

Certified Thermal Details and Products Scheme - Assessment results

Farrat Isolevel Ltd – TBF Structural thermal breaks in balcony details

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1 Introduction

1.1 Certified Thermal Details and Products Scheme

The Certified Thermal Details and Products Scheme (www.bregroup.com/certifiedthermalproducts) 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.

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

- Building junction details (e.g. in line with SAP Table K1 junction types + some bespoke detail types)
- Opening products (e.g. windows, doors and rooflights)
- Major (plane) building elements (e.g. wall, roof and floor products)

Certification and listing through the scheme ensures that the requirements of the appropriate standard(s) are met and maintained. Note that this assessment report does not in itself constitute certification of products to the scheme, but provides evidence of performance in support of certification.

1.2 Farrat Isolevel Ltd – Structural thermal breaks in balcony details

Farrat Isolevel Ltd have submitted a range of junction details to BRE. These were assessed against the requirements of the Certified Thermal Details and Products Scheme, as set out in SD227: Rev 0.4.

Ψ -value (W/m·K) and temperature factors (f) were assessed for the following junction details:

- Farrat TBF (15mm) Balcony: Steel to steel connection ('small' beam)
- Farrat TBF (25mm) Balcony: Steel to steel connection ('large' beam)
- Farrat TBF (15mm) Balcony: Steel to concrete connection ('small' beam)
- Farrat TBF (25mm) Balcony: Steel to concrete connection ('small' beam)
- Farrat TBF (15mm) Balcony: Steel to concrete connection ('large' beam)
- Farrat TBF (25mm) Balcony: Steel to concrete connection ('large' beam)

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.



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 (second edition, 2016)

2.2 Software

The assessment was undertaken using Physibel TRISCO v12 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 Thermal conductivities

The representative thermal conductivities used in the models were taken from BS EN ISO 10456:2007 and information provided by the client, as detailed in Table 2. All air gaps within the construction were calculated according to BS EN ISO 6946.

Table 2: Representative thermal conductivities

Material	Thermal conductivity (W/m·K)
Farrat TBF thermal break	0.20 ^a
Steel	50.0 ^b
Brick	1.16 ^a
Insulation	0.027 ^a
Blockwork	1.29 ^a
Plasterboard	0.21 ^b
Concrete slab	2.30 ^b
Hollow core precast concrete (equivalent conductivity, allowing for cast in voids, established via separate model)	0.89 ^c
Concrete screed	1.15 ^b

Data sources: ^a From client/ test certificate, ^b From BS EN ISO 10456:2007, ^c Calculated via separate model



3 Assessment results

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

Table 3: Assessment Results

Scheme detail reference	SAP Reference	Description	Calculated Ψ -value (W/m ² K)	Temperature Factor
600376	E23	Farrat TBF (15mm) Balcony: Steel to steel connection ('small' beam)	0.347	0.91
600377	E23	Farrat TBF (25mm) Balcony: Steel to steel connection ('large' beam)	0.426	0.90
600378	E23	Farrat TBF (15mm) Balcony: Steel to concrete connection ('small' beam)	0.308	0.82
600379	E23	Farrat TBF (25mm) Balcony: Steel to concrete connection ('small' beam)	0.300	0.82
600380	E23	Farrat TBF (15mm) Balcony: Steel to concrete connection ('large' beam)	0.424	0.83
600381	E23	Farrat TBF (25mm) Balcony: Steel to concrete connection ('large' beam)	0.404	0.84

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

- Geometry and materials
- Temperature distribution profile



4 References

The following documents (in their most recent versions at the date of this report) may be referred to in their entirety or in part for the purposes of this assessment.

