

Improved
2015
specification

marmox
therm·block

Reduce heat loss at the base of walls



Solves cold bridging at the wall-floor junction



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Technical Information

Ψ value - wall/floor junction

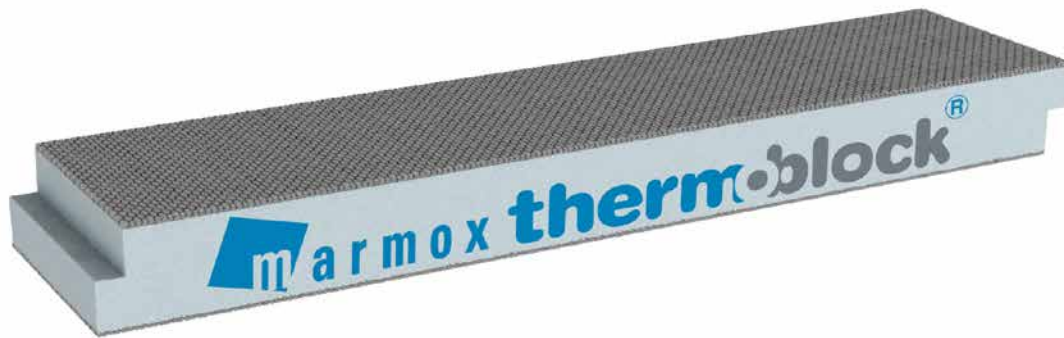
0.03 - 0.07 (W/m.K)

Effective thermal conductivity

0.047 (W/m.K)

Mean compressive strength

9.0N/mm²



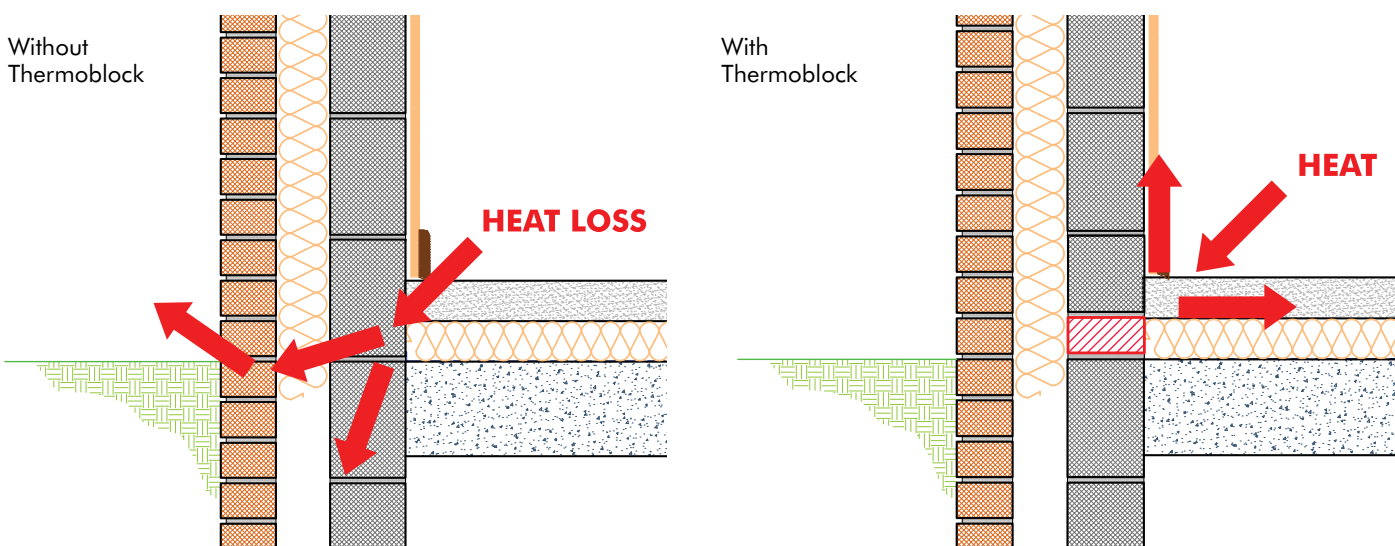
Why Thermoblock should be used

All building regulations in the UK and Ireland now say:

“The building fabric should be continuous over the whole building envelope and constructed so that there are no reasonably avoidable thermal bridges in the insulation layers caused by gaps in the various elements.”

Marmox Thermoblock satisfies this requirement perfectly.

Marmox Thermoblock is a structural insulation block that sits at the junction in the wall with the floor. It replaces the first course of blocks or bricks or sits beneath the sole plate of a timber frame.



