CERTIFICATE CS/1004-2
U Value Competency Scheme

Project ID : 17 Branch Hill, London NW3 7NA
Structure element : Flat roof
Description : Flat roof - bonded
File reference : 1E13AD7503.FCF

Calculated 'U' value = 0.13W/m²K (Calculated in accordance with BS EN ISO 6946:2007)

Element Description	Element Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)	Mean T (K)	Delta T (K)
Outside surface resistance	-	-	0.040	-	-	80.73	0.05
BALLAST (gravel / paving slabs on support)	50.0	0.000	0.000	0.00	0.00	80.76	0.00
SINGLE PLY MEMBRANE (adhered)	1.5	0.160	0.009	-	138.00	80.76	0.01
KINGSPAN THERMAROOF TR27 LPC / FM	25.0	0.026	0.962	300.00	7.50	81.34	1.14
KINGSPAN OPTIM-R (VACUUM INSULATED PANELS) bridged with 20.0% FLEX (T) infill panels where runs of OPTIM-R panel do not accurately fit dimension of roof (40.0mm)	40.0	0.007	5.714	-	100.00	85.29	6.77
KINGSPAN OPTIM-R (VACUUM INSULATED PANELS) bridged with 20.0% FLEX (T) infill panels where runs of OPTIM-R panel do not accurately fit dimension of roof (25.0mm)	25.0	0.007	3.571	-	100.00	90.79	4.23
RECOMMENDED PROTECTION LAYER 3mm rubber crumb	3.0	0.000	0.000	0.00	0.00	92.91	0.00
VAPOUR CHECK BITUMINOUS	3.0	0.230	0.013	0.00	300.00	92.92	0.02
REINFORCED CONCRETE (2% STEEL)	225.0	2.500	0.090	659.00	148.28	92.98	0.11
Inside surface resistance	-	-	0.100	-	-	93.09	0.12

Detailed U-value Calculation Results

Construction includes 2 bridged layers.

Non-bridged layers

Outside surface resistance	0.040 m²K/W
SINGLE PLY MEMBRANE (adhered)	0.009 m²K/W
KINGSPAN THERMAROOF TR27 LPC / FM	0.962 m²K/W
VAPOUR CHECK BITUMINOUS	0.013 m²K/W
REINFORCED CONCRETE (2% STEEL)	0.090 m²K/W
Inside surface resistance	0.100 m²K/W
Resistance of non-bridged layers, R_{NB}=	1.214 m²K/W

Detailed U-value Calculation Results (continued)

Resistance of heat flow paths

$R_{P1} = R_{NB} + R_{L1} = 1.214 + 9.286 = 10.500$ m²K/W $F_{P1} = 80.000\%$

$R_{P2} = R_{NB} + R_{L2} = 1.214 + 2.500 = 3.714$ m²K/W $F_{P2} = 20.000\%$

Fraction of face area of materials

KINGSPAN OPTIM-R (VACUUM INSULATED PANELS) bridged with, $F_{L1} = 80.0\%$

FLEX (T) infill panels where runs of OPTIM-R panel do not accurately fit dimension of roof, $F_{B1} = 20.0\%$

Upper resistance limit

$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$

$R_{upper} = 1 / ((0.800/10.500) + (0.200/3.714)) = 7.690$ m²K/W

Lower resistance limit

$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$

$R_{lower} = 1.214 + 1 / ((0.8000/9.2857) + (0.2000/2.5000)) = 7.232$ m²K/W

Total resistance of roof

$R_T = (R_{upper} + R_{lower}) / 2 = (7.690 + 7.232) / 2 = 7.461$ m²K/W

(Correction for mechanical fasteners, Delta Uf = 0.0000W/m²K | Correction for air gaps, Delta Ug = 0.0000W/m²K)
(Alpha 0.0 m^{-1} | Fasteners per square metre 0.0000)
(Fasteners cross-sectional area 0.000 mm² | Thermal conductivity of fastener 0.00 W/mK)