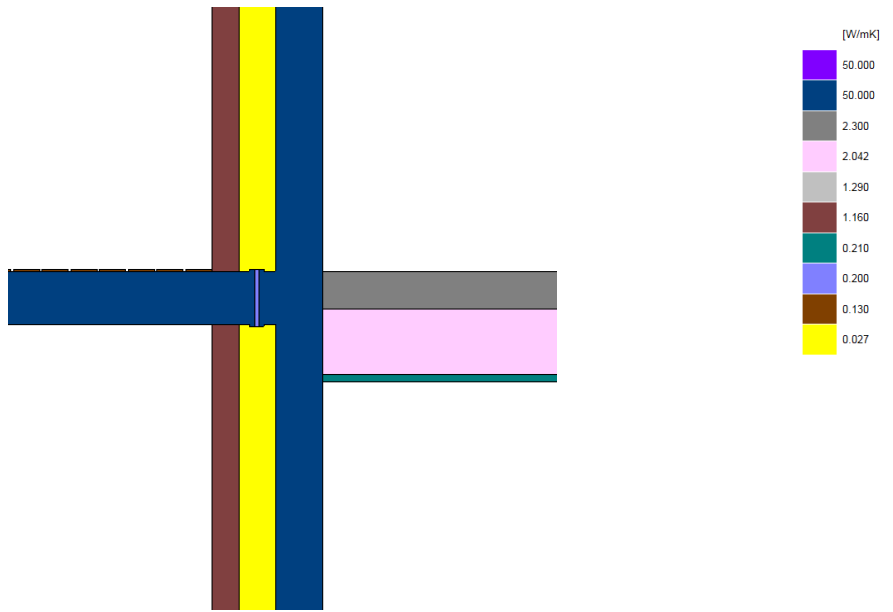
Standard/ Document reference	Title
BR 497	Conventions for Calculating Linear Thermal Transmittance and Temperature Factors, BRE
BR 443	Conventions for U-values, BRE
BS EN ISO 10211	Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations
BS EN ISO 6946	Building components and building elements. Thermal resistance and thermal transmittance - Calculation methods
BS EN ISO 13370	Thermal performance of buildings. Heat transfer via the ground - Calculation methods
BS EN ISO 10077 (parts 1 and 2)	Thermal performance of windows, doors and shutters - Calculation of thermal transmittance Numerical method for frames
BS EN ISO 10456	Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values
IP1/06	Assessing the effects of thermal bridging at junctions and around openings



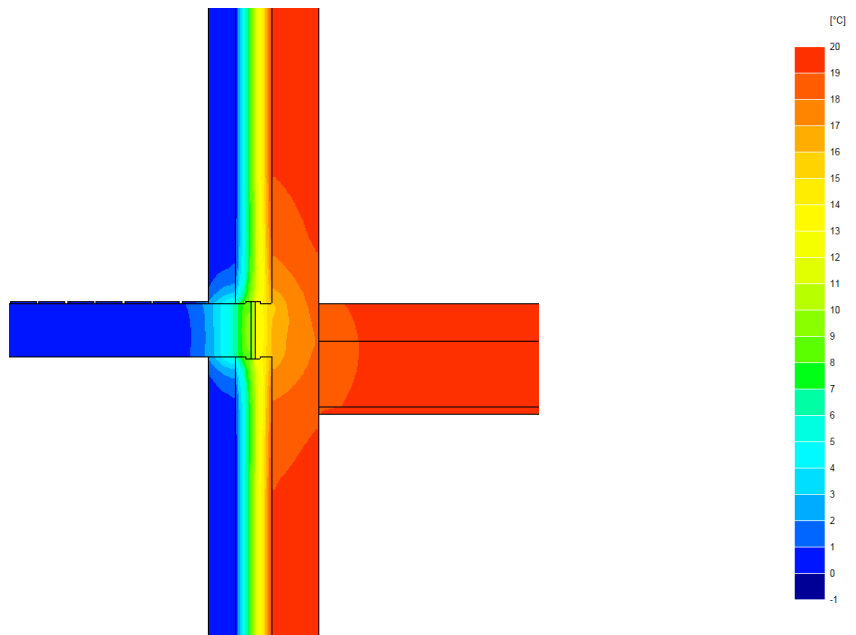
Appendix A Modelling outputs of materials and temperature distribution profiles

600376 - Farrat TBF (15mm) Balcony: Steel to steel connection ('small' beam)

