Certified Thermal Details and Products Scheme

Marmox: Thermoblock

Prepared for: Mark Bowman, Marmox UK Ltd

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1 Introduction

1.1 Certified Thermal Details and Products Scheme

The Certified Thermal Details and Products Scheme and database allows users to search a range of accurate and independently assessed thermal junction details, products and elements, ensuring accuracy, consistency, credibility and quality throughout the design and specification process.

This scheme provides independent, third party assessment and certification of the 'as designed' thermal performance of:

- Building junction details (e.g. SAP Table K, plus some bespoke detail types)
- Opening products (e.g. windows, doors and rooflights)
- Major (plane) building elements (e.g. wall, roof and floor products)

This ensures that the performance, marking and classification requirements of the appropriate standards are met and maintained.

1.2 Marmox Thermoblock ground floor & roof junctions

Marmox have submitted a range of ground floor and roof junction details incorporating Thermoblock load bearing thermal insulation blocks to BRE for certification via the Certified Thermal Details and Products Scheme, and subsequent listing of the results on the Scheme's online database:

www.bregroup.com/certifiedthermalproducts

Ψ-value (W/m·K) and temperature factor (*f*) calculations were undertaken for the following junction details:

- Cavity wall, concrete slab floor, insulation under screed (65mm Thermoblock)
- Cavity wall, concrete slab floor, insulation under slab (65mm Thermoblock)
- Cavity wall, suspended concrete floor, insulation under slab (65mm Thermoblock)
- Cavity wall, beam & block floor, insulation under screed (65mm Thermoblock)
- Timber frame wall, concrete slab floor, insulation under screed (65mm Thermoblock)
- Timber frame wall, concrete slab floor, insulation under slab (65mm Thermoblock)
- Steel frame wall, concrete slab floor, insulation under slab (65mm Thermoblock)
- Threshold, concrete slab floor, insulation under screed (65mm Thermoblock)
- Cavity wall, concrete deck roof parapet (65mm Thermoblock)
- Timber frame wall, beam & block floor, insulation under screed (100mm Thermoblock)

The quantity which describes the heat loss associated with a thermal bridge is its linear thermal transmittance, Ψ. This is a property of a thermal bridge and is the rate of heat flow per degree per unit length of the bridge, that is not accounted for in the U-values of the plane building elements containing the thermal bridge.

The temperature factor (*f*) is used to assess the risk of surface condensation or mould growth and is calculated under steady state conditions. To avoid problems of surface condensation or mould growth, the f_{Rsi} should not be less than a critical temperature factor (f_{CRsi}). A range of appropriate critical temperature factors, as identified in BRE Information Paper IP 1/06, are detailed in Table 1.

In this case, the critical temperature factor selected for assessment is for dwellings/ residential buildings (0.75).

Table 1: Recommended critical temperature factors

Type of Building	**Critical Temperature Factor (f_{CRsi})**
Storage Buildings	0.30
Offices, retail premises	0.50
Dwellings, residential buildings, schools	0.75
Sports halls, kitchens, canteens	0.80
Swimming pools, laundries, breweries	0.90

2 Assessment

2.1 Thermal assessment

Thermal assessment models of junction details were created for each of the details. These were developed on the basis of information provided by the client, with representative thermal conductivities assumed for each material.

The assessments were undertaken in compliance with:

- BR 497 - Conventions for calculating linear thermal transmittance and temperature factors, BRE, 2016
- BR 443 - Conventions for U-value calculations, BRE, 2019
- BS EN ISO 6946:2017 - Building components and building elements - Thermal resistance and thermal transmittance - Calculation methods, BSI, 2017
- BS EN ISO 13370:2017 - Thermal performance of buildings - Heat transfer via the ground - Calculation methods, BSI, 2017

2.2 Software

The assessment was undertaken using Physibel TRISCO (v 12.0) thermal modelling software.

2.3 Geometry

Within the models, the geometry of the junction details was taken from drawings provided by the client, as per the detail drawings contained within Appendix B.

2.4 Temperatures and surface resistances

The surface resistances used for thermal models were as follows:

Internal, horizontal heat flow	= 0.13 m^2K/W
Internal, upward heat flow	= 0.10 m^2K/W
Internal, downward heat flow	= 0.17 m^2K/W
External heat flow, exposed areas	= 0.04 m^2K/W

Internal temperature = 20ºC
External temperature = 0ºC
Underfloor space temperatures are determined according to BS EN ISO 13370

2.5 Thermal conductivities

The representative thermal conductivities used in the models were taken from BS EN ISO 10456 and information provided the client, as detailed in Table 2.

Table 2: Representative thermal conductivities

Material	**Thermal conductivity (W/m·K)**
Marmox Thermoblock	0.053
PIR wall (masonry) or floor insulation	0.021
PIR wall (timber frame) or roof insulation	0.024
XPS insulation	0.035
Mineral wool insulation	0.040
PVC (cavity closer profile)	0.17
Plasterboard	0.21
Timber	0.13
Brick	0.77
Medium density blockwork	0.85
Concrete block flooring	0.45
Low density concrete	0.83
Screed	1.15
Concrete foundations	1.65
Reinforced concrete (2% steel)	2.50
Ground	2.00

3 Assessment results

3.1 Assessment results

The results for the assessment of the junction details are given in Table 3.

Table 3: Assessment Results

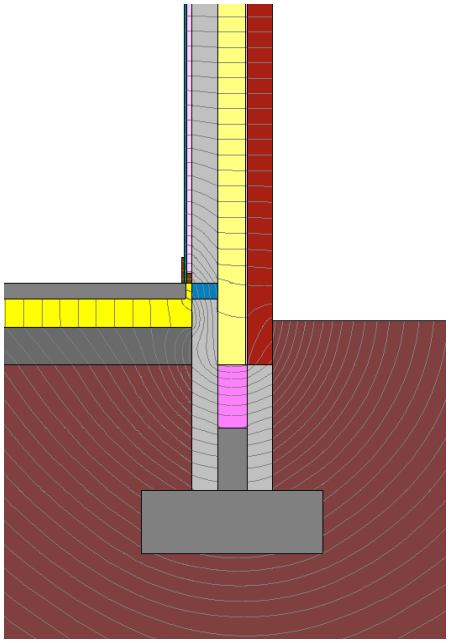
Reference No.	Manufacturer Reference	Description	Calculated Ψ-value (W/m·K)	Temperature Factor
600384	65mm Thermoblock	Cavity wall, concrete slab floor, insulation under screed	0.067	0.94
600385	65mm Thermoblock	Cavity wall, concrete slab floor, insulation under slab	0.075	0.95
600386	65mm Thermoblock	Cavity wall, suspended concrete floor, insulation under slab	0.158	0.93
600387	65mm Thermoblock	Cavity wall, beam & block floor, insulation under screed	0.173	0.95
600388	65mm Thermoblock	Timber frame wall, concrete slab floor, insulation under screed	0.053	0.92
600389	65mm Thermoblock	Timber frame wall, concrete slab floor, insulation under slab	0.185	0.87
600390	65mm Thermoblock	Steel frame wall, concrete slab floor, insulation under slab	0.121	0.91
600391	65mm Thermoblock	Cavity wall, concrete deck roof parapet	0.101	0.93
600392	65mm Thermoblock	Threshold, concrete slab floor, insulation under screed	0.058	0.92
600393	100mm Thermoblock	Timber frame wall, beam & block floor, insulation under screed	0.127	0.95

Graphics from the thermal modelling for each of the variations are given in Appendix A. This includes the materials and temperature distribution profile.