One of the worst areas of heat loss through a thermal bridge is where the floor meets the wall allowing heat to be transmitted to the outside. In this area up to 30% of heat in an otherwise well insulated room can be lost. This is the point where Marmox Thermoblock acts as a thermal barrier blocking that heat loss.

Stops Mould Growth

The current requirement for improved thermal insulation in a wall can sometimes increase the risk of surface condensation and therefore result in mould growth.

' f_{RSI} ' is the calculated risk factor (sometimes called the 'temperature factor') and to avoid the risk of mould growth this value should always be above 0.75. For a typical application where Marmox Thermoblock is used at the base of a wall in an accredited construction detail the f_{RSI} value has been calculated to be 0.87. This shows that Marmox Thermoblock will be beneficial in reducing the risk of mould growth.

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What is a Marmox Thermoblock?

Marmox Thermoblock is a high insulating, load-bearing, building block designed to replace the course of brick or block at the bottom of a wall. They practically eliminate the thermal bridge at this point and retain significant heat within the building structure.

Although the Marmox Thermoblock is a lightweight product, it has a very high mean compressive strength of 9N/mm² making it suitable for supporting walls compliant with Building Standards.

The Marmox Thermoblock consists of a core of highly insulating XPS (or PIR) with 18 load bearing epoxy concrete columns and a polymer concrete facing on the top and bottom layers. The core of the standard block is 85% XPS with a thermal conductivity of 0.028W/m.K and 15% epoxy concrete with a thermal conductivity of 0.125W/m.K. The average thermal conductivity of the core is therefore 0.044W/m.K.



Placement of Marmox Thermoblock

The most popular and effective application is to use just one row of Marmox Thermoblocks at the base of the inner leaf in the perimeter wall.

It can also be used in solid single leaf walls, outer leaves, party walls, at the wall/roof junction, parapets (see page 12), beneath window and door frames and in other locations where cold bridging needs addressing.

Versions Available

The standard Thermoblock is 65mm high, although 100mm high blocks can also be made

Because XPS can be distorted with direct contact from a flame gun, a Parapet Block version is available which has a core of flame-proof PIR. This is available in 53mm thickness only and should be used when torch-applied bitumen based waterproof layers and hot bitumen are being used.

The XPS version is available in three widths, 100mm, 140mm and 215mm. The PIR version is available in two thicknesses 100mm and 140mm.



Stops heatloss at the wall-floor junction

In a typical detached property, it has been calculated (Energy Saving Trust: Thermal Bridging and Airtightness 2009) that an unaddressed Thermal Bridge can account for 30% of the building's heat loss. Marmox Thermoblock can reduce this to approximately 2% and reduce the daily CO₂ emissions associated with this wasted heat from 1.5kg to 0.1kg.

Building Regulations – Energy Conservation

Part L (England, Wales, R.o.I), Section 6, Part D (N.I.)

Marmox Thermoblock satisfies all current requirements of the standards

The non-dwelling and dwelling versions of the regulations now require continuity of insulation at the wall-floor junction.

Building regulations now require that heat loss due to thermal bridging should be taken into account in SAP calculations (for dwellings) and SBEM calculations (for buildings other than dwellings) at the design stage. The heat loss through the wall/floor junction is expressed as a ψ value, which is the linear thermal transmittance and the cumulative heat loss as a y value. The design of the junctions should be based on Accredited Construction Details (ACDs) or Enhanced Construction Details (ECDs). Both SAP, SBEM or other approved software then allocate a specific default y value for each type of junction.

When variations to standard designs are used, the UK government's National Calculation Method (NCM) which encompasses SAP and SBEM, allows values derived either from thermal modelling or from measurement to be used. Using the published ψ value of Marmox Thermoblock in this calculation will give an appreciably better y value. Using standard ACDs will add a heat loss of 0.08Watts to all the U values of a property, ECDs will add 0.04Watts but Marmox Thermoblock typically will add about 0.01Watt or less.

Building regulations - Towards Zero Carbon

Marmox Thermoblock will meet zero carbon standards.

English Building Regulations for dwellings (Part L1A: 2013) now include another measurement of heat loss: Fabric Energy Efficiency.

This standard is based on the Ene2 points calculation used in the Code for Sustainable Homes. This requirement is met by ensuring continuity of the insulation on the "fabric" of the building. It is measured in terms of kilowatt-hours of energy lost for every square meter.

Incorporating Marmox Thermoblock to remove a thermal bridge can be shown to reduce the total heat loss in a room by 95%.