Materials



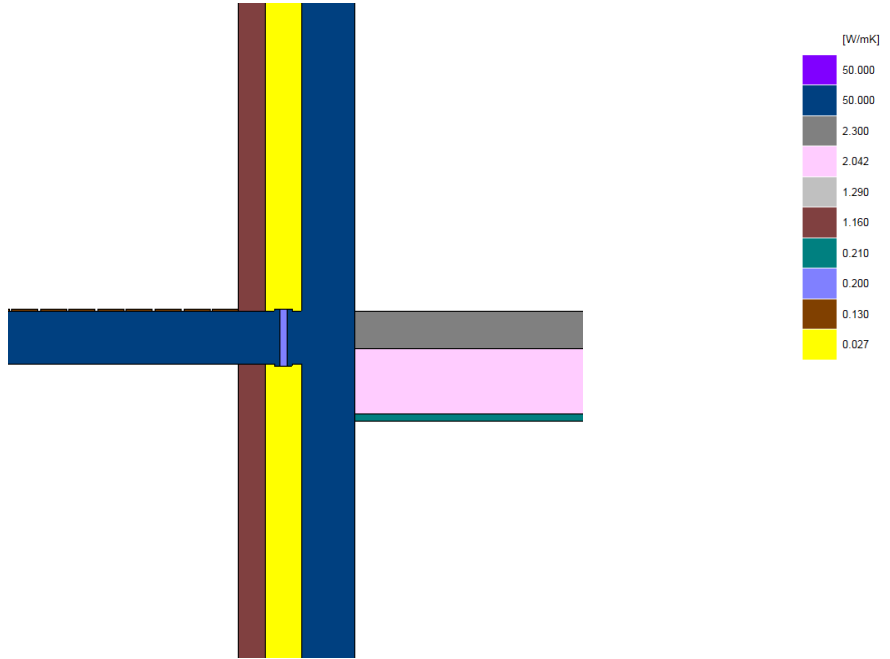
Temperature profile



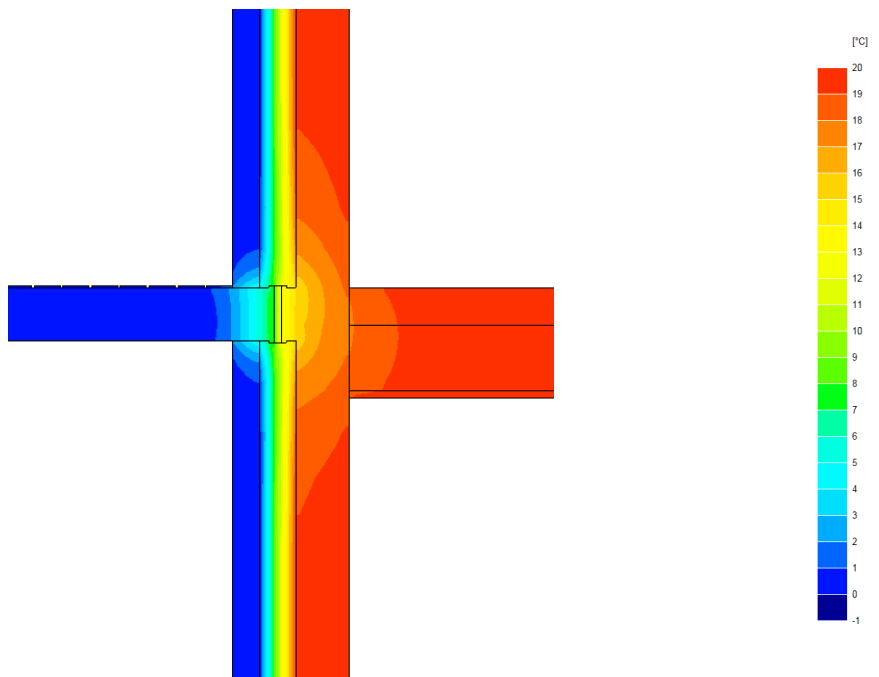


600377 - Farrat TBF (25mm) Balcony: Steel to steel connection ('large' beam)

