

Documentation of the component
Thermal transmittance (U-value) according to Digest 465

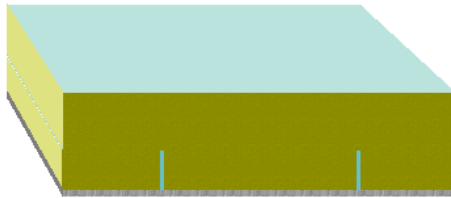
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Source: **own catalogue - Flat roofs**

Component: **NCAF12541 227Shepherds Bush Rd Flat Rf Dormer 01V2**

OUTSIDE

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



INSIDE

Assignment: Roof with a pitch $\geq 70^\circ$

	Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]	
	Rse					0.0400	
	1	Own catalogue	VM ZINC Panel (Standing Seam) 600mm CC	0.0007	160.000		0.0000
	2	Own catalogue	Breather membrane for VM Zinc	0.0002	0.100		0.0020
	3	Own catalogue	Hardrock Multi-Fix (DD)	0.2200	0.039		5.6410
	Fixings	Generic Thermally Broken Fasteners No./m²:	0.8/m²	0.500		-	
	Fixings	equivalent diameter: 0.01 m					
	Air gaps	Level 0: dU" = 0.00 W/(m²K)					
	4	BS EN 12524	Steel	0.0007	50.000		0.0000
	5	Light steel-frame	consisting of:	0.1500	ø 0.184		0.8157
	5a	Own catalogue	Steel Frame Slab	99.70 %	0.034		-
	Air gaps	Level 0: dU" = 0.00 W/(m²K)					
	5b	BS EN 12524	Steel	00.30 %	50.000		-
	6	BS EN 12524	Polyethylene 0.15 mm	0.0002	0.170		0.0009
	7	BS EN 12524	Gypsum plasterboard	0.0125	0.250		0.0500
	8	BS EN 12524	Gypsum plasterboard	0.0125	0.250		0.0500
	Rsi					0.1300	
			0.3968				



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$$R_T = p \cdot R_{T'} + (1-p) \cdot R_{T''} = 8.81 \text{ m}^2\text{K/W}$$

Correction to U-value for	according to	delta U [W/(m ² K)]
Mechanical fasteners	Digest 465	0.0001
Air gaps	BS EN ISO 6946 Annex F	0.0000
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.0000

$$U = 1/R_T + \Sigma \Delta U = 0.11 \text{ W/(m}^2\text{K)}$$

- 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.

$$U = 0.11 \text{ W/(m}^2\text{K)} \quad R_T = 8.81 \text{ m}^2\text{K/W}$$

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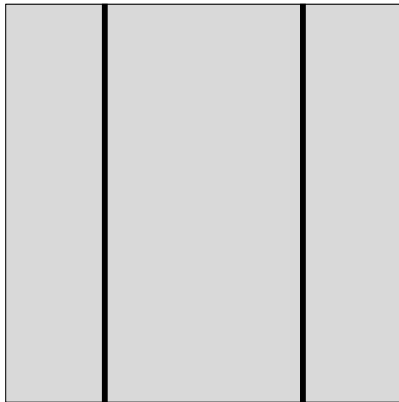
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Steel percentage: 0.30 %

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



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

Upper limit of the thermal transfer resistance R

$$U_A [W/(m^2K)] = \frac{1}{(\sum R_{i,A}) + R_{si} + R_{se}} = \frac{1}{10.16 + 0.13 + 0.04} = 0.10$$

$$U_B [W/(m^2K)] = \frac{1}{(\sum R_{i,B}) + R_{si} + R_{se}} = \frac{1}{5.75 + 0.13 + 0.04} = 0.17$$

$$R_T' = \frac{1}{A * U_A + B * U_B} = 10.30 \text{ m}^2\text{K/W}$$

Lower limit of the thermal transfer resistance R

$R_{se} [m^2K/W]$		= 0.04
$R_1'' [m^2K/W] = d_1 / \lambda_1 =$	0.0007 / 160.000	= 0.00
$R_2'' [m^2K/W] = d_2 / \lambda_2 =$	0.0002 / 0.100	= 0.00
$R_3'' [m^2K/W] = d_3 / \lambda_3 =$	0.2200 / 0.039	= 5.64
$R_4'' [m^2K/W] = d_4 / \lambda_4 =$	0.0007 / 50.000	= 0.00
$R_5'' [m^2K/W] = d_5 / (\lambda_{5a} * A + \lambda_{5b} * B) =$	0.1500 / (0.034 * 99.70% + 50.000 * 0.30%)	= 0.82
$R_6'' [m^2K/W] = d_6 / \lambda_6 =$	0.0002 / 0.170	= 0.00
$R_7'' [m^2K/W] = d_7 / \lambda_7 =$	0.0125 / 0.250	= 0.05
$R_8'' [m^2K/W] = d_8 / \lambda_8 =$	0.0125 / 0.250	= 0.05
$R_{si} [m^2K/W]$		= 0.13

