB standard in Ireland

NZEB

What is NZEB?

Nearly Zero Energy Building (NZEB): a building that has a very high energy performance, as determined in accordance with Annex I of the EU Energy Performance of Buildings Directive Recast (EPBD Recast) 2010/31/EU of 19th May 2010. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

Part L and European Union (Energy Performance of Buildings) (No. 2) Regulations 2019 Technical Guidance Document Conservation of Fuel and Energy - Dwellings 0.5 Definitions

Front Cover: *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) standards.

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Xtratherm and the drive for NZEB

Since the introduction of building regulations, it has been recognised that the role played by well insulated buildings was paramount to energy conservation. Whether the goal was to reduce our reliance on imported energy, to reduce energy costs for the homeowner or ultimately for environmental necessity, the Fabric First approach has been recognised.

For over 30 years Xtratherm has worked with individuals and organisations to develop and promote better understanding, better evaluation and better building techniques for Irish Construction. Whether Passive standard, Fabric Energy Efficiency standard or Code for Sustainable Homes, we have witnessed an enthusiastic drive for better energy performance in buildings.

To meet these ambitions, Xtratherm have driven our own technical competencies in energy calculation and enthusiastically shared that knowledge with construction professionals, educators and specifiers. This has allowed us to develop, in consultation with the construction industry, innovative insulation systems delivering detailing and continuity that delivers thermal performances beyond simple U-Values.

The 2019 Irish Building Reglations sees the introduction of NZEB standards. It is the most significant advance in building standards in Ireland in 30 years. These changes define all the levels that we must meet as an industry to achieve Nearly Zero Energy Buildings.

Meeting NZEB will require the attainment of excellence in the performance of building envelopes. Not only in design, but in the delivery on site, to close the gap between intent and actual performance. In Ireland our regulatory push has resulted in the delivery of excellence both in understanding and build quality within certain sectors of the construction industry, not least the drive for better performing self build projects where knowledge and technique already meet the NZEB standard in many cases.

The following guidance gives examples of compliant fabric specification. The targets remain substantially unchanged, as those published by Xtratherm after the 2011 changes to achieve ‘A’ Rated Designs’. The next step to NZEB is already being achieved.

Fabric First must remain the first priority for all. Whether the energy we use to heat, light and power our homes comes from renewable sources or not, it should never be wasted. That energy will be a cost for the homeowner.

Xtratherm will continue to provide warranted calculations and advice on energy calculation. We will continue to contribute with our expertise in the education of construction professionals and on site training to improve energy performance, developing products and processes to reduce energy usage and are committed to reducing our own carbon footprint in Ireland.

Xtratherm Technical Team

NZEB where we are...

The Building Regulations

Irish building regulations Technical Guidance Document L (TGD L) was revised in 2019 setting minimum energy performance requirements for new buildings to achieve Nearly Zero Energy Buildings (NZEB) targets and ensuring that when buildings are renovated their energy performance is upgraded.

Xtratherm Regulation Guides

Guides to Irish Regulation requirements in Part L and Part F are available from the Xtratherm website or from the Xtratherm Technical Support team. Technical Guidance Document (TGD).

L - Conservation of Fuel and Energy – Dwellings (2019)
F - Ventilation (2019)

NZEB Targets

ENERGY

EPC
≤ 0.30

CARBON

CPC
≤ 0.35

RENEWABLES

RER
≤ 0.20

For all new builds, NZEB is equivalent to a 25% improvement in energy performance on the 2011 Building Regulations. A range of examples are shown in excel versions of the DEAP software available in the Domestic BER Resource page. Key changes to Part L for NZEB compliance include a:

1. Maximum Energy Performance Coefficient of 0.30
2. Maximum Carbon Performance of 0.35
3. Renewable Energy Ratio of 20%

For a comprehensive explanation of the targets please refer to page 36 of this Guide

The Part L Performance Targets

TGD L Example

The example given below is directly from TGD L (Table 2 Example B) for a semi-detached dwelling and illustrates the typical specifications as outlined for compliance in Appendix E, Part L. (Further examples are provided on pages 8 and 9)

	Element or system	Specifications
	Dwelling Size & Shape	Semi-detached house, two-storey Overall internal dimensions: 7m wide x 9m deep x 5.1m high Total floor area 126m² Rectangular shape with no irregularities
	Opening Areas (windows and doors)	25% of total floor area The above includes one opaque door of area 1.85m², any other doors are fully glazed
FABRIC TARGETS	Floor U-Value	U = 0.14 W/m²K e.g. Slab-on-ground floor with 120mm insulation of conductivity 0.023 W/mK
FABRIC TARGETS	Cavity U-Value	U = 0.13 W/m²K e.g. 150mm cavity wall with 100mm cavity insulation of thermal conductivity 0.022 W/mK and 60mm internal insulation of conductivity 0.022 W/mK
FABRIC TARGETS	Ceiling U-Value	U = 0.11 W/m²K e.g. 360mm insulation of conductivity 0.04 W/mK, between and over ceiling joists
FABRIC TARGETS	Windows U-Value	Triple glazed, low E (En = 0.05, soft coat) 20mm gap, argon filled, PVC frames (U = 0.9 W/m²K, solar transmittance = 0.6)
FABRIC TARGETS	Door U-Value	U = 1.5 W/m²K
FABRIC TARGETS	Thermal Bridging Factor	0.05 x total exposed surface area (W/m²K)
FABRIC TARGETS	Air Permeability	Infiltration due to structure = 0.25ac/h (5m³/(hr.m²)@50pa)
	Living Area Fraction	25% of total floor area
	Shading and Orientation	28.7m² glazing orientated E/W; 0.9m² glazing orientated N; average overshading
	Number of Sheltered Sides	2
	Internal Heat Capacity Category	Medium
	Ventilation System	Natural ventilation with intermittent extract fans
	Chimneys	None
	Open Flues	None
	Intermittent Extract fans	3
	Draught Lobby	None
	Primary Heating Fuel (space & water)	Mains gas
	Heating System	Boiler and radiators with energy efficient water pump in heated space (energy consumption of 52kWh/yr)
	Heat Generator	Mains gas condensing boiler, seasonal efficiency 91.3%, room-sealed, fanned flue
	Heating System Controls	Boiler Interlock and Time and Temperature Zone Control
	Hot Water System	120 litre cylinder with 100mm insulation Demand met by space heating boiler, separate time control for space and water heating, cylinder temperature controlled by thermostat 2 showers, each with 6 litres/min flow restrictor, 1 bath
	Primary Water Heating Losses	Insulated primary pipework between heat generator and cylinder
	Secondary Space Heating	None
	Secondary Space Heating	100% low energy lighting, conforming to the following specification: · A+ Rated Bulbs with efficacy of 94 lumen/cW · Total = 504 Watts
	Renewable Energy Source	1.25 kWp Photovoltaic east/west facing, no overshading, 30°, 9.38m² (7.5m²/kWp)

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 running costs. Technologies such as ventilation systems, heating systems, even double glazing have 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 Xtratherm solutions illustrated later in this publication follow the same reasoning. Taking the route of improved air permeability lower than 5 m³/m2h @ 50 Pa, to increase the contribution from renewable energy technologies (i.e. RER ≥ 0.20), will rely on technologies to deliver energy savings. Specification, installation and maintenance of all these systems will be crucial for long term effectiveness. 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 10 of this Guide.

The consequences for reducing fabric performance to minimum standards are illustrated on page 35.

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. Better detailing delivers energy savings beyond a simple U-Value improvement.

A set of 'good practice' details have been available in the form of 'Acceptable Construction Details' (ACDs) published by the Department of the Environment in Ireland. These details are a set of design drawings for the junctions listed in Table D1-D6 of Part L which are most prone to heat loss. They detail, using traditionally used 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. DEAP is the software that is used to calculate a dwellings BER rating. Within DEAP Thermal bridging through junctions are accounted for as a 'Y-Value.'