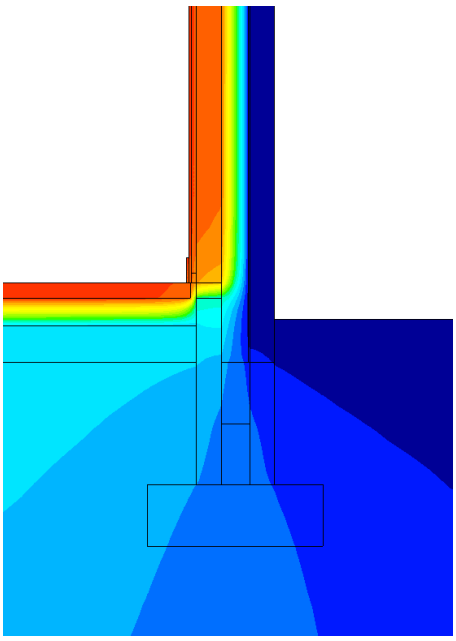
Appendix A Materials with heat flows and temperature distribution profiles

600384: Cavity wall, concrete slab floor, insulation under screed (65mm Thermoblock)

Materials and heat flow

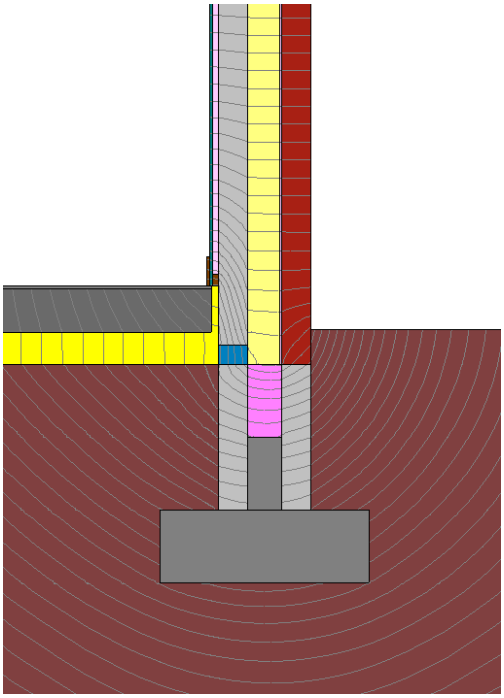


Temperature profile

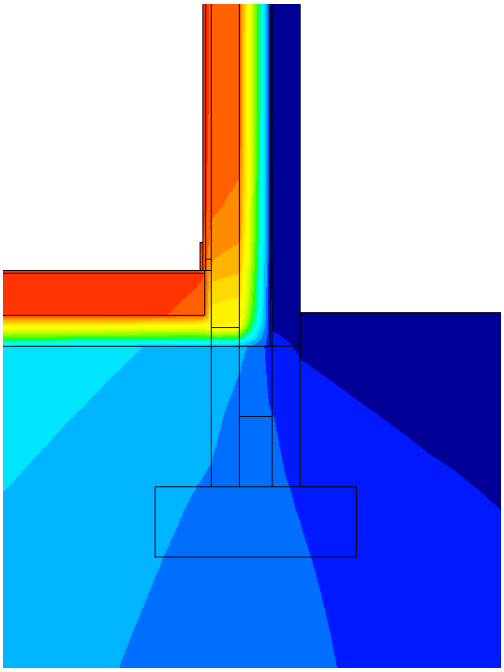


600385: Cavity wall, concrete slab floor, insulation under slab (65mm Thermoblock)

Materials and heat flow

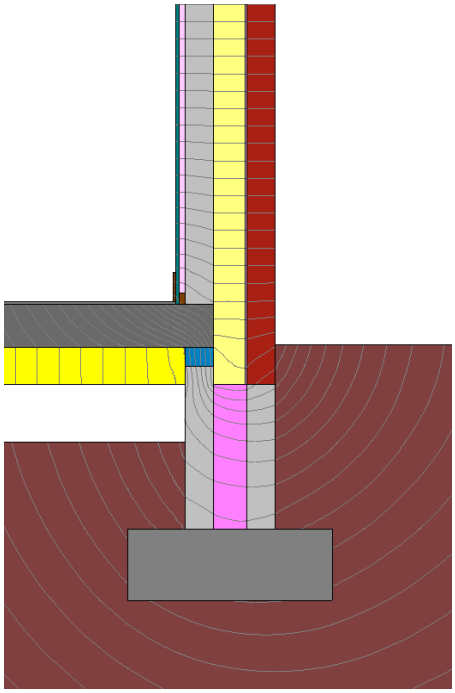


Temperature profile

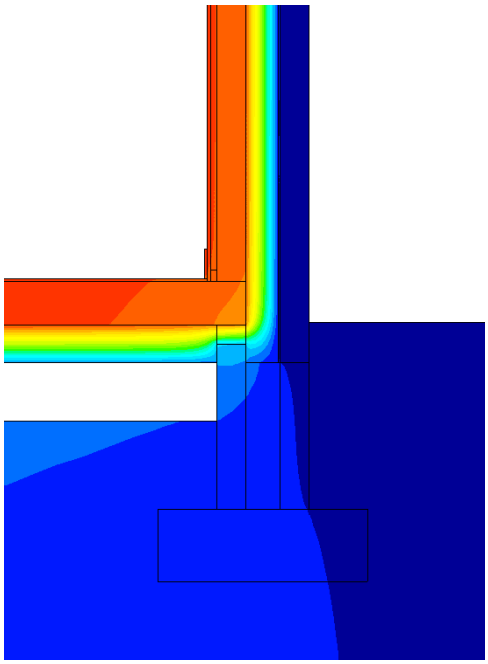


600386: Cavity wall, suspended concrete floor, insulation under slab (65mm Thermoblock)

Materials and heat flow

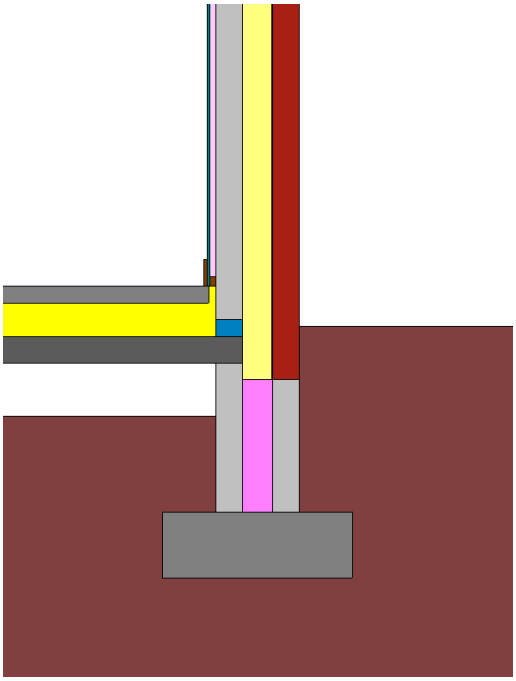


Temperature profile

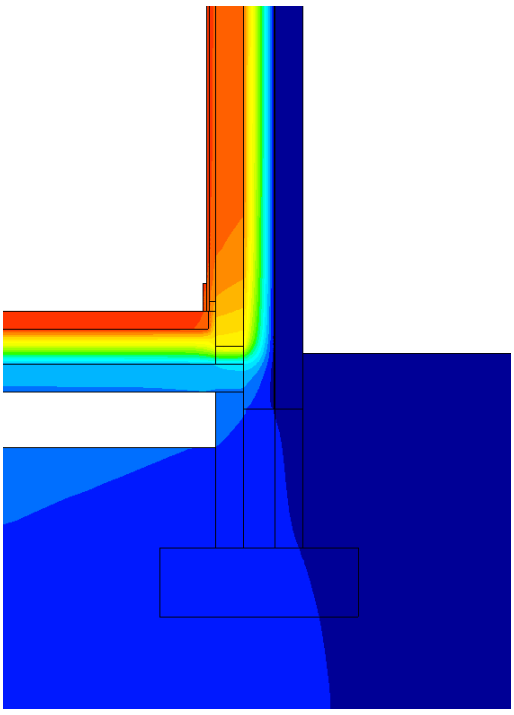


600387: Cavity wall, suspended beam & block floor, insulation under screed (65mm Thermoblock)

Materials

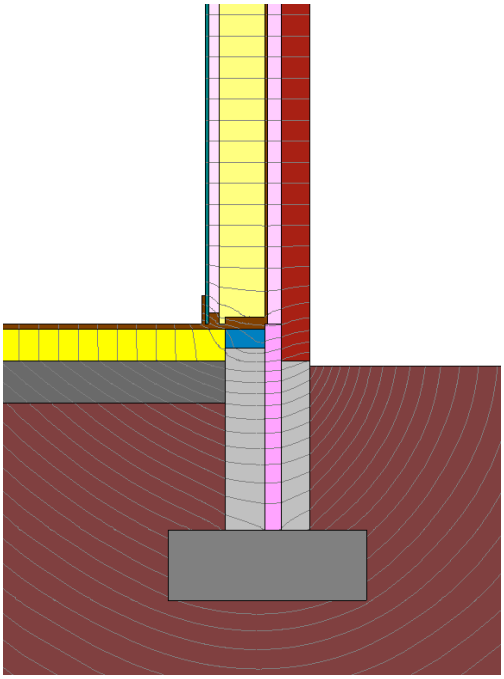


Temperature profile

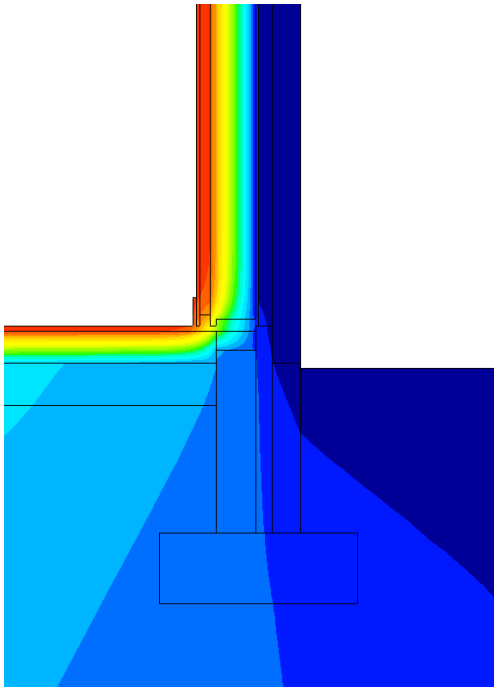


600388: Timber frame wall, concrete slab floor, insulation under screed (65mm Thermoblock)