(Delta Uf + Delta Ug) is less than 3% of (1 / Rt) so U = (1 / Rt) = 0.13W/m²K

For further information on the specified products, e.g. literature or specification clauses, please follows the links below:-

Thermaroof TR27 LPC / FM

Optim-R

Project ID : 17 Branch Hill, London NW3 7NA
Structure element : Flat roof
Description : Flat roof - bonded
File reference : 1E13AD7503.FCF
Humidity Class: 3 - Dwellings with low occupancy
Location: 5a England SE & Central South

Condensation calculations performed in accordance with BS5250: 2011

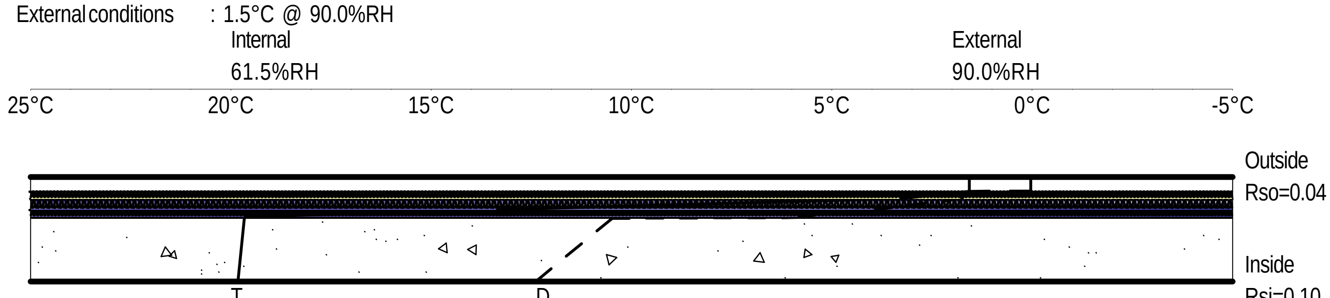
Condensation is occuring at the following layers interfaces:-
Interface 1 : SINGLE PLY MEMBRANE (adhered) / KINGSPAN THERMAROOF TR27 LPC / FM

Month	Int (°C)	Int (%RH)	Ext (°C)	Ext (%RH)	Interface 1	
					Gc (Kg/m²)	Ma (Kg/m²)
Jan	20.0	61.5	1.5	90.0	0.00	0.00
Feb	20.0	60.4	1.8	86.5	0.00	0.00
Mar	20.0	59.7	3.7	84.0	0.00	0.00
Apr	20.0	59.1	6.0	81.0	0.00	0.00
May	20.0	61.0	9.3	81.0	0.00	0.00
Jun	20.0	63.8	12.4	80.0	0.00	0.00
Jul	20.0	67.3	14.5	80.5	0.00	0.00
Aug	20.0	68.0	14.1	82.5	0.00	0.00
Sep	20.0	66.2	11.8	85.5	0.00	0.00
Oct	20.0	63.9	8.7	88.0	0.00	0.00
Nov	20.0	61.8	4.4	89.5	0.00	0.00
Dec	20.0	61.7	2.5	90.5	0.00	0.00

Gc = Monthly moisture accumulation per area at an interface
Ma = Accumulated moisture content per area at an interface

Peak accumulated moisture content per area at interface (Ma) = 0.00 Kg/m²
Annual moisture accumulation (Ma) = 0.00 Kg/m²
Peak moisture build-up month : January