Are all junctions accounted for within DEAP?
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.

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 owner's preference, many prefer open windows - even in the depths of winter. How we use our properties influences the energy and carbon results.

y = 0.15

(DEAP Default)

The equivalent of an open 'Garage Door' 2.1m x 3.3m (6.93m^2) opening.

y = 0.08

(Acceptable Details)

The equivalent of an open 'Patio Door' 2.1m x 1.8m (3.78m^2) opening.

y = 0.03

(Thermally Modelled Junctions)

The equivalent of an open 'Window 1.25m x 1.25m (1.56m^2) opening.

Achieving NZEB Compliance for Typical New Dwellings

Detached: Scheme Development

EPC	CPC	RER
Target: 0.300	0.35	20%
Actual: 0.255	0.209	50%

Result: A2 Rating

Floor U-Value	0.11	150mm Hyfloor
Cavity U-Value	0.16	125mm CavityTherm
Ceiling U-Value	0.12	300mm fibre plus thermal lining
Windows U-Value	1.40	Double glazed
Door U-Value	1.00	Insulated door
Thermal Bridging Factor	0.03	Calculated details
Air Permeability	5	0.25 ACH
Natural Ventilation	Yes	
Heating System	392/217%	Heat Pump: Space/Water Efficiency
Heating Controls	Yes	Full Time & Temp Controls
Cylinder	200L	Factory Insulated 100mm
Secondary Heating	Yes	Log Burning Stove
Delay Start Stat	No	
Light Fittings	100%	Low Energy Lights
Renewable Technology	Yes	From Heat Pump

Semi-Detached: Scheme Development

EPC	CPC	RER
Target: 0.300	0.35	20%
Actual: 0.293	0.268	26%

Result: A2 Rating

Floor U-Value	0.11	150mm Hyfloor
Cavity U-Value	0.16	125mm CavityTherm
Ceiling U-Value	0.12	300mm fibre plus thermal lining
Windows U-Value	1.40	Double glazed
Door U-Value	1.00	Insulated door
Thermal Bridging Factor	0.04	Calculated details
Air Permeability	5	0.25 ACH
Natural Ventilation	Yes	
Heating System	91.2%	Gas Condensing Boiler
Heating Controls	Yes	Full Time & Temp Controls
Cylinder	200L	Factory Insulated 100mm
Secondary Heating	None	
Delay Start Stat	None	
Light Fittings	100%	Low Energy Lights
Renewable Technology	Yes	3 x 270w PV Panels (4.89m²)

Apartment: Scheme Development

Mid Floor Apartment

EPC	CPC	RER
Target: 0.300	0.35	20%
Actual: 0.294	0.286	39%

Result: A2 Rating

Floor U-Value	None	
Cavity U-Value	0.16	125mm CavityTherm
Ceiling U-Value	None	
Windows U-Value	1.40	Double Glazed
Door U-Value	1.00	Insulated Door
Thermal Bridging Factor	0.02	Calculated Details
Air Permeability	5	0.25 ACH
Natural Ventilation	Yes	
Heating System	390/210%	Heat Pump: Space/Water Efficiency
Heating Controls	Yes	Full Time & Temp Controls
Cylinder	180L	Factory Insulated 100mm
Secondary Heating	None	
Delay Start Stat	None	
Light Fittings	100%	Low Energy Lights
Renewable Technology	Yes	From Heat Pump

Detached: Self Build

EPC	CPC	RER
Target: 0.300	0.35	20%
Actual: 0.280	0.226	45%

Result: A2 Rating

Floor U-Value	0.11	150mm Hyfloor
Cavity U-Value	0.13	150mm CavityTherm
Ceiling U-Value	0.12	300mm Fibre Plus Thermal Lining
Windows U-Value	1.40	Double Glazed
Door U-Value	1.00	Insulated Door
Thermal Bridging Factor	0.02	Calculated Details
Air Permeability	5	0.25 ACH
Natural Ventilation	Yes	
Heating System	268/233%	Heat Pump: Space/Water Efficiency
Heating Controls	Yes	Full Time & Temp Controls
Cylinder	300L	Factory Insulated 100mm
Secondary Heating	Yes	Log Burning Stove
Delay Start Stat	None	
Light Fittings	100%	Low Energy Lights

NZEB Solutions

Xtratherm innovation

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 0.13 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

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A+ BRE

BRE Certification Limited

NBS Plus

Technical Data

CavityTherm	
Thermal Conductivity	0.021 (W/mK)
Length (mm)	1200
Width (mm)	450
Thickness (mm)	100, 110, 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. CavityTherms' unique profiled facing directs any moisture that might have penetrated the external wall down the protective facing and back onto the external leaf.

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

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 lamba 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.

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

NBS **Plus**

Thermal Performance

Typical U-Values

CavityTherm (Inner block 100)

Block Type	100mm	110mm	125mm	150mm
Light 0.15	0.18	0.17	0.15	0.13
Med 0.33	0.19	0.17	0.15	0.13
Dense 1.13	0.20	0.18	0.16	0.13

Thermal Resistances

Thickness (mm)	R-Value* (m^2 K/W)
100	4.50
110	5.00
125	5.70
150	6.90

* PIR only

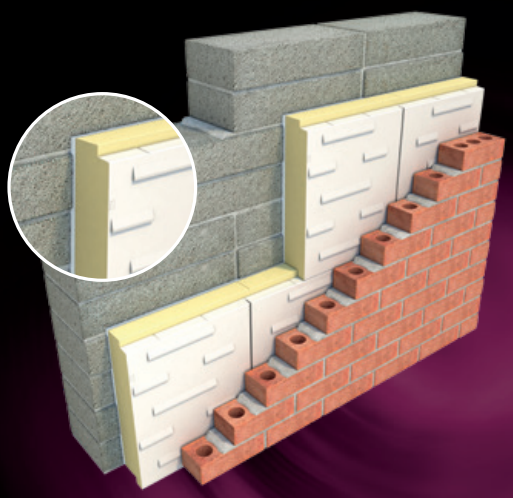
Thermal Bridging

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

Xtratherm PSI Values*
Using Acceptable Details

Acceptable Details	Block Type	PSI
1.01a GF	Dense 1.13	0.167
1.01b GF	Med 0.33	0.091
1.01b GF	Light 0.20	0.067
1.23.2 Lintel Close-R	Dense 1.13	0.002
1.23.2 Lintel Close-R	Med 0.33	0.001
1.25 Jamb Close-R	Dense 1.13	0.003
1.25 Jamb Close-R	Med 0.33	0.001
1.26 Sill Forward	Dense 1.13	0.025
1.26 Sill Forward	Med 0.33	0.023
1.27.1 Corner	Dense 1.13	0.050
1.27.1 Corner	Med 0.33	0.042

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



Xtratherm innovation

CavityTherm Flex

Built-in Full Fill Cavity Walls

CavityTherm Flex is the perfect solution when insulating fair faced inner block walls or when block is laid flat resulting in an uneven surface to accept the insulation. The 25mm flexible fleece layer absorbs any variations due to block tolerances, providing a continuous unbroken bond between insulation layer and block. Achieve passive level U-Values as low as 0.14 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
- Flexible backing to eliminate indentations
- Prepositioned slots for sloping wall ties - no creep
- Fully engineered jointing
- Full range of accessory pieces build continuous system
- Excellent Thermal bridging values

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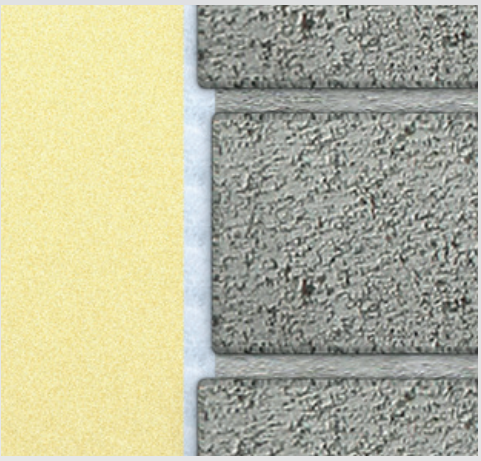
Technical Data



The boards have gas tight facings with one face bonded to a profiled HIPS skin during manufacture to provide a drainage plane.