The FEE Standard will be included in the 2016 "Zero Carbon" Building Standards (for housing) for Scotland, Wales and Northern Ireland.

The 2016 "Zero Carbon" Building Regulations will require houses to have similar energy losses equivalent to those currently specified as CfSH Level 5. The cold bridge at the wall-floor junction must be removed in order to achieve this level of insulation.

The 2019 regulations for Zero Carbon buildings (non-domestic) will demand a 100% improvement in the overall heat loss (the Building Emissions/Energy Rate) compared with the previous standard. Because thermal bridging can account for 30% of heat loss, using Marmox Thermoblock will allow this target to be achieved.

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Building regulations - Structure

Part L (England, Wales, R.o.I), Section 1, Part D (N.I.)

Marmox Thermoblock is strong enough to be used at the foot of a supporting wall.

The Declared Unit Strength of Marmox Thermoblock to BS-EN 772-1 is in excess of most aerated concrete blocks, even the "High Strength Grades" which are those with a compressive strength of 7.3N/mm². Consequently, Marmox Thermoblock can replace any masonry block with a strength of up to 9N/mm² without any loss of integrity of the wall.

Specifically for "low rise housing," all British building regulations along with BS 8103: Part 2 present a simple guide to the block strength and wall thicknesses of masonry needed depending on whether the dwelling is one, two or three storey. Marmox Thermoblock meets all of these requirements.

For residential buildings of over 3 storeys and commercial and industrial buildings, the structural design should be carried out in accordance with BS 5628: Part 1 by a suitably qualified engineer.

When carrying out the design in accordance with BS 5628: Part 1, the structural engineer will take into account the mean and characteristic compressive strengths which are represented at the back of this brochure.

The Code for Sustainable Homes

Changes to the code were introduced in 2010 as part of the European Union's drive towards zero carbon in 2016/2020. Achieving CfSH rating 3 is virtually mandatory which is equivalent to a 25% reduction in CO₂ emissions in new buildings, compared with standards set in the 2006 building regulations.

From 2013 a CfSH rating of 4 or higher is now increasingly being specified.

Another section of the Code requires that chemicals used during manufacture must have a Global Warming Potential of less than 5 and a zero Ozone Depleting Potential.

Marmox Thermoblock easily achieves all of the above.

Incorporating Marmox Thermoblock into a design will often provide enough Ene1 and Ene2 points so that other point gaining additions such as solar panels can be reduced or eliminated from the design.



Achieving a minimum of level 4

To achieve a CfSH rating of 4, the CO₂ emissions must be at least 44% better than those stated in the 2006 building regulations.

In a typical construction, by employing Enhanced Construction Details alone, it can be shown that CO₂ emissions are reduced by between 35% and 55%. ECDs therefore can certainly help in achieving a rating of 4.

However Using Marmox Thermoblock would typically reduce the CO₂ emissions by between 60% and 90%, virtually guaranteeing at the very least a CfSH rating of 4 or more.

Marmox Thermoblock can be instrumental in achieving the zero carbon rating. Specifying Marmox Thermoblock will ensure that buildings using it will be future proof.

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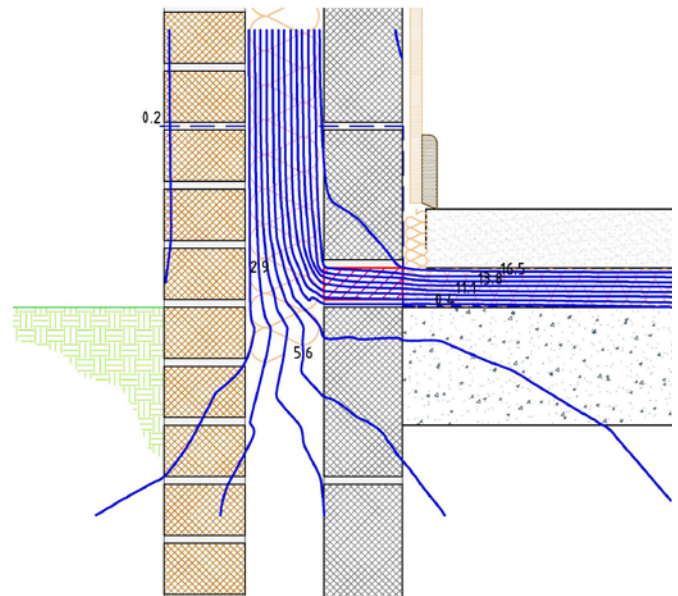
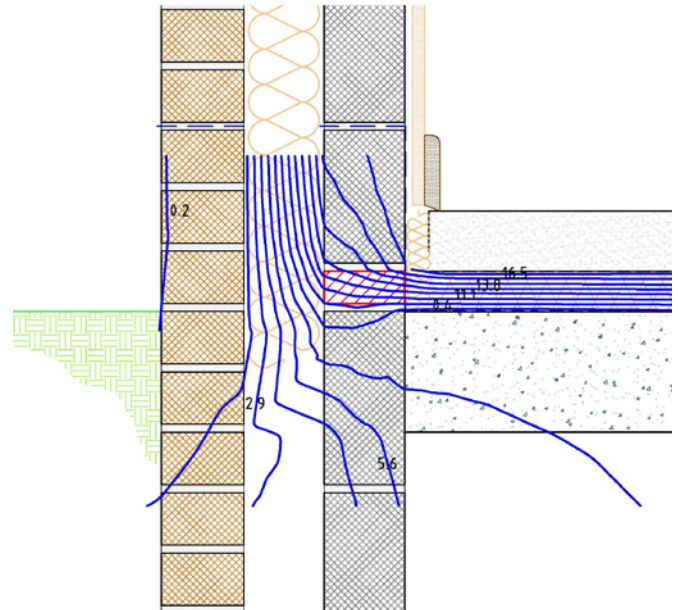
Heat loss at the thermal bridge