Internal conditions : 20.0°C @ 61.5%RH
External conditions : 1.5°C @ 90.0%RH



Scale 1 : 27

Structure Description		External Wall U Value Calculation			
A/A	Material	Material Thickenss **d** (m)	Materials Thermal Conductivity **λ** (W/mK)	Materials Thermal Resistance **R** (m^2K/W)	Typical Drawing Detail
1	EWI Topcoat	0.001	0.700	0.00143	N/A
2	StarContactWhite	0.005	0.800	0.006	
3	ResolutionTherm	0.100	0.022	4.545	
4	StarContactWhite	0.005	0.800	0.006	
5		0.000	1.000	0.000	
6	Ytong Block	0.215	0.110	1.955	
7	Air Gap (If Exists)	0.000		0.000	
8	0	0.000	1.000	0.000	
9	0	0.000	0.840	0.000	
10	Plasterboard	0.012	0.190	0.063	
11					
12					
13			1.000	0.000	
14			1.000	0.000	
15			1.000	0.000	
Thermal Flow		Horizontal		**U Value**	
Rsi (m^2K/W)		0.130		**(W/m^2K)**	
Rse (m^2K/W)		0.040		**0.1482**	
Notes		Only the yellow boxes need to be filled in. You only need to know the thickness and the λ value of the materials. If a material does not exist in your case you leave the d value as zero (0) and the λ value as one (1). You can also replace a material of the list by just renaming ones. If there is no Air Gap then we replace the R of Air with zero(0).			

LIBRARY	
Material	**λ (W/Mk)**
Mortars	
OpenContact	0.8
StarContact	0.8
MultiContact 55 W	0.93
TopCoats	
SilikonTop	0.7
NanoporTop	0.5
GranoporTop	0.7
StyleTop	0.7
SilikatTop	0.7
Insulation Boards	
OpenTherm Reflectair	0.031
Star Therm EPS Grey	0.031
Pro Therm EPS White	0.038
Star Therm Mineral	0.038
Resolution Therm	0.022
Star Therm Nature	0.045
Other	
Bricks, Outer	0.84
Block, Dense	0.034
Concrete, Outer	1.4
GypsumBoard	0.19
CementBoard	0.79

R denoted by the thermal resistance of a building material, and the units are measured in (m2.k / w)
For each building material that participates in a cross section we calculate the thermal resistance R separately
This is given by the quotient d/λ (where d is the thickness of the material and k the thermal conductivity coefficient
d is measured in meters (m) and lamda (λ) is measured in (w/m.k)
So by calculating all individual R of the materials in the order shall contribute we find the total R-sectional
according to th formula **Rges= Rsi+R1+R2+…Rn+Rsa**
Rsi=1/α1 is called Internal Thermal Transfer Resistance and is measured in (m2.k/w)
Accordingly Rsα=1/α2 is called External Thermal Transfer Resistance and measured in (m2.k/w)
α1 and α2 are Thermal Transfer factors and measured in (w/m2.k), they indicate the Thermal Transfer
on the surface of the building materials.
Finaly, U value is calculated by the formula U=1/Rges σε (w/m2.k) and indicates the flow of energy per unit of time

