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Certified Thermal Details and Products Scheme

Marmox – Thermoblock (100mm, 140mm & 215mm blocks)

Prepared for: Mark Bowman, UK technical manager

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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 K1 + 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 (100mm, 140mm & 215mm blocks)

Marmox have submitted the **Thermoblock (100mm, 140mm and 215mm variations)** within junction details to BRE. These were assessed, certified and listed on the Certified Thermal Details and Products Scheme database:

www.bre.co.uk/certifiedthermalproducts

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

- Cavity wall (100mm and 140mm variations)
    - Slab on ground (insulation above slab)
    - Beam and block
- Timber frame (140mm and 215mm variations)
    - Slab on ground (insulation above slab)
    - Beam and block

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.

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

Table 1: Recommended critical temperature factors

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

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

2.2 Software

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

2.3 Geometry

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

2.4 Thermal conductivities

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

Material	**Thermal conductivity (W/m·K)**
XPS Thermoblock	0.047
Brick	0.77
Concrete block	1.13
Lightweight concrete block	0.19
Screed/ infill concrete	1.15
Dense concrete	2.30
Render	1.00
Plasterboard	0.21
Timber	0.13
Mineral wool (wall)	0.032
Rigid insulation (wall)	0.023
Mineral wool (floor)	0.035
Rigid insulation (floor)	0.022

Table 2: Representative thermal conductivities

3 Assessment results

3.1 Assessment results

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

	Manufacturer Reference	Description	Calculated Ψ-value (W/m·K)	Temperature Factor
600376	100 mm XPS Thermoblock	Cavity wall-ground floor junction (insulation above slab)	0.032	0.94
600377	140 mm XPS Thermoblock	Cavity wall-ground floor junction (insulation above slab)	0.030	0.94
600378	100 mm XPS Thermoblock	Cavity wall-ground floor junction (beam and block floor)	0.079	0.87
600379	140 mm XPS Thermoblock	Cavity wall-ground floor junction (beam and block floor)	0.087	0.86
600380	140 mm XPS Thermoblock	Timber frame wall-ground floor junction (insulation above slab)	0.042	0.92
600381	140 mm XPS Thermoblock	Timber frame wall-ground floor junction (beam and block floor)	0.075	0.89
600382	215 mm XPS Thermoblock	Timber frame wall-ground floor junction (insulation above slab)	0.039	0.93
600383	215 mm XPS Thermoblock	Timber frame wall-ground floor junction (beam and block floor)	0.065	0.91

Table 3: Assessment results

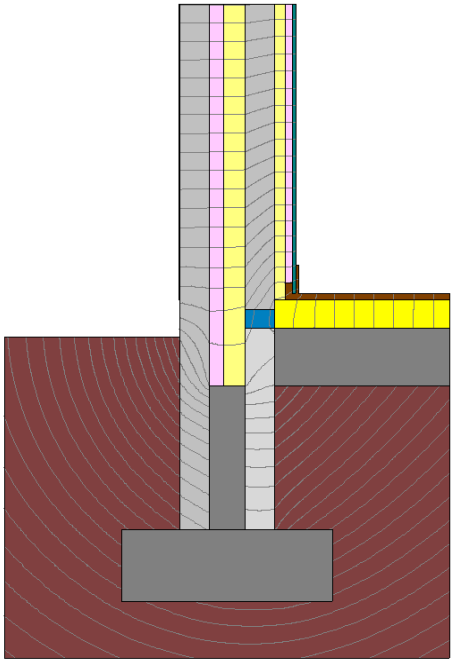
Graphics from the thermal modelling for each of the variations are given in Appendix A. This includes for:

- Geometry and heat flow (heat flow not available in models with 3D elements, e.g. beam and block floors)
- Temperature distribution profile

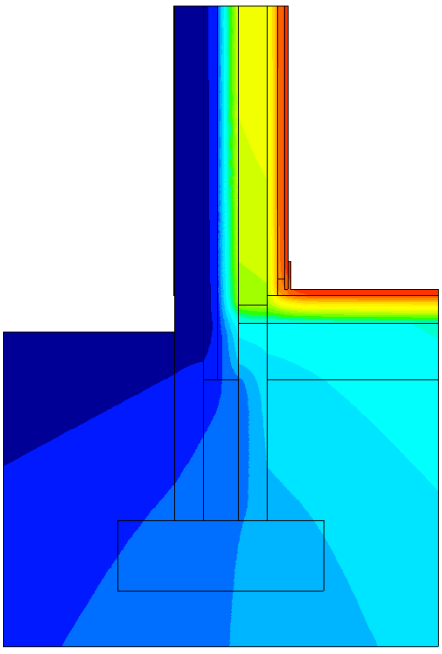
Appendix A Materials with heat flows and Temperature Distribution Profiles

600376 - Cavity wall-ground floor junction (insulation above slab with 100mm Thermoblock)

Materials and heat flow

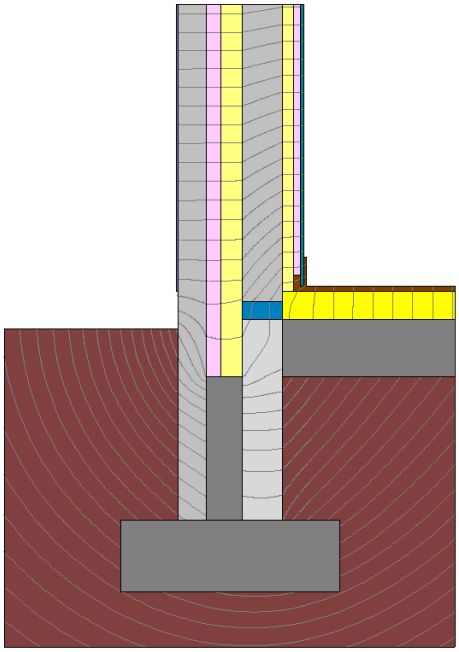


Temperature profile

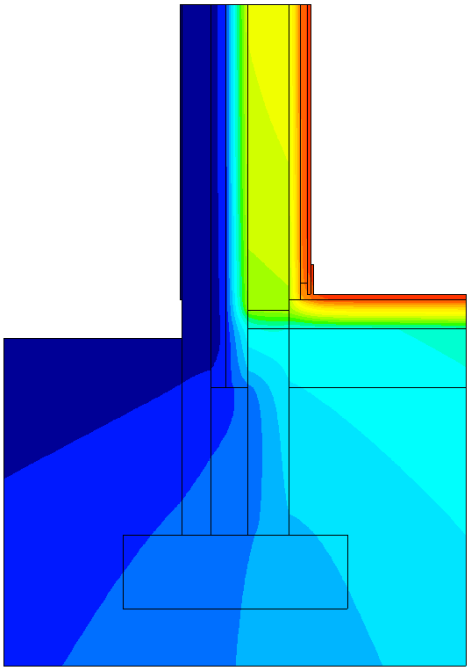


600377 - Cavity wall-ground floor junction (insulation above slab with 140mm Thermoblock)