CavityTherm's unique profile facing directs any moisture that might have penetrated the external wall down the protective facing and back onto the external leaf. The internal face has a 25mm flexible fleece layer to accept discrepancies in the inner block facing.

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

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

Thermal Performance

Typical U-Values

CavityTherm Flex (Inner block 215)

Block Type

	125mm	150mm
Light 0.15	0.14	0.12
Med 0.33	0.16	0.13
Dense 1.13	0.17	0.14

Includes 5mm residual cavity, 25mm flexible fleece, plaster finish.

CavityTherm Flex (Inner block 100)

Block Type

	125mm	150mm
Light 0.15	0.16	0.13
Med 0.33	0.16	0.14
Dense 1.13	0.17	0.14

Includes 5mm residual cavity, 25mm flexible fleece, plaster finish.

Thermal Resistances

Thickness (mm)	R-Value* (m^2 K/W)
125	5.50
150	6.70

* PIR + Flexible Fleece

Specification Clause

The built-in full fill cavity wall insulation shall be CavityTherm Flex by Xtratherm, including corner boards and ancillary detail components, comprising a rigid Polyisocyanurate (PIR) core manufactured to EN 13165 between low emissivity foil facings and Flexible Fleece to inner skin with engineered HIPS to outer skin. The CavityTherm Flex _ _ _mm with a declared Lambda value of 0.021 W/mK (PIR) and 0.036 W/mK (Flexible Fleece) to achieve a U-Value of __ _ _W/m2K for the wall element. To be installed in accordance with instructions issued by Xtratherm.

Refer to NBS clause F30 150, F30 12

NBS Plus

BBA
CERTIFICATE CS/nnnn-n
U Value Competency Scheme

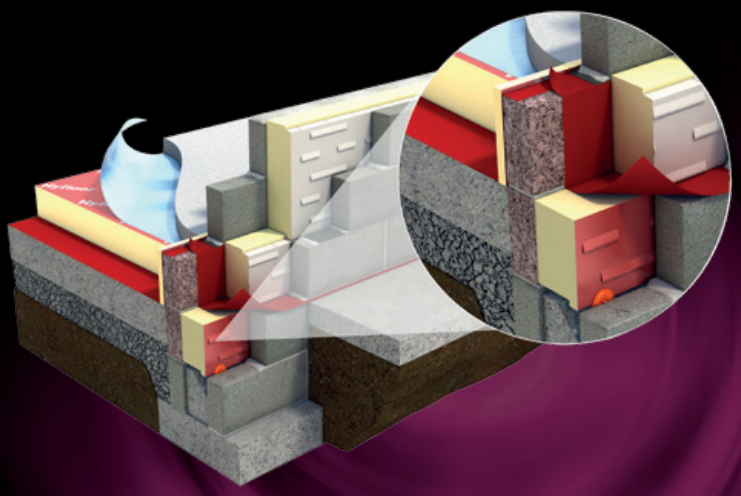
Thermal Bridging

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

Xtratherm PSI Values*
Using Acceptable Details

Acceptable Details	Block Type	PSI
1.01a GF	Dense 1.13	0.166
1.01b GF	Med 0.33	0.090
1.01b GF	Light 0.20	0.067
1.23.2 Lintel Close-R	Dense 1.13	0.001
1.23.2 Lintel Close-R	Med 0.33	0.000
1.25 Jamb Close-R	Dense 1.13	0.002
1.25 Jamb Close-R	Med 0.33	0.000
1.26 Sill Forward	Dense 1.13	0.019
1.26 Sill Forward	Med 0.33	0.018
1.27.1 Corner	Dense 1.13	0.048
1.27.1 Corner	Med 0.33	0.040

* Using 125mm CavityTherm Flex. Psi values for other thicknesses can be requested from our technical department.



Xtratherm innovation

Hyfloor Strip

Foundation System

Hyfloor Strip Foundation System, combining engineered floor insulation with high performance foundation riser panels with medium density block, achieves both U-Values and PSI value detailing to achieve NZEB and passive floor performance.

Xtratherm's Floor & Foundation system supplies the designer with a traditional system that provides the thermal performance and detailing, using traditional materials to meet NZEB and Passive standards in Irish floor constructions.

Making use of readily available medium density block that reaches the 7.5 N/mm² requirement within Irish Building Regulations Technical Guidance Document A.

Key Benefits

- Meets passive foundation targets
- Addresses site detailing from an early stage
- Y-Values achieved < 0.05
- U-Values achieved 0.11- 0.13 W/m²k
- Using blocks suitable for multi storey buildings with a high compressive strength of 7.5N/mm² and 13N/mm²
- Traditional construction, avoiding the need for engineering assurances

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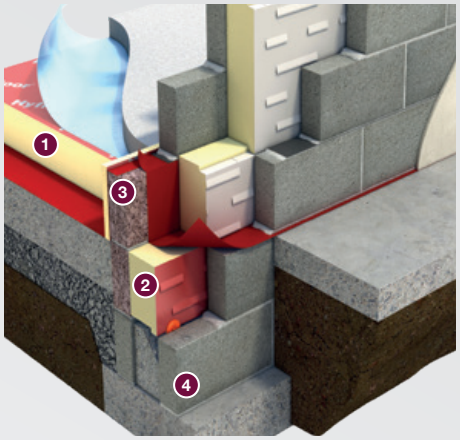
NBS Plus

Technical Data

Providing effective insulation, that has been detailed and installed professionally at the initial stages of any building project has multiple benefits. Detailing properly at floor level sets the standard for the thermal performances and installation accuracy of the total building envelope; get the floor right and good practice is set for the rest of the build. Hyfloor Strip Foundation System provides U-Value and Thermal Bridging performance to meet NZEB standards along with assurance of compressive strength at foundation level.



Traditionally, insulating at floor level didn't receive the attention by designers and site operatives that is now required to meet NZEB or Passive standards; normally within a day, the insulation and all detailing are buried within the structure. The real disconnect however is the relationship between the installation of the floor insulation and the wall insulation. Typically completed as two separate skills at different times, and often by different teams, without consideration of their effect on thermal bridging at the wall/floor junction.

Installing the Hyfloor insulation (1) along with the foundation strip insulation (2) at ground work stage ensures a thermally efficient junction.

The inclusion of a medium density block (3) provides a full 7.5Kn base for loading requirements. At this stage, (before the outer leaf is built) inspection and sign off of this critical junction can ensure compliance with the ACDs.

Traditionally, block work contractors are relied upon to provide this robust detailing after riser walls (4) have been built to DPC level. This normally entails pushing insulation into a cavity from above in contravention of SR325 guidance.

Notes For Render

1. 150mm Hyfloor
2. Hyloor Foundation Strip
3. Medium Density Block
4. Riser walls

Where the DPC is folded at wall-floor junctions it doubles in thickness which pushes out the insulation and causes issues within the cavity.

Our riser board has a thicker 20mm fleece which can compensate for this while still maintaining the thermal efficiency of the insulation and integrity of the cavity offering a simple solution to a typically complicated problem.

