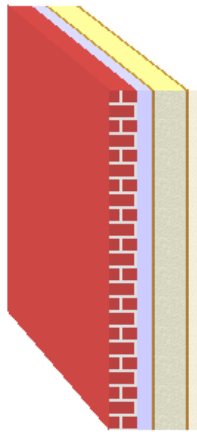
Documentation of the component
Thermal transmittance (U-value) according to BS EN ISO 6946
Source: **Own Catalogue - External Walls**
Component: **PB_SIP125_Cavity_Brick_U021**

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 inner leaf (f = 0.000 / automatic disregarding acc. BRE 4.4.3)	0.1020	0.770	D	0.1325
☑	2	BS EN ISO 6946	Slightly vent. air layer: 50 mm, horiz. heat flow	0.0500	0.556	D	0.0899
☑	3	DuPont Tyvek	Tyvek Housewrap	0.0002	0.100	C	0.0017
☑	4	BS EN 12524	Oriented strand board (OSB)	0.0110	0.130	D	0.0846
☑	5	Elastogran	PU Foam 103	0.1030	0.025	E	4.1200
☑	6	BS EN 12524	Oriented strand board (OSB)	0.0110	0.130	D	0.0846
☑	7	TYVEK	Tyvek SD2 ALB/VCL	0.0003	0.100	C	0.0025
☑	8	British Gypsum Limited	Gyproc HandiBoard (12.5)	0.0125	0.190	D	0.0658
☑	9	British Gypsum Limited	Gyproc HandiBoard (12.5)	0.0125	0.190	D	0.0658
		Rsi					0.1300
				0.3024			

$R_T = R_{si} + \Sigma R_i + R_{se} = 4.82$ m²K/W

$U = 1/R_T = 0.21$ 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.
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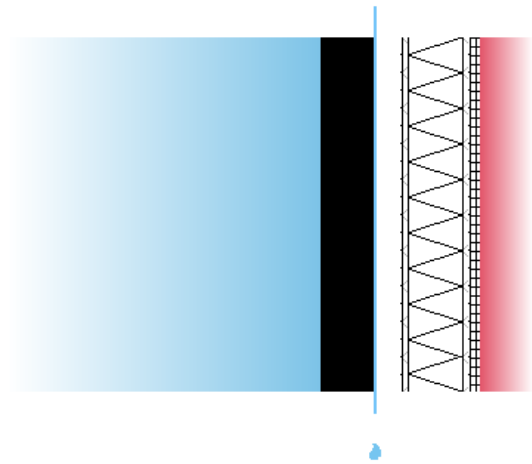
U_{max} = 0.35 W/(m²K) U = 0.21 W/(m²K) R_T= 4.82 m²K/W

Source of Umax value: England, Wales: Approved Document L1A (2006), Table 2 - New Build Dwellings

Documentation of the component
Calculation according BS EN ISO 13788
Source: **Own Catalogue - External Walls**
Component: **PB_SIP125_Cavity_Brick_U021**

OUTSIDE INSIDE



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 103	0.1030	0.025	E	50.00	E	5.15	4.1200
Oriented strand board (OSB)	0.0110	0.130	D	30.00	D	0.33	0.0846
Tyvek SD2 ALB/VCL	0.0003	0.100	C	8000.00	C	2.00	0.0025
Gyproc HandiBoard (12.5)	0.0125	0.190	D	4.00	D	0.05	0.0658
Gyproc HandiBoard (12.5)	0.0125	0.190	D	4.00	D	0.05	0.0658

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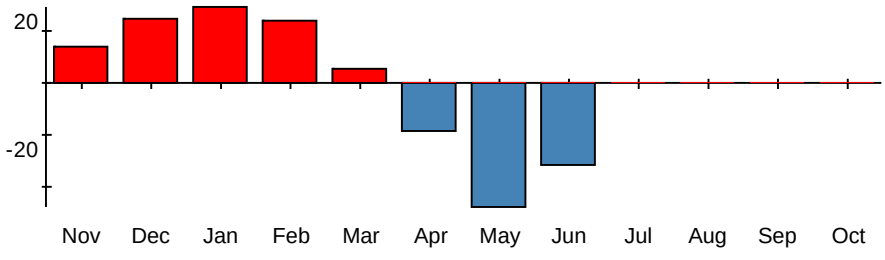
Condensation risk analysis - summary of main results
Calculation according BS EN ISO 13788

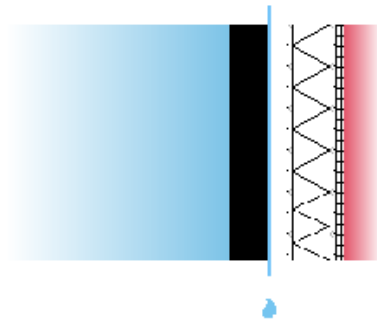
Surface temperature to avoid critical surface moisture:
No danger of mould growth is expected.