Materials



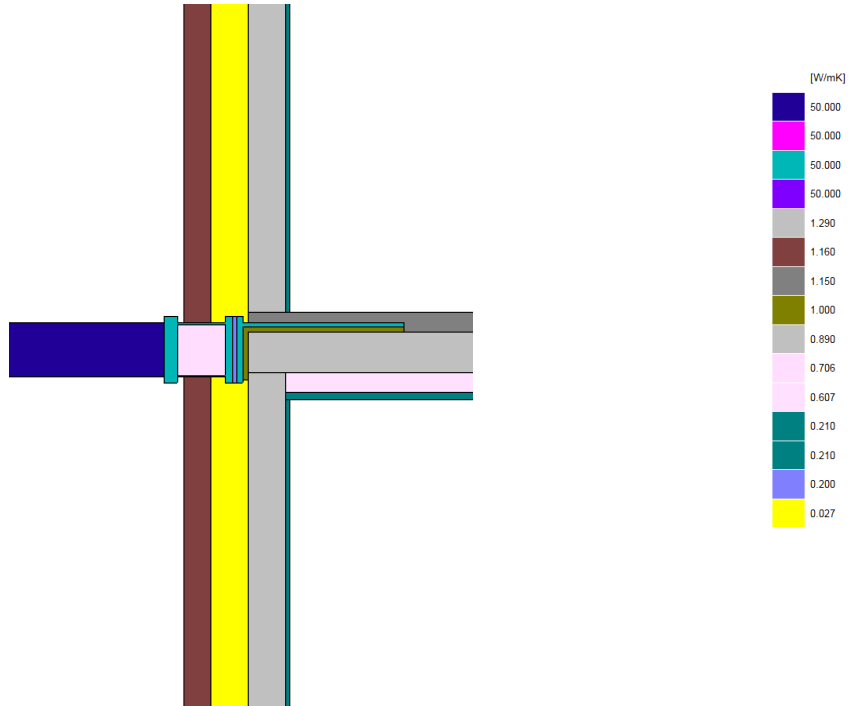
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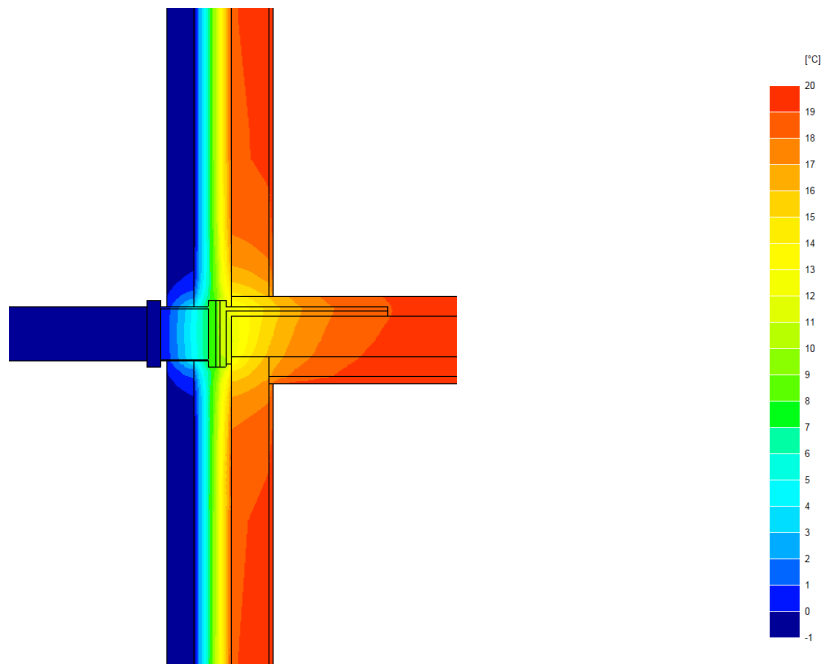


600378 - Farrat TBF (15mm) Balcony: Steel to concrete connection ('small' beam)