Materials and heat flow

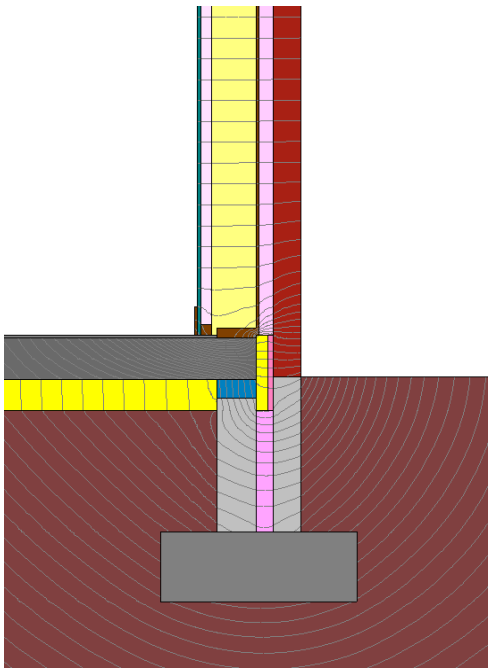


Temperature profile

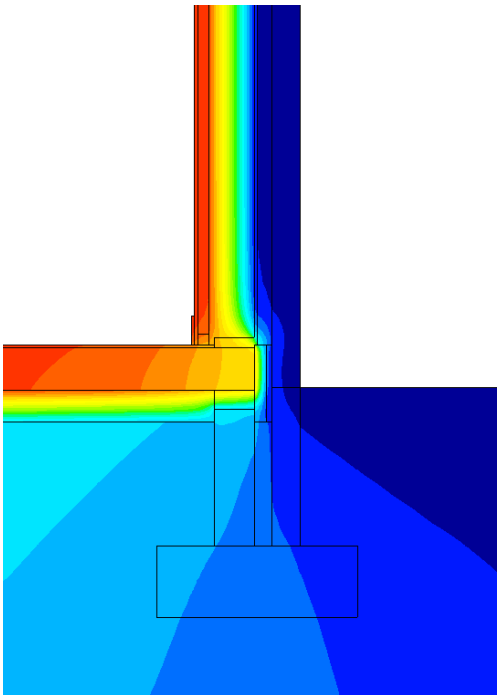


600389: Timber frame wall, concrete slab floor, insulation under slab (65mm Thermomblock)

Materials and heat flow

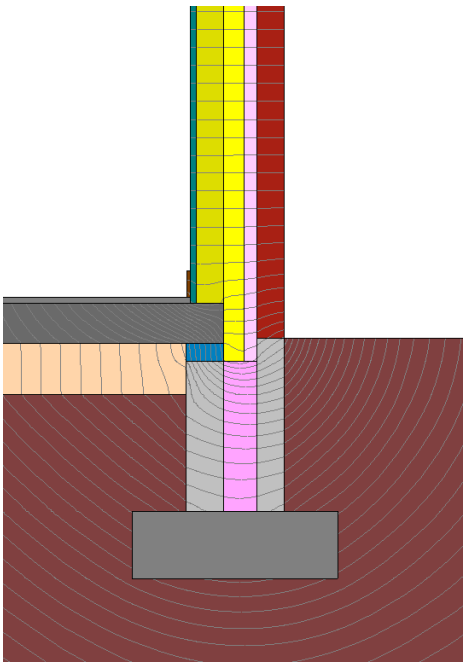


Temperature profile

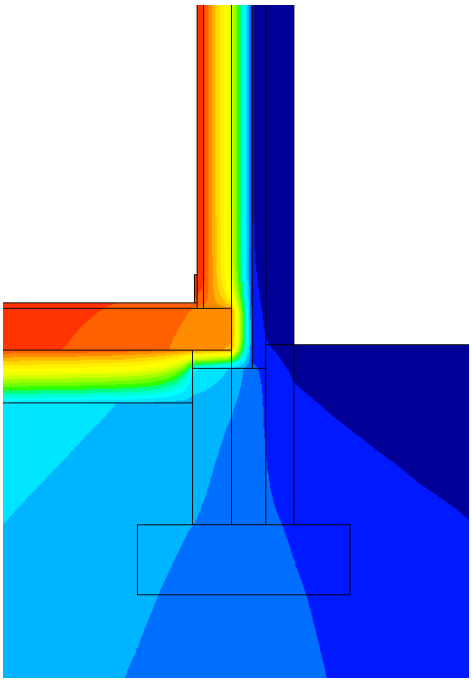


600390: Steel frame wall, concrete slab floor, insulation under slab (65mm Thermoblock)

Materials and heat flow

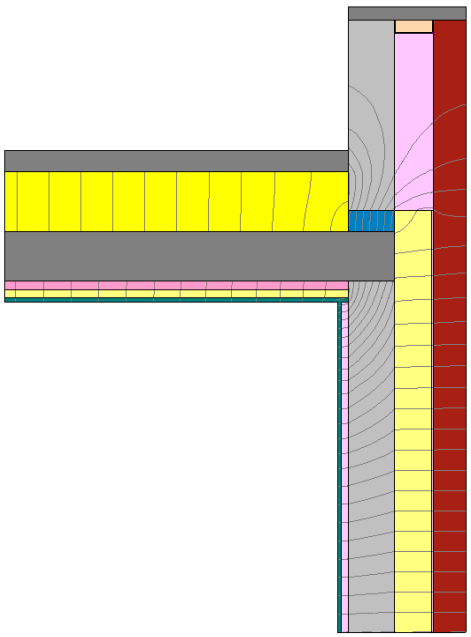


Temperature profile

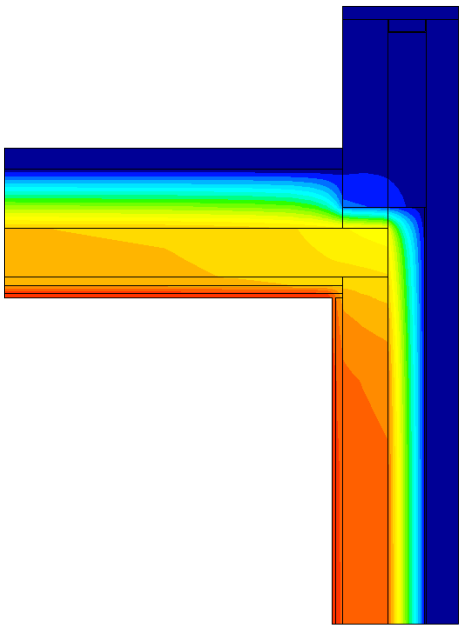


600391: Cavity wall, concrete deck roof parapet (65mm Thermoblock)