Thermal Bridging

Thermal Bridging, the Y-Value & NZEB

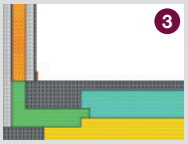
It might help to view the Y-Value that is used in DEAP to measure the effectiveness of detailing at junctions (basically how continuous the insulation system is) as a PENALTY U-Value. This U-Value is spread over the buildings to account for additional heat loss at junctions. Lets say you design your building element to achieve an average U-Value of 0.15W/m²K. The default Y-Value when using the government published Acceptable Details is 0.08 W/m2K, bringing your average U-Value to 0.023W/m²K Xtratherm Detailing including the Xtratherm Riser can achieve Y-Value of <0.03. - The typical target to achieve NZEB.

Xtratherm Riser Med Block 7n

PSI 0.076

Lightweight Block System

PSI 0.061



EPS Wrapped Foundation

PSI 0.105

HD Foamglas Break

PSI 0.056

Thermal Performance

Typical U-Values

Ground Supported Slab

Thickness (mm)	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

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

Suspended Hollow Core Floor

Thickness (mm)	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	0.14	0.14	0.14	0.14
150mm	0.11	0.11	0.12	0.12	0.12	0.12

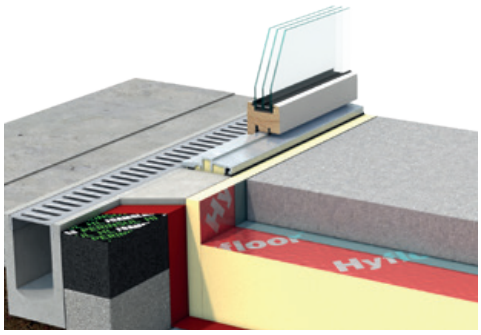
- 65mm screed
- Separating Layer Polythene sheet
- Insulation with Perimeter strips
- DPM 1200 gauge Polythene or Radon barrier
- 150mm Suspended Hollow Core floor

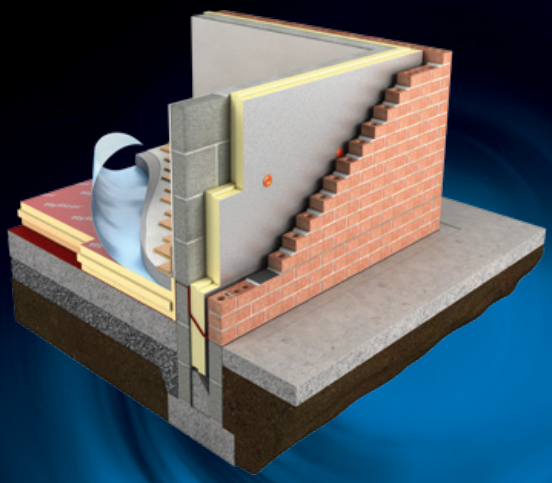
Foamglas Threshold

Detailing at thresholds offers particular issues in achieving the continuity of insulation. Avoiding thermal bridging, whilst maintaining level thresholds and avoiding water damage and degradation needs careful detailing.

Xtratherm have solutions using Perinsul by Foamglas to achieve passive levels for this difficult junction.

Contact Xtratherm for literature and CPD.





Xtratherm innovation

XtroWall Plus 110

Insulation for Partial Fill Cavity Walls

XtroWall Plus is a superior performance insulation with an Agrément declared Lambda value of 0.020 Wm/K and an enhanced Euroclass C fire classification. It is faced with a robust PIR aluminium foil and is available with engineered jointing to deliver improved Thermal Bridging detailing.

This lower Lambda improves U-Values and meets Zero Carbon standards, proving an excellent choice for passive and low energy builds. XtroWall Plus can achieve a passive U-Value of 0.15 W/m²K in a traditional cavity wall. Building with Xtrowall Plus, a residual cavity is maintained, offering excellent protection against wind driven rain.

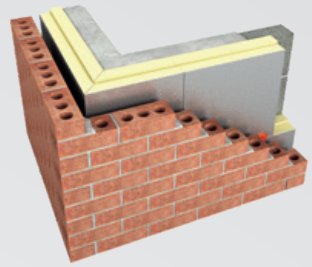
Key Benefits

- Achieves 0.15 U-Value in 150mm Cavity
- Improved Lambda value 0.020 W/mK
- Enhanced Euroclass C fire classification
- Engineered Jointing
- Corner Panels & Cavity Closers: Reduced Thermal Bridging
- Clear Cavity Maintained

Xtratherm®
More than insulation

Technical Data

1



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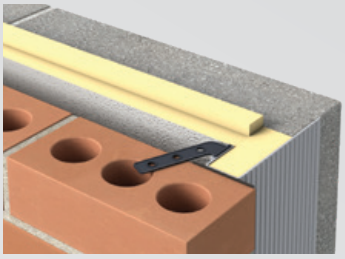


2

XtroWall Plus	
Length (mm)	1200
Width (mm)	450
Thickness (mm)	110

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

Property & Units	
Thermal Conductivity	0.020 (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.

1

The XtroWall Plus Cavity Wall System includes an optional pre-formed corner panel that folds to 90 degrees to effectively insulate a junction that is normally vulnerable to thermal bridging and cold spots.

2

The XtroWall Plus engineered 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 textured robust low emissivity foil facing on XtroWall Plus 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.

Note

A residual cavity is the air space that remains when XtroWall Plus is placed against the inner leaf of the cavity of a wall. The recommended residual cavity width required is 40mm in accordance with Irish Building Regulations, however a reduced cavity may be permissible in certain circumstances. A 50mm residual cavity is typically required in Northern Ireland.

Specification Clause

The partial fill cavity wall insulation shall be Xtratherm XtroWall Plus manufactured to EN 13165 by Xtratherm, comprising a rigid modified Polyisocyanurate (PIR) core with textured robust low emissivity foil facings and engineered shiplapped jointing. XtroWall Plus _ _ _mm with Agrément declared Lambda value of 0.020 W/mK to achieve a U-Value of _ _ _ W/m²K for the wall 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 F30 155, F30 12

Thermal Performance

Typical U-Values

Table 1
U-Value calculations to EN ISO:6946
XtroWall Plus Insulation for Partial Fill Cavity Walls

Thickness (mm)

XtroWall Plus 0.020 110mm

Wall Construction	U-Value
Block outer leaf with 100mm dense block inner (plastered)	0.15
Block outer leaf with 215mm dense block inner (plastered)	0.15
Block outer leaf with 215mm dense block inner (fair faced)	0.15
Block outer leaf with 215mm Hollow block inner (plastered)	0.15
Brick outer leaf with 100mm dense block inner (plastered)	0.15

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

- 19mm render
- 100mm outer leaf blockwork
- Low emissivity unventilated cavity (0.713 resistance)
- XtroWall Plus cavity wall partial fill PIR insulation
- 100mm inner leaf blockwork
- Plaster finish

Thermal Resistances

Thickness (mm)	R-Value (m² K/W)
110	5.5

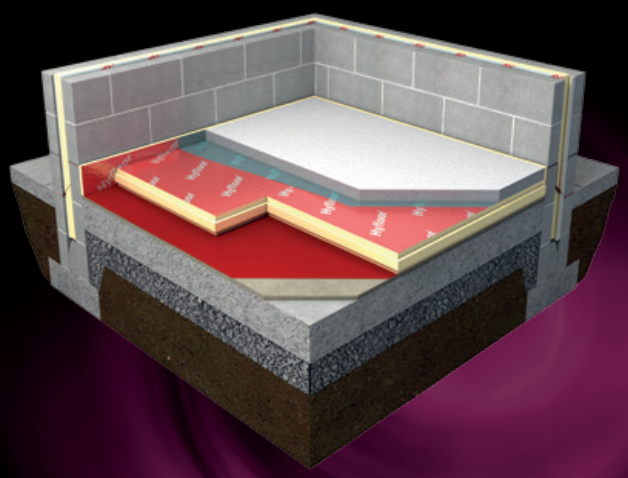
Resistance 'R' Values
The resistance value of any thickness of Xtratherm insulation can be ascertained by simply dividing the thickness of the material (in metres) by its lambda value, for example: Lambda 0.020 W/mk and thickness 110mm -> 0.110/ 0.020 -> R-Value = 5.5. In accordance with EN 13165, R-Values should be rounded down to the nearest 0.05 (m2K/W).