The heat loss for a thermal bridge is determined by its linear thermal transmittance. This is measured in Watts for every metre of the thermal bridge for every degree difference in the temperature between inside and outside of the room. The UK maximum allowable heat loss at a thermal bridge (wall/floor junction) is 0.16W/m.K. Using an ACD reduces this figure to 0.08W/m.K, an enhanced construction design with additional interleaf insulation and edge insulation will be 0.04W/m.K but just one row of Marmox Thermoblock will take this down to approximately 0.01W/m.K.

From the ψ values, 'y-values' (heat loss across the length of the cold bridge) are calculated which are used by the designers in the SAP/SBEM calculation of the building. Without knowing the true y values, building regulations require a 'default y-value' to be used which makes it harder to achieve a good CfSH rating. These default y values add an approximated additional heat loss to the whole property, which is less accurate than calculating it using the approved data provided by a product manufacturer such as Marmox.

BBA tests (to BS-EN ISO10211) using one Accredited Construction Detail determined the ψ value of the floor/wall junction with two types of block; a) cellular concrete block inner wall and b) dense concrete block inner wall both with Marmox Thermoblock at the wall/floor junction.

The following isotherms show the heat flow using Marmox Thermoblock in both these standard scenarios. Since the isotherms are virtually flat, this implies that the heat flow is virtually vertical. i.e. in the direction of the supporting columns in the Marmox Thermoblock. The red rectangle represents the Marmox Thermoblock in a wall with dense concrete block (top diagram) and with an aerated concrete block (bottom diagram).



Conductive inner leaf (W/m.K)

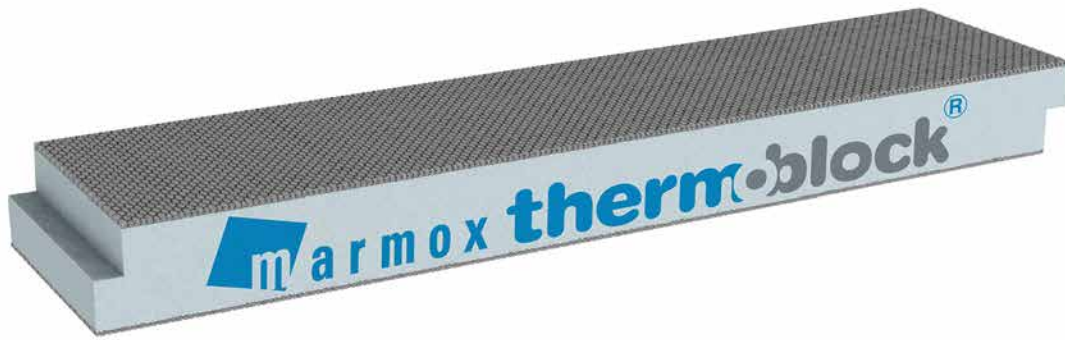
1.2 (high density concrete block)

0.2 (7.3N aircrete block)