Materials and heat flow

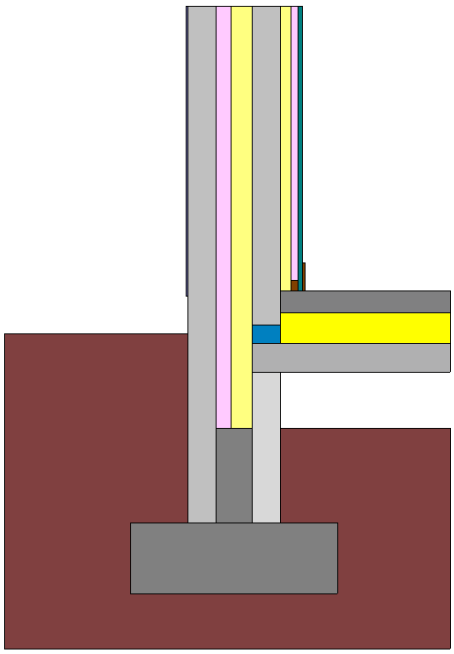


Temperature profile

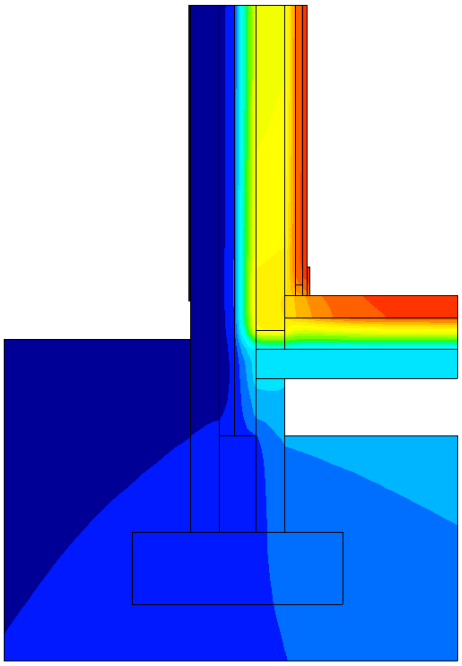


600378 - Cavity wall-ground floor junction (beam and block floor with 100mm Thermoblock)

Materials

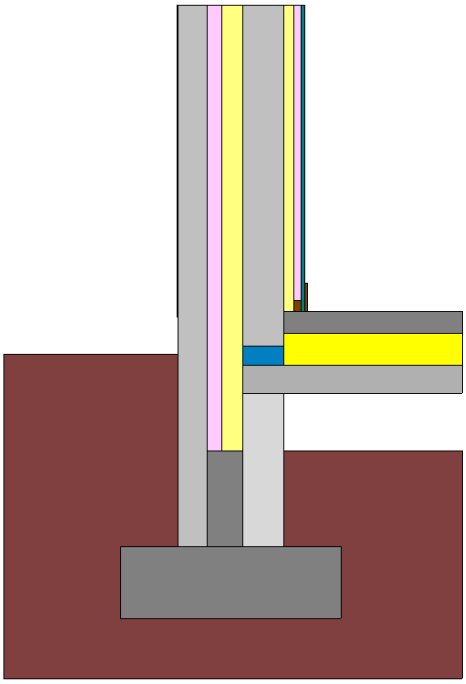


Temperature profile

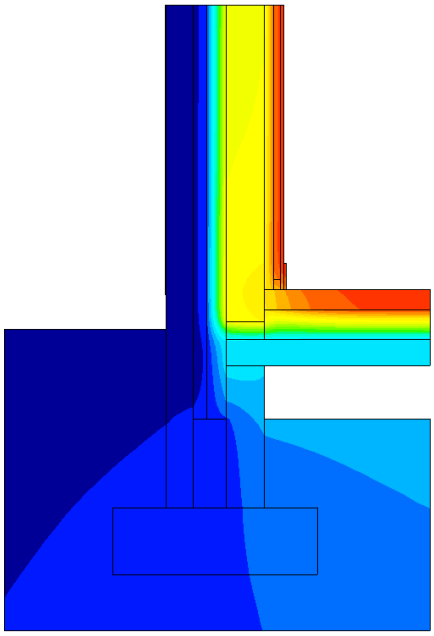


600379 - Cavity wall-ground floor junction (beam and block floor with 140mm Thermoblock)

Materials

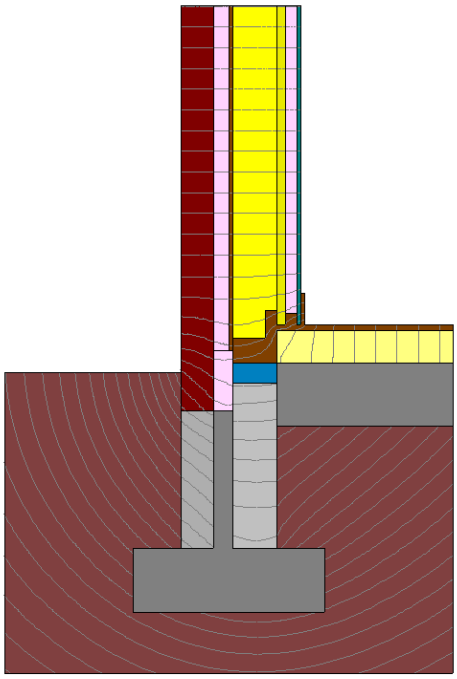


Temperature profile

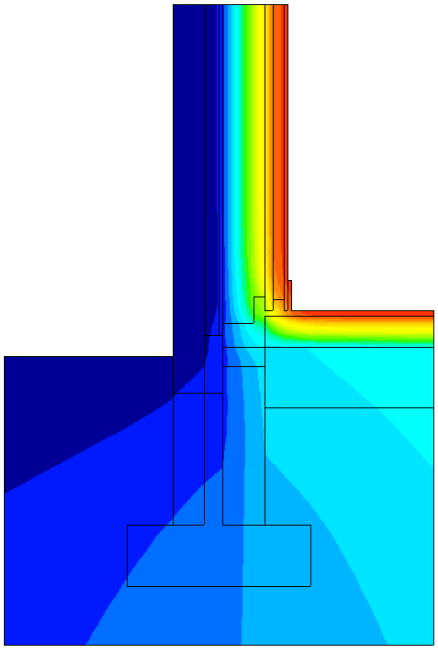


600380 – Timber frame wall-ground floor junction (insulation above slab with 140mm Thermoblock)

Materials and heat flow

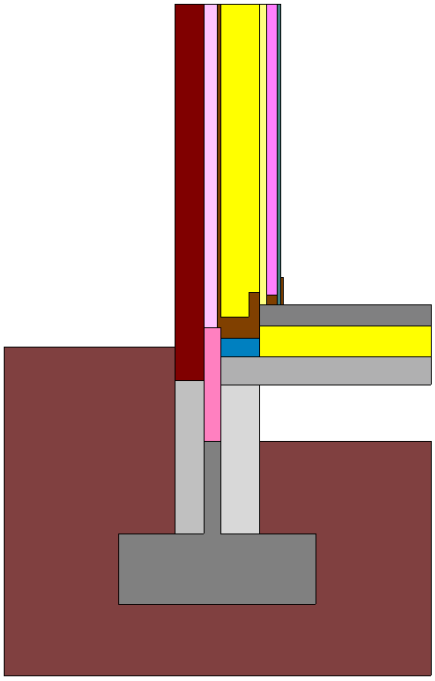


Temperature profile

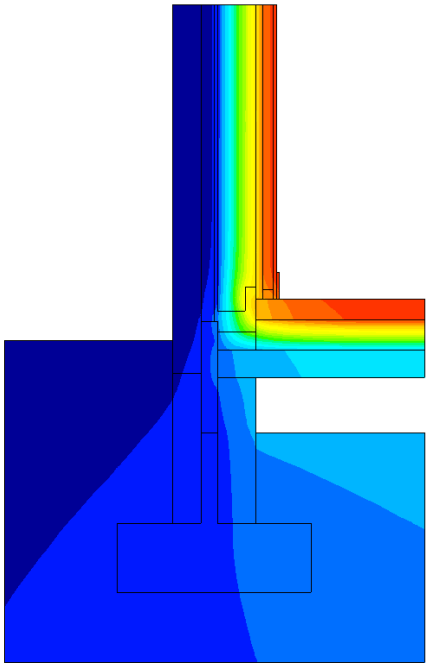


600381 – Timber frame wall-ground floor junction (beam and block floor with 140mm Thermoblock)