Branch Hill U Values 14-1-17

Position	Quantity	Uf	Ug	psi'	Area	W/m²K
01	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	0.746 m²	1.31 W/m²K
02	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	0.746 m²	1.31 W/m²K
03	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.677 m²	1.35 W/m²K
04	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.677 m²	1.35 W/m²K
05	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.765 m²	1.25 W/m²K
06	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.765 m²	1.25 W/m²K
07	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	1.930 m²	1.09 W/m²K
08	1 Pcs	3.04 W/m²K	1.10 W/m²K	0.036 W/mK	6.714 m²	1.42 W/m²K
10	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	0.746 m²	1.31 W/m²K
11	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	2.189 m²	1.05 W/m²K
12	1 Pcs	3.08 W/m²K	1.00 W/m²K	0.036 W/mK	4.557 m²	1.42 W/m²K
13	1 Pcs	3.08 W/m²K	1.00 W/m²K	0.036 W/mK	4.557 m²	1.42 W/m²K
14	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	2.189 m²	1.05 W/m²K
15	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	0.746 m²	1.31 W/m²K
16	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	1.052 m²	1.28 W/m²K
17	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	3.513 m²	1.25 W/m²K
18	1 Pcs	1.46 W/m²K	1.00 W/m²K	0.035 W/mK	9.720 m²	1.21 W/m²K
19	1 Pcs	1.18 W/m²K	1.00 W/m²K	0.055 W/mK	29.520 m²	1.23 W/m²K
20	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	1.296 m²	1.13 W/m²K
21	1 Pcs	2.89 W/m²K	0.50 W/m²K	0.031 W/mK	0.935 m²	1.33 W/m²K
22	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.860 m²	1.25 W/m²K
23	1 Pcs	2.91 W/m²K	0.50 W/m²K	0.031 W/mK	0.860 m²	1.25 W/m²K
24	1 Pcs	2.90 W/m²K	0.50 W/m²K	0.031 W/mK	2.132 m²	1.07 W/m²K
25	1 Pcs	3.05 W/m²K	1.00 W/m²K	0.036 W/mK	7.563 m²	1.32 W/m²K
27	1 Pcs	5.50 W/m²K	1.00 W/m²K	0.036 W/mK	2.498 m²	2.82 W/m²K
28	1 Pcs	5.50 W/m²K	1.00 W/m²K	0.036 W/mK	2.498 m²	2.82 W/m²K
29	1 Pcs	3.08 W/m²K	1.00 W/m²K	0.036 W/mK	4.251 m²	1.43 W/m²K
30	1 Pcs	3.33 W/m²K	1.00 W/m²K	0.036 W/mK	9.406 m²	1.37 W/m²K
31	1 Pcs	3.33 W/m²K	1.00 W/m²K	0.036 W/mK	9.299 m²	1.37 W/m²K
33	1 Pcs	3.08 W/m²K	1.00 W/m²K	0.036 W/mK	4.482 m²	1.43 W/m²K
34	1 Pcs	1.69 W/m²K	1.00 W/m²K	0.042 W/mK	2.287 m²	1.39 W/m²K
35	1 Pcs	3.24 W/m²K	1.00 W/m²K	0.042 W/mK	8.276 m²	1.36 W/m²K
36	1 Pcs	3.32 W/m²K	0.50 W/m²K	0.031 W/mK	4.919 m²	1.25 W/m²K
37	1 Pcs	3.30 W/m²K	1.00 W/m²K	0.036 W/mK	7.361 m²	1.40 W/m²K
38	1 Pcs	2.90 W/m²K	1.00 W/m²K	0.042 W/mK	4.919 m²	1.38 W/m²K
Total Amount	**35 Pcs**	**3.01 W/m²K**	**0.73 W/m²K**	**0.034 W/mK**	**145.651 m²**	**1.36 W/m²K**

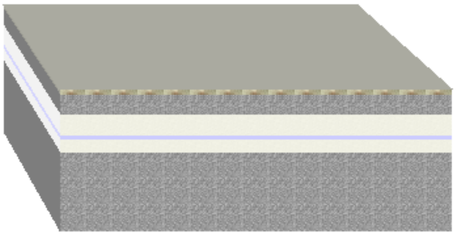
The thermal transmission coefficients were calculated for insertion elements and windows (Uw) according to EN ISO 10077-1:2006 and for curtain walls (Ucw) in compliance with EN ISO 12631:2012. Notice: Uw Kernel V1.0

Remarks:

This calculation is only for information.

Documentation of the component — 30. June 2016
Thermal transmittance (U-value) — Page 1/2
Source: **own catalogue - 779 Branch Hill**
Component: **F01**

INSIDE



OUTSIDE

Assignment: Ground floor

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rsi					0.1700
☑	1	BS EN 12524	Limestone, extra hard & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.0200	2.300	D	0.0087
☑	2	Generic Building Materials	Concrete screed	0.0100	1.150	D	0.0087
☑	3	Generic Building Materials	Concrete screed	0.0650	1.150	D	0.0565
☑	4	Kingspan	Kooltherm K3 Floorboard	0.0800	0.020	E	4.0000
☑	5	BS EN ISO 6946	Unventilated air layer: 15 mm, downwards heat flow	0.0150	0.088	D	0.1705
☑	6	Kingspan	Styrozone H350R	0.0500	0.029	E	1.7241
☑	7	BS EN 12524	Concrete, Reinforced (with 2% of steel)	0.3000	2.500	D	0.1200
		Rse					0.0000
				0.5400			

