PRP

Ashley Road

Thermal Performance

BP10456
Date:09.08.2023

prp-co.uk

Architecture
Urban Design
Masterplanning
Landscape
Development Consultancy
Research

Project	Ashley Road
PRP Reference	BP10456
Design stage	3 – Pre-contract
Issue	01 – First Issue
Author	Anthony Briden
Date	9 August 2023
Reviewer	Eve Russell

Disclaimer:

PRP disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and taking account of the resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and PRP accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

Document Revision History

Date of Issue	Version
10 August 2023	01 – First Issue

Contents

1 SCOPE OF WORK 5
2 U-VALUE 6
3 THERMAL BRIDGING 25
4 ANALYSIS 29

1 Scope of Work

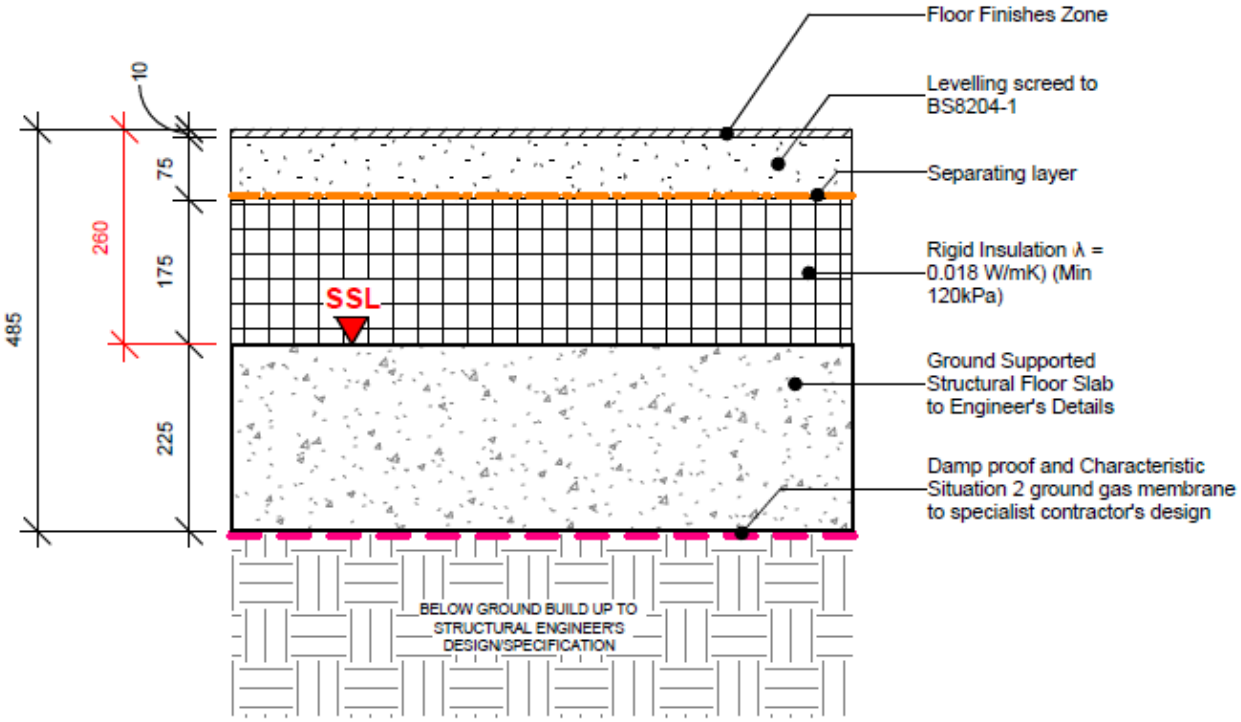
To assess the thermal performance of the proposed building at Ashley Road.

To report performance based on the proposed design and to relate this to PHPP requirements.

2 U-Value

U-value calculations have been made for each construction element type to determine the U-values which have been calculated based on Levitt Bernstein build-ups.

GF01 – Ground Floor



U-Value

0.09 W/m²K

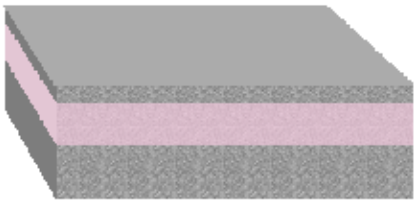
BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - Ashley Road PH**
Component: **GF01**

9. August 2023
Page 1/2

INSIDE



OUTSIDE

Assignment: Ground floor

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rsi					0.1700
✓	1	Generic Building Materials	Concrete screed (1800 kg/m³)	0.0750	1.150	D	0.0652
✓	2	PRP Build-up Library	Phenolic foam - Variable thickness 0.18	0.1750	0.018	E	9.7222
✓	3	BS EN 12524	Concrete, Reinforced (with 1% of steel)	0.2250	2.300	D	0.0978
		Rse					0.0000
				0.4750			

U = 0.09 W/(m²K)

Explanation see next page

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U = 0.09 W/(m²K) R_T= 10.06 m²K/W

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - Ashley Road PH**
Component: **GF01**

9. August 2023
Page 2/2

Slab-on-ground floor according to BS EN ISO 13370

Input data:

λ	Thermal conductivity [W/(mK)]	1.50	(Thermal conductivity of the ground)
A	Floor area [m²]	50.00	
P	Exposed perimeter [m]	28.50	
R_f	Thermal resistance [m²K/W]	9.885	(see construction layer list)
w	Thickness of walls [m]	0.30	

Kind of edge insulation:		no edge insulation
D	Depth of insulation [m]	0.80
d_n	Thickness of insulation [m]	0.08
R_n	Thermal resistance [m²K/W]	2.0