Materials

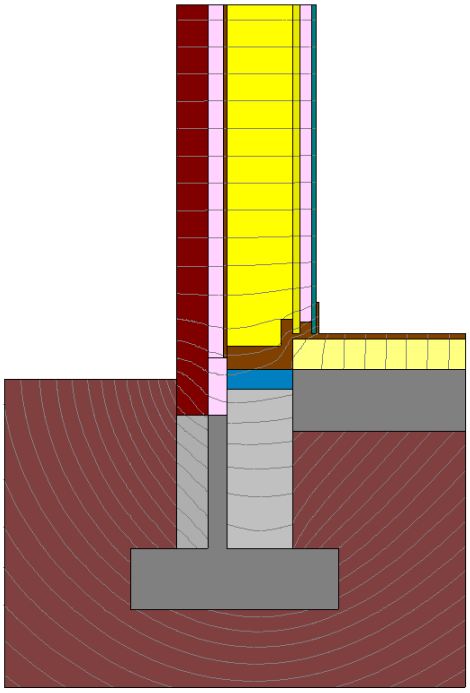


Temperature profile

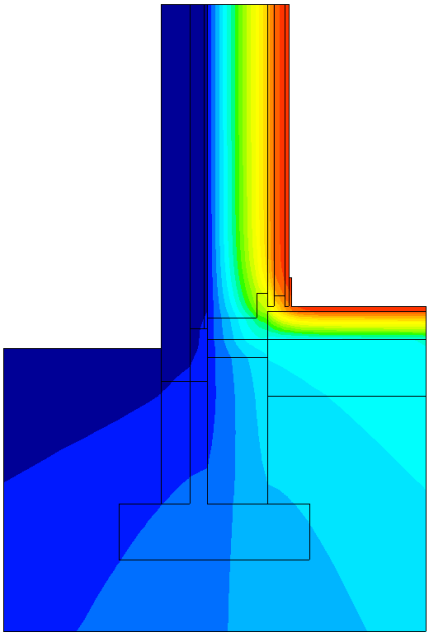


600382 - Timber frame wall-ground floor junction (insulation above slab with 215mm Thermoblock)

Materials and heat flow

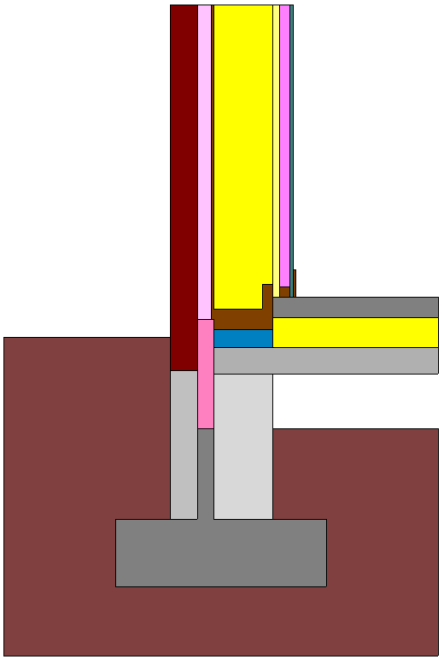


Temperature profile

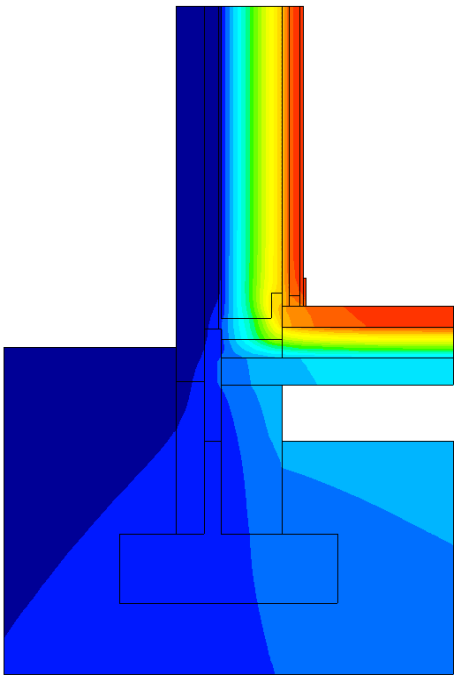


600383 - Timber frame wall-ground floor junction (beam and block floor with 215mm Thermoblock)