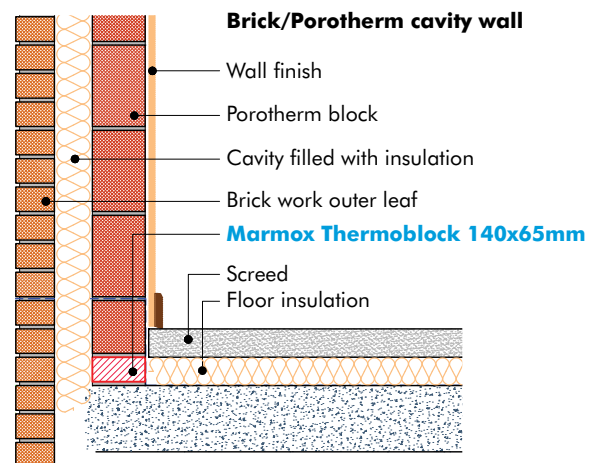
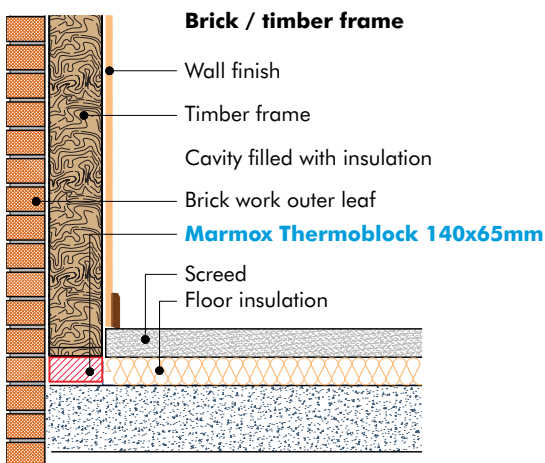
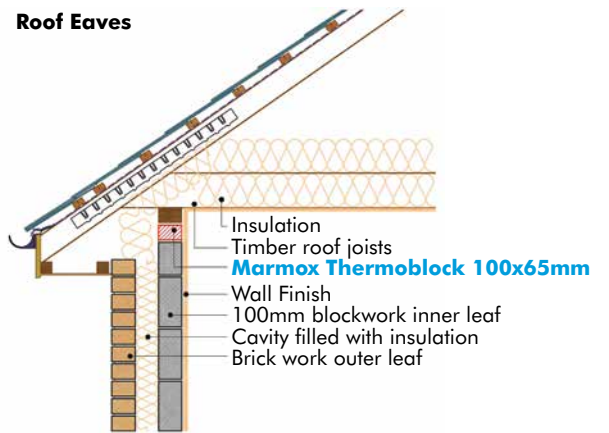
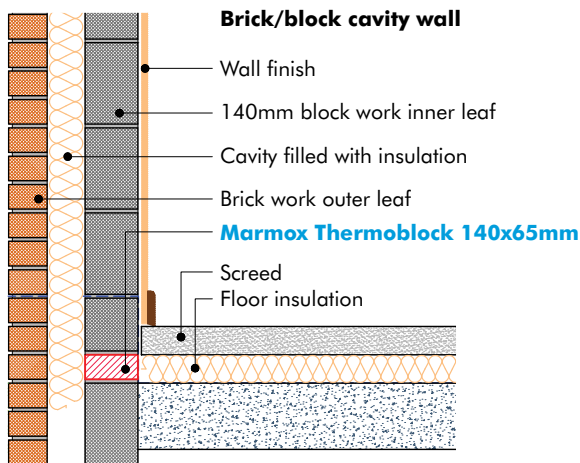
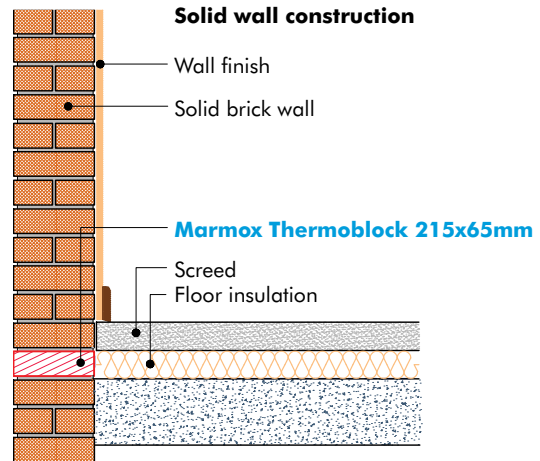
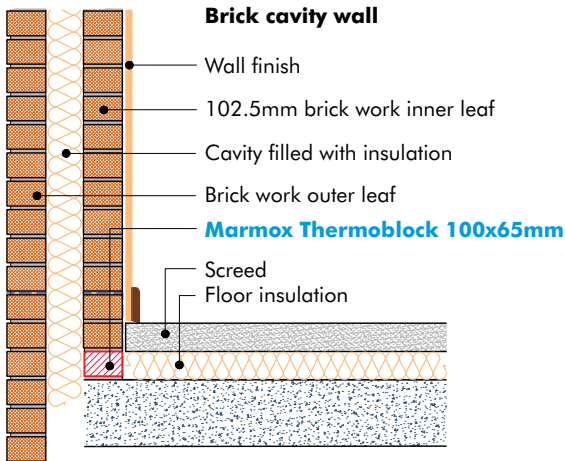
ψ value W/m.K of the junction