Thermal Bridging

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

Xtratherm PSI Values
Using Acceptable Details

Acceptable Details	Block Type	PSI
1.01a GF	Dense 1.13	0.164
1.01b GF	Med 0.33	0.088
1.01b GF	Light 0.20	0.065
1.23.2 Lintel Close-R	Dense 1.13	0.004
1.23.2 Lintel Close-R	Med 0.33	0.000
1.25 Jamb Close-R	Dense 1.13	0.004
1.25 Jamb Close-R	Med 0.33	0.000
1.26 Sill Forward	Dense 1.13	0.026
1.26 Sill Forward	Med 0.33	0.016
1.27.1 Corner	Dense 1.13	0.041
1.27.1 Corner	Med 0.33	0.036



Xtratherm innovation

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 (T&G) engineered tongue and grooved floor insulation as the answer to achieve lower U-Values – in a practical and robust manner. Hyfloor (T&G) has a superior thickness to performance ratio, allowing the lower targets required under Building Regulations to be achieved with minimum thickness.

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

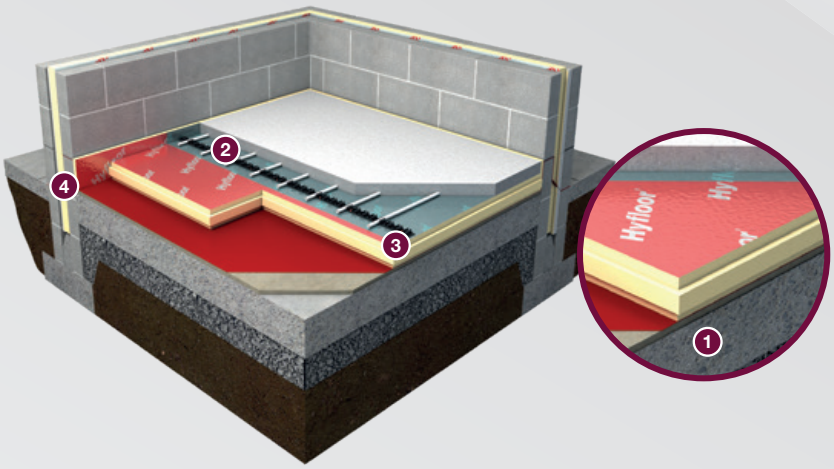
Xtratherm®
More than insulation

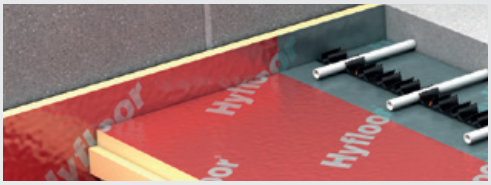
A+ BRE

BRE Certification Limited

NBS Plus

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

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

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

Hyfloor (T&G) provides 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 Xtratherm Perimeter strip (XT/STR) insulation 25mm thick around the external and internal wall/floor junctions, a robust detail is created.

Specification Clause

The floor insulation shall be Xtratherm Thin-R XT/HYF (T&G) manufactured to EN 13165 by Xtratherm, 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 Xtratherm.

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

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

Thermal Performance

Typical U-Values

Table 1
U-Value calculations to EN ISO:6946 for IRL 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)	0.40	0.50	0.60	0.70	0.80
75mm	0.19	0.20	0.20	0.21	0.21
100mm	0.15	0.16	0.16	0.17	0.17
125mm	0.13	0.13	0.14	0.14	0.14
150mm	0.11	0.12	0.12	0.12	0.12

Table 2
U-Value calculations to EN ISO:6946 for IRL 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)	0.40	0.50	0.60	0.70	0.80
75mm	0.19	0.19	0.20	0.20	0.20
100mm	0.15	0.16	0.16	0.16	0.16
125mm	0.13	0.13	0.13	0.14	0.14
150mm	0.11	0.11	0.12	0.12	0.12

Thermal Resistances

Thickness (mm)	R-Value (m²K/W)
75	3.55
100	4.75
125	5.95
150	7.10

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 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 (m2 K/W).

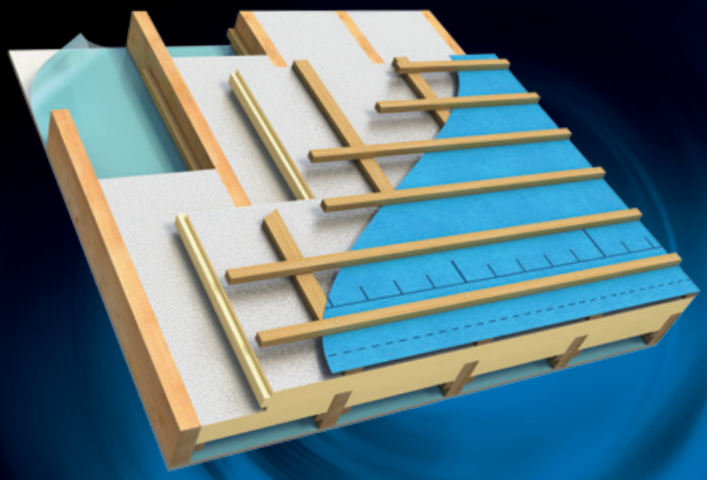
Thermal Bridging

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

Xtratherm PSI Values*
Using Acceptable Details

Acceptable Details	Block Type	PSI
1.01a GF	Dense 1.13	0.168
1.01a GF	Med 0.33	0.064
1.01a GF	Light 0.20	0.063

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



Xtratherm innovation

XtroLiner Sarking (T&G)

Insulation for Sarking Warm Roof Construction

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. Using this product improves detailing, speeds up the installation process and provide 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

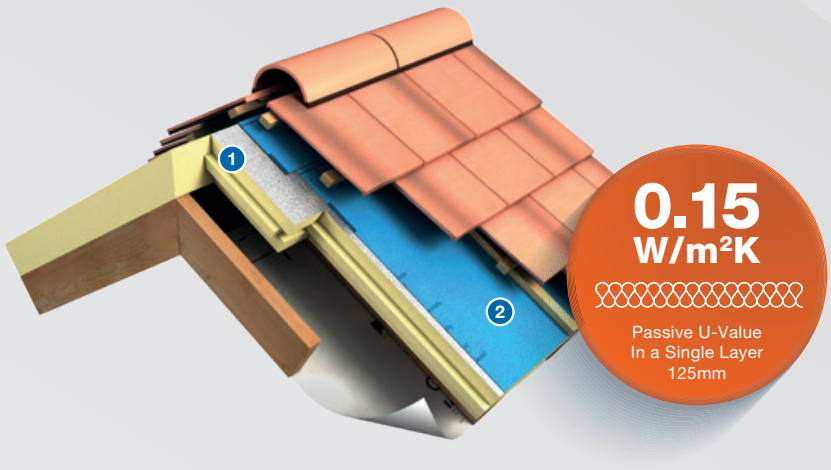
Xtratherm®
More than insulation

A+ BRE

BRE Certification Limited

NBS Plus

Technical Data



XO/SK (T&G)	
Length (mm)	2400
Width (mm)	1200
Thickness (mm)	50, 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.

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.