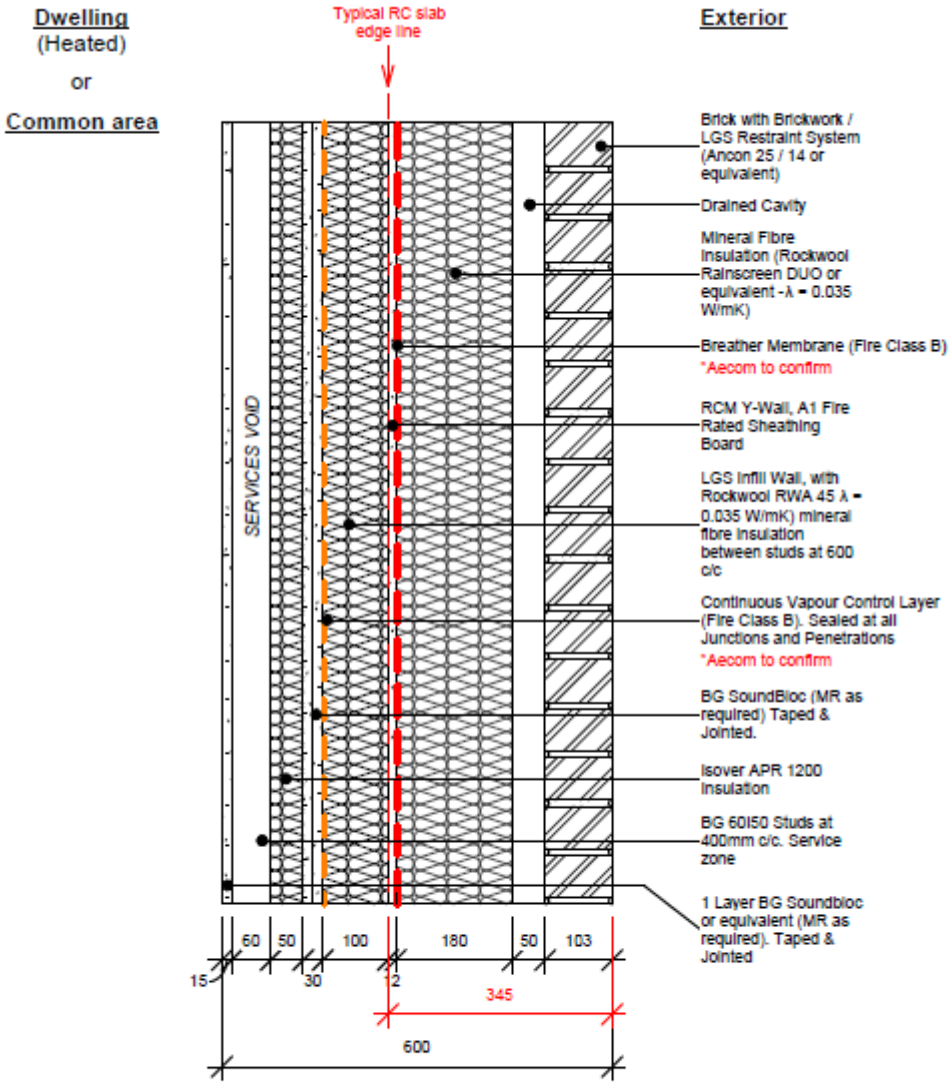
Intermediate results:

B'	Characteristic dimension [m]	3.509
d_t	Equivalent thickness [m]	15.443
U_0	Thermal transmittance [W/(m²K)]	0.088
$\Delta\Psi$	Correction term [W/(mK)]	0.000

U = 0.09 W/(m²K) **Thermal Transmittance**

L_s = 4.4 W/K **Steady-state thermal coupling coefficient**

EW01 – External Brick Wall.



EW-01A	(Light Brick 01)	*A2, A3, B2, B3, C2*
EW-01B	(Light Brick 02)	*A1, A5, B1, C1*
EW-01C	(Dark Brick 01)	*A4 Only*

U-Value

0.11 W/m²K

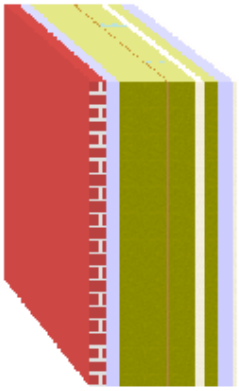
BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW01**

9. August 2023
Page 1/4

OUTSIDE INSIDE



This illustration of inhomogeneous layers is provided only to assist in visualising the arrangement.

Assignment: External wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	Generic Building Materials	Brick outer leaf & Mortar outer leaf (f = 0.000 / automatic disregard acc. BRE 443)	0.0650	0.770	D	0.0844
☑	2	Unventilated Airspace BR 443	Normal cavity - 50 mm, unventilated	0.0500	0.278	D	0.1799
☑	3	Rockwool Ltd	Rainscreen Duo-Slab (100-225mm)	0.1800	0.035	B	5.1429
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	4	BS EN 12524	Breather membrane	0.0001	0.170	D	0.0006
☑	5	PRP Build-up Library	RCM Y-Wall Board	0.0120	0.120	E	0.1000
☑	6	Light steel-frame	consisting of:	0.1000	ø 0.185		0.5408
	6a	PRP Build-up Library	Mineral wool batt - Variable thickness 0.035	99.70 %	0.035	E	-
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
	6b	BS EN 12524	Steel	00.30 %	50.000	D	-
☑	7	BS EN 12524	Polyethylene 0.15 mm	0.0002	0.170	D	0.0009
☑	8	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	9	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	10	PRP Build-up Library	Mineral wool batt - Variable thickness 0.039	0.0500	0.039	L	1.2821
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	11	BS EN ISO 6946	Unventilated airspace large: horizontal heat flow	0.0600	0.319	D	0.1879
		Airspace: mean temp.: 10°C / deltaT: <5 K / Epsilon1: 0.9 W/(m²K) / Epsilon2: 0.9 W/(m²K)					
☑	12	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
		Rsi					0.1300
				0.5623			

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW01**

9. August 2023
Page 2/4

$R_T = p*R_T' + (1-p)*R_T'' = 9.48$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Air gaps	BS EN ISO 6946 Annex F	~~0.0032~~
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.0000

$U = 1/R_T + \Sigma\Delta U = 0.11$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
D .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

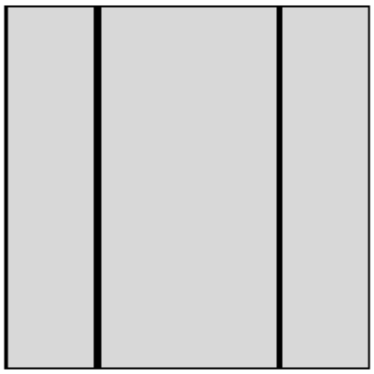
U = 0.11 W/(m²K) R_T= 9.48 m²K/W

BuildDesk U 3.4 PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW01**

9. August 2023
Page 3/4

Steel percentage: 0.30 %



Light steel-frame sections
The portion is given in %.

