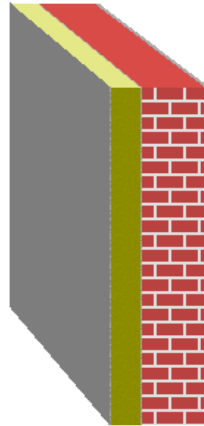


Documentation of the component
 Thermal transmittance (U-value) according to BS EN ISO 6946
 Source: **own catalogue - Pat Stanley**
 Component: **23 Cleveland Road**

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Assignment: External wall

	Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
	Rse					0.0400
☒	1	Own catalogue	Wetherby Silicone Render	0.0100	0.532	0.0188
☒	2	Own catalogue	Wetherby Stone Wool Insulation Board	0.1000	0.036	2.7778
	Fixings	Plastic insulation anchors No./m²:	8/m²	0.500	D	-
	Fixings	equivalent diameter: 0.01 m / alpha: 0.800				
	Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☒	3	Own catalogue	Wetherby Insulation Bedding Adhesive	0.0050	0.556	0.0090
☒	4	Own catalogue	Brick & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.2150	0.770	0.2792
☒	5	BS EN 12524	Gypsum plasterboard	0.0120	0.250	0.0480
	Rsi					0.1300
0.3420						

$$R_T = R_{si} + \sum R_i + R_{se} = 3.30 \text{ m}^2\text{K/W}$$

Correction to U-value for	according to	delta U [W/(m²K)]
Mechanical fasteners	BS EN ISO 6946 Annex D	0.000
Air gaps	BS EN ISO 6946 Annex D	0.007
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.000

$$U = 1/R_T + \sum \Delta U = 0.30 \text{ W/(m}^2\text{K)}$$

- 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_{max} = **0.30 W/(m²K)**

U = **0.30 W/(m²K)** R_T = **3.30 m²K/W**

Source of U_{max} value: England and Wales Approved Document L1A 2010 Tab 2 Dwellings New

Calculated with BuildDesk 3.4.5

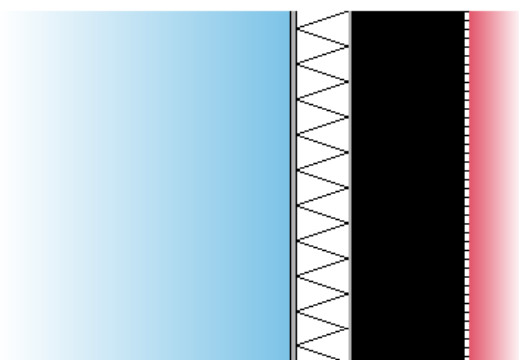
Documentation of the component
Calculation according BS EN ISO 13788

21. February 2022
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Source: **own catalogue - Pat Stanley**
Component: **23 Cleveland Road**

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

Assignment: External wall

Name	Thickn. [m]	lambda [W/(mK)]	Q	μ [-]	Q	sd [m]	R [m²K/W]
Wetherby Silicone Render	0.0100	0.532	E	6.00	E	0.06	0.0188
Wetherby Stone Wool Insulation Board	0.1000	0.036	E	1.00	E	0.10	2.7778
Wetherby Insulation Bedding Adhesive	0.0050	0.556	E	6.00	E	0.03	0.0090
Brick & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.2150	0.770	E	45.00	E	9.68	0.2792
Gypsum plasterboard	0.0120	0.250	D	4.00	D	0.05	0.0480

- 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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Documentation of the component
Calculation according BS EN ISO 13788
Source: **own catalogue - Pat Stanley**
Component: **23 Cleveland Road**

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Condensation risk analysis - summary of main results

Calculation according BS EN ISO 13788

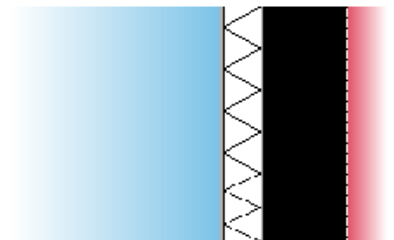
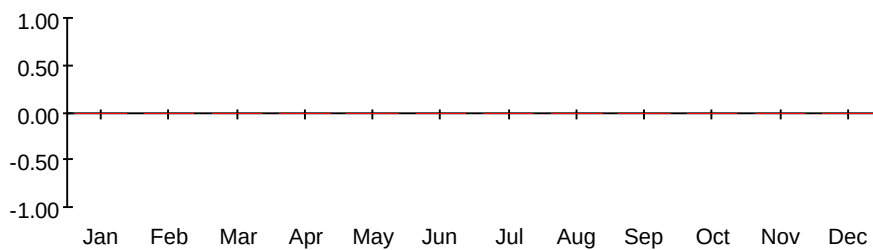


Surface temperature to avoid critical surface moisture:
No danger of mould growth is expected.



Interstitial condensation:
No condensation is predicted at any interface in any month.