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

Thermal Performance

Typical U-Values

Table1
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	125mm	-
0.15	75mm	75mm
0.15	50mm	100mm

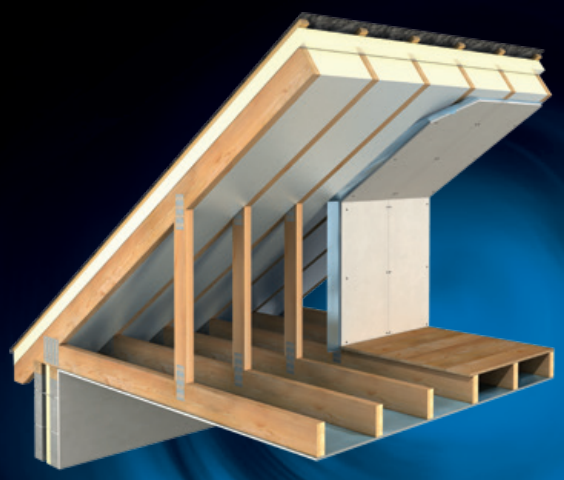
Rafters taken at 400mm centres

- Breather Membrane
- XO/SK (T&G) over Rafters to reduce thermal bridging
- XO/PR between Rafters
- Vapour Control
- Plasterboard

Thermal Resistances

Thickness (mm)	R-Value (m² K/W)
50	2.35
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).



Xtratherm innovation

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 XtroLiner Pitched Roof 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

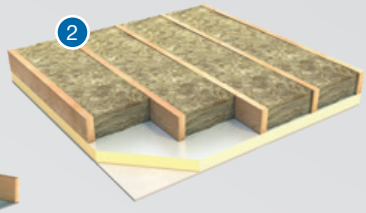
Xtratherm®
More than insulation

A+ BRE ENVIRONMENTAL RATING

BRE Certification Limited

NBS Plus

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

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

Specification Clause

The pitched roof insulation shall be Xtratherm XtroLiner XO/PR manufactured to EN 13165 by Xtratherm, 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 Xtratherm.

Xtratherm 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 XtroLiner Pitched Roof to the underside, before the plasterboard is fixed. Xtratherm 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. Xtratherm 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 Roof

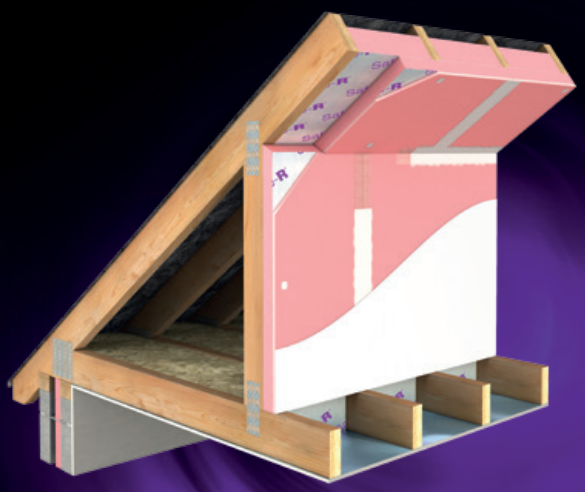
XtroLiner Thickness		Rafter Centres	
Between	**Under**	**600mm**	**400mm**
N/A	100mm	0.18	0.18
N/A	120mm	0.16	0.16
75mm	75mm	0.14	0.14
75mm	100mm	0.14	0.12

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 (m² 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 Xtratherm 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).



Xtratherm innovation

Safe-R Fireline Thermal Laminate

Insulation for Drylining Walls Fixed with either Adhesive Dabs or Mechanical Fixing

Safe-R Fireline Thermal Laminate is a composite insulated panel of Xtratherm Euroclass B phenolic insulation bonded to 15mm Fireline plasterboard for internal applications. The superior thermal performance provides excellent U-Values at minimal intrusion into valuable living space.

Key Benefits

- Superior Thermal Performance – As low as 0.020 W/mK
- Fire Performance – Test in accordance with EN1365-2 for 45 minutes*
- Reaction To Fire – B-s1, d0
- Space Saving – High performance to thickness ratio

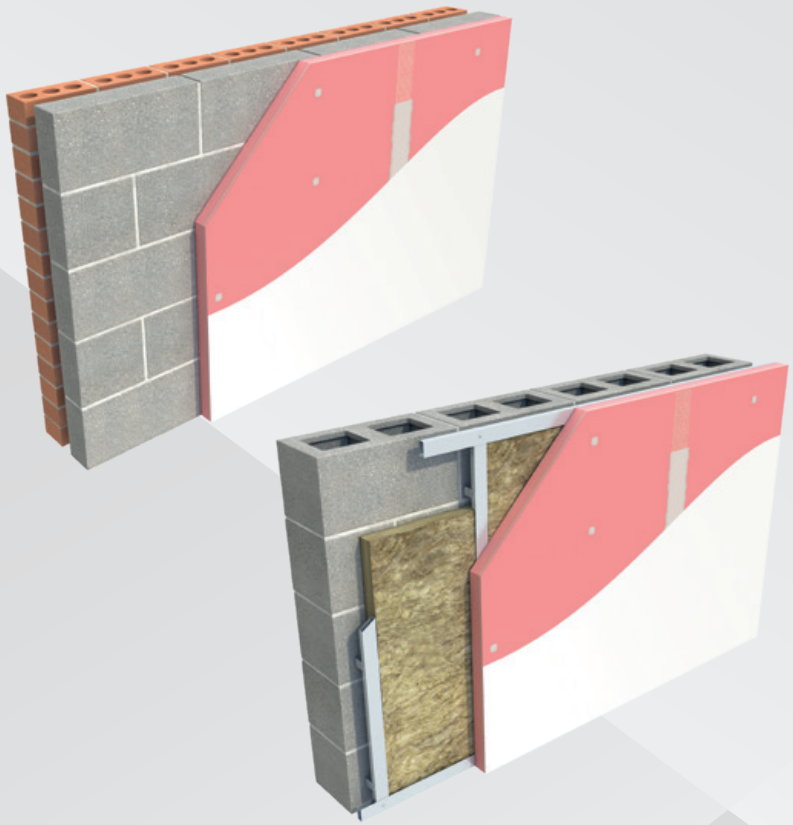
Xtratherm®
More than insulation

Technical Data

Safe-R Fireline Thermal Laminate on sloped roofs (ventilated or hybrid) provides the most efficient U-Values with minimal intrusion into valuable living space and the assurance of 45 minutes* fire rating.

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 the ventilation gap may be reduced or dispensed with, check with membrane manufacturer. Refer to manufacturer's guidelines.

Safe-R Fireline Thermal Laminate was tested to EN1365-2: 2012 to achieve a 45 minute fire rating with the following construction. SR/PR 100mm was fitted between the joists with Pur Pro TEC7 applied between the edge of the insulation and the joists. The 65mm Safe-R Fireline Thermal Laminate was fixed to the joists by countersunk screws (⌀ 5 x 120mm) spaced evenly at 400mm centres. Scrim tape and filler were applied at board joints. Intusil Firetherm sealant was applied to the exposed edge of the roof and wall where gaps were present. A gypsum-based finish plaster was applied.



Specification Clause

The insulated pitched roof wall insulation shall be Xtratherm Safe-R SR/TB-FL Fireline Thermal Liner manufactured to EN 13950 by Xtratherm, comprising a rigid Euroclass B-s1, d0 Phenolic core and 15mm Fireline plasterboard. The Safe-R SR/TB-FL Fireline Thermal Liner _ _ _mm with DOP declared Lambda value as low as 0.020 W/mK (Phenolic only), bonded to a 15mm Fireline plasterboard achieving 45 minutes fire resistance tested to EN1365-2, to achieve a U-Value of _ _ _W/m²K. To be installed in accordance with instructions issued by Xtratherm.