A	consisting of material layers: 1, 2, 3, 4, 5, 6a, 7, 8, 9, 10, 11, 12	= 99.70%
B	consisting of material layers: 1, 2, 3, 4, 5, 6b, 7, 8, 9, 10, 11, 12	= 0.30%

Upper limit of the thermal transfer resistance R

U_A [W/(m²K)] = $\frac{1}{(\Sigma R_{(A)} + R_{si} + R_{se})}$ = $\frac{1}{10.02 + 0.13 + 0.04}$ = 0.10

U_B [W/(m²K)] = $\frac{1}{(\Sigma R_{(B)} + R_{si} + R_{se})}$ = $\frac{1}{7.16 + 0.13 + 0.04}$ = 0.14

$$R_T' = \frac{1}{A \cdot U_A + B \cdot U_B} = 10.17\ m^2K/W$$

Lower limit of the thermal transfer resistance R

R_{se} [m²K/W]		= 0.04
R_1'' [m²K/W] = d_1/λ_1 =	0.0650 / 0.770	= 0.08
R_2'' [m²K/W] = d_2/λ_2 =	0.0500 / 0.278	= 0.18
R_3'' [m²K/W] = d_3/λ_3 =	0.1800 / 0.035	= 5.14
R_4'' [m²K/W] = d_4/λ_4 =	0.0001 / 0.170	= 0.00
R_5'' [m²K/W] = d_5/λ_5 =	0.0120 / 0.120	= 0.10
R_6'' [m²K/W] = $d_6/(\lambda_{6a} * A + \lambda_{6b} * B)$ =	0.1000 /(0.035 * 99.70% + 50.000 * 0.30%)	= 0.54
R_7'' [m²K/W] = d_7/λ_7 =	0.0002 / 0.170	= 0.00
R_8'' [m²K/W] = d_8/λ_8 =	0.0150 / 0.250	= 0.06
R_9'' [m²K/W] = d_9/λ_9 =	0.0150 / 0.250	= 0.06
R_{10}'' [m²K/W] = d_{10}/λ_{10} =	0.0500 / 0.039	= 1.28
R_{11}'' [m²K/W] = d_{11}/λ_{11} =	0.0600 / 0.319	= 0.19
R_{12}'' [m²K/W] = d_{12}/λ_{12} =	0.0150 / 0.250	= 0.06
R_{si} [m²K/W]		= 0.13

$$R_T'' = \Sigma R_i'' + R_{si} + R_{se} = 7.87\ m^2K/W$$

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW01**

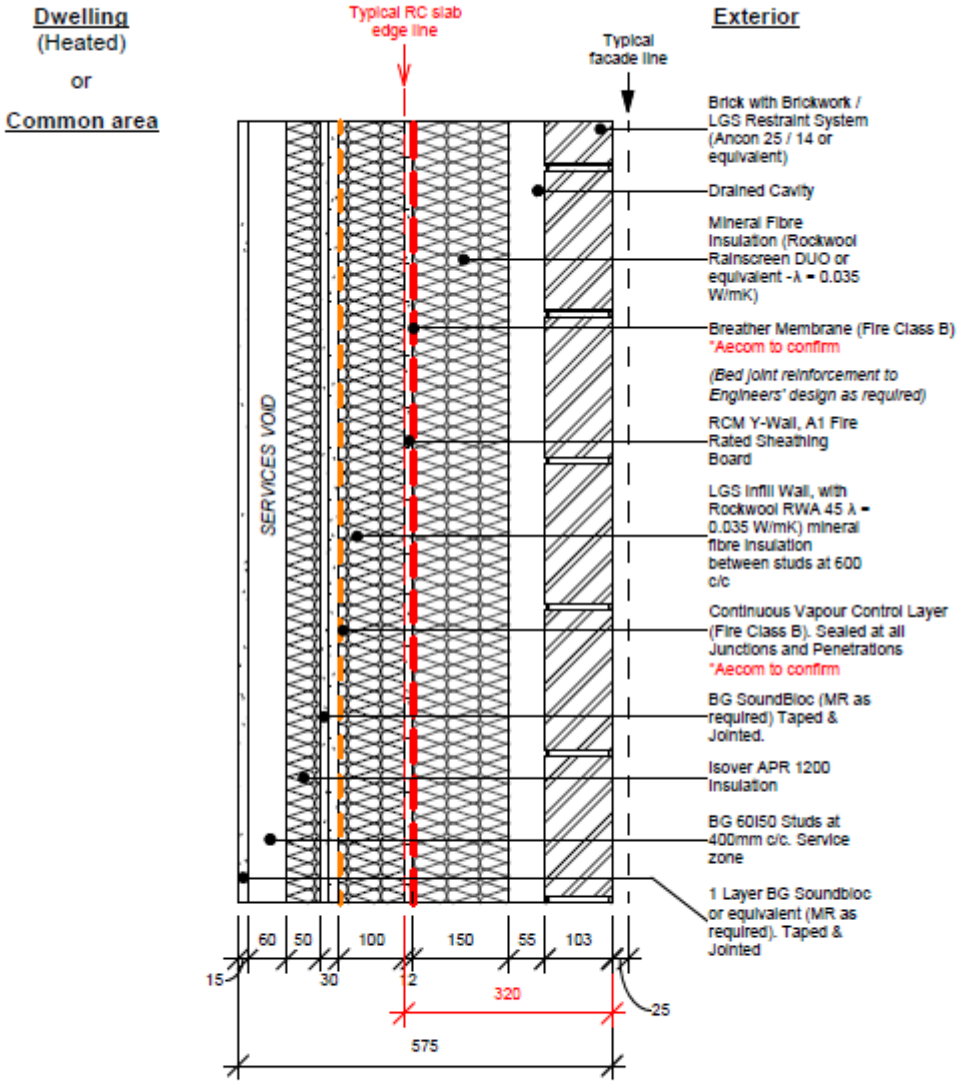
9. August 2023
Page 4/4

Kind of frame:	Hybrid frame
Flange width:	known not to exceed 50 mm
Stud spacing s [m]:	0.600
Stud depth d [m]:	0.100
Web thickness t [m]:	0.00180
Steel percentage [%]:	0.30