Materials and heat flow

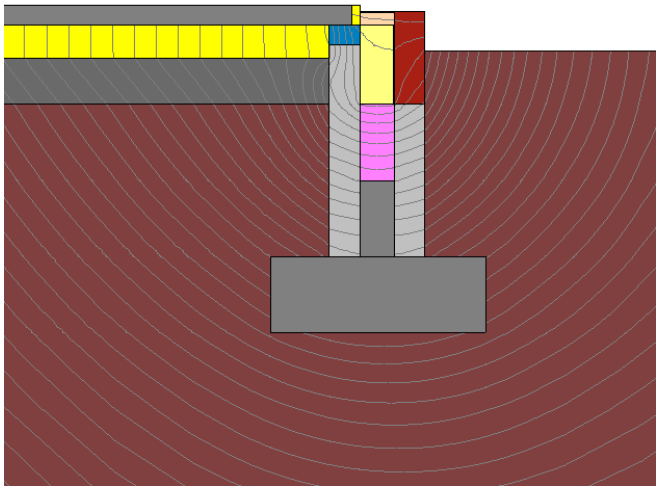


Temperature profile

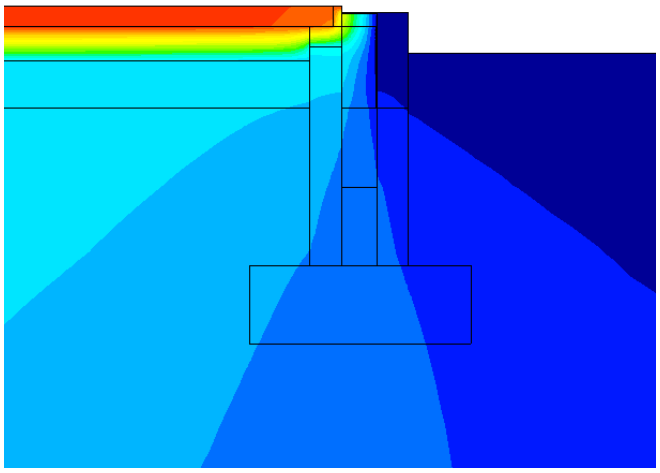


600392: Threshold, concrete slab floor, insulation under screed (65mm Thermoblock)

Materials and heat flow

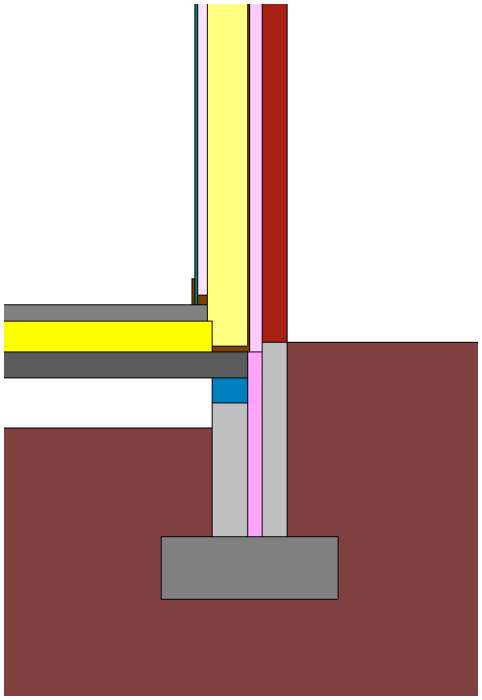


Temperature profile

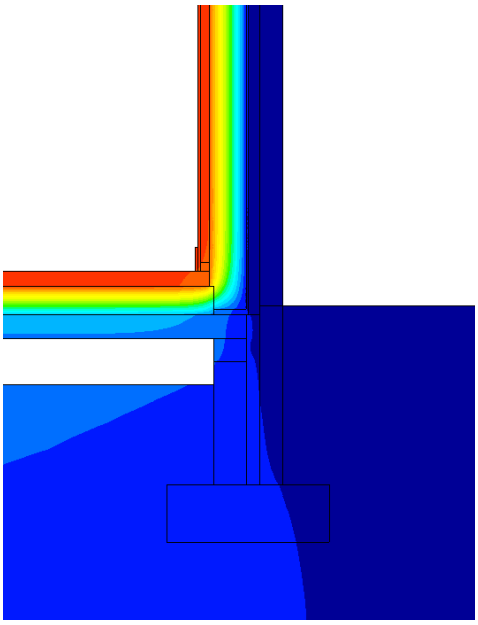


600393: Timber frame wall, beam & block floor, insulation under screed (100mm Thermoblock)

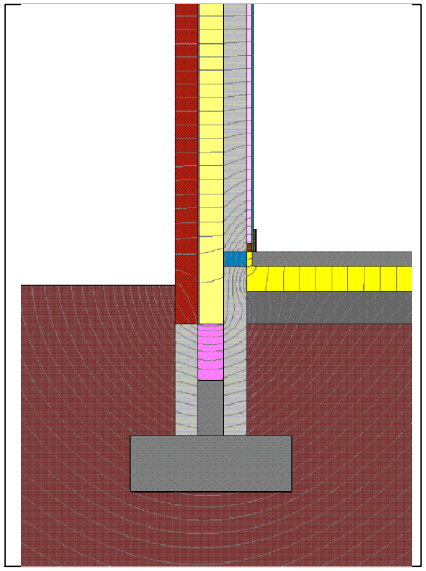
Materials and heat flow



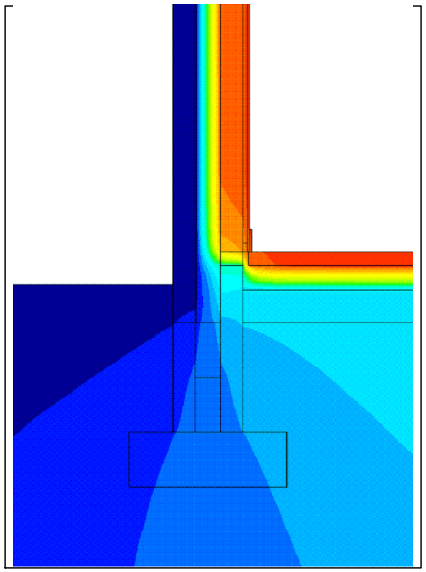
Temperature profile



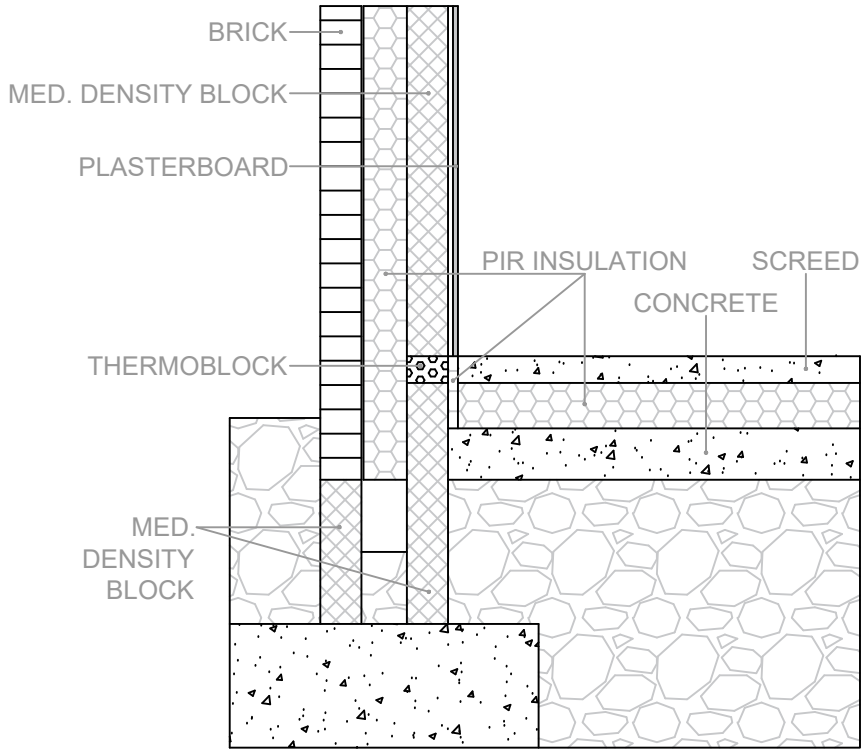
Appendix B Junction detail drawings



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 5.24 (m²K)/W
- Floor - 5.24 (m²K)/W
- Perimeter - 1.52 (m²K)/W