Materials



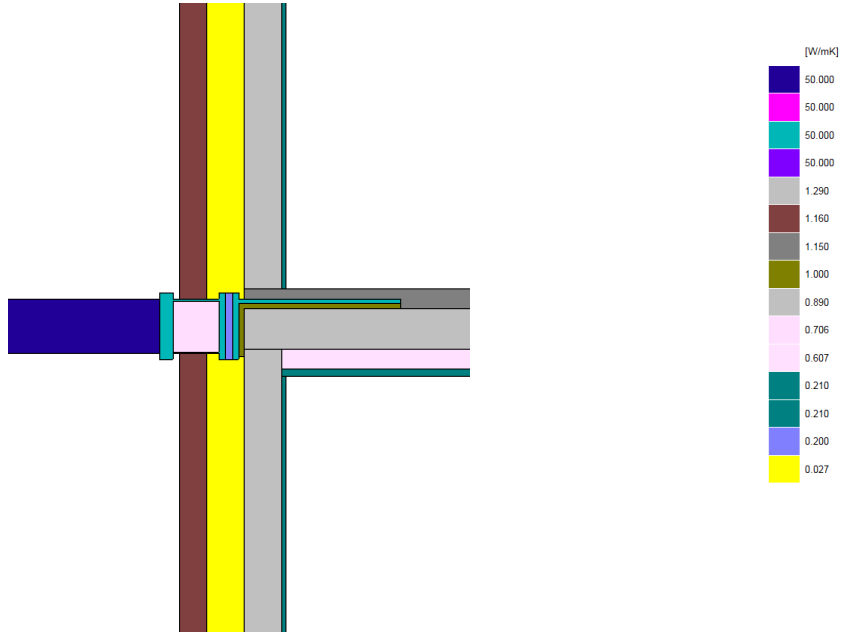
Temperature profile



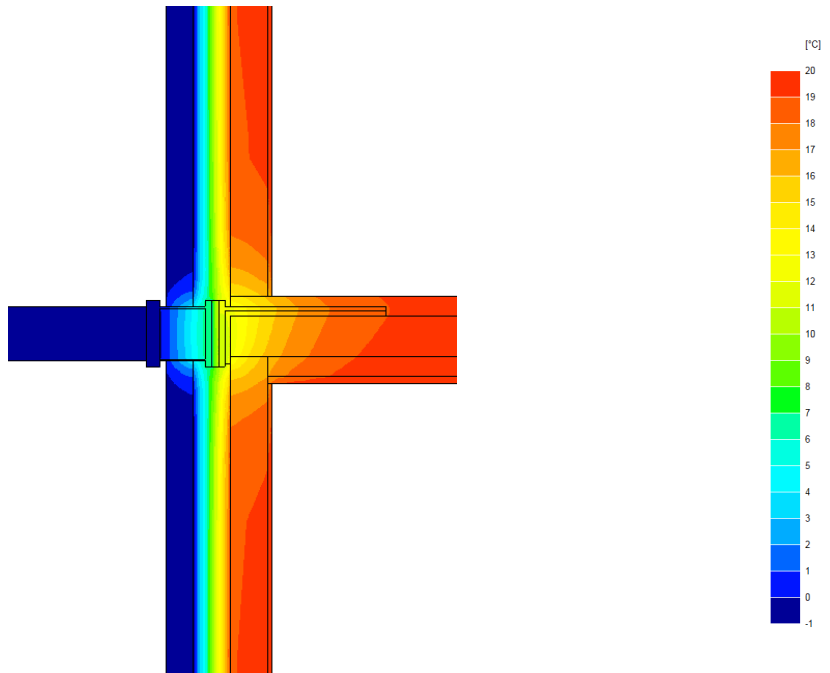


600379 - Farrat TBF (25mm) Balcony: Steel to concrete connection ('small' beam)

Materials



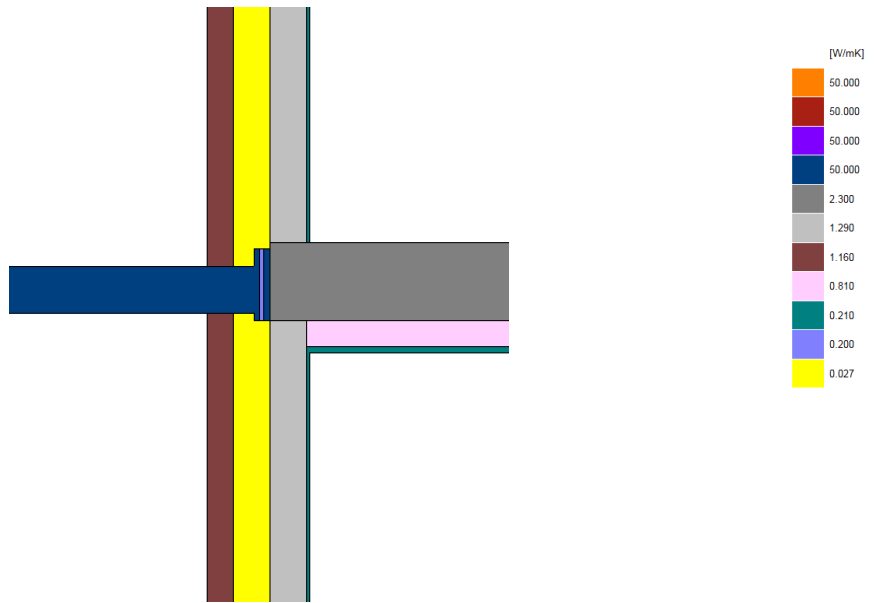
Temperature profile



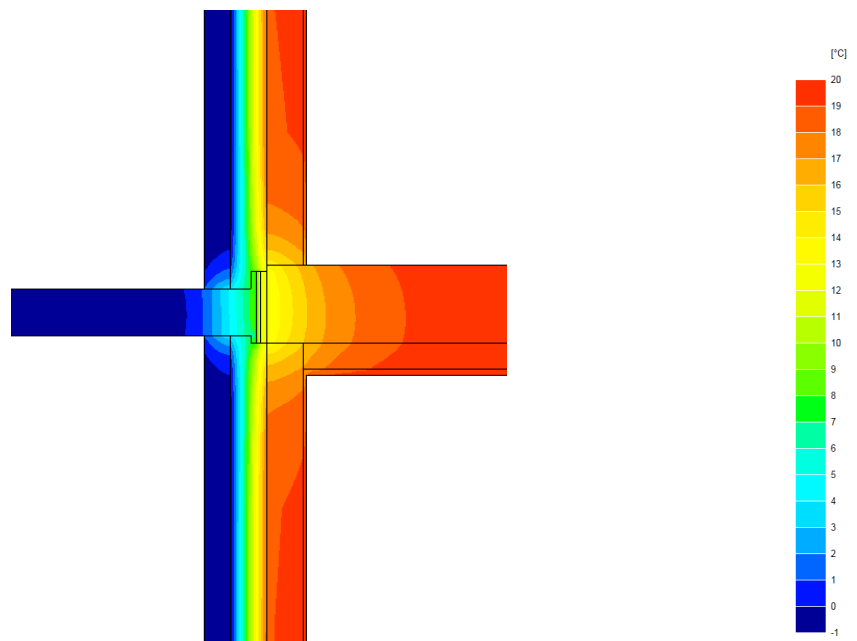


600380 - Farrat TBF (15mm) Balcony: Steel to concrete connection ('large' beam)