Weight factor p
Formula: $p = 0{,}8 * (R_T''/R_T') + 0{,}32 - 0{,}2 * (0{,}6/s) - 0{,}04 * (d/0{,}1) =$ **0.699**

$$R_T = p*R_T' + (1-p)*R_T'' = 9.48\ m^2K/W$$

EW03 - External Brick Wall (Soldier Recessed Panel)



EW-03A	(Light Brick 01)	*A2, A3, B2, B3, C2*
EW-03B	(Light Brick 02)	*A1, A5, B1, C1*
EW-03C	(Dark Brick 01)	*A4 Only*

U-Value

0.12 W/m²K

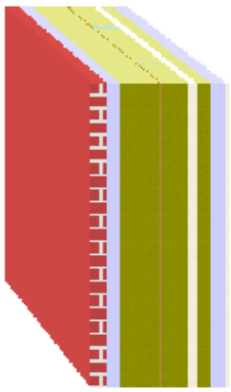
BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW03**

9. August 2023
Page 1/4

OUTSIDE INSIDE



This illustration of inhomogeneous layers is provided only to assist in visualising the arrangement.

Assignment: External wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	Generic Building Materials	Brick outer leaf & Mortar outer leaf (f = 0.000 / automatic disregard acc. BRE 443)	0.0650	0.770	D	0.0844
☑	2	Unventilated Airspace BR 443	Normal cavity - 50 mm, unventilated	0.0500	0.278	D	0.1799
☑	3	Rockwool Ltd	Rainscreen Duo-Slab (100-225mm)	0.1500	0.035	B	4.2857
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	4	BS EN 12524	Breather membrane	0.0001	0.170	D	0.0006
☑	5	PRP Build-up Library	RCM Y-Wall Board	0.0120	0.120	E	0.1000
☑	6	Light steel-frame	consisting of:	0.1000	ø 0.185		0.5408
	6a	PRP Build-up Library	Mineral wool batt - Variable thickness 0.035	99.70 %	0.035	E	-
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
	6b	BS EN 12524	Steel	00.30 %	50.000	D	-
☑	7	BS EN 12524	Polyethylene 0.15 mm	0.0002	0.170	D	0.0009
☑	8	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	9	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	10	PRP Build-up Library	Mineral wool batt - Variable thickness 0.039	0.0500	0.039	E	1.2821
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	11	BS EN ISO 6946	Unventilated airspace large: horizontal heat flow	0.0600	0.319	D	0.1879
		Airspace: mean temp.: 10°C / deltaT: <5 K / Epsilon1: 0.9 W/(m²K) / Epsilon2: 0.9 W/(m²K)					
☑	12	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
		Rsi					0.1300
				0.5322			

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW03**

9. August 2023
Page 2/4

$R_T = p*R_T' + (1-p)*R_T'' = 8.58$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Air gaps	BS EN ISO 6946 Annex F	~~0.0028~~
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.0000

$U = 1/R_T + \Sigma\Delta U = 0.12$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U = 0.12 W/(m²K) R_T= 8.58 m²K/W

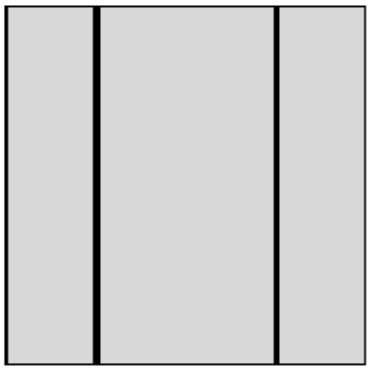
BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW03**

9. August 2023
Page 3/4

Steel percentage: 0.30 %



Light steel-frame sections
The portion is given in %.

A	consisting of material layers: 1, 2, 3, 4, 5, 6a, 7, 8, 9, 10, 11, 12	= 99.70%
B	consisting of material layers: 1, 2, 3, 4, 5, 6b, 7, 8, 9, 10, 11, 12	= 0.30%

Upper limit of the thermal transfer resistance R

U_A [W/(m²K)] = $\frac{1}{(\Sigma R_{iA}) + R_{si} + R_{se}}$ = $\frac{1}{9.16 + 0.13 + 0.04}$ = 0.11

U_B [W/(m²K)] = $\frac{1}{(\Sigma R_{iB}) + R_{si} + R_{se}}$ = $\frac{1}{6.30 + 0.13 + 0.04}$ = 0.15

$$R_T' = \frac{1}{A * U_A + B * U_B} = 9.32\ m^2K/W$$

Lower limit of the thermal transfer resistance R

R_{se} [m²K/W]		= 0.04
R_1'' [m²K/W] = d_1/λ_1 =	0.0650 / 0.770	= 0.08
R_2'' [m²K/W] = d_2/λ_2 =	0.0500 / 0.278	= 0.18
R_3'' [m²K/W] = d_3/λ_3 =	0.1500 / 0.035	= 4.29
R_4'' [m²K/W] = d_4/λ_4 =	0.0001 / 0.170	= 0.00
R_5'' [m²K/W] = d_5/λ_5 =	0.0120 / 0.120	= 0.10
R_6'' [m²K/W] = $d_6/(\lambda_{6a} * A + \lambda_{6b} * B)$ =	0.1000 /(0.035 * 99.70% + 50.000 * 0.30%)	= 0.54
R_7'' [m²K/W] = d_7/λ_7 =	0.0002 / 0.170	= 0.00
R_8'' [m²K/W] = d_8/λ_8 =	0.0150 / 0.250	= 0.06
R_9'' [m²K/W] = d_9/λ_9 =	0.0150 / 0.250	= 0.06
R_{10}'' [m²K/W] = d_{10}/λ_{10} =	0.0500 / 0.039	= 1.28
R_{11}'' [m²K/W] = d_{11}/λ_{11} =	0.0600 / 0.319	= 0.19
R_{12}'' [m²K/W] = d_{12}/λ_{12} =	0.0150 / 0.250	= 0.06
R_{si} [m²K/W]		= 0.13

$$R_T'' = \Sigma R_i'' + R_{si} + R_{se} = 7.01\ m^2K/W$$

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Ashley Road PH**
Component: **EW03**