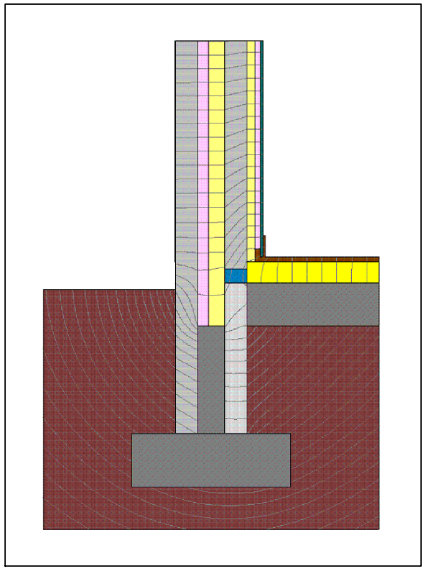
Materials



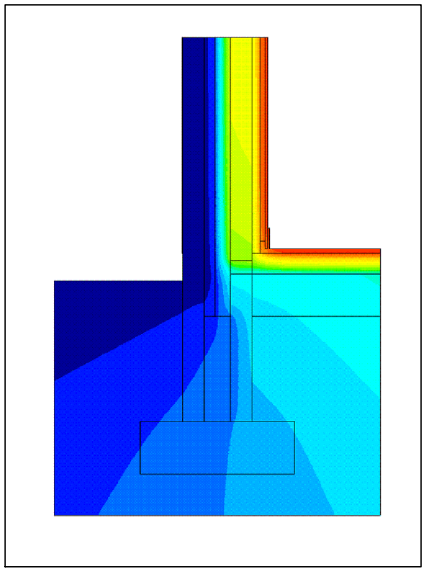
Temperature profile



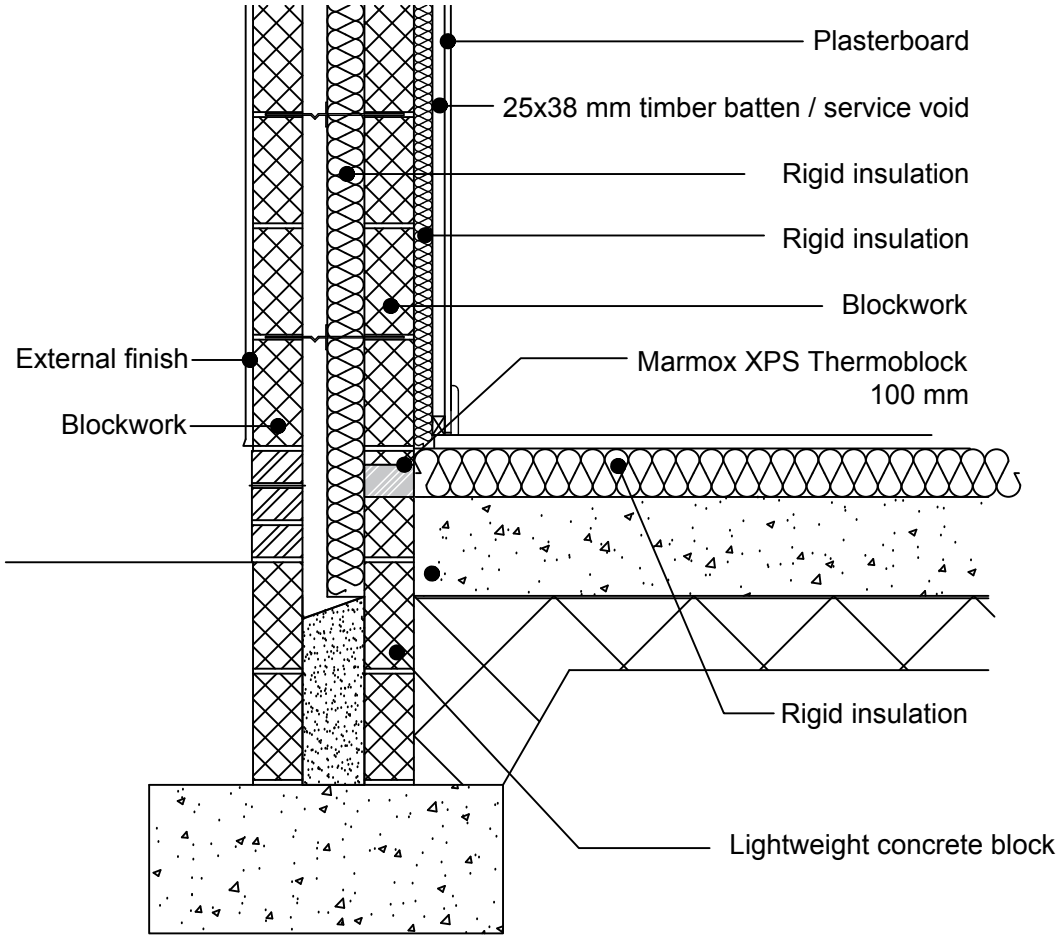
Appendix B Junction detail drawings



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 (cavity) - 3.26 (m²K)/W
- Wall (inner leaf) - 1.63 (m²K)/W
- Floor - 4.55 (m²K)/W

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BRE GLOBAL CERTIFICATION

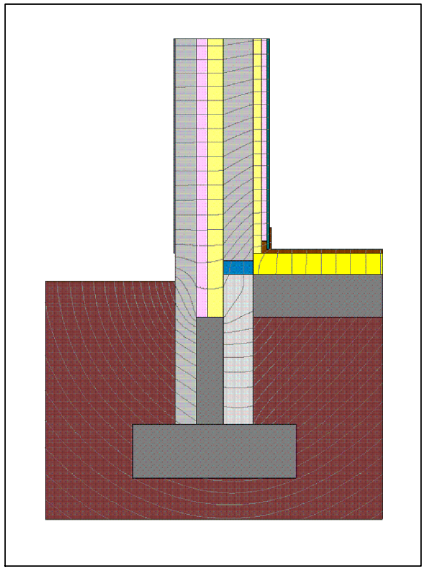
Ψ-value (W/m·K) = 0.032

Temperature Factor (*f*) = 0.94

Product type: 100mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (insulation above slab)

Certified Thermal Details and Products Scheme

Reference no.: 600376



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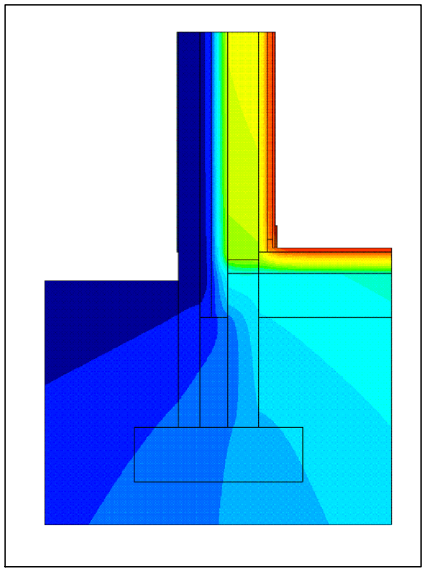
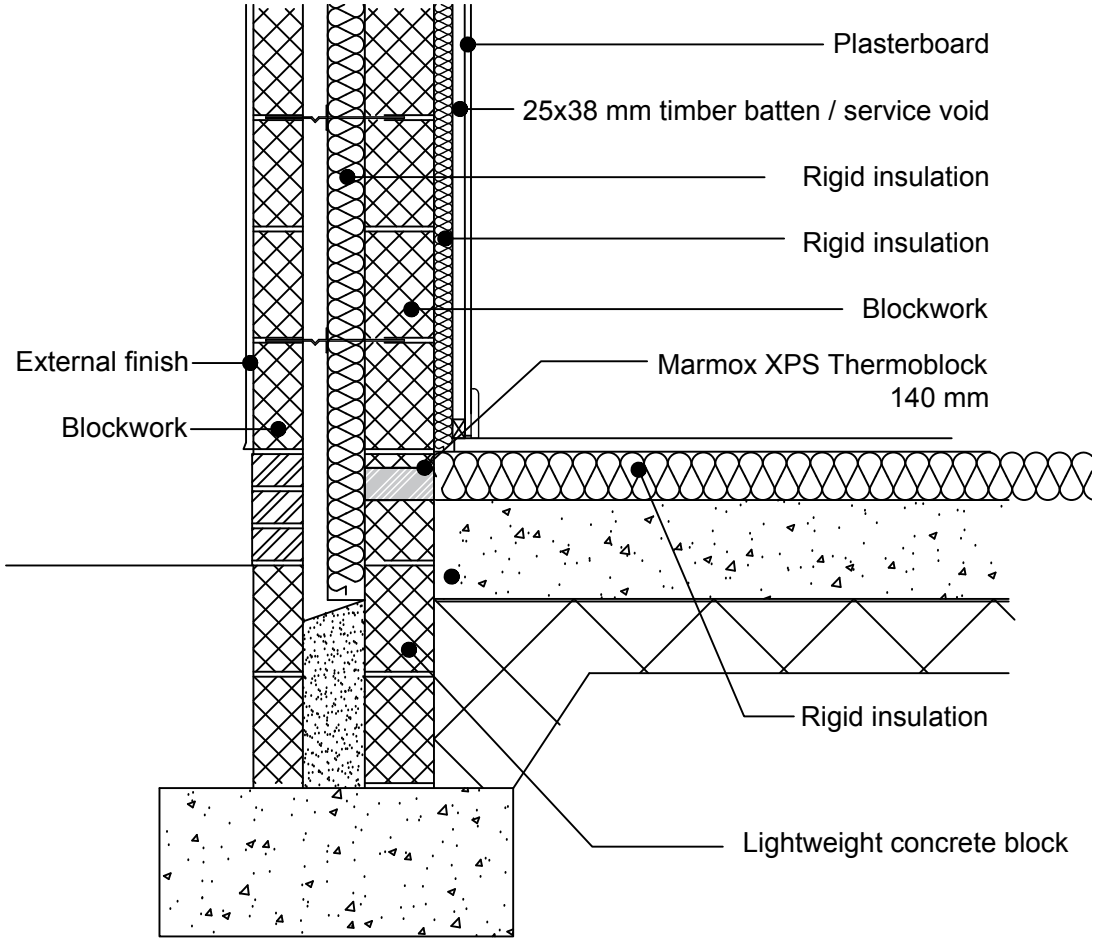
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall (cavity) - 3.26 (m²K)/W
- Wall (inner leaf) - 1.63 (m²K)/W
- Floor - 4.55 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.030