Refer to NBS clause K10 205, K10 15, K10 245, K10 25

NBS Plus

Thermal Performance

Typical U-Values

Table 1 - Sloped Roofs
U-Value calculations to EN ISO:6946
SR/TB-FL Insulation for Pitched Roof

Hybrid Roof

SR/PR between rafters	SR/TB-FL under rafters	400mm centres	600mm centres
100mm	50mm*	0.15	0.14
120mm	50mm*	0.14	0.13
120mm	60mm*	0.13	0.12
120mm	70mm*	0.12	0.12

*Insulation thickness only

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

Table 2 - Walls drylined on battens
U-Value calculations to EN ISO:6946
SR/TB-FL Insulation for Walls

Pumped Bead @ 0.333 W/mK*

Safe-R SR/TB-FL on battens					
Wall Type	Insulation Thickness				
	50 '	60 '	70 '	80 '	90 '
215mm Hollow Block (External Ender)	0.29	0.26	0.23	0.21	0.19
Solid Brick	0.29	0.25	0.23	0.20	0.19
Cavity Wall Pumped Brick & Block*	0.16	0.15	0.14	0.13	0.13

'Insulation thickness only

Thermal Resistances

Thickness (mm) Phenolic	Thickness (mm) Plasterboard	Overall Thickness (mm)	Overall R-Value (m² K/W)
50'	15	65	2.40
60'	15	75	2.90
70'	15	85	3.35
80'	15	95	3.85
90'	15	105	4.35

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 phenolic thickness 50mm -> 0.050/ 0.021 -> R-Value = 2.38. In accordance with EN 13950, R-values should be rounded down to the nearest 0.05 (m² K/W).

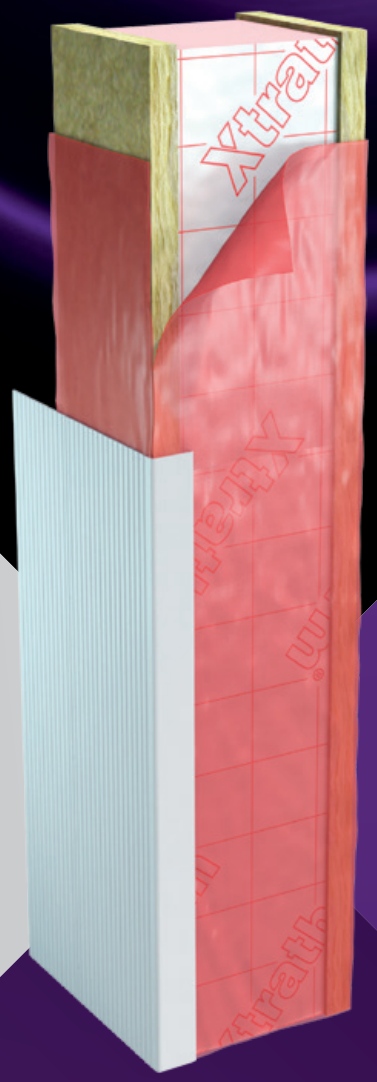
Safe-R Close-R

Xtratherm innovation

A high performance EN fire-rated cavity closer providing compliance with structural and thermal regulations in Ireland.

Safe-R Close-R achieves an excellent fire rating and allows for the correct placement of wall ties to meet TGD Part A structural requirements. The superior insulation performance attains Passive & NZEB standards for thermal bridging.

The combination of StoneWool with Safe-R Phenolic was tested to EN1363-1 and EN1364-1. The high thermal performance provides certified PSI values reaching Passive Thermal Bridging standards.



Key Benefits

- Achieved in excess of 4 hour fire rating in a 150mm cavity when tested to EN1366-4
- Provides template for wall ties placement
- Ensures continuity of insulation
- Suitable for door, window, eaves openings
- Suitable for use at expansion join

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More than insulation

Technical Data

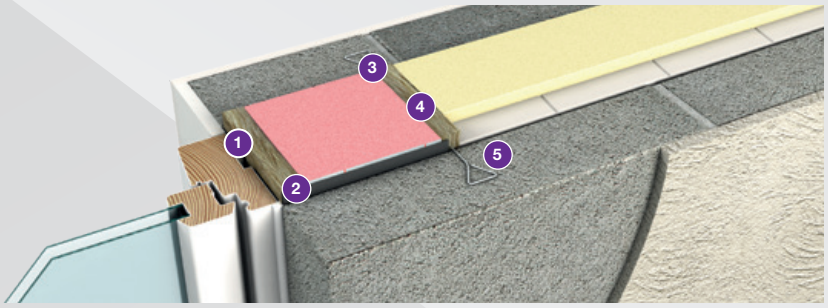
These extra structural ties do interrupt the continuity of the insulation layer and increase thermal bridging issues at very vulnerable areas, with mould growth normally most evident at reveals. Safe-R Close-R achieves an excellent fire rating and allows for the correct placement of wall ties to meet TGD Part A structural requirements. The superior insulation performance attains Passive & NZEB standards for thermal bridging.

Safe-R Close-R Properties

Product Code	Cavity Width	Width (Compression)	Length	Depth
XTCLSR1200100	Safe-R Close-R 100mm	105mm	1200	200
XTCLSR1200125	Safe-R Close-R 125mm	130mm	1200	200
XTCLSR1200150	Safe-R Close-R 150mm	155mm	1200	200

Safe-R Close-R is available with a PVC weatherproof casing that is keyed to accept a plaster finish.

Product Code	Return Block	Width (Compression)	Length	Depth
XTCLSR1200075R	Safe-R Close-R 75mm Return	80mm	1200	200



1. Fire & Thermal
The combination of StoneWool with Safe-R Phenolic meets the highest thermal and fire targets.

2. Allow for DPC
The placement of traditional DPC's at openings allows for protection of the framing junction. Windows/door tolerances necessitate the use of sealants which is hidden by the DPC.

3. 5mm Compression fit
Oversized StoneWool ensures tight fit within cavity opening.

4. 25mm StoneWool
StoneWool acts as a compressive layer to embed wall ties and allow seamless fit with chosen wall insulation.

5. 225mm Template
The Safe-R Close-R acts as a template for the correct placement of ties at every block course ensuring compliance with TGD Part A.

Specification Clause

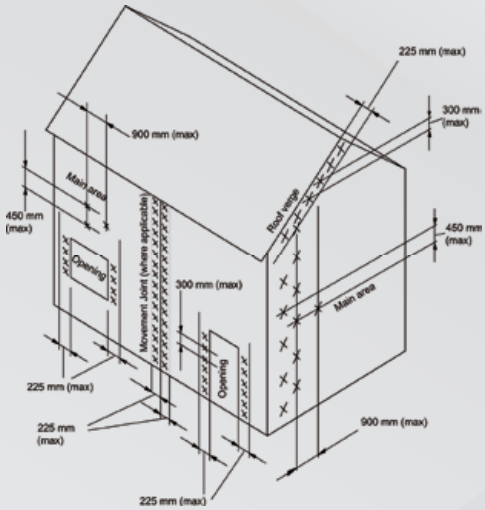
The Safe-R Cavity Closer shall comprise of a rigid Phenolic core between low emissivity foil facings manufactured to EN 13166 with a declared Lambda value as low as 0.020 W/mK and mineral wool manufactured to EN 13162, with a declared Lambda value as low as 0.037 W/mK wrapped in a protective red sleeve to achieve a minimum 1 hour fire resistance tested to EN 1366/4.
To be installed in accordance with instructions issued by Manufacturer.

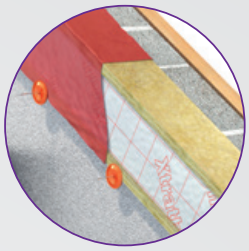
Building Regulation Requirements

TGD A - Requirements for additional wall ties at openings and movement joints

Wall ties should be provided in cavity walls and should comply with I.S. EN 845-1.

Extra wall ties are required at the jambs of openings and movement joints as shown in the diagram opposite.