Interstitial condensation and
evaporation per month gc [g/m²]



Component, condensation range

Documentation of the component
Calculation according BS EN ISO 13788
Source: **own catalogue - Pat Stanley**
Component: **23 Cleveland Road**

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Surface temperature to avoid critical surface humidity Calculation according BS EN ISO 13788

Location: Manchester Airport; Humidity class according BS EN ISO 13788 annex A: Dwellings with low occupancy

	1	2	3	4	5	6	7	8	9	10	11	12
Month	Te [°C]	phi_e ---	Ti [°C]	phi_i ---	pe [Pa]	delta p [Pa]	pi [Pa]	ps(Tsi) [Pa]	Tsi,min [°C]	fRsi ---	Tsi [°C]	Tse [°C]
I January	4.2	0.830	20.0	0.594	684	704	1388	1735	15.3	0.701	18.8	4.4
February	4.1	0.800	20.0	0.583	655	708	1363	1704	15.0	0.685	18.8	4.3
March	5.8	0.760	20.0	0.570	701	633	1333	1666	14.7	0.623	19.0	6.0
April	7.8	0.710	20.0	0.554	751	544	1294	1618	14.2	0.524	19.1	7.9
May	11.3	0.680	20.0	0.555	910	388	1298	1622	14.2	0.337	19.4	11.4
June	14.1	0.710	20.0	0.601	1142	263	1405	1756	15.5	0.231	19.6	14.2
July	16.1	0.720	20.0	0.638	1317	174	1491	1863	16.4	0.075	19.7	16.1
August	15.8	0.740	20.0	0.648	1328	187	1515	1894	16.6	0.201	19.7	15.8
September	13.3	0.770	20.0	0.631	1175	298	1474	1842	16.2	0.435	19.5	13.4
October	10.3	0.810	20.0	0.619	1014	432	1446	1808	15.9	0.579	19.3	10.4
November	6.7	0.820	20.0	0.598	804	593	1397	1746	15.4	0.652	19.0	6.9
December	5.2	0.840	20.0	0.600	743	659	1402	1752	15.4	0.691	18.9	5.4

- The critical month is January with $f_{Rsi,max} = 0.701$
 $f_{Rsi} = 0.927$

$f_{Rsi} > f_{Rsi,max}$, the component complies.

Nr Explanation

- External temperature
- External rel. humidity
- Internal temperature
- Internal relative humidity
- External partial pressure $p_e = \phi_e \cdot p_{sat}(T_e)$; $p_{sat}(T_e)$ according formula E.7 and E.8 of BS EN ISO 13788
- Partial pressure difference. The security factor of 1.10 according to BS EN ISO 13788, ch.4.2.4 is already included.
- Internal partial pressure $p_i = \phi_i \cdot p_{sat}(T_i)$; $p_{sat}(T_i)$ according formula E.7 and E.8 of BS EN ISO 13788
- Minimum saturation pressure on the surface obtained by $p_{sat}(T_{si}) = p_i / \phi_{si}$,
where $\phi_{si} = 0.8$ (critical surface humidity)
- Minimum surface temperature as function of $p_{sat}(T_{si})$, formula E.9 and E.10 of BS EN ISO 13788
- Design temperature factor according 3.1.2 of BS EN ISO 13788
- Internal surface temperature, obtained from $T_{si} = T_i - R_{si} \cdot U \cdot (T_i - T_e)$
- External surface temperature, obtained from $T_{se} = T_e + R_{se} \cdot U \cdot (T_i - T_e)$

Documentation of the component
Calculation according BS EN ISO 13788
Source: **own catalogue - Pat Stanley**
Component: **23 Cleveland Road**

21. February 2022
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Interstitial condensation - main results

Calculation according BS EN ISO 13788

No condensation is predicted at any interface in any month.

Climatic conditions

Location: Manchester Airport; Humidity class according BS EN ISO 13788 annex A: Dwellings with low occupancy

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Internal temperature [°C]	Ti	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Internal rel. humidity [%]	phi_i	59.4	58.3	57.0	55.4	55.5	60.1	63.8	64.8	63.1	61.9	59.8	60.0
External temperature [°C]	Te	4.2	4.1	5.8	7.8	11.3	14.1	16.1	15.8	13.3	10.3	6.7	5.2
External rel. humidity [%]	phi_e	83.0	80.0	76.0	71.0	68.0	71.0	72.0	74.0	77.0	81.0	82.0	84.0

Documentation of the component

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Heat capacity

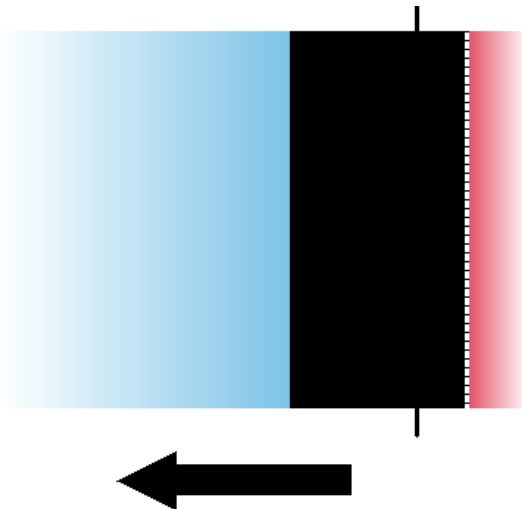
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Source: **own catalogue - Pat Stanley**

Component: **23 Cleveland Road**

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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 Wetherby Silicone Render	0.0100	0.532	E	1.00	E	1800.0	E	18.0	A, -, C
2 Wetherby Stone Wool Insulation Board	0.1000	0.036	E	1.03	E	25.0	E	0.0	A, -, C
3 Wetherby Insulation Bedding Adhesive	0.0050	0.556	E	1.00	E	1800.0	E	9.0	A, -, -
4 Brick & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.1270	0.770	E	0.80	E	1700.0	E	172.7	A, -, -
4 Brick & Mortar outer leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.0880	0.770	E	0.80	E	1700.0	E	119.7	-, -, -
5 Gypsum plasterboard	0.0120	0.250	D	1.00	D	900.0	D	10.8	-, -, -
Start of calculation - Warm									
	0.3420							130.5	

Heat capacity = 130.5 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 $\lambda \leq 0.08 \text{ W/(mK)}$).

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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