U = 0.13 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
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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_{max} = 0.25 W/(m²K) U = 0.13 W/(m²K) R_T= 6.26 m²K/W

Source of Umax value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - 779 Branch Hill**
Component: **F01**

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

Input data:

λ	Thermal conductivity [W/(mK)]	2.00	(Thermal conductivity of the ground)
A	Floor area [m²]	200.00	
P	Exposed perimeter [m]	75.50	
R_f	Thermal resistance [m²K/W]	6.089	(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:

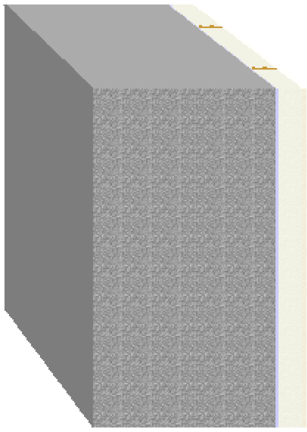
B'	Characteristic dimension [m]	5.298
d_t	Equivalent thickness [m]	12.897
U_0	Thermal transmittance [W/(m²K)]	0.131
$\Delta\Psi$	Correction term [W/(mK)]	0.000

U = 0.13 W/(m²K) **Thermal Transmittance**

L_S = 26.1 W/K **Steady-state thermal coupling coefficient**

Documentation of the component 30. June 2016
Thermal transmittance (U-value)
Source: **own catalogue - 779 Branch Hill**
Component: **W3**

OUTSIDE INSIDE



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

Assignment: Basement wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0000
☑	1	BS EN 12524	Concrete, High density	0.3500	2.000	D	0.1750
☑	2	BS EN 12524	Concrete, Reinforced (with 2% of steel)	0.2750	2.500	D	0.1100
☑	3	BS EN ISO 6946	Unventilated air layer: 10 mm, horiz. heat flow	0.0100	0.067	D	0.1493
☑	4	Inhomogeneous material layer	consisting of:	0.0800	ø 0.020		3.9287
	4a	Kingspan	Kooltherm K12 Framing	99.67 %	0.020	E	-
	4b	BS EN 12524	Softwood Timber [500 kg/m³]	00.33 %	0.130	D	-
☑	5	Fermacell	Fermacell 15mm Gypsum Fibreboard	0.0150	0.300	D	0.0500
		Rsi					0.1300
				0.7300			

U = 0.16 W/(m²K) Explanation see next page

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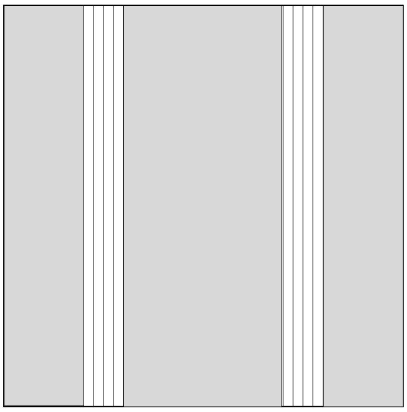
U_{max} = 0.30 W/(m²K) U = 0.16 W/(m²K) R_T= 4.56 m²K/W

Source of Umax value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - 779 Branch Hill**
Component: **W3**

Draft of the component (portion in %):



The inhomogeneous layer consists of two zones (A, B).
The portion is given in %.