$$R_T'' = \sum R_i'' + R_{si} + R_{se} = 6.73 \text{ m}^2\text{K/W}$$

Kind of frame:	Hybrid frame
Flange width:	known not to exceed 50 mm
Stud spacing s [m]:	0.600
Stud depth d [m]:	0.150
Web thickness t [m]:	0.00180
Steel percentage [%]:	0.30

Weight factor p

Formula: $p = 0,8 * (R_T''/R_T') + 0,32 - 0,2 * (0,6/s) - 0,04 * (d/0,1) = 0.583$

$$R_T = p * R_T' + (1-p) * R_T'' = 8.81 \text{ m}^2\text{K/W}$$

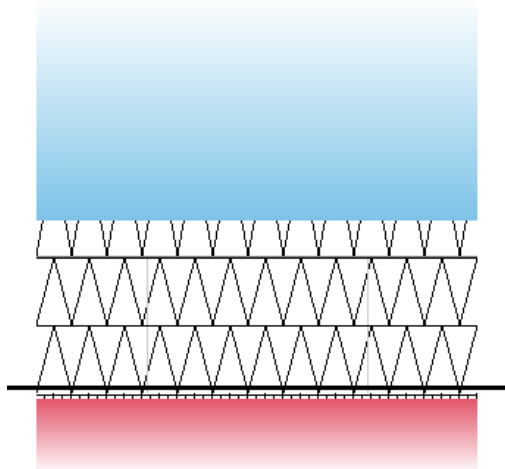
Documentation of the component
Heat capacity

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Source: own catalogue - Flat roofs

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OUTSIDE



INSIDE

The list of materials shown below may differ from those in the U-value calculation printout. Only material layers which are used in the heat capacity calculation are listed.

Single material layers shown in the U-value calculation printout may be separated to meet the exclusion criteria:

- A .. The total thickness of the layers exceed 0.1 m.
- B .. The mid point in the construction is reached.

For insulation layers the following criteria applies:

- C .. An insulating layer is reached (defined as $\lambda \leq 0.08 \text{ W/(mK)}$).

Name	Thickness [m]	lambda [W/(mK)]	Q	Thermal capacity [kJ/(kgK)]	Q	Density [kg/m³]	Q	Thermal mass kJ/(m²K)	Criteria Exclusion
End of calculation - Cold									
1 VM ZINC Panel (Standing Seam) 600mm CC	0.0007	160.000	E	0.88	E	2800.0	E	1.7	A, -, C
2 Breather membrane for VM Zinc	0.0002	0.100	E	1.70	E	322.0	E	0.1	A, -, C
3 Hardrock Multi-Fix (DD)	0.2200	0.039	E	1.03	E	160.0	E	0.0	A, -, C
4 Steel	0.0007	50.000	D	0.45	D	7800.0	D	2.5	A, -, C
5 Light steel-frame consisting of:	0.0752							0.8	A, -, C
5a Steel Frame Slab	99.70%	0.034	E	1.03	E	35.0	E	2.7	A, -, C
5b Steel	00.30%	50.000	D	0.45	D	7800.0	D	0.8	A, -, C
5 Light steel-frame consisting of:	0.0749							0.8	-, -, C
5a Steel Frame Slab	99.70%	0.034	E	1.03	E	35.0	E	2.7	-, -, C
5b Steel	00.30%	50.000	D	0.45	D	7800.0	D	0.8	-, -, -
6 Polyethylene 0.15 mm	0.0002	0.170	D	2.20	D	920.0	D	0.3	-, -, -
7 Gypsum plasterboard	0.0125	0.250	D	1.00	D	900.0	D	11.3	-, -, -
8 Gypsum plasterboard	0.0125	0.250	D	1.00	D	900.0	D	11.3	-, -, -
Start of calculation - Warm									
	0.3968							22.8	

Heat capacity = 22.8 kJ/(m²K)

The following exclusion criteria apply:

- A .. The total thickness of the layers exceed 0.1 m.
- C .. An insulating layer is reached (defined as $\lambda \leq 0.08 \text{ W/(mK)}$).

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