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BRE GLOBAL CERTIFICATION

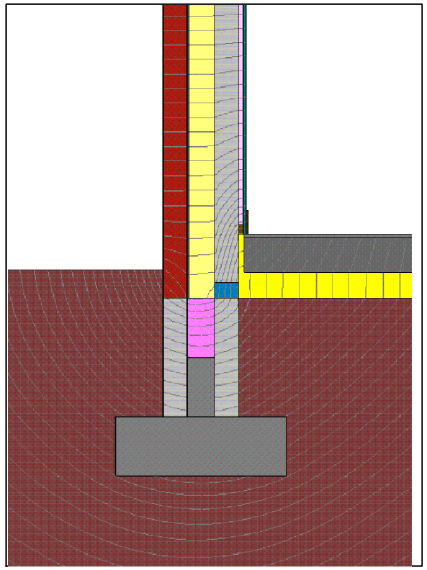
Ψ-value (W/m·K) = 0.067

Temperature Factor (*f*) = 0.94

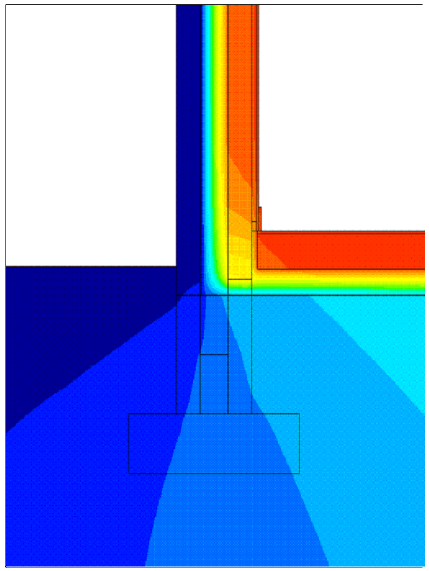
Product type: 65mm XPS Thermoblock
Junction type: Cavity wall, concrete slab floor, insulation under screed

Certified Thermal Details and Products Scheme

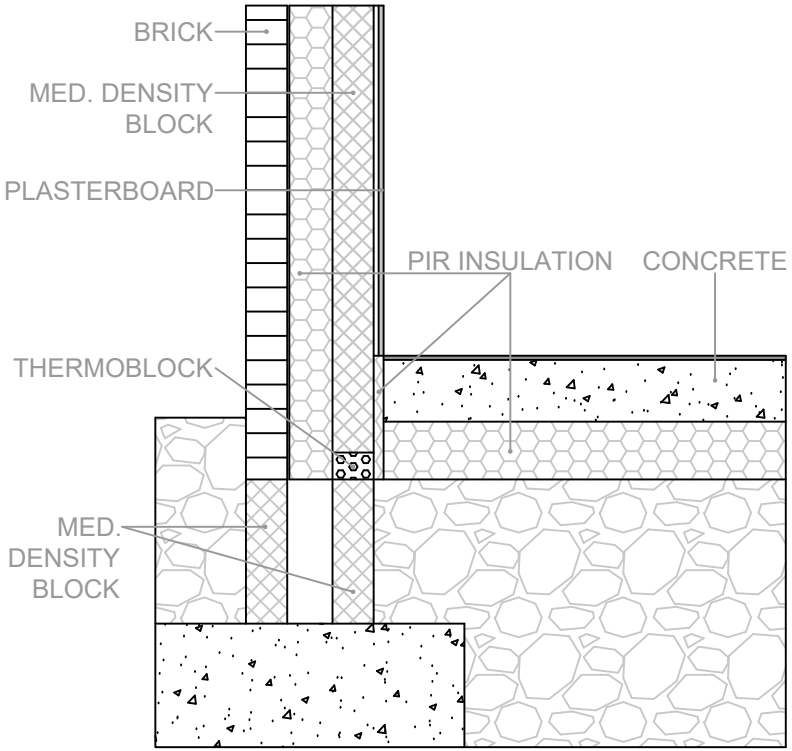
Reference no.: 600384



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 5.24 (m²K)/W
- Floor - 5.24 (m²K)/W
- Perimeter - 1.52 (m²K)/W

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BRE GLOBAL CERTIFICATION

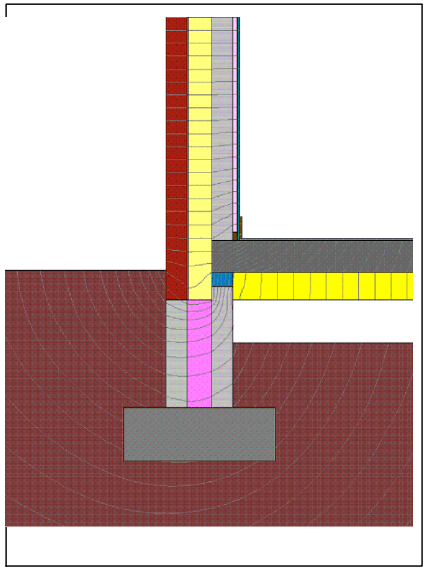
Ψ-value (W/m·K) = 0.075

Temperature Factor (*f*) = 0.95

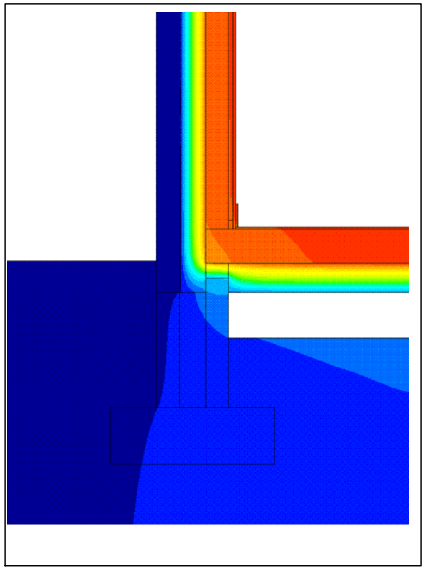
Product type: 65mm XPS Thermoblock
Junction type: Cavity wall, concrete slab floor, insulation under slab

Certified Thermal Details and Products Scheme

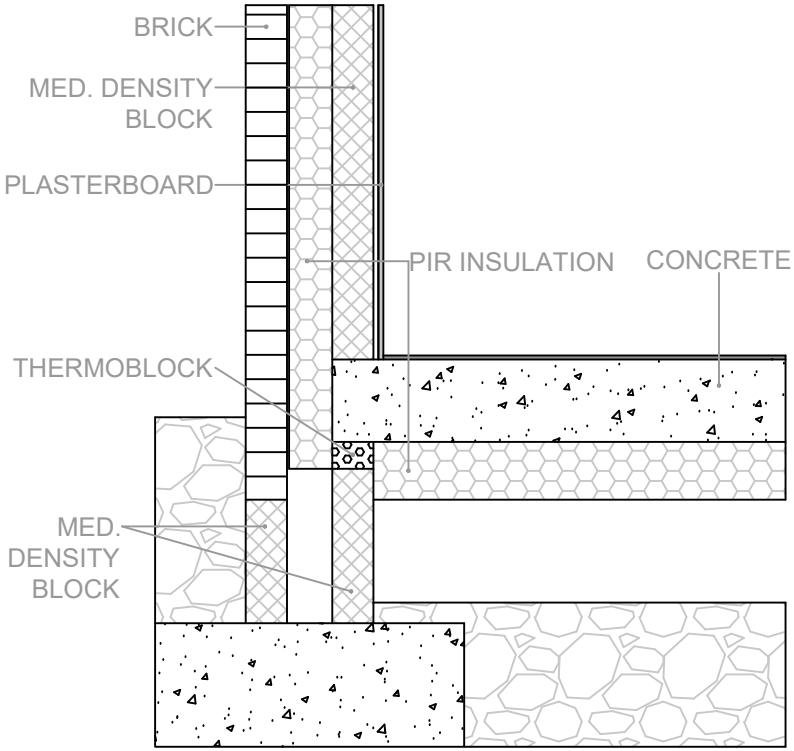
Reference no.: 600385



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 5.24 (m²K)/W
- Floor - 6.19 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.158

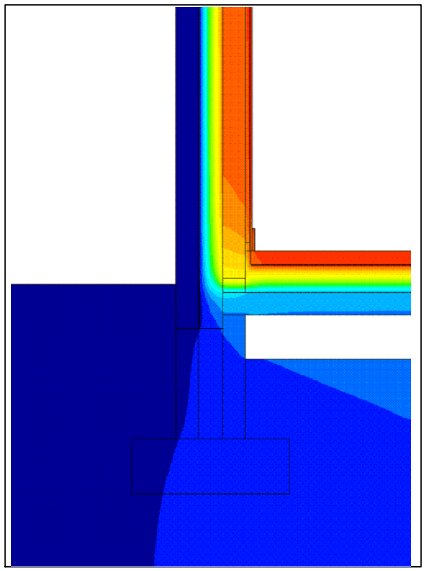
Temperature Factor (*f*) = 0.93

Product type: 65mm XPS Thermoblock
Junction type: Cavity wall, suspended floor, insulation under slab