0.069

0.034



Examples of where to use



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Offsetting the cost

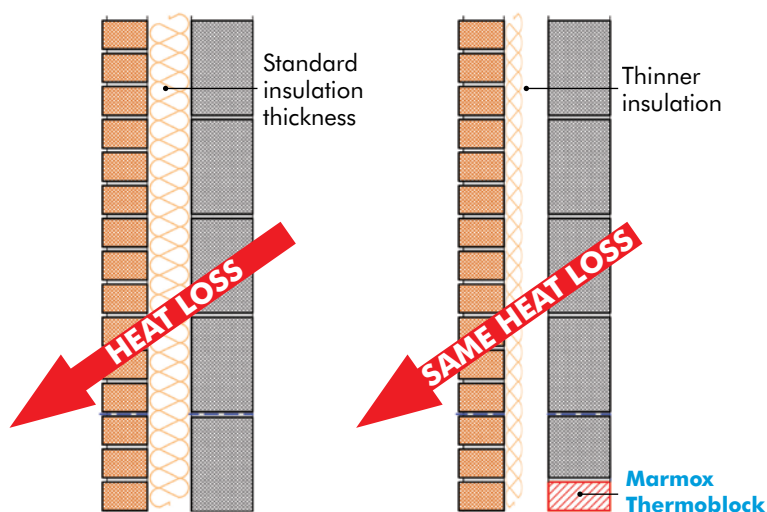
Using Marmox Thermoblock could allow less insulation elsewhere.

Incorporating Marmox Thermoblock into a design will reduce the Y Value used in SAP or SBEM. Because SAP/SBEM are concerned with the overall heat loss, if the Y value is reduced (meaning the heat loss at the thermal bridge is reduced), possibly the U value of the wall or floor insulation could be made a little bit worse yet still the overall heat loss or DER (Dwelling Efficiency Rate) would be the same. For example:

Standard thickness wall insulation with no thermal bridging block
 $100\text{W/K} + 12\text{W/K} = 112\text{W/K}$

If the heat loss at the thermal bridge is reduced to 2W/K , the thickness of the wall insulation could be reduced
 Slightly thinner wall insulation (cheaper) with thermal bridge insulation
 $110\text{W/K} + 2\text{W/K} = 112\text{W/K}$

The overall heat loss through these two walls could be the same.....



Cost benefit and payback

In addition to reducing CO₂ emissions, easily achieving CfSH level 4 and meeting building regulations, Marmox Thermoblock of course will reduce heating costs. Because there are so many variables involved such as internal temperature, external temperature, number of times the door is opened during a day and the insulation of the rest of the building envelope it is impossible to determine an accurate figure.

Thermal heat loss estimations for various buildings with accredited construction designed junctions were used to estimate very approximate payback times – that is the length of time before the cost of installing the Thermoblock is paid for by the resultant cost savings in energy usage. It was assumed that insulation everywhere else was compliant with building regulations and there was no significant air leakage or dampness and central heating was used for eight months of the year for 12 hours per day where the external temperature was 10°C less than the desired internal temperature.

Type of building	Approximate payback time
Terraced town house (two external walls)	2-3 years
3 bedroom semi-detached house	3-4 years
Four bedroom detached house	4-5 years
A single storey extension / conservatory	6-7 years
Single story school block (30m x 10m)	4-5 years

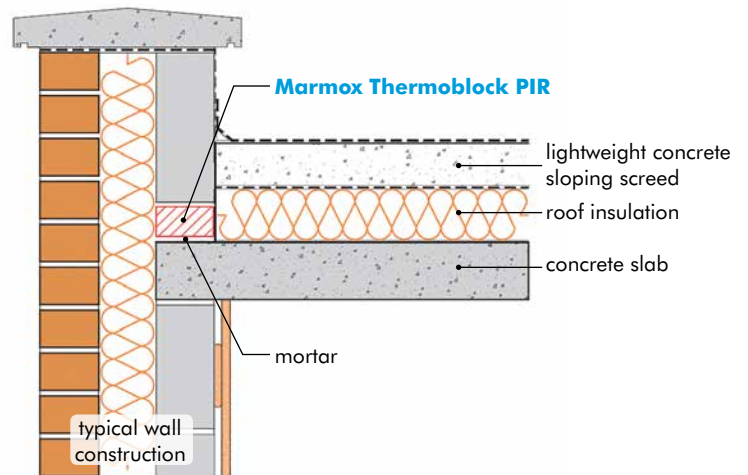
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Reduce heat loss at the base of walls

Parapet block

Heat can be lost from a room below a flat or sloping roof that supports a parapet wall. In addition to wasting energy, parapet walls can result in condensation and mould growth on the walls underneath.