Temperature Factor (*f*) = 0.94

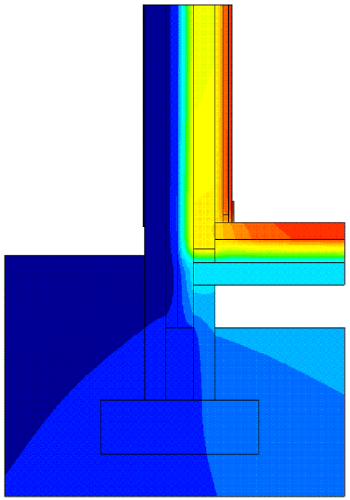
Product type: 140mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (insulation above slab)

Certified Thermal Details and Products Scheme

Reference no.: 600377

Heat flow distribution diagram not available

Heat Flow Distribution diagram
For illustrative purposes only.



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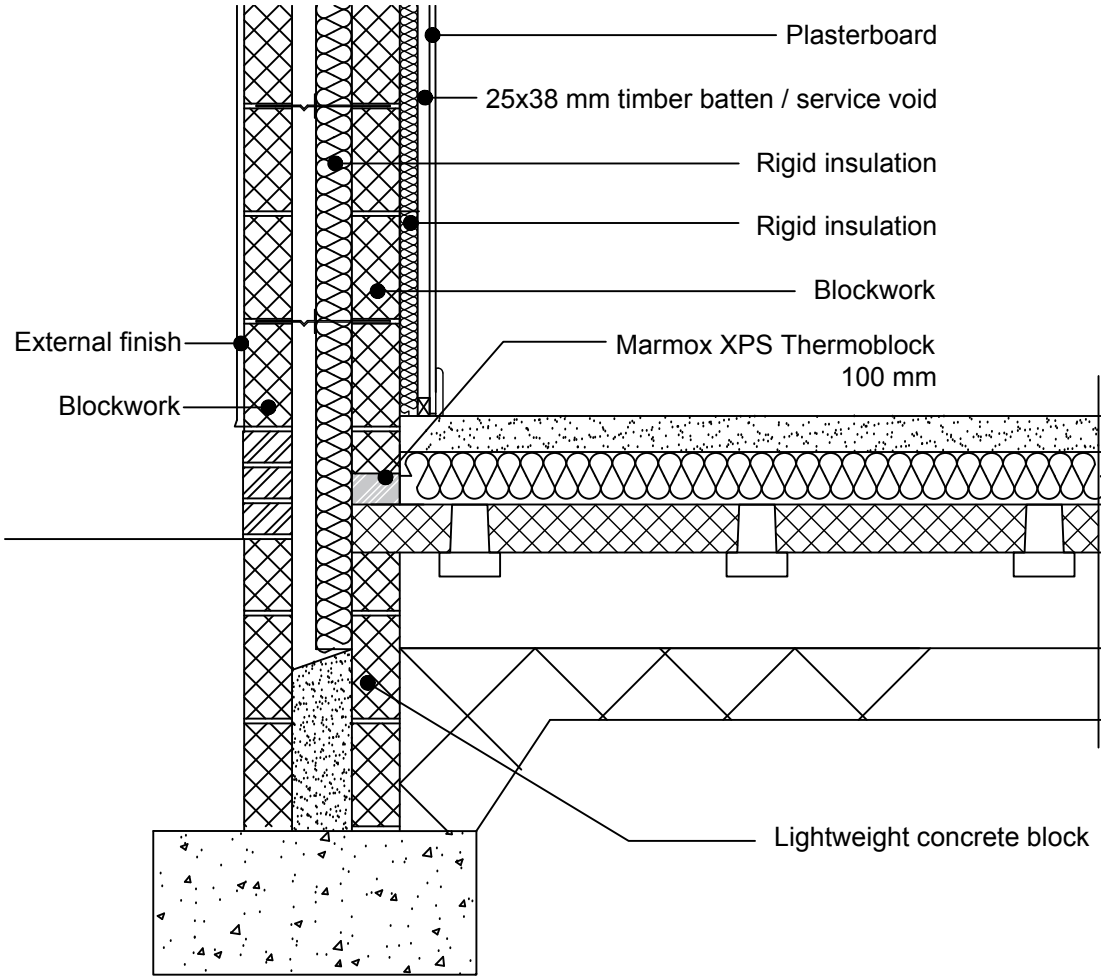

Calculation conditions

Thermal Resistance of insulation used in details:

- Wall (cavity) - 3.26 (m²K)/W
- Wall (inner leaf) - 1.63 (m²K)/W
- Floor - 5.00 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.079

Temperature Factor (*f*) = 0.87

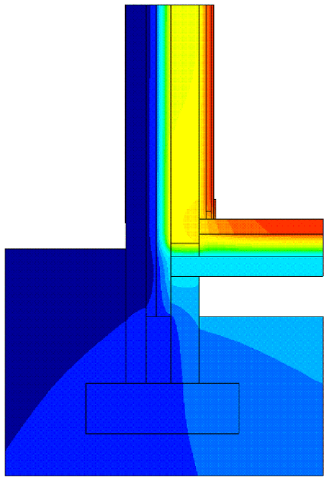
Product type: 100mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (beam and block)

Certified Thermal Details and Products Scheme

Reference no.: 600378

Heat flow distribution diagram not available

Heat Flow Distribution diagram
For illustrative purposes only.