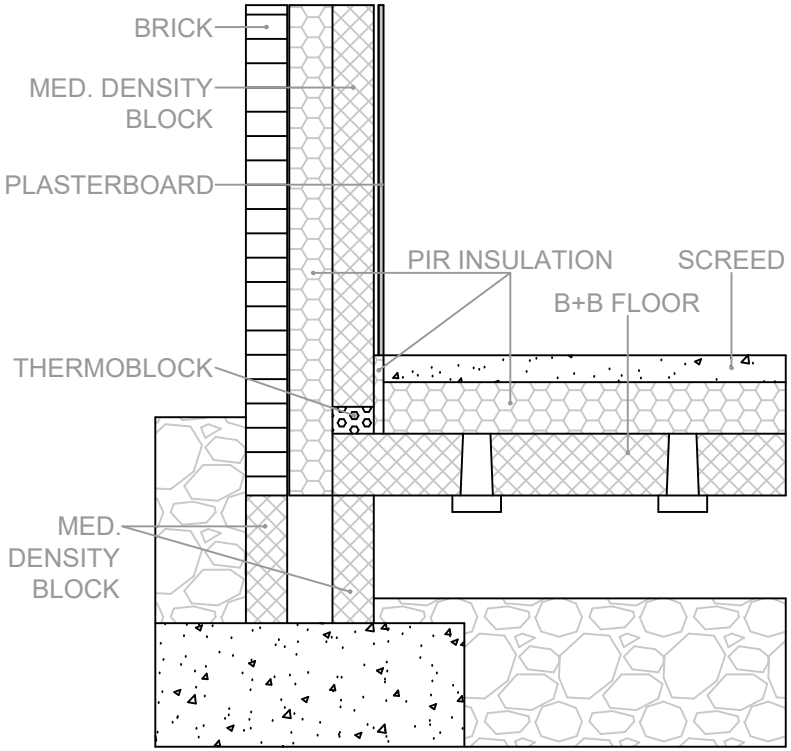
Certified Thermal Details and Products Scheme

Reference no.: 600386

Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 5.24 (m²K)/W
- Floor - 5.95 (m²K)/W
- Perimeter - 1.52 (m²K)/W

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BRE GLOBAL CERTIFICATION

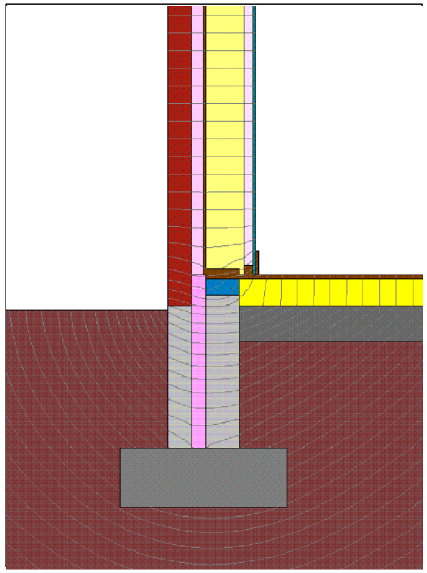
Ψ-value (W/m·K) = 0.173

Temperature Factor (*f*) = 0.95

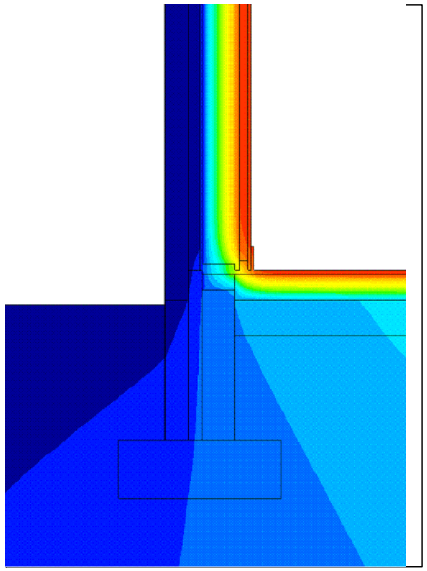
Product type: 65mm XPS Thermoblock
Junction type: Cavity wall, beam & block floor, insulation under screed

Certified Thermal Details and Products Scheme

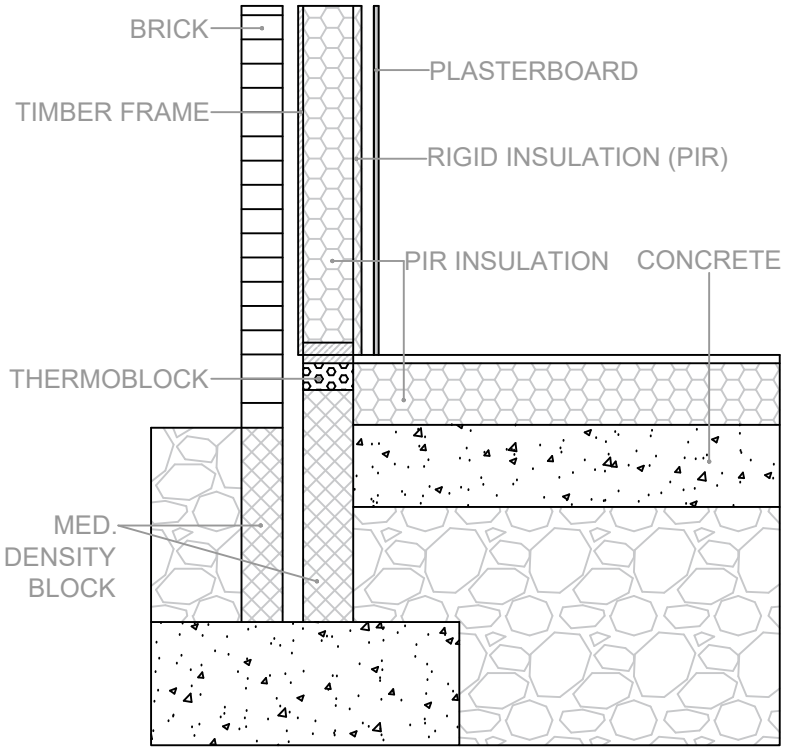
Reference no.: 600387



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 6.67 (m²K)/W
- Floor - 5.24 (m²K)/W

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BRE GLOBAL CERTIFICATION

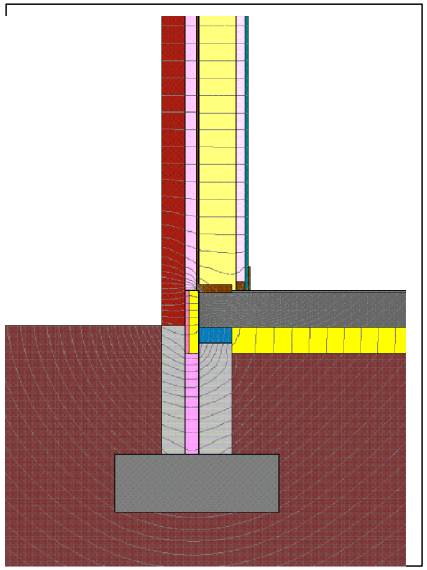
Ψ-value (W/m·K) = 0.053

Temperature Factor (*f*) = 0.92

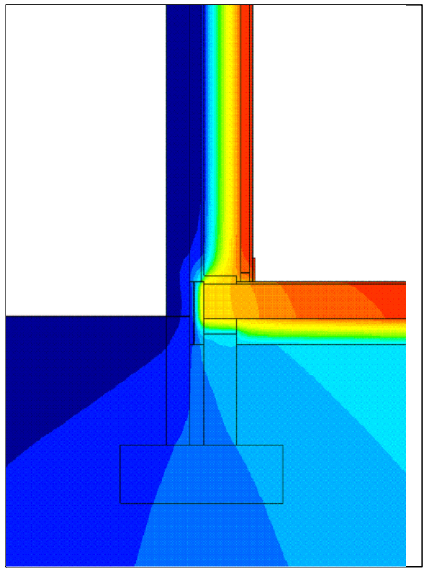
Product type: 65mm XPS Thermoblock
Junction type: Timber frame, concrete slab floor, insulation under screed