9. August 2023
Page 4/4

Kind of frame:	Hybrid frame
Flange width:	known not to exceed 50 mm
Stud spacing s [m]:	0.600
Stud depth d [m]:	0.100
Web thickness t [m]:	0.00180
Steel percentage [%]:	0.30

Weight factor p
Formula: $p = 0{,}8 * (R_T''/R_T') + 0{,}32 - 0{,}2 * (0{,}6/s) - 0{,}04 * (d/0{,}1) =$ **0.682**

$$R_T = p*R_T' + (1-p)*R_T'' = 8.58\ m^2K/W$$

EW01 Sheer / Column

This wall type may contain areas of concrete frame through the build-up, bridging the SFS façade. An assumed similar build-up has been assessed to illustrate the impact of this to the overall U-value of an EW01 wall for a U-value of 0.15 W/m^{2}K. In the case a 20% proportion of column across a façade will increase the U-value from 0.11 W/m^{2}K to 0.12 W/m^{2}K.

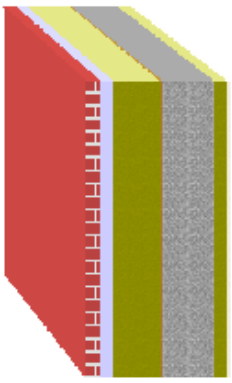
BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **own catalogue - Ashley Road PH**
Component: **EW01 Sheer**

10. August 2023
Page 1/1

OUTSIDE INSIDE



Assignment: External wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	Generic Building Materials	Brick outer leaf & Mortar outer leaf (f = 0.000 / automatic disregard acc. BRE 443)	0.0650	0.770	D	0.0844
☑	2	Unventilated Airspace BR 443	Normal cavity - 50 mm, unventilated	0.0500	0.278	D	0.1799
☑	3	Rockwool Ltd Air gaps	Rainscreen Duo-Slab (100-225mm) Level 1: dU" = 0.01 W/(m²K)	0.1800	0.035	B	5.1429
☑	4	BS EN 12524	Breather membrane	0.0001	0.170	D	0.0006
☑	5	PRP Build-up Library	RCM Y-Wall Board	0.0120	0.120	E	0.1000
☑	6	BS EN 12524	Concrete, Reinforced (with 1% of steel)	0.2000	2.300	D	0.0870
☑	7	BS EN 12524	Polyethylene 0.15 mm	0.0002	0.170	D	0.0009
☑	8	PRP Build-up Library Air gaps	Mineral wool batt - Variable thickness 0.039 Level 1: dU" = 0.01 W/(m²K)	0.0500	0.039	E	1.2821
☑	9	British Gypsum Limited Rsi	Gyproc SoundBloc	0.0150	0.250	D	0.0600 0.1300
				0.5723			

$R_T = R_{si} + \Sigma R_i + R_{se} = 7.11$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Air gaps	BS EN ISO 6946 Annex F	0.0056
		0.0056

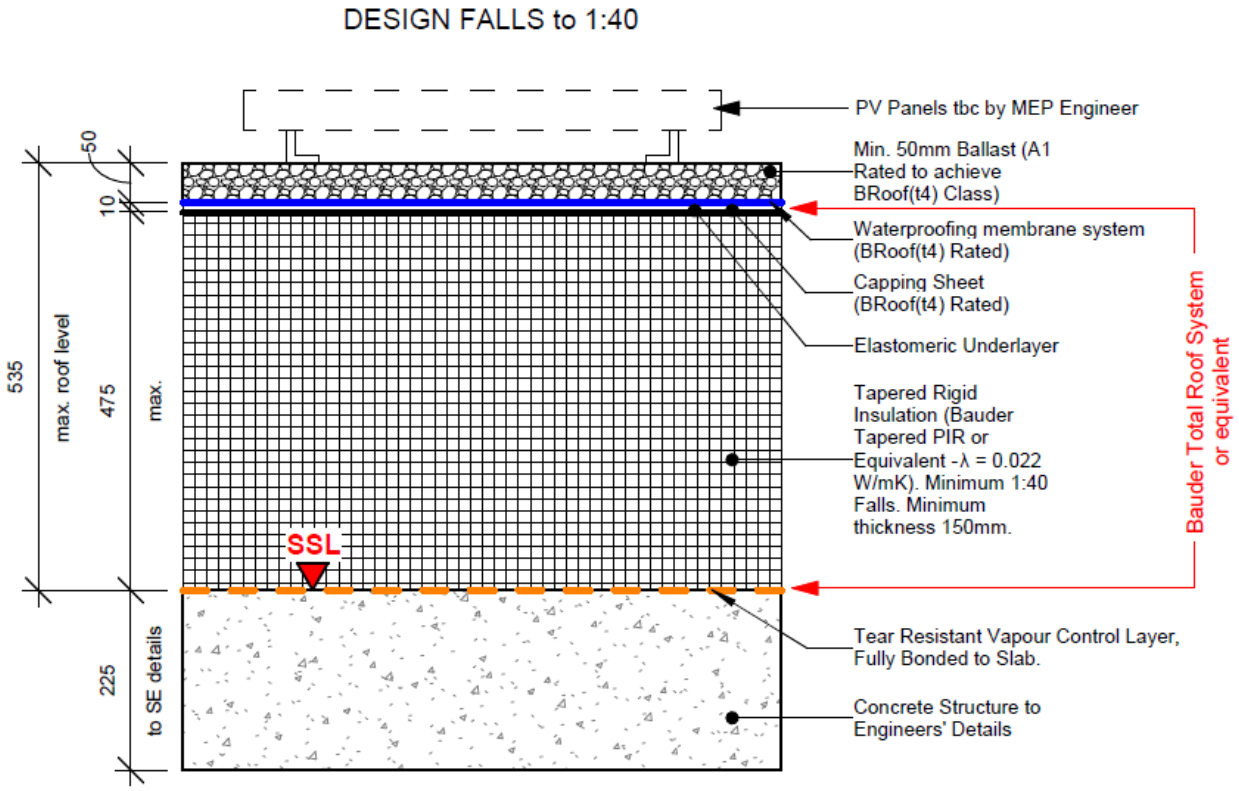
$U = 1/R_T + \Sigma\Delta U = 0.15$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U = 0.15 W/(m²K) R_T= 7.11 m²K/W