Specifically for this purpose, we have developed the Marmox Thermoblock-PIR version, or Parapet Block. Marmox Thermoblock PIR blocks are available in one height only: 53mm.



What is a parapet block

Thermoblock-PIR is made with flame-resistant polyisocyanurate integrated into a strong epoxy-concrete frame with a compressive strength of 9N/mm^2 . It is ideal for use in areas where hot bituminous membranes are being applied using a heat gun or torch. Because the Polymer-concrete is non-combustible and the PIR core of the product is difficult to burn, the flame from a gas torch can be applied directly on to the product without causing damage.

It is also critical that Parapet walls are designed to resist a range of wind pressures therefore the introduction of an insulation element at the base of the wall must not compromise the integrity of the structure.

To ensure the suitability of the product supporting parapet walls, tests have been carried out to EN1052-1. These have confirmed that the stability and lateral movement of a wall is unaffected by the replacing the bottom layer of bricks or blocks with Thermoblock.



Why use Thermoblock-PIR?

Eliminating the thermal bridge beneath parapet walling has often been ignored because to do so would involve continuing the floor insulation to the internal wall insulation. Constructing a free standing wall on top of normal insulation would be dangerous since the wall could be distorted or even blown over by wind pressure. Although the core of Thermoblock-PIR is soft insulating foam, the frame of the product is our unique and exceptionally strong epoxy-concrete. This material is rated to carry a load of 9N/mm² and unlike ordinary insulation material it will not compress until it reaches this very high breaking load. Like standard Thermoblock, one layer of Thermoblock-PIR should be used to replace the base layer of blocks or bricks and they should be fixed with normal mortar at 12 to 15mm thickness. Doing so will eliminate the thermal bridge and not affect the stability of the wall.

The UK requirement for the heat loss at this position is a Ψ value of 0.56W/m.K

Type of Wall block used	Thermal Conductivity of walling	Psi (Ψ) value at the junction
High Density Concrete	1.2 W/m.K	0.128W/m.K
Lightweight Concrete	0.2 W/m.K	0.101/m.K

Accessories

Blocks should be sealed together to ensure air tightness of the building using Marmox Multibond. This action will also prevent moisture rising by capillary action into the joint which could create a series of micro-thermal bridges. Marmox Multibond is a completely VOC free waterproof sealant and adhesive. It is fire rated for 4 hours, noise attenuating and because it is water based, it is compatible with the cement based mortar used to fix it.



What it should NOT be used for

NOT an alternative to aircrete blocks

Marmox Thermoblock is designed specifically for use at the thermal bridge and can be used in combination with aircrete blocks to give the very best performance.

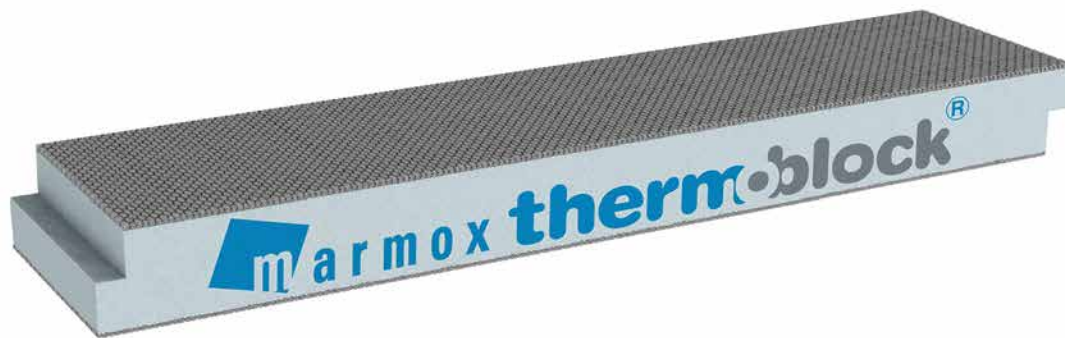
Although construction blocks made from aircrete, AAC or cellular concrete provide excellent thermal properties, they are not the same as Marmox Thermoblock.