Certified Thermal Details and Products Scheme

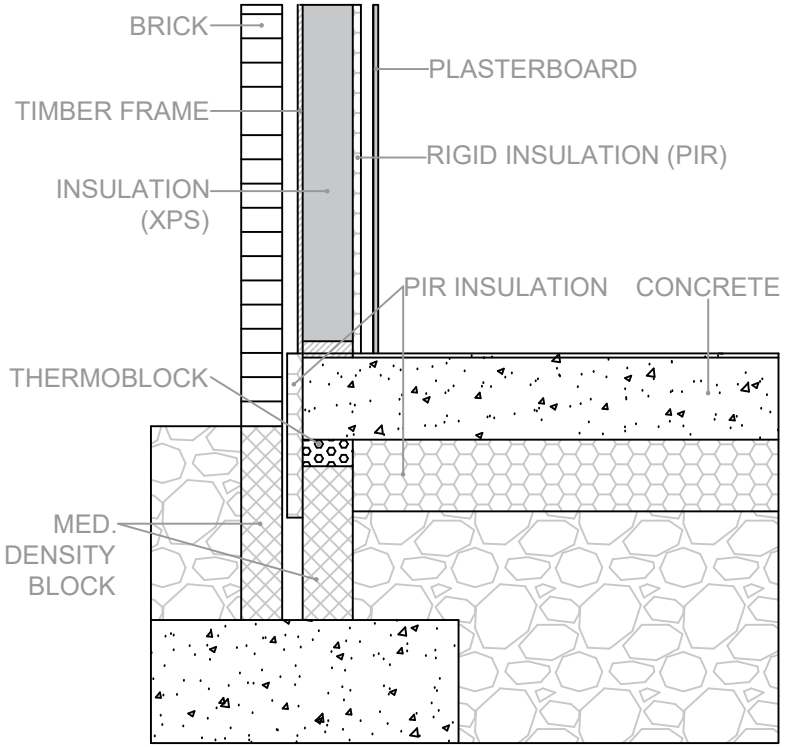
Reference no.: 600388



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 6.64 (m²K)/W
- Floor - 5.24 (m²K)/W
- Perimeter - 1.90 (m²K)/W

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BRE GLOBAL CERTIFICATION

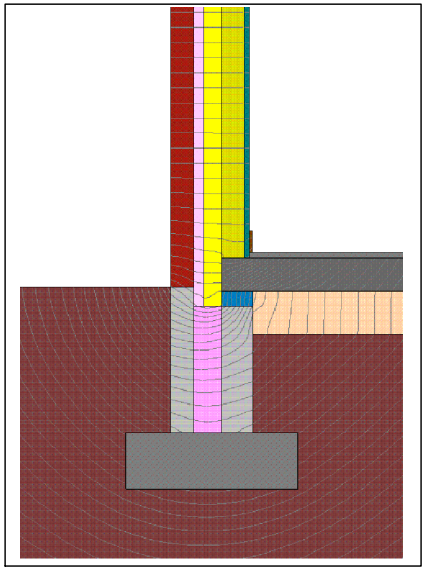
Ψ-value (W/m·K) = 0.185

Temperature Factor (*f*) = 0.87

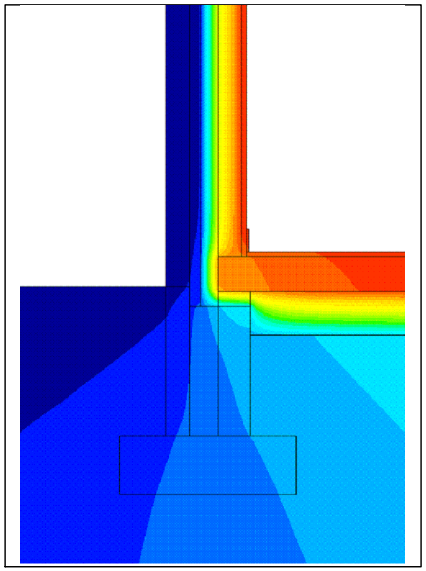
Product type: 65mm XPS Thermoblock
Junction type: Timber frame, concrete slab floor, insulation under slab

Certified Thermal Details and Products Scheme

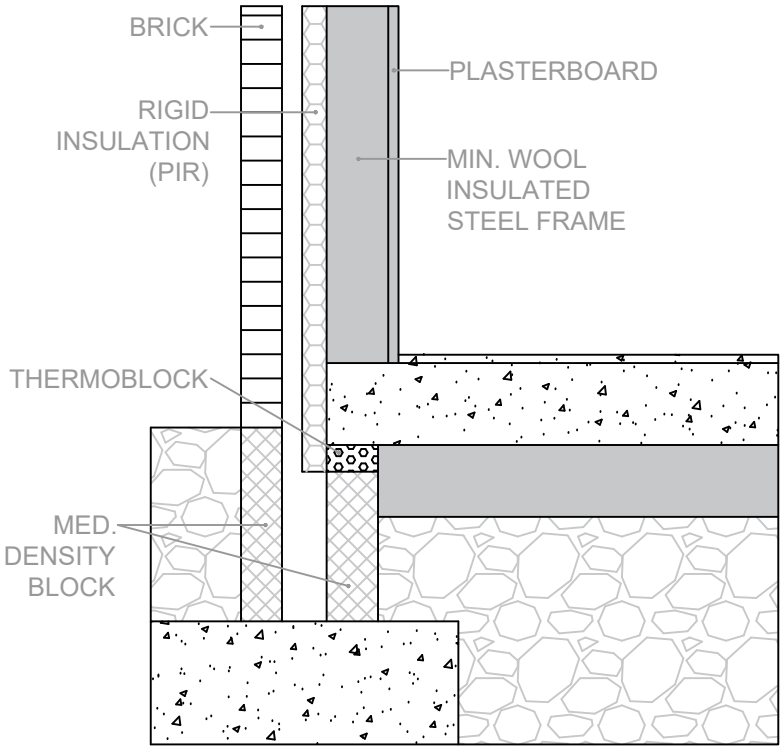
Reference no.: 600389



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall (mineral wool) - 2.50 (m²K)/W
- Wall (PIR) - 3.57 (m²K)/W
- Floor - 5.42 (m²K)/W

marmox
Waterproofing & Insulation Solutions

BRE GLOBAL CERTIFICATION

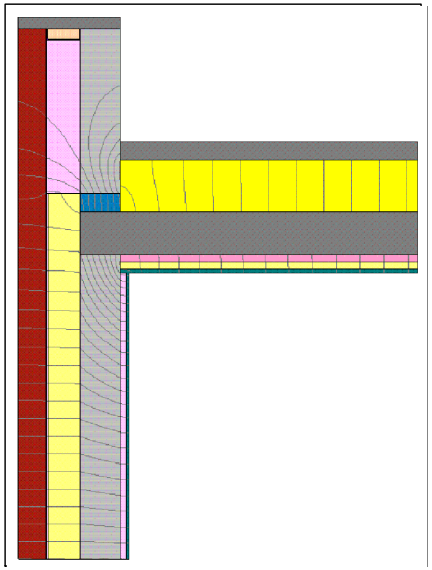
Ψ-value (W/m·K) = 0.121

Temperature Factor (*f*) = 0.91

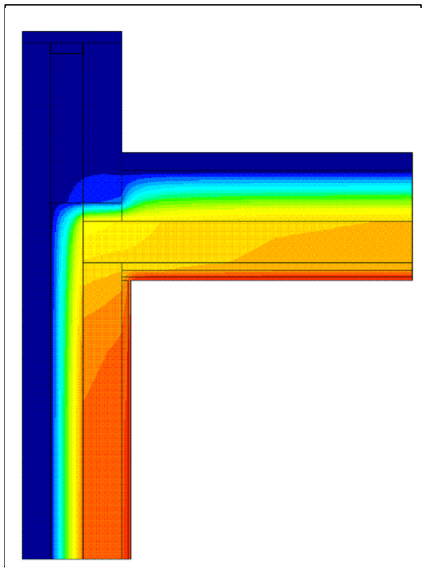
Product type: 65mm XPS Thermoblock
Junction type: Steel frame, concrete slab floor, insulation under slab