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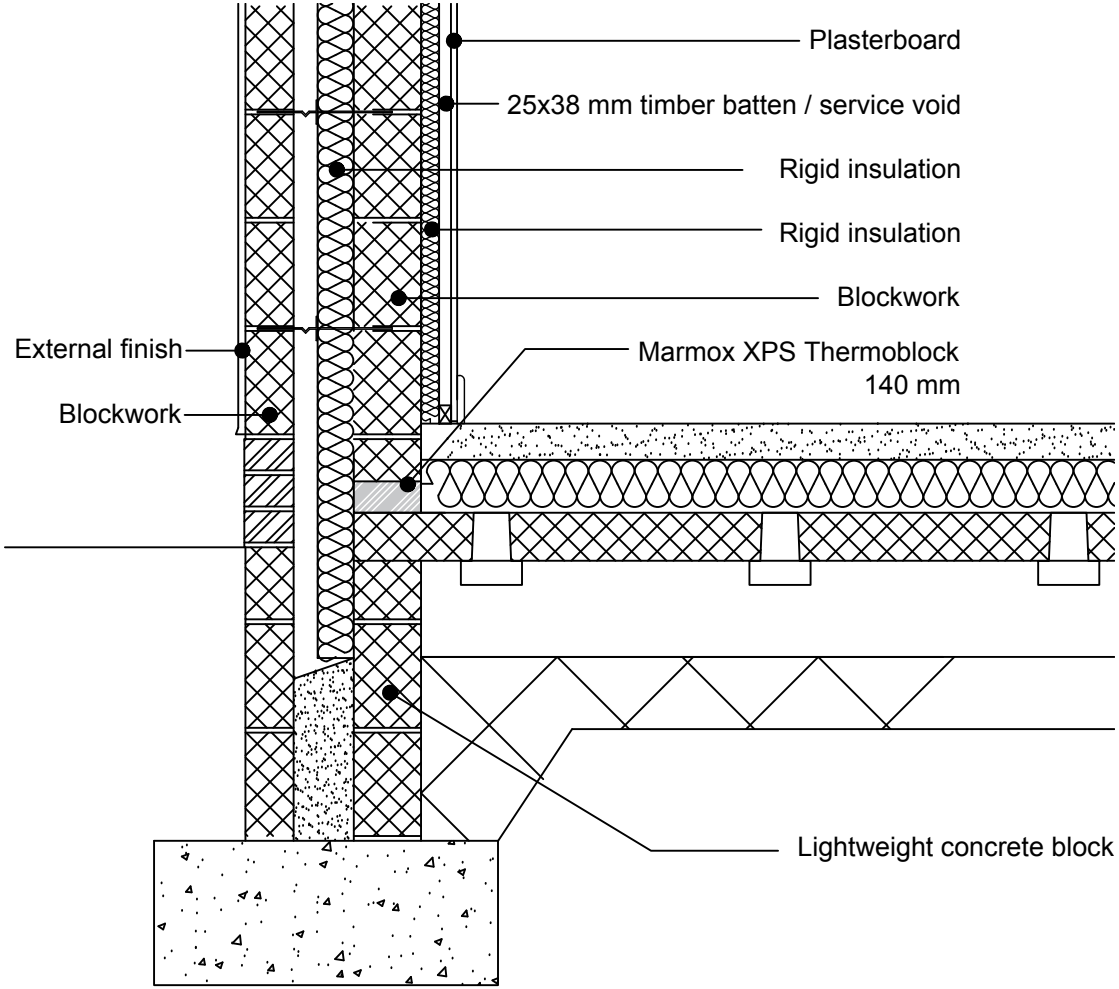
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall (cavity) - 3.26 (m²K)/W
- Wall (inner leaf) - 1.63 (m²K)/W
- Floor - 5.00 (m²K)/W

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BRE GLOBAL CERTIFICATION

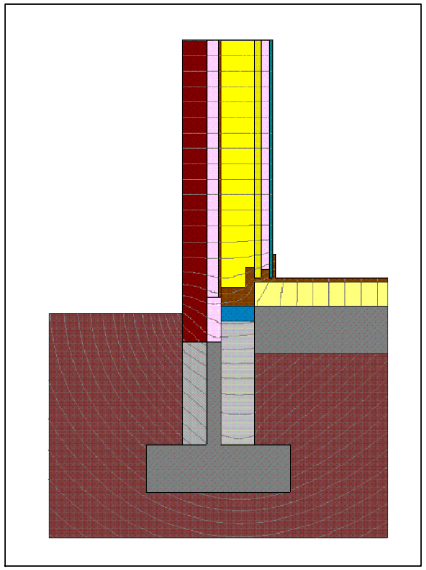
Ψ-value (W/m·K) = 0.087

Temperature Factor (*f*) = 0.86

Product type: 140mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (beam and block)

Certified Thermal Details and Products Scheme

Reference no.: 600379



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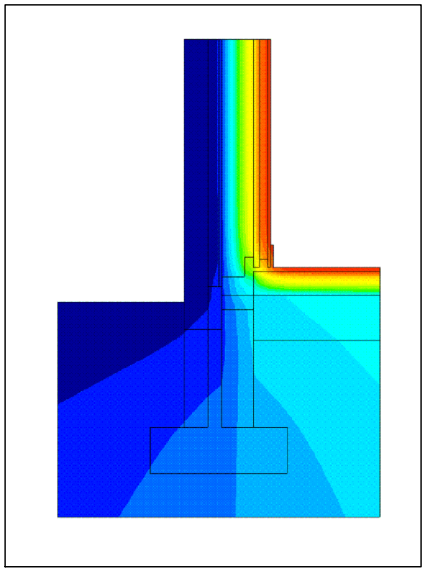
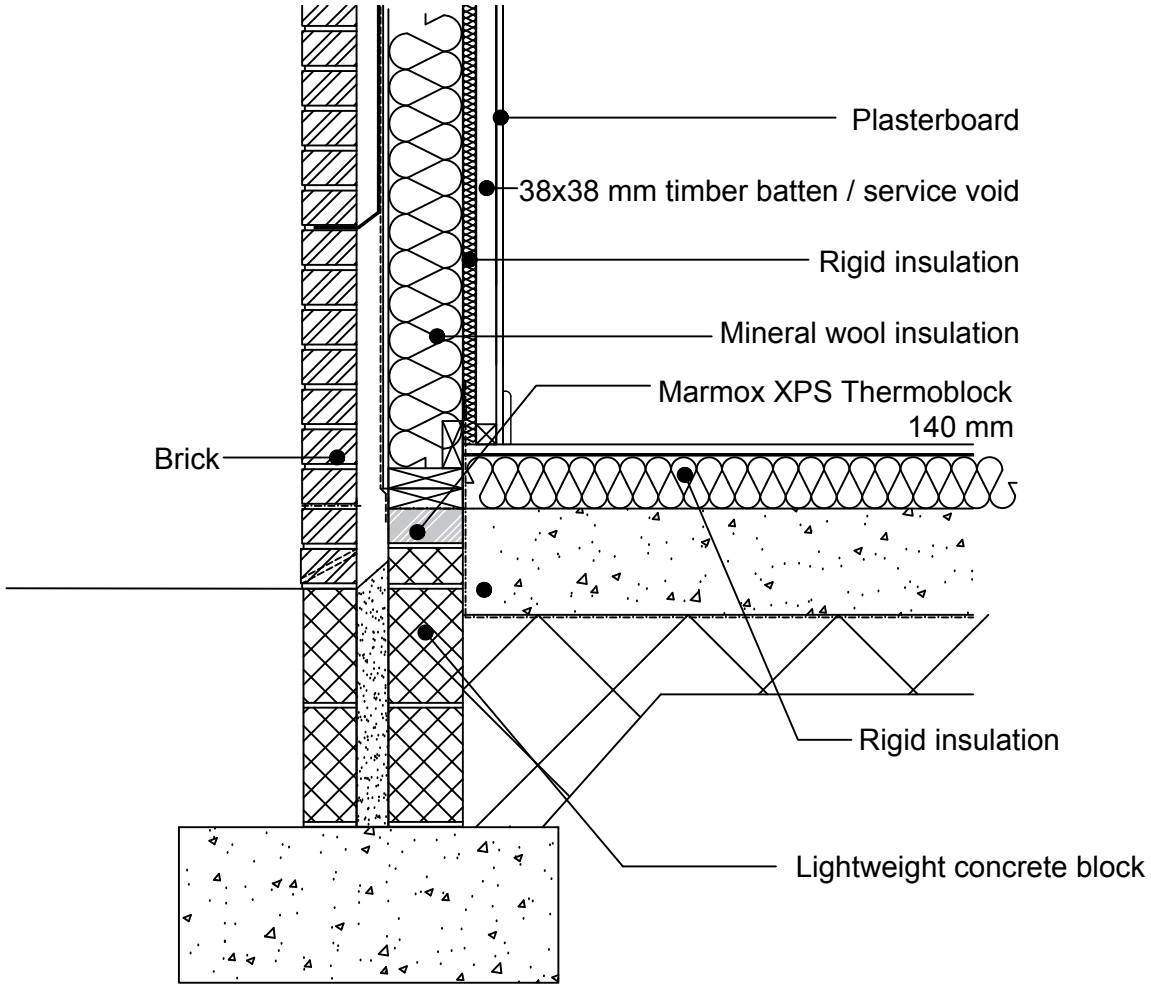
For illustrative purposes only.