Calculated with BuildDesk 3.4.6

RF01 – Flat Roof



U-Value

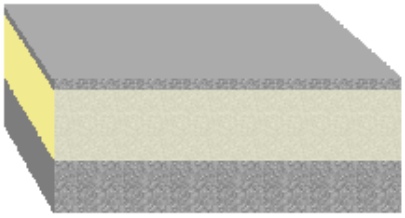
0.08 W/m²K

BuildDesk U 3.4 PRP

Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **own catalogue - Ashley Road PH**
Component: **RF10**

9. August 2023
Page 1/1

OUTSIDE



INSIDE

Assignment: Flat roof

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	Generic Building Materials	Ballast (chips or Paving slab) (1800 kg/m³)	0.0500	1.100	D	0.0455
☑	2	Topseal Systems Ltd	Topseal waterproofing roof system GRP - 1.75mm	0.0018	0.190	D	0.0092
☑	3	PRP Build-up Library	Polyurethane 0.022 Variable thickness	0.3000	0.022	E	13.6364
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	4	BS EN 12524	Concrete, Reinforced (with 1% of steel)	0.2250	2.300	D	0.0978
		Rsi					0.1000
				0.5768			

$R_T = R_{si} + \Sigma R_i + R_{se} = 13.93$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Air gaps	BS EN ISO 6946 Annex F	0.0096
		0.0096

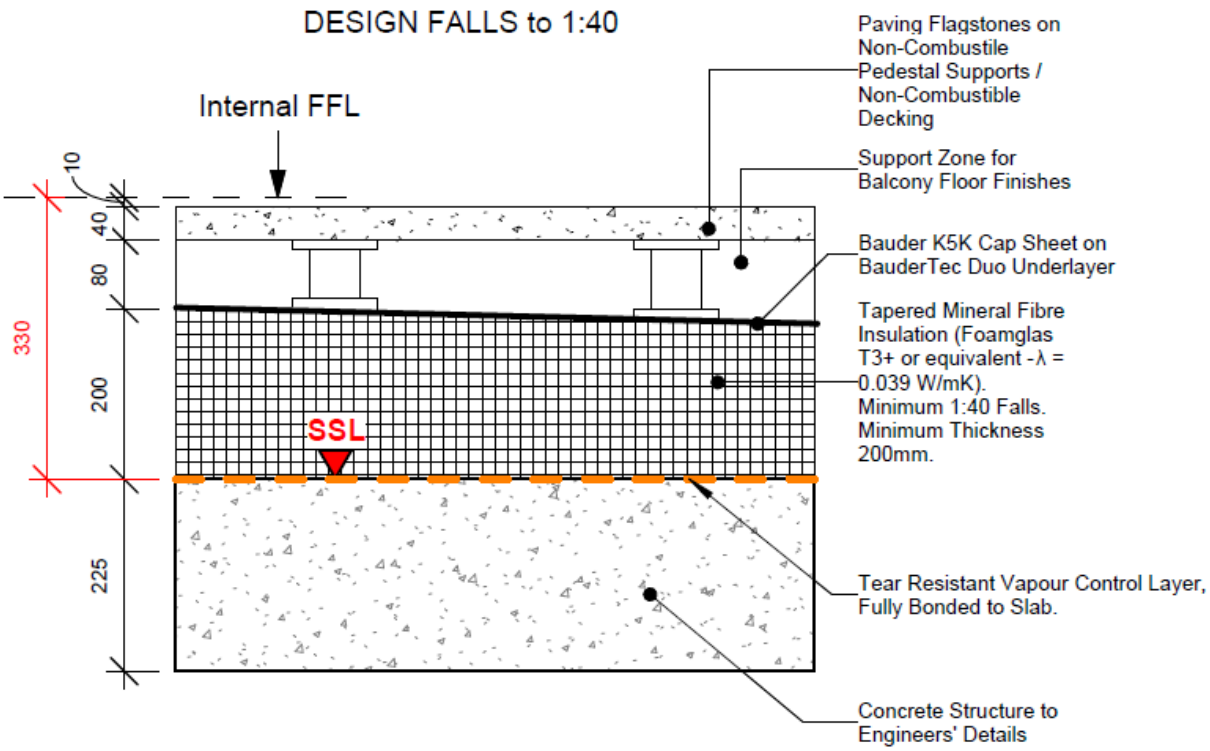
$U = 1/R_T + \Sigma\Delta U = 0.08$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
D .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U = 0.08 W/(m²K) R_T= 13.93 m²K/W

Calculated with BuildDesk 3.4.6

BF20 – Terrace Roof



U-Value

0.16 W/m²K

BuildDesk U 3.4

PRP

Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **own catalogue - Ashley Road PH**
Component: **BF20**

9. August 2023
Page 1/1

OUTSIDE

INSIDE

Assignment: Flat roof

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	Topseal Systems Ltd	Topseal waterproofing roof system GRP - 1.75mm	0.0018	0.190	D	0.0092
☑	2	PRP Build-up Library	Mineral wool batt - Variable thickness 0.039	0.2500	0.039	E	6.4103
		Air gaps	Level 1: dU'' = 0.01 W/(m²K)				
☑	3	BS EN 12524	Concrete, Reinforced (with 1% of steel)	0.2250	2.300	D	0.0978
		Rsi					0.1000
				0.4768			

$R_T = R_{si} + \Sigma R_i + R_{se} = 6.66$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Air gaps	BS EN ISO 6946 Annex F	0.0093
		0.0093

$U = 1/R_T + \Sigma\Delta U = 0.16$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U = 0.16 W/(m²K) R_T= 6.66 m²K/W

3 Thermal Bridging

In most junctions' design development is currently insufficient to fully calculate psi-values however, some assessment has been made based on similar experience.

