

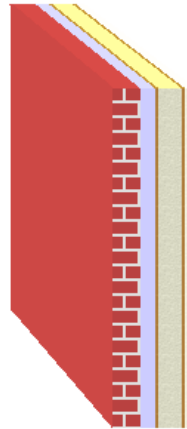


Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **Own Catalogue - External Walls**
Component: **PB_SIP100_Cavity_Brick_u25**

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Assignment: External wall

	Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
	Rse					0.0400
<input checked="" type="checkbox"/>	1	Generic Building Materials	Brick outer leaf & Mortar inner leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.1020	0.770	D 0.1325
<input checked="" type="checkbox"/>	2	BS EN ISO 6946	Slightly vent. air layer: 50 mm, horiz. heat flow	0.0500	0.556	D 0.0899
<input checked="" type="checkbox"/>	3	DuPont Tyvek	Tyvek Housewrap	0.0002	0.100	C 0.0017
<input checked="" type="checkbox"/>	4	BS EN 12524	Oriented strand board (OSB)	0.0110	0.130	D 0.0846
<input checked="" type="checkbox"/>	5	Elastogran	PU Foam 078	0.0780	0.023	E 3.3913
<input checked="" type="checkbox"/>	6	BS EN 12524	Oriented strand board (OSB)	0.0110	0.130	D 0.0846
<input checked="" type="checkbox"/>	7	Generic Building Materials	Acoustic or fire resistant plasterboard	0.0125	0.250	D 0.0500
<input checked="" type="checkbox"/>	8	Generic Building Materials	Acoustic or fire resistant plasterboard	0.0125	0.250	D 0.0500
	Rsi					0.1300
			0.2772			

$$R_T = R_{si} + \sum R_i + R_{se} = 4.05 \text{ m}^2\text{K/W}$$

$$U = 1/R_T = 0.25 \text{ W}/(\text{m}^2\text{K})$$

- 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.
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$$U_{\max} = 0.35 \text{ W}/(\text{m}^2\text{K})$$

$$U = 0.25 \text{ W}/(\text{m}^2\text{K}) \quad R_T = 4.05 \text{ m}^2\text{K/W}$$

Source of U_{max} value: England, Wales: Approved Document L1A (2006), Table 2 - New Build Dwellings

Calculated with BuildDesk 3.4.4



Documentation of the component
Calculation according BS EN ISO 13788

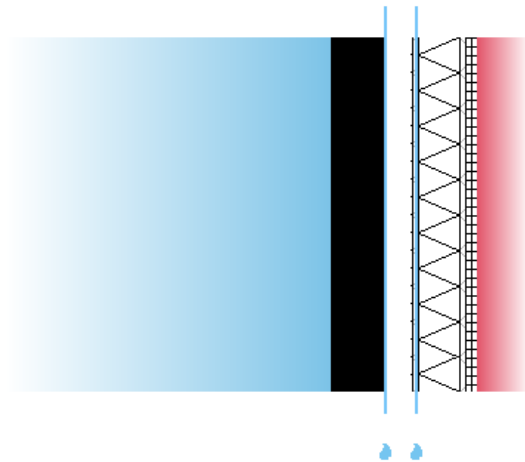
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Source: **Own Catalogue - External Walls**

Component: **PB_SIP100_Cavity_Brick_u25**

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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]
Brick outer leaf & Mortar inner leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.1020	0.770	D	45.00	D	4.59	0.1325
Slightly vent. air layer: 50 mm, horiz. heat flow	0.0500	0.556	D	1.00	D	0.05	0.0899
Tyvek Housewrap	0.0002	0.100	C	176.00	C	0.03	0.0017
Oriented strand board (OSB)	0.0110	0.130	D	30.00	D	0.33	0.0846
PU Foam 078	0.0780	0.023	E	50.00	E	3.90	3.3913
Oriented strand board (OSB)	0.0110	0.130	D	30.00	D	0.33	0.0846
Acoustic or fire resistant plasterboard	0.0125	0.250	D	4.00	D	0.05	0.0500
Acoustic or fire resistant plasterboard	0.0125	0.250	D	4.00	D	0.05	0.0500