Temperature Distribution diagram
For illustrative purposes only.



Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 4.38 (m²K)/W
- Wall (inner leaf) - 1.09 (m²K)/W
- Floor - 4.55 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.042

Temperature Factor (*f*) = 0.92

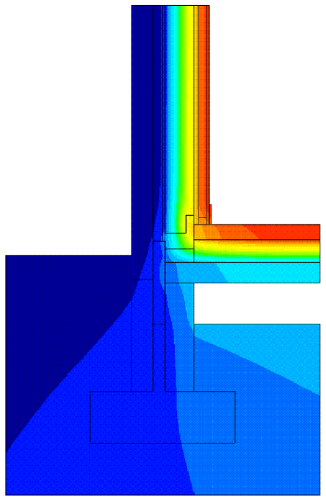
Product type: 140mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (insulation above slab)

Certified Thermal Details and Products Scheme

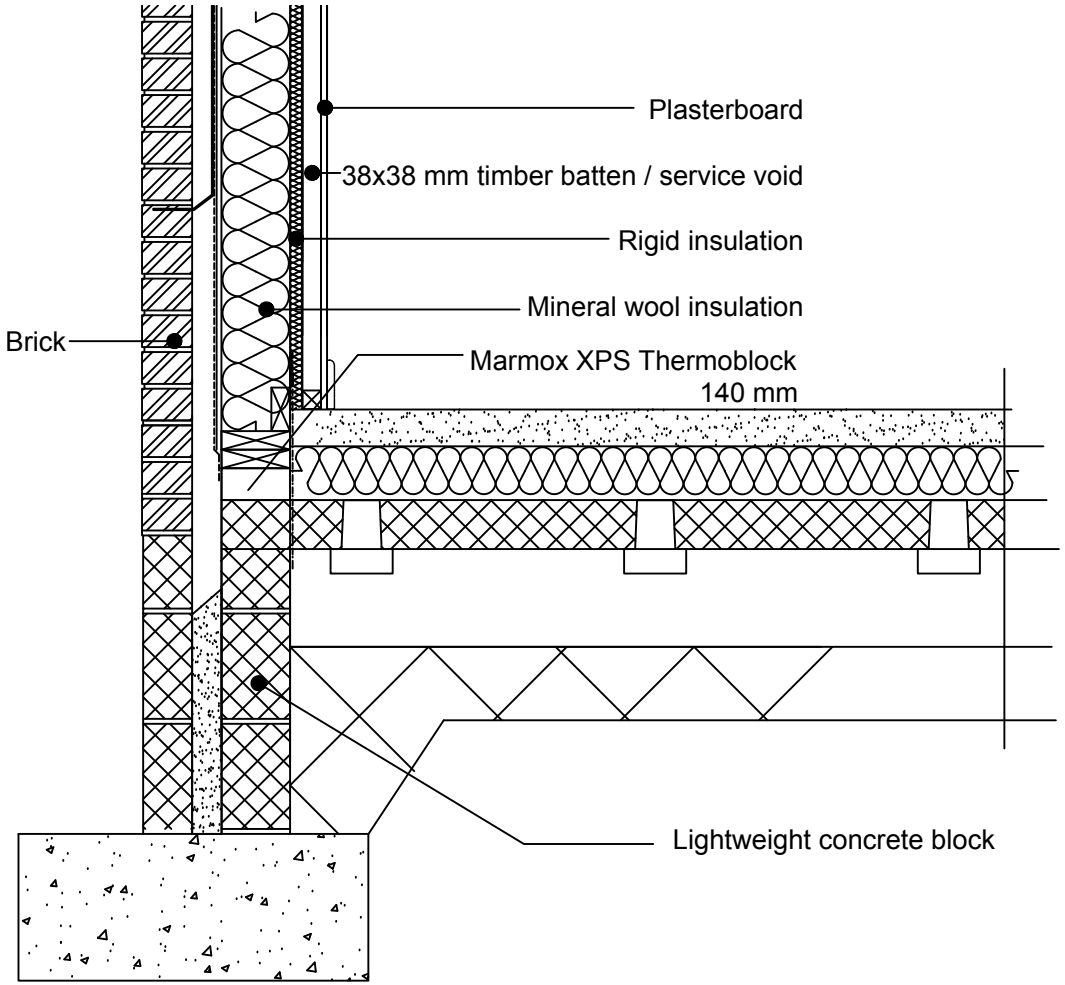
Reference no.: 600380

Heat flow distribution diagram not available

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 - 4.38 (m²K)/W
- Wall (inner leaf) - 1.09 (m²K)/W
- Floor - 5.00 (m²K)/W

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BRE GLOBAL CERTIFICATION

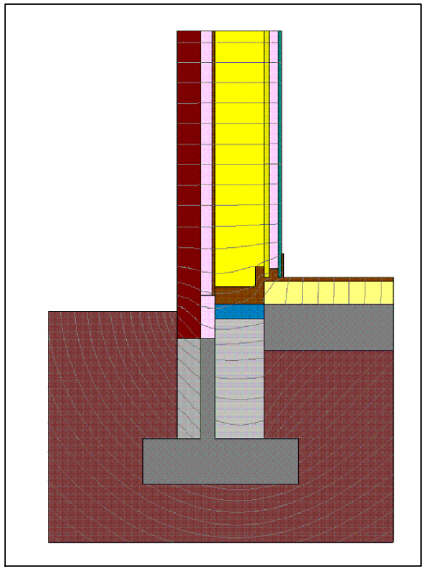
Ψ-value (W/m·K) = 0.075

Temperature Factor (*f*) = 0.89

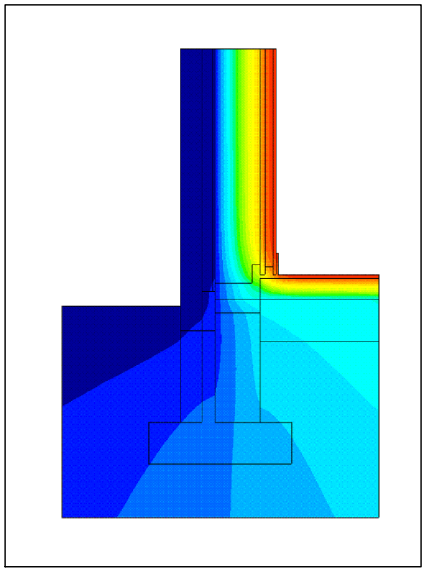
Product type: 140mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (beam and block)

Certified Thermal Details and Products Scheme

Reference no.: 600381



Heat Flow Distribution diagram
For illustrative purposes only.