Materials



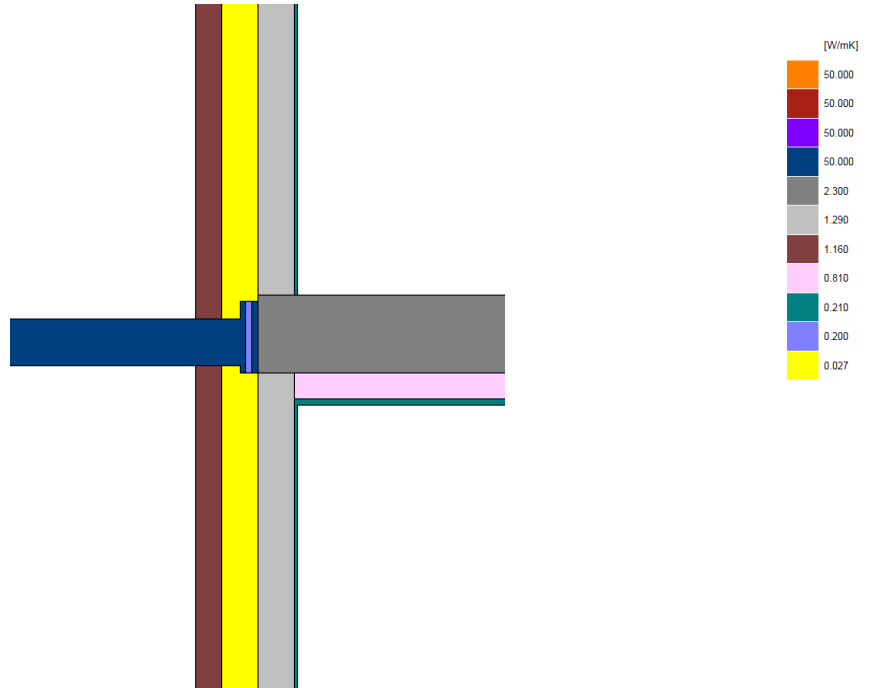
Temperature profile



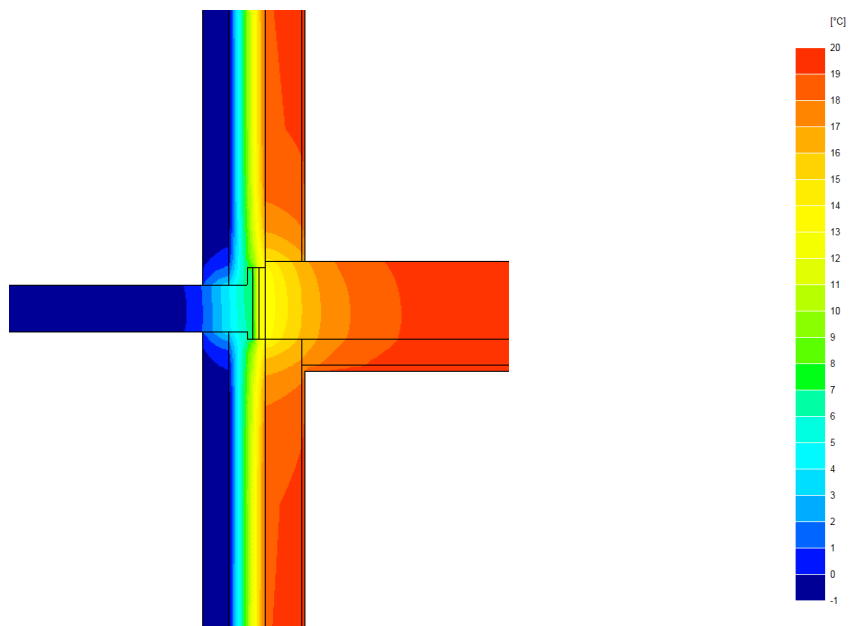


600381 - Farrat TBF (25mm) Balcony: Steel to concrete connection ('large' beam)