Certified Thermal Details and Products Scheme

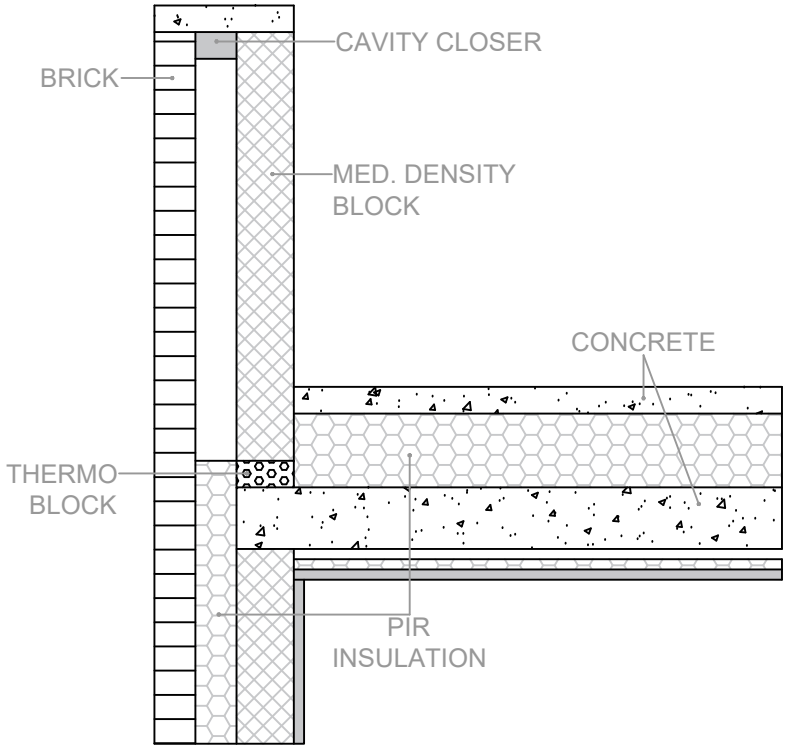
Reference no.: 600390



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 5.24 (m²K)/W
- Roof - 7.50 (m²K)/W

marmox
Waterproofing & Insulation Solutions

BRE GLOBAL CERTIFICATION

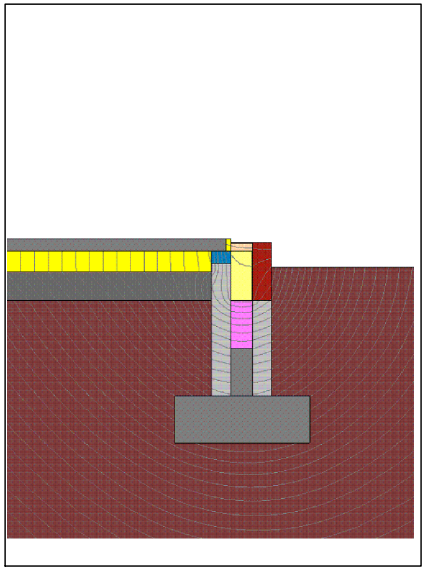
Ψ-value (W/m·K) = 0.101

Temperature Factor (*f*) = 0.93

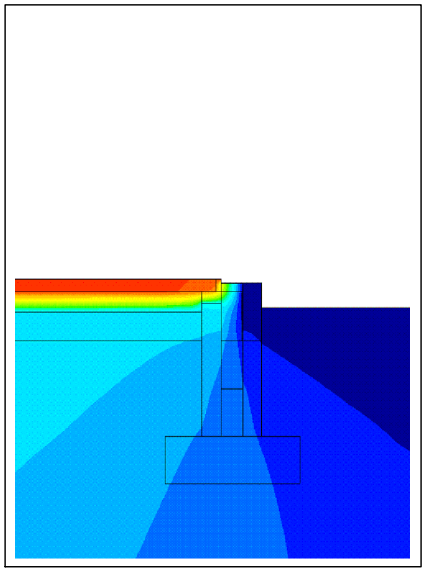
Product type: 65mm XPS Thermoblock
Junction type: Cavity wall, concrete deck roof parapet

Certified Thermal Details and Products Scheme

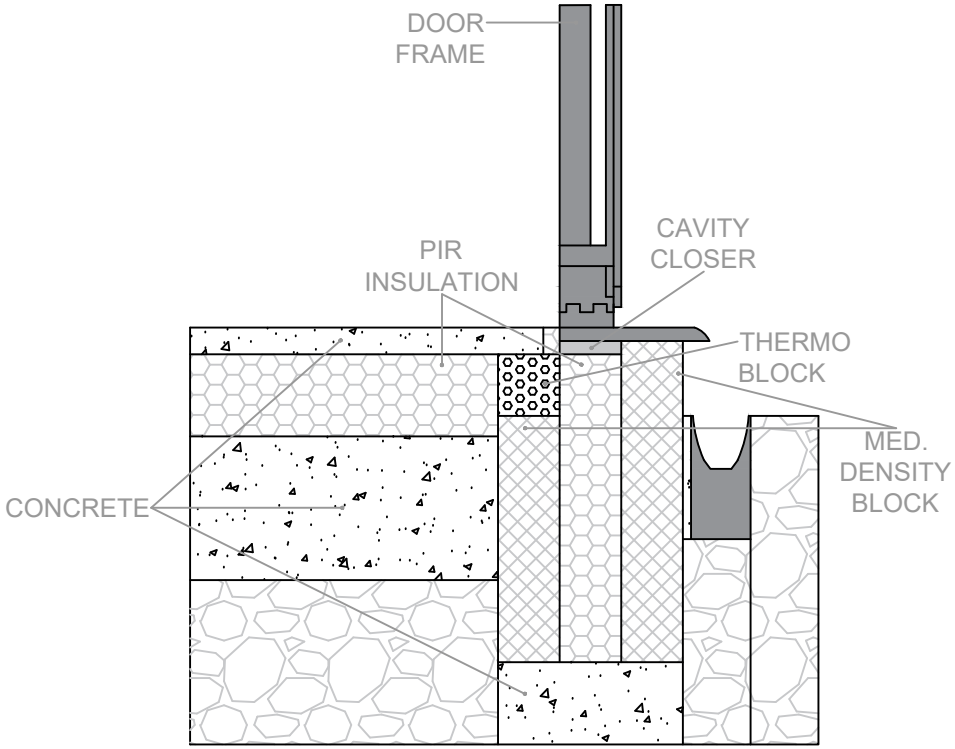
Reference no.: 600391



Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Floor - 5.24 (m²K)/W

marmox
Waterproofing & Insulation Solutions

BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.058

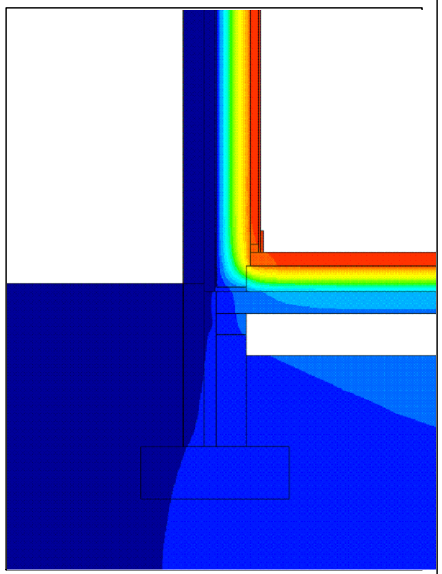
Temperature Factor (*f*) = 0.92

Product type: 65mm XPS Thermoblock
Junction type: Threshold, concrete slab floor, insulation under screed

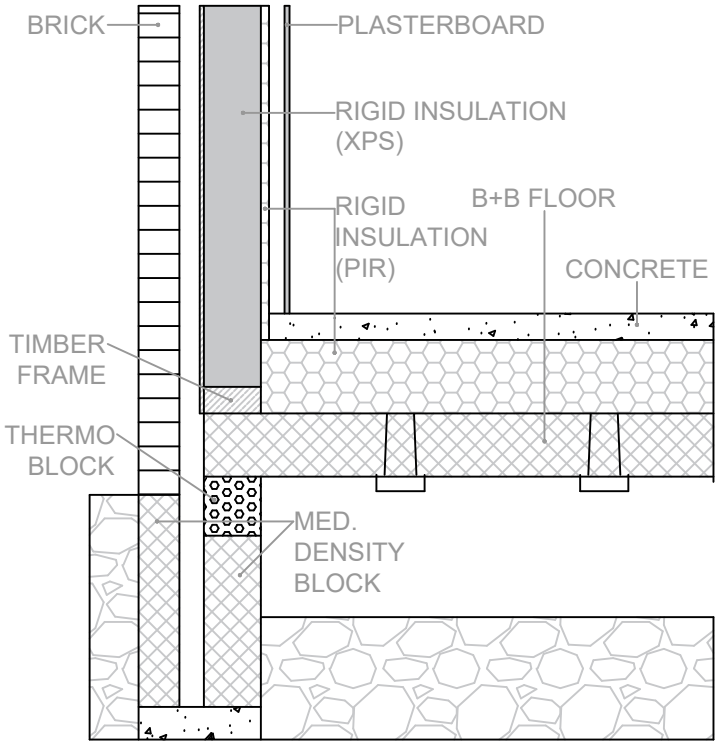
Certified Thermal Details and Products Scheme

Reference no.: 600392

Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 6.67 (m²K)/W
- Floor - 5.95 (m²K)/W

marmox
Waterproofing & Insulation Solutions

BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.127

Temperature Factor (*f*) = 0.95

Product type: 100mm XPS Thermoblock
Junction type: Timber frame, beam & block floor, insulation under screed

Certified Thermal Details and Products Scheme

Reference no.: 600393