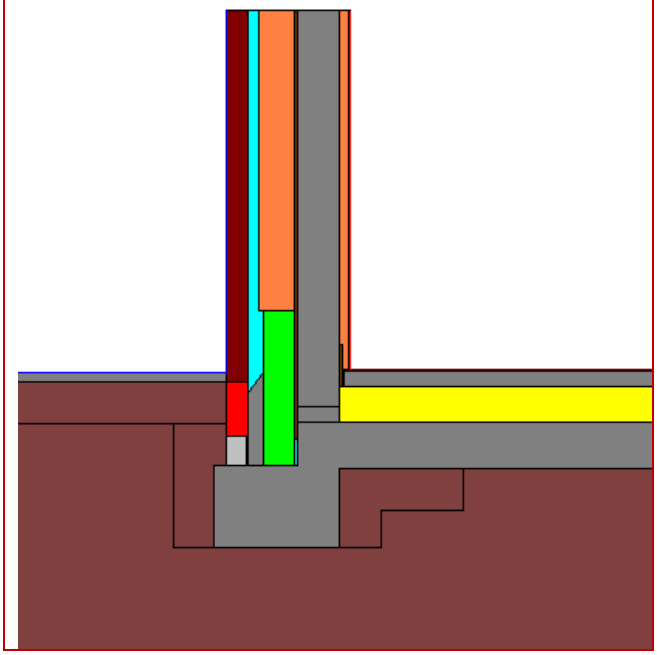
The most pertinent junction is where the ground floor slab meets the walls (external and party), since the insulation is penetrated by the concrete frame.

Results of the calculations for these junctions are tabulated below. The risk of surface condensation, can be seen to be below the threshold for temperature factor (fRsi) of 0.75 in all cases.

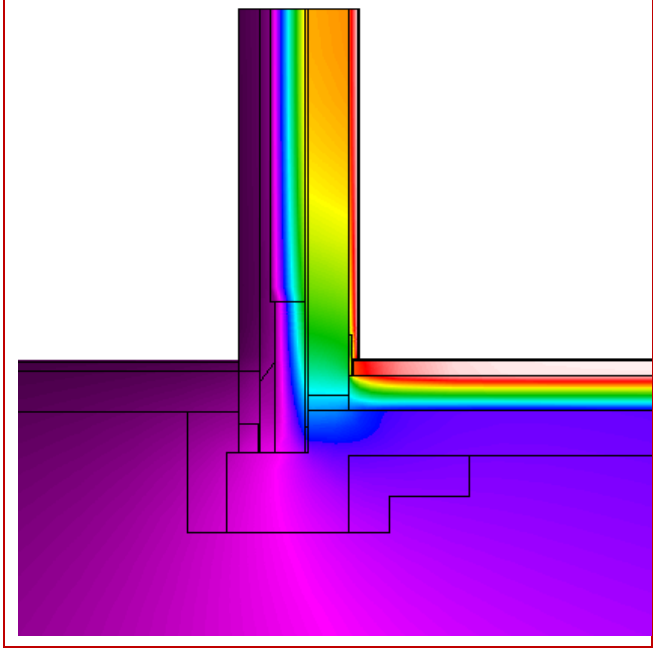
	External Wall	Party Wall	fRsi Ext	fRsi Party
Counterfactual	0.29	0.31	0.85	0.95
Thermal Break	0.16	0.12	0.91	0.98