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Documentation of the component
Calculation according BS EN ISO 13788
Source: **Own Catalogue - External Walls**
Component: **PB_SIP100_Cavity_Brick_u25**

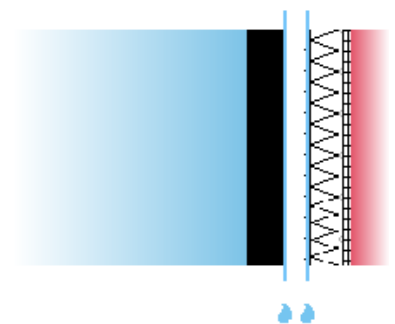
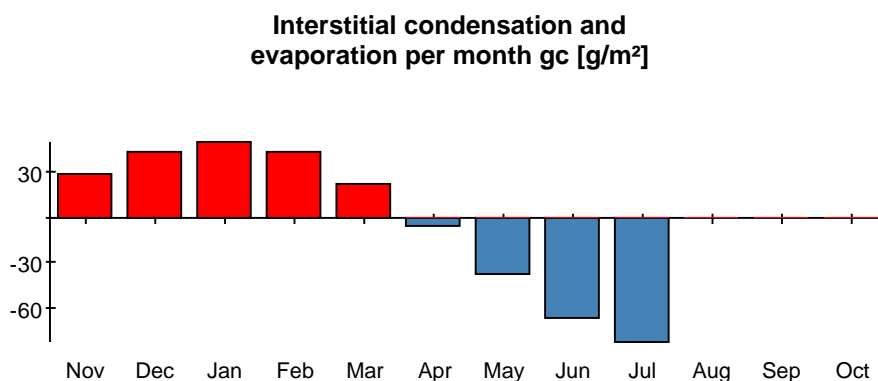
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Condensation risk analysis - summary of main results Calculation according BS EN ISO 13788

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

✓ **Interstitial condensation occurs, but all the condensate is predicted to
evaporate during the summer months.**

**The risk of degradation of building materials and deterioration of thermal
performance as a consequence of the calculated maximum amount of moisture
shall be considered according to regulatory requirements and other guidance in
product standards.**



Component, condensation range



Documentation of the component
Calculation according BS EN ISO 13788

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Source: **Own Catalogue - External Walls**

Component: **PB_SIP100_Cavity_Brick_u25**

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

Location: Stanstead; 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]
January	3.7	0.870	20.0	0.607	692	726	1419	1773	15.6	0.731	19.0	3.9
February	3.5	0.850	20.0	0.600	667	735	1402	1753	15.4	0.723	19.0	3.7
March	5.5	0.800	20.0	0.585	722	646	1368	1710	15.1	0.659	19.1	5.6
April	7.4	0.750	20.0	0.570	772	561	1333	1667	14.7	0.575	19.2	7.5
May	11.0	0.750	20.0	0.593	984	401	1385	1731	15.2	0.471	19.5	11.1
June	14.2	0.750	20.0	0.630	1214	258	1472	1840	16.2	0.345	19.7	14.3
July	16.5	0.730	20.0	0.653	1370	156	1526	1907	16.8	0.073	19.8	16.5
August	16.3	0.730	20.0	0.649	1352	165	1517	1896	16.7	0.100	19.8	16.3
September	13.9	0.770	20.0	0.639	1222	272	1494	1868	16.4	0.414	19.6	14.0
October	10.4	0.840	20.0	0.636	1059	428	1487	1858	16.3	0.620	19.4	10.5
November	6.5	0.870	20.0	0.618	842	601	1443	1804	15.9	0.695	19.2	6.6
December	4.9	0.880	20.0	0.614	762	673	1435	1793	15.8	0.721	19.1	5.0

- The critical month is January with $f_{Rsi,max} = 0.731$
 $f_{Rsi} = 0.940$

$f_{Rsi} > f_{Rsi,max}$, 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 - External Walls**
 Component: **PB_SIP100_Cavity_Brick_u25**

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Interstitial condensation - main results Calculation according BS EN ISO 13788

Interstitial condensation occurs but all the condensate is predicted to evaporate during the summer months.