Gable


Wall Plate


Block Return

Thermal Bridging

Detail Safe-R Close-R	Default PSi Value	Safe-R Close-R PSi Value	f-Factor
125mm Cavity Wall Jamb	0.006	0.004	0.96
150mm Cavity Wall Jamb	0.006	0.005	0.97
Party wall	0.032	Psi from 0.037 to 0.019*	0.98
Eaves	0.053	0.051	0.94

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 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 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 Part L 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 Ireland we are blessed with a mild climate where most of us sleep with the windows open, it is a matter of preference.

At the Air Infiltration and Ventilation Symposium in Dublin March 2019 it was illustrated how difficult it is to get the desired performances – *https://www.aivc.org/resources/collection-papers/volume/27-28-march-2019-quality-ventilation-key-achieving-low-energy (search for AIVC Dublin)*

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

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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 energy 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 Passive House Association Ireland can offer guidance and advice - **https://phai.ie**

Or the Irish Green Building Council can advise on embodied energy - **www.igbc.ie**

The SEI published a guide to building Passive housing in Ireland, Passive homes **'Guidelines for the design and construction of passive house dwellings in Ireland'**. It contained a foreword from Dr Wolfgang Feist, the founder of the Passive House Institute in Germany, as well as information specific to the Irish climate for consideration by those interested in Passive Haus.

Double or Triple Glazing?

Again, NZEB standard has been achieved in the regulation examples by using double glazing that delivers a U-Value of 1.40W/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 when 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. 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/m^{2}K, 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 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 as A2 or A3. 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 Acceptable 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 CO^2 produced from our dwellings, how we use our homes, and the lifestyles 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.

Detached: Self Build

In this example, we have achieved compliance by using 150mm CavityTherm and 150mm Hyfloor using calculated Y-Values for the fabric in combination with a heat pump to satisfy the renewable contribution.

PASS

Item	U-Value	Specification
Floor Insulation	0.11	150mm Hyfloor
Cavity Wall	0.13	150mm CavityTherm
Ceiling	0.12	300mm Fibreglass & 42.5mm Thin-R Thermal Liner Mechanically Fixed
Windows	1.40	Double Glazed
Front Door	1.00	Insulated door (To be confirmed by supplier)
Back door	1.50	(To be confirmed by supplier)
Heating system	Yes	Heat pump - 268% Space heating 233% water heating
Heating controls	Yes	Full time and temperature controls
Light Fittings %	100%	CFL low energy lights
Thermal Bridging Factor	0.02	Calculated using Xtratherm details
Air Permeability	5	0.25 ACH
Renewable Technology	Yes	From heat pump
Natural Ventilation	Yes	
Secondary Heating	Yes	Log burner stove
Delay Start Stat	N/A	
Cylinder	300L	Cylinder factory insulated 100mm

RESULTS	EPC	CPC	RER
A2 Rating	0.280	0.226	45%
Maximum permitted performance for EPC and CPC	0.300	0.350	20%

Detached: Self Build

In this example, we haven't achieved compliance.

Using backstop U-Values and uncalculated default Y-Values, it shows the effect on the results compared to the previous option while keeping the specification identical.

FAIL

Item	U-Value	Specification
Floor Insulation	0.15	125mm PIR
Cavity Wall	0.18	100mm PIR
Ceiling	0.16	300mm Fibreglass
Windows	1.40	Double Glazed
Front Door	1.40	Standard door
Back door	1.40	Standard door
Heating system	Yes	Heat pump - 222% Space heating 233% water heating
Heating controls	Yes	Full time and temperature controls
Light Fittings %	100%	CFL low energy lights
Thermal Bridging Factor	0.08	Default Y-Value when using ACDs
Air Permeability	5	0.25 ACH
Renewable Technology	Yes	From heat pump
Natural Ventilation	Yes	
Secondary Heating	Yes	Log burner stove
Delay Start Stat	N/A	
Cylinder	300L	Cylinder factory insulated 100mm

RESULTS	EPC	CPC	RER
A2 Rating	0.403	0.327	41%
Maximum permitted performance for EPC and CPC	0.300	0.350	20%

Whole-Dwelling Energy Performance

New Dwellings

Primary energy use and the associated carbon dioxide emissions, as calculated using the Dwelling Energy Assessment Procedure (DEAP) must not exceed specified target values.

In order to achieve the primary energy use rate for NZEB the energy performance coefficient (EPC) of a dwelling must be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC), which is 0.30. The EPC is calculated by dividing the primary energy use of the dwelling (calculated using DEAP) by the primary energy use of a reference dwelling defined in Appendix C of TGD L. Primary energy does not include energy derived from on-site renewable energy technologies.

An acceptable carbon dioxide emissions rate for NZEB is achieved if the calculated carbon performance coefficient (CPC) is no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC), which is 0.35. The carbon performance coefficient is calculated by dividing the carbon dioxide emissions (calculated using DEAP) by the carbon dioxide emissions of the same reference dwelling defined in Appendix C of TGD L.

Both requirements must be met, so in summary, the whole-dwelling performance requirement for the dwelling as constructed is:

$$\text{EPC} \leq 0.30 \;\&\; \text{CPC} \leq 0.35$$

Compliance is achieved easier in dwellings where on-site renewable energy technologies are used. Renewable energy technologies are solar thermal systems, solar photovoltaic systems, biomass systems, biofuel systems, heat pumps, wind power generators and other similar small scale systems. Guidance on the specification of renewable technologies for dwellings appears in Technical Guidance Document supporting document Heating and Domestic Hot Water Systems for Dwellings (forthcoming). SEAI maintains databases of renewable energy systems products, including information about their performance characteristics.

Where the EPC ≤ 0.30 and the CPC ≤ 0.35 the ratio of primary energy from renewable energy technologies to total primary energy use (known as the Renewable Energy Ratio, or RER) should be at least 0.20, which meets the EPBD requirement for a 'significant level of energy provision from renewable energy technologies' in NZEB. The RER is calculated by DEAP, and the requirement is:

$$\text{RER} \geq 0.20$$

The contribution of local centralised renewable energy sources supplying a heat distribution system serving all the dwellings in a district, area or block may be included in the RER. Alternatively, a combined heat and power (CHP) system supplying heat and hot water and contributing thermal energy equivalent to an RER of 0.20 is an acceptable way of meeting the requirement. For guidance on the design of CHP systems, TGD L refers to CIBSE Applications Manual AM12 Combined Heat and Power in Buildings.

Where a building contains more than one dwelling (e.g. a terrace of houses or a block of apartments) it is acceptable to show that either every individual dwelling has an EPC ≤ 0.30, a CPC ≤ 0.35 and an RER ≥ 0.20, or that for all the dwellings in the building the average EPC ≤ 0.30, the average CPC ≤ 0.35 and the average RER ≥ 0.20. The average EPC, CPC and RER are calculated by multiplying the EPC, CPC and RER calculated for each dwelling by its floor area, adding the results together (separately) and dividing by the total floor area of the building. Calculation of the average EPC and CPC should exclude any common parts, but calculation of the average RER should include any common parts.

Meet the team who can help you with your project

Our Dedicated Sales Team

Our Commitment:

- Bespoke variable mixed loads of products, including phenolic
- Flexible delivery times
- Direct to site deliveries available
- Various transport vehicle types available
- Dedicated Sales Support
- Dedicated Merchants Technical Support
- On-site support and training for installers
- 3rd Party approved technical calculations
- Access to sales opportunities
- Training of merchant staff

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

Please refer to the Resources section of our website for more details

The Xtratherm Innovation Centre

The Xtratherm exhibition space and training academy 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

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F +353 (0)46 906 6090

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

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 our customer bases in Europe and further afield from our group headquarters in Navan, Co. Meath. Their experience and expertise has been built through our engagement and participation with the Irish construction industry for over 30 years.

Internal Technical Team

Danny Kearney

Mark Magennis

Paschal Gallagher

Conor Sheppard

Francis Rilley

Marc Walsh

Alessandro Martinis

External Technical Team

Phil Ward

Raymond Madden

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