Typical AAC blocks provide λ values of 0.11W/m.K for 3.6N blocks and 0.22W/m.K for the stronger 7.3N versions. Where as the Marmox Thermoblock λ value is between two to four times more effective. This is important when determining the heat loss at the thermal bridge.

NOT an alternative to a damp proof course

Marmox Thermoblocks are waterproof and if a sealant is used to bond the blocks together they do create a solid waterproof barrier but they are not defined as such. They will however act as a secondary defence in keeping walls damp free.





Notes before fitting

- Thermoblock should be laid on a flat surface and the block, brick or sole plate that is placed on top must also be flat, uniform and of the same width as the Thermoblock
- Marmox Thermoblocks should be incorporated into the base of the wall so that its top surface is below the level of the adjoining floor. No surface of the Marmox Thermoblock should ever be left exposed.
- Marmox Thermoblocks should not be laid on top of each other.
- Hollow or indented bricks must not be used unless the hollow is facing upwards because a flat surface should always be presented to the Marmox Thermoblock.



Installation instructions

- 1 Marmox Thermoblock is laid onto a flat foundation layer of bricks, blocks or concrete using a standard brick laying soft mortar. Note: If Thermoblocks are being laid on top of bricks then they need to be laid onto the bricks flat side.
- 2 In the same way as laying a brick, press the Thermoblock into position and tap down until level and stable. The Thermoblocks have staggered joints and should be interlocked to form a rigid structure.
- 3 To provide a waterproof and air tight barrier at the base of the wall, Marmox Multibond Sealant should be used on the staggered joints, approximately one tube per box for blocks.
- 4 To cut the Thermoblocks an ordinary handsaw can be used. A standard brick rotary blade cutter may also be used as this will be able to easily cut through the concrete columns.
- 5 Lay the first layer of bricks or blocks on top of the Thermoblock layer with a standard soft mortar. If using lightweight blocks this layer should be about 15mm thick so that the weight is distributed uniformly over the surface and through the columns.
- 6 Although Marmox Thermoblocks form a continuous moisture barrier it is not designed to replace the traditional damp proof course. The DPC should still be installed and its position is unaffected by the location of the layer of Marmox Thermoblocks.

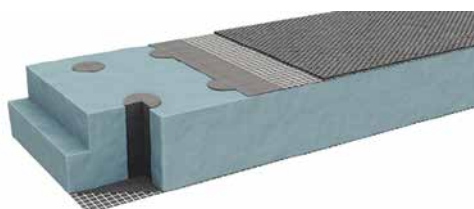


Reduce heat loss at the base of walls

Table of characteristics

Property	Units	European Standard	Standard Thermoblock	Extra thick Thermoblock	Thermoblock PIR (Parapet)
Total Thickness	mm	EN 823	65	100	53
Thickness of insulation	mm	EN 823	60	95	47
Width	mm	EN 822	100	100	100
			140	140	140
			215	215	
Length	mm	EN 822	600	600	600
Weight	kg	EN 822	100mm = 1.6 140mm = 1.9 215mm = 2.5	100mm = 2.2 140mm = 2.6 215mm = 4.0	100mm = 1.4 140mm = 1.7
Thermal conductivity (λ) of insulant	W/m.K	EN 12664 EN 13165	0.028	0.028	0.026
Thermal conductivity of (λ) of support columns	W/m.K	EN 12667	0.130	0.130	0.130
Thermal conductivity of (λ) of slurry coating	W/m.K	EN 10456	1.15	1.15	1.15
Effective thermal conductivity of (λ) of insulation core	W/m.K	EN 12664/5/7	0.044	0.044	0.041
Vertical thermal resistance (R) of insulation core	m ² K/W	EN 12667	1.4	2.1	1.1
Declared compressive strength (f_b)	N/mm ²	EN 772-1	9.0	9.0	9.0
Characteristic compressive strength (f_k)	N/mm ²	EN 771-4	100mm = 6.6 140mm = 8.0 215mm = 8.0	100mm = 6.6 140mm = 8.0 215mm = 8.0	100mm = 6.6 140mm = 8.0 215mm = 8.0
Expansion coefficient	Mm/m.k	EN 53752	0.07	0.07	0.07
Water absorption	%	EN 771-3	3.1%	2.2%	6.4%
Maximum operating temperature	°C	EN 14706	75°	75°	250°
Fire resistance	Euroclass	EN 13164	E	E	E
Fire resistance	Minutes	EN 1365-1	>120mins	>120mins	>120mins

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