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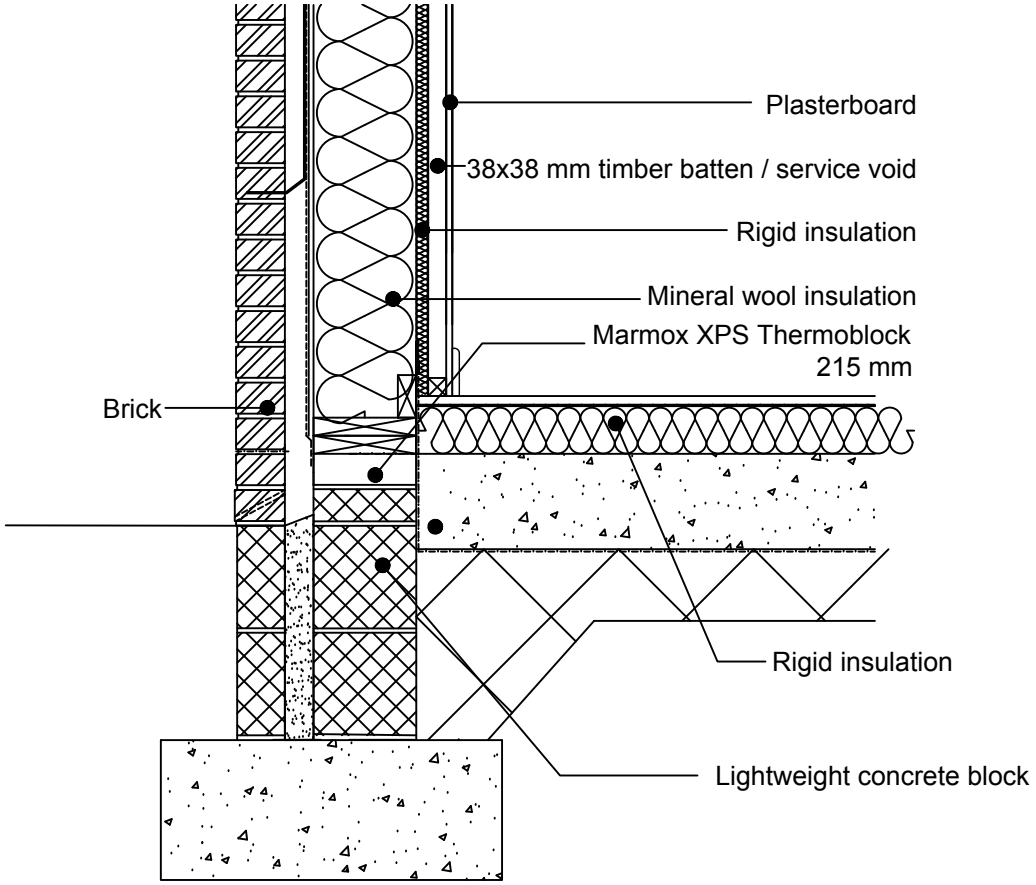

Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 6.72 (m²K)/W
- Wall (inner leaf) - 1.09 (m²K)/W
- Floor - 4.55 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.039

Temperature Factor (*f*) = 0.93

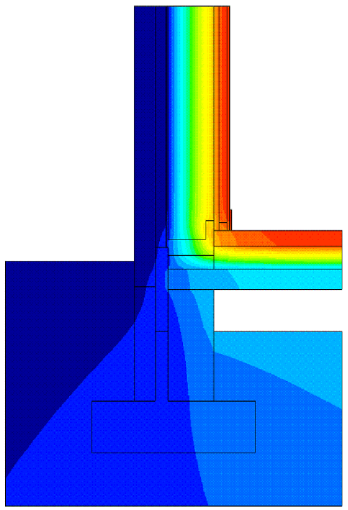
Product type: 215mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (insulation above slab)

Certified Thermal Details and Products Scheme

Reference no.: 600382

Heat flow distribution diagram not available

Heat Flow Distribution diagram
For illustrative purposes only.



Temperature Distribution diagram
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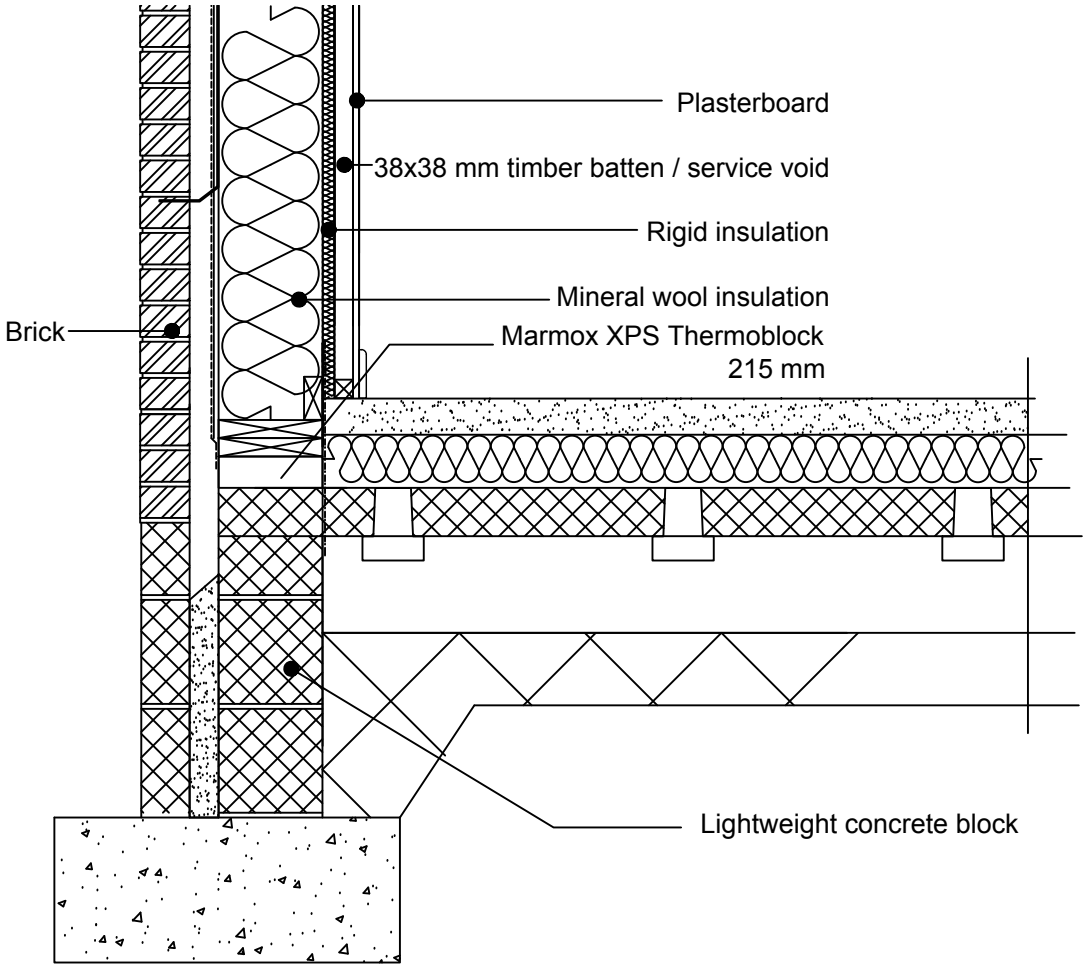

Calculation conditions

Thermal Resistance of insulation used in details:

- Wall - 6.72 (m²K)/W
- Wall (inner leaf) - 1.09 (m²K)/W
- Floor - 5.00 (m²K)/W

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BRE GLOBAL CERTIFICATION

Ψ-value (W/m·K) = 0.065

Temperature Factor (*f*) = 0.91

Product type: 215mm Marmox XPS Thermoblock
Junction type: Wall-ground floor junction (beam and block)

Certified Thermal Details and Products Scheme

Reference no.: 600383