Sheer wall or column to floor

Junction Detail



Temperature Analysis

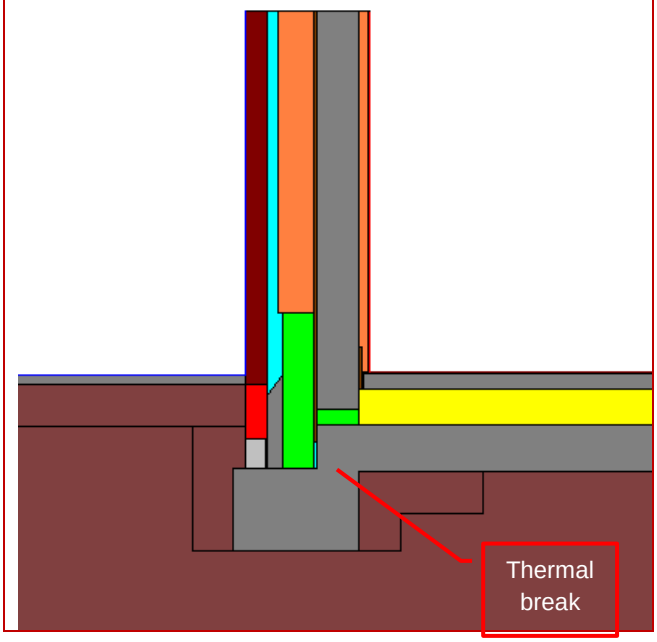


Linear Thermal Transmittance Ψ-Value
0.29 W/mK

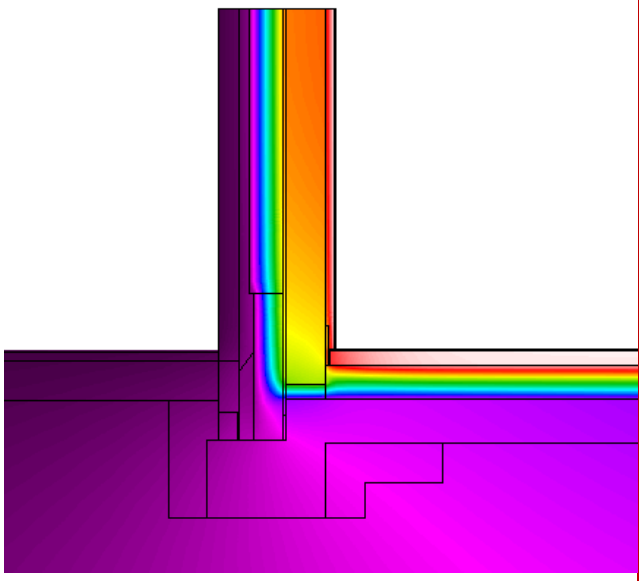
Temperature Factor (ƒRsi)
0.85

Sheer wall or column to floor - Thermal break

Junction Detail



Temperature Analysis

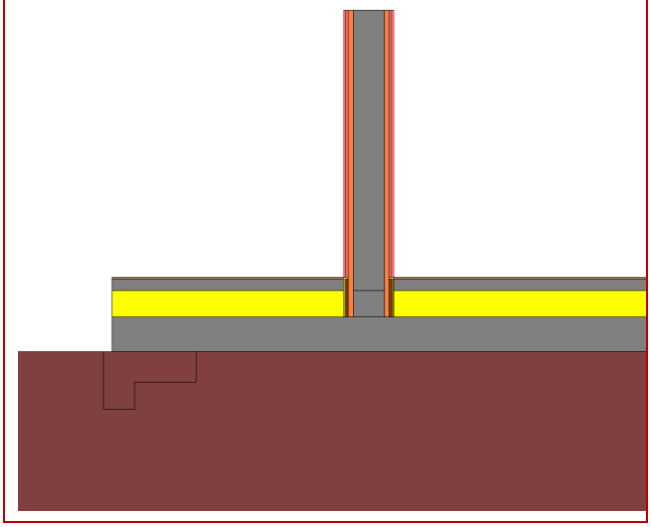


Linear Thermal Transmittance Ψ-Value
0.16 W/mK

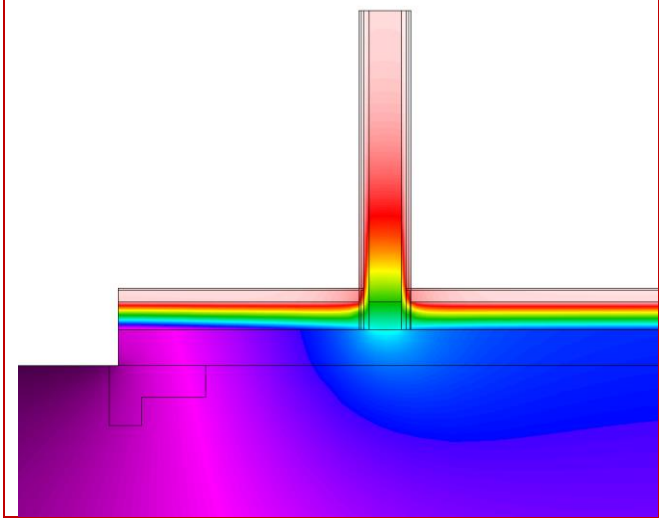
Temperature Factor (ƒRsi)
0.91

Party wall to floor

Junction Detail



Temperature Analysis

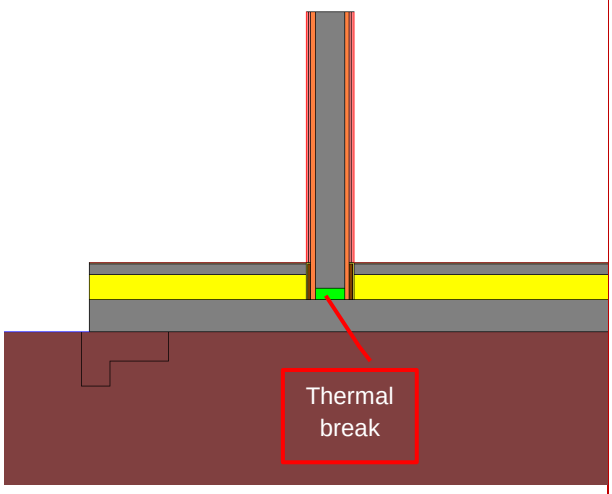


Linear Thermal Transmittance Ψ-Value
0.31 W/mK

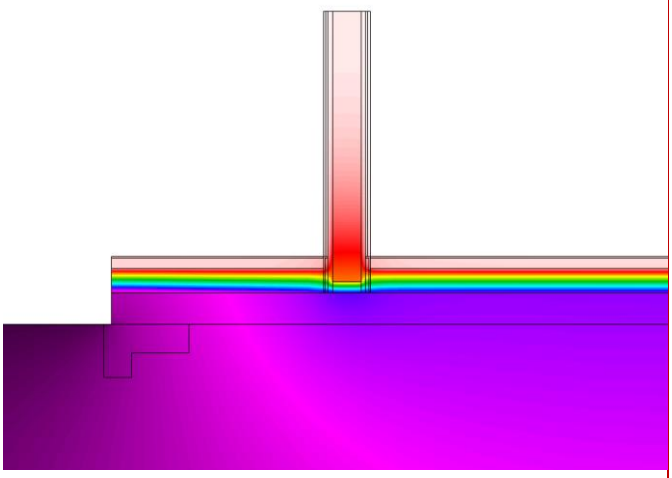
Temperature Factor (ƒRsi)
0.95

Party wall to floor - Thermal break

Junction Detail



Temperature Analysis



Linear Thermal Transmittance Ψ-Value
0.12 W/mK

Temperature Factor (ƒRsi)
0.98

Key

	Conductivity (W/mK)	Colour in diagrams
Floor Insulation	0.018	
XPS	0.033	
Cavity Insulation	0.035	
Drylining Insulation	0.036	
Acoustic edge insulation	0.040	
Thermal Break	0.090	
Y-Wall / Coreboard	0.120	
Floor Material	0.130	
Sealant	0.170	
Block Below Ground	0.240	
Plasterboard	0.250	
Brick	0.770	
Brick Below Ground	1.000	
Screed / Concrete	2.000	
Soil	2.000	
RC Concrete	2.100	

4 Analysis

U-values - With the exception of the terrace roof are in line with Passive House principals.

PHPP worksheet calculations for U-values use a simplified calculation methodology, co-ordination between these calculations and those above will be informed by advice from the Passive House assessor.

Thermal Bridging - On general principle, the RC (Reinforced Concrete) frame should be externally insulated with no gaps or bridges in the envelope. In practical terms this is relatively straightforward except at the ground level wall to floor junction, in particular where columns or sheer walls meet the slab would benefit from maximised use of thermal breaks.

The floor slab insulation has a very low thermal conductivity a typical high-performance floor insulation would be 0.020 or 0.021 W/mK.

Thermal Break thermal conductivity is based on a high-level assessment using 80mm Schöck Sconnex® type W thermal breaks at 2m centres with 0.031 W/mK insulation between connections.