Materials

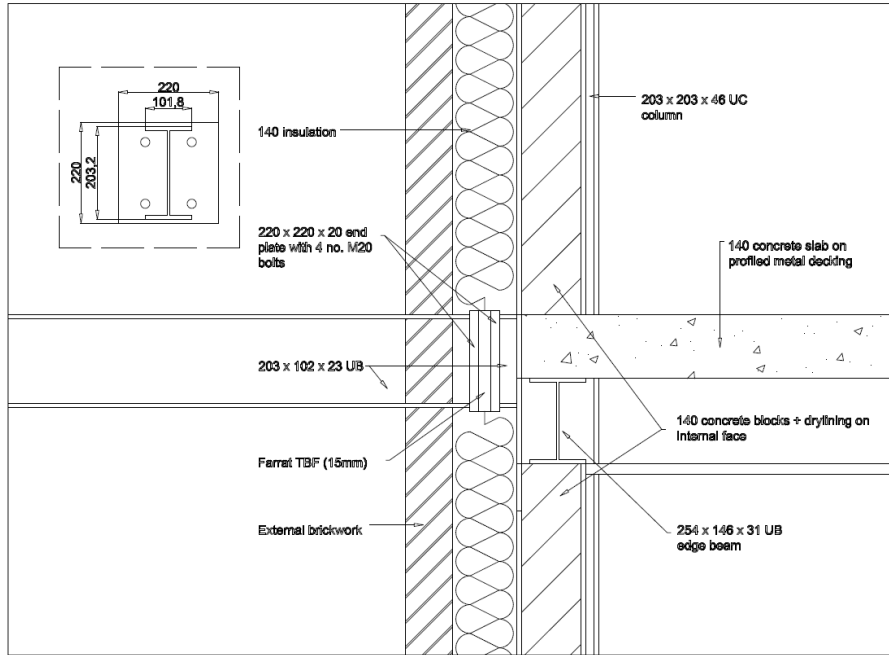


Temperature profile

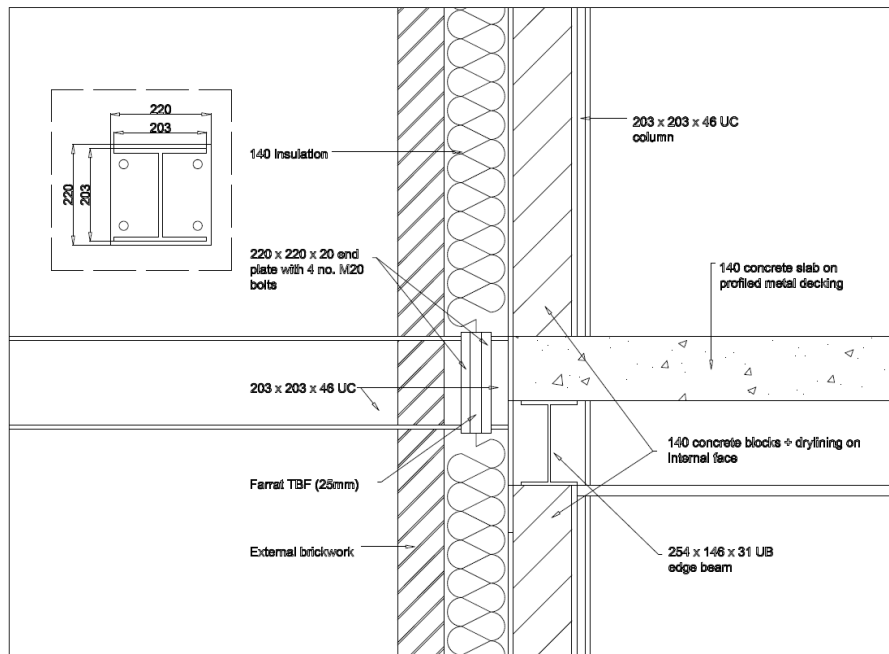


Appendix B Client drawings

600376 - Steel to steel connection (small beam) TBF 15mm

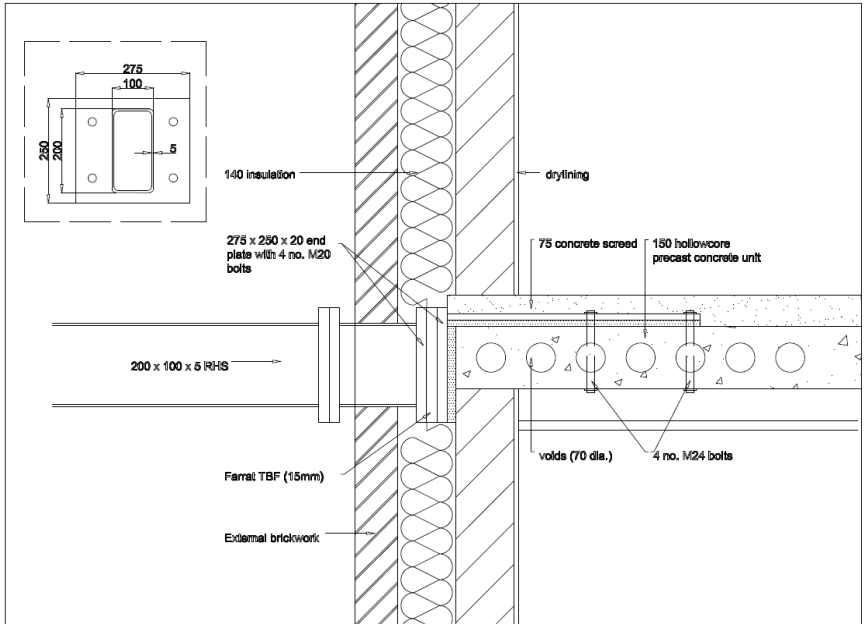


600377 - Steel to steel connection (large beam) TBF 25mm