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.

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 - External Walls**
Component: **PB_SIP125_Cavity_Brick_U021**

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]
I	January	3.7	0.870	20.0	0.607	692	726	1419	1773	15.6	0.731	19.2	3.8
	February	3.5	0.850	20.0	0.600	667	735	1402	1753	15.4	0.723	19.2	3.6
	March	5.5	0.800	20.0	0.585	722	646	1368	1710	15.1	0.659	19.3	5.6
	April	7.4	0.750	20.0	0.570	772	561	1333	1667	14.7	0.575	19.4	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	14.2
	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	19.7	13.9
	October	10.4	0.840	20.0	0.636	1059	428	1487	1858	16.3	0.620	19.5	10.5
	November	6.5	0.870	20.0	0.618	842	601	1443	1804	15.9	0.695	19.3	6.6
	December	4.9	0.880	20.0	0.614	762	673	1435	1793	15.8	0.721	19.2	5.0

- The critical month is January with $f_{Rsi,max}$ = 0.731
  f_{Rsi} = 0.949

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

Nr Explanation

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

Documentation of the component
Calculation according BS EN ISO 13788
Source: **Own Catalogue - External Walls**
Component: **PB_SIP125_Cavity_Brick_U021**

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.

Climcatic conditions
Location: Stanstead; Humidity class according BS EN ISO 13788 annex A: Dwellings with low occupancy

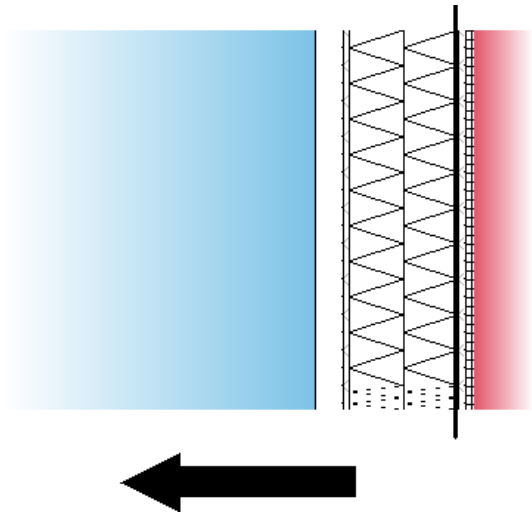
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Internal temperature [°C]	Ti	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Internal rel. humidity [%]	phi_i	60.7	60.0	58.5	57.0	59.3	63.0	65.3	64.9	63.9	63.6	61.8	61.4
External temperature [°C]	Te	3.7	3.5	5.5	7.4	11.0	14.2	16.5	16.3	13.9	10.4	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	11	20	24	20	4	-15	-38	-26	---	---	---	---
	Ma	11	31	55	74	79	64	25	---	---	---	---	---

Documentation of the component
Heat capacity
Source: **Own Catalogue - External Walls**
Component: **PB_SIP125_Cavity_Brick_U021**

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 <= 0.08 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	~~0.1~~	A, -, C
3	Tyvek Housewrap	0.0002	0.100	C	1.70	C	358.0	C	~~0.1~~	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 103	0.0393	0.025	E	1.70	E	45.0	E	~~0.0~~	A, -, C
5	PU Foam 103	0.0638	0.025	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	Tyvek SD2 ALB/VCL	0.0003	0.100	C	1.70	C	432.0	C	0.2	-, -, -
8	Gyproc HandiBoard (12.5)	0.0125	0.190	D	1.00	D	680.0	D	8.5	-, -, -
9	Gyproc HandiBoard (12.5)	0.0125	0.190	D	1.00	D	680.0	D	8.5	-, -, -
	Start of calculation - Warm									
		0.3024							**29.3**	

Heat capacity = 29.3 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 <= 0.08 W/(mK)).

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