The risk of degradation of building materials and deterioration of thermal performance as a consequence of the calculated maximum amount of moisture shall be considered according requirements and other guidance in product standards.

Climatic conditions

Location: Stanstead; 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	60.7	60.0	58.5	57.0	59.3	63.0	65.3	64.9	63.9	63.6	61.8	61.4
External temperature [°C]	Te	3.7	3.5	5.5	7.4	11.0	14.2	16.5	16.3	13.9	10.4	6.5	4.9
External rel. humidity [%]	phi_e	87.0	85.0	80.0	75.0	75.0	75.0	73.0	73.0	77.0	84.0	87.0	88.0

Monthly moisture content per area gc [g/m²]

Accumulated moisture content per area Ma [g/m²]

		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Brick outer leaf & Mortar inner leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3) / Slightly vent. air layer: 50 mm, horiz. heat flow	gc	29	37	37	32	28	16	-32	-67	-83	---	---	---
Oriented strand board (OSB) / PU Foam 078	Ma	29	66	103	136	163	179	147	80	---	---	---	---
	gc	---	7	13	11	-5	-22	-6	---	---	---	---	---
	Ma	---	7	21	32	27	4	---	---	---	---	---	---



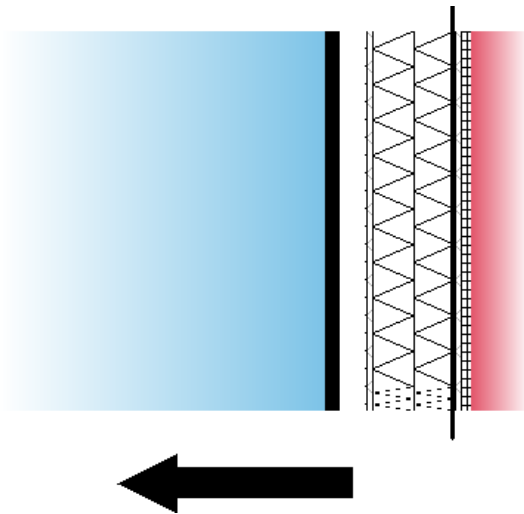
Documentation of the component
Heat capacity

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Source: **Own Catalogue - External Walls**
Component: **PB_SIP100_Cavity_Brick_u25**

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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	Brick outer leaf & Mortar inner leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.1020	0.770	D	0.80	D	1700.0	D	138.7	A, -, C
2	Slightly vent. air layer: 50 mm, horiz. heat flow	0.0500	0.556	D	1.01	D	1.2	D	0.4	A, -, C
3	Tyvek Housewrap	0.0002	0.100	C	1.70	C	358.0	C	0.4	A, -, C
4	Oriented strand board (OSB)	0.0110	0.130	D	1.70	D	650.0	D	12.2	A, -, C
5	PU Foam 078	0.0140	0.023	E	1.70	E	45.0	E	0.0	A, -, C
5	PU Foam 078	0.0640	0.023	E	1.70	E	45.0	E	0.0	-, -, C
6	Oriented strand board (OSB)	0.0110	0.130	D	1.70	D	650.0	D	12.2	-, -, -
7	Acoustic or fire resistant plasterboard	0.0125	0.250	D	1.00	D	900.0	D	11.3	-, -, -
8	Acoustic or fire resistant plasterboard	0.0125	0.250	D	1.00	D	900.0	D	11.3	-, -, -
Start of calculation - Warm										
								0.2772	34.7	

Heat capacity = 34.7 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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