A	24.92 + 49.84 + 24.92 consisting of material layers: 1, 2, 3, 4a, 5	= 99.67%
B	0.17 + 0.17 consisting of material layers: 1, 2, 3, 4b, 5	= 0.33%

Upper limit of the thermal transfer resistance R

U_A [W/(m²K)] = $\frac{1}{(\Sigma R_{i,A}) + R_{si} + R_{se}} = \frac{1}{4.48 + 0.13 + 0}$ = 0.22

U_B [W/(m²K)] = $\frac{1}{(\Sigma R_{i,B}) + R_{si} + R_{se}} = \frac{1}{1.10 + 0.13 + 0}$ = 0.81

$$R_T' = \frac{1}{A * U_A + B * U_B} = 4.57 \text{ m}^2\text{K/W}$$

Lower limit of the thermal transfer resistance R

R_{se} [m²K/W]		= 0
R_1'' [m²K/W] = d_1 / λ_1 =	0.3500 / 2.000	= 0.18
R_2'' [m²K/W] = d_2 / λ_2 =	0.2750 / 2.500	= 0.11
R_3'' [m²K/W] = d_3 / λ_3 =	0.0100 / 0.067	= 0.15
R_4'' [m²K/W] = $d_4 / (\lambda_{4a} * A + \lambda_{4b} * B)$ =	0.0800 /(0.020 * 99.67% + 0.130 * 0.33%)	= 3.93
R_5'' [m²K/W] = d_5 / λ_5 =	0.0150 / 0.300	= 0.05
R_{si} [m²K/W]		= 0.13

$$R_T'' = \Sigma R_i'' + R_{si} + R_{se} = 4.54 \text{ m}^2\text{K/W}$$

Source: **own catalogue - 779 Branch Hill**
Component: **W3**

Wall of a heated basement according to BS EN ISO 13370

Input data:

λ	Thermal conductivity [W/(mK)]	1.50	(Thermal conductivity of the ground)
P	Exposed perimeter [m]	28.50	
R_w	Thermal resistance [m²K/W]	4.428	(see construction layer list)
w	Thickness of walls [m]	0.730	(see construction layer list)
R_f	Thermal resistance [m²K/W]	2.000	(thermal resistance of basement floor)
z	Basement of depth [m]	2.00	

Intermediate results:

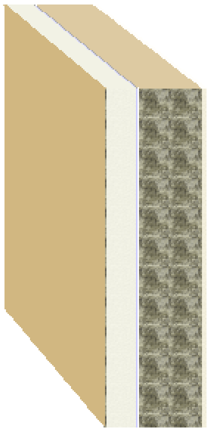
d_t	Equivalent thickness [m]	4.045
d_w	Equivalent thickness [m]	6.897
U_{bw}	Thermal transmittance [W/(m²K)]	0.162

U = 0.16 W/(m²K) **Thermal Transmittance**

L_S = 9.2 W/K **Steady-state thermal coupling coefficient**

Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **own catalogue - 779 Branch Hill**
Component: **W2**

OUTSIDE INSIDE



Assignment: External wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0400
☑	1	BS EN 12524	Render, cement and sand	0.0100	1.000	D	0.0100
☑	2	Kingspan	Kooltherm K5 External Wall Board	0.1000	0.020	E	5.0000
		Fixings	Vertical Twist stainless steel No./m²:	2.5/m²	17.000	D	-
		Fixings	equivalent diameter: 0.0101 m / alpha: 0.800				
		Air gaps	Level 1: dU'' = 0.01 W/(m²K)				
☑	3	BS EN ISO 6946	Unventilated air layer: 7 mm, horizontal heat flow	0.0070	0.054	D	0.1296
☑	4	Generic Building Materials	Plaster dabs -Gypsum [1200 kg/m³]	0.0015	0.430	D	0.0035
☑	5	Xella	YTONG 3.6 Standard Block & Mortar outer leaf (f = 0.015)	0.2150	0.122	E	1.7594
☑	6	Generic Building Materials	Plaster dabs -Gypsum [1200 kg/m³]	0.0015	0.430	D	0.0035
☑	7	Generic Building Materials	Standard wallboard plasterboard	0.0150	0.210	D	0.0714
		Rsi					0.1300
				0.3500			