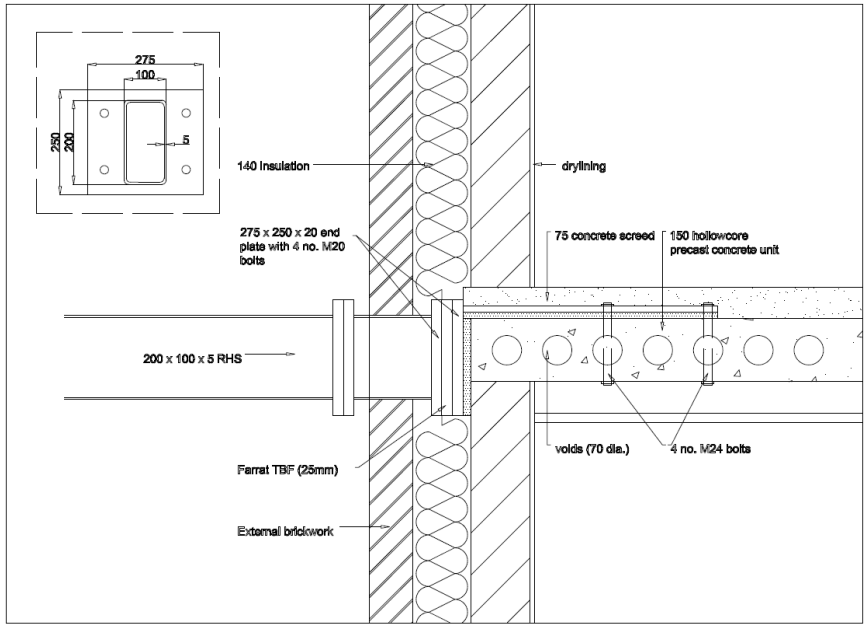




600378 - Steel to concrete connection (small beam) TBF 15mm

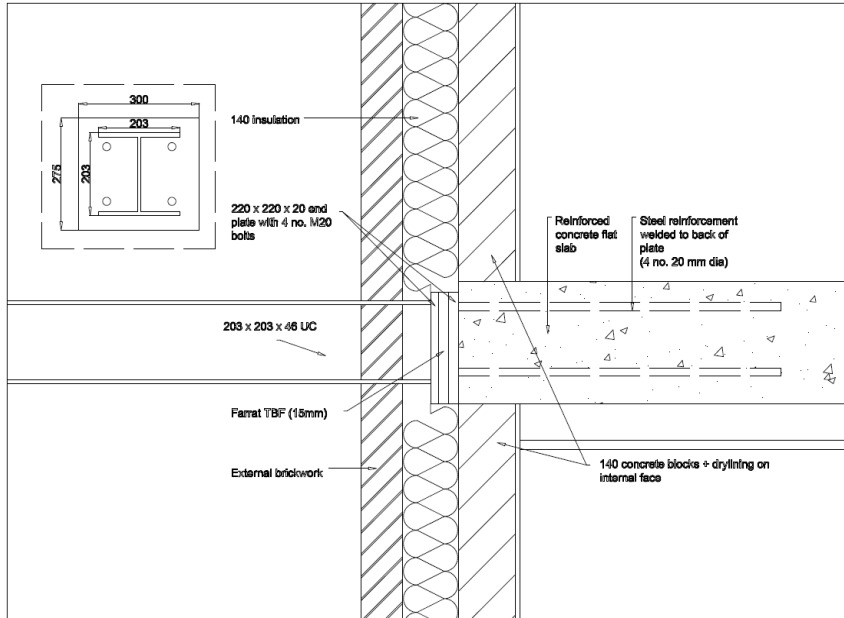


600379 - Steel to concrete connection (small beam) TBF 25mm





600380 - Steel to concrete connection (large beam) TBF 15mm



600381 - Steel to concrete connection (large beam) TBF 25mm