$R_T = R_{si} + \Sigma R_i + R_{se} = 7.15$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Mechanical fasteners	BS EN ISO 6946 Annex D	0.019
Air gaps	BS EN ISO 6946 Annex D	0.005
		0.024

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

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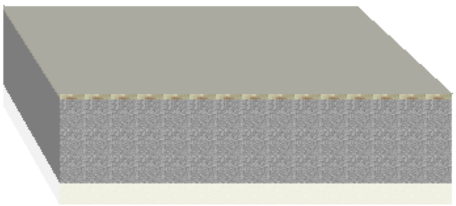
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information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

U_{max} = 0.30 W/(m²K) U = 0.16 W/(m²K) R_T= 7.15 m²K/W

Source of Umax value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - 779 Branch Hill**
Component: **F02**

INSIDE



OUTSIDE

Assignment: Ground floor

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rsi					0.1700
[x]	1	BS EN 12524	Limestone, semi-hard & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.0200	1.400	D	0.0143
[x]	2	Generic Building Materials	Concrete screed	0.0200	1.150	D	0.0174
[x]	3	BS EN 12524	Concrete, Reinforced (with 2% of steel)	0.3000	2.500	D	0.1200
[x]	4	Kingspan	Styrozone H350R	0.0800	0.029	E	2.7586
		Rse					0.0000
				0.4200			

U = 0.25 W/(m²K) Explanation see next page

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U_{max} = 0.25 W/(m²K) U = 0.25 W/(m²K) R_T= 3.08 m²K/W

Source of Umax value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

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]	42.00	
P	Exposed perimeter [m]	34.00	
R_f	Thermal resistance [m²K/W]	2.910	(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:

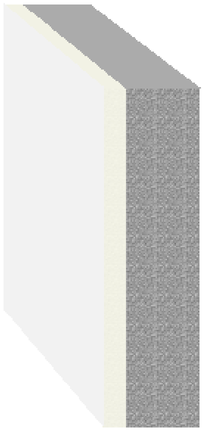
B'	Characteristic dimension [m]	2.471
d_t	Equivalent thickness [m]	4.980
U_0	Thermal transmittance [W/(m²K)]	0.246
ΔΨ	Correction term [W/(mK)]	0.000

U = 0.25 W/(m²K) **Thermal Transmittance**

L_S = 10.3 W/K **Steady-state thermal coupling coefficient**

Documentation of the component
Thermal transmittance (U-value)
Source: **own catalogue - 779 Branch Hill**
Component: **W1**

OUTSIDE INSIDE



Assignment: Basement wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.0000
☑	1	Kingspan	Styrozone H350R	0.0800	0.029	E	2.7586
☑	2	BS EN 12524	Concrete, Reinforced (with 2% of steel)	0.2500	2.500	D	0.1000
		Rsi					0.1300
				0.3300			

U = 0.23 W/(m²K) Explanation see next page

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U_{max} = 0.30 W/(m²K) U = 0.23 W/(m²K) R_T= 2.99 m²K/W

Source of Umax value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

Wall of a heated basement according to BS EN ISO 13370

Input data:

λ	Thermal conductivity [W/(mK)]	1.50	(Thermal conductivity of the ground)
P	Exposed perimeter [m]	34.00	
R_w	Thermal resistance [m²K/W]	2.859	(see construction layer list)
w	Thickness of walls [m]	0.330	(see construction layer list)
R_f	Thermal resistance [m²K/W]	2.000	(thermal resistance of basement floor)
z	Basement of depth [m]	2.00	

Intermediate results:

d_t	Equivalent thickness [m]	3.645
d_w	Equivalent thickness [m]	4.543
U_{bw}	Thermal transmittance [W/(m²K)]	0.230

U = 0.23 W/(m²K) **Thermal Transmittance**

L_S = 15.7 W/K **Steady-state thermal coupling coefficient**