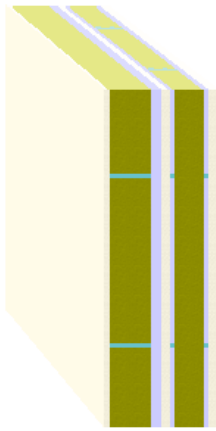
Documentation of the component
Thermal transmittance (U-value) according to Digest 465
Source: **own catalogue - Internal walls**
Component: **NCHE16552- Downley Drive, Manchester, Int Wall 01**

INSIDE

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

On the basis of the given information about the inhomogeneous layers, it is not possible to estimate how and where bearing elements intersect each other. It was assumed that the layers intersect crosswise. The size of the areas was calculated corresponding to their percentage of the whole area.

Assignment: Internal wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.1300
☑	1	Generic Building Materials	Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	0.0595
☑	2	Generic Building Materials	Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	0.0595
☑	3	Inhomogeneous material layer	consisting of:	0.0700	ø 0.135		0.5188
	3a	ROCKWOOL	RWA45	99.80 %	0.035	E	-
	3b	BS EN 12524	Steel	00.20 %	50.000	D	-
☑	4	Inhomogeneous material layer	consisting of:	0.0700	ø 0.135		0.5188
	4a	ROCKWOOL	RWA45	99.80 %	0.035	E	-
	4b	BS EN 12524	Steel	00.20 %	50.000	D	-
☑	5	BS EN ISO 6946	Unventilated airspace large: horizontal heat flow	0.0350	0.188	D	0.1864
		Airspace: mean temp.: 10°C / deltaT: <5 K / Epsilon1: 0.9 W/(m²K) / Epsilon2: 0.9 W/(m²K)					
☑	6	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	7	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	8	Inhomogeneous material layer	consisting of:	0.0150	ø 0.188		0.0799
	8a	BS EN ISO 6946	Unventilated air layer: 15 mm, horiz. heat flow	99.80 %	0.088	D	-
	8b	BS EN 12524	Steel	00.20 %	50.000	D	-
☑	9	Light steel-frame	consisting of:	0.1000	ø 0.185		0.5408
	9a	ROCKWOOL	RWA45	99.70 %	0.035	E	-
	9b	BS EN 12524	Steel	00.30 %	50.000	D	-
☑	10	Inhomogeneous material layer	consisting of:	0.0150	ø 0.188		0.0799
	10a	BS EN ISO 6946	Unventilated air layer: 15 mm, horiz. heat flow	99.80 %	0.088	D	-
	10b	BS EN 12524	Steel	00.20 %	50.000	D	-
☑	11	BS EN 12524	Polyethylene 0.15 mm	0.0002	0.170	D	0.0009
☑	12	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
☑	13	British Gypsum Limited	Gyproc SoundBloc	0.0150	0.250	D	0.0600
		Rsi					0.1300
				0.3902			

The unheated space is regarded with a reduction factor b according to EN ISO 13789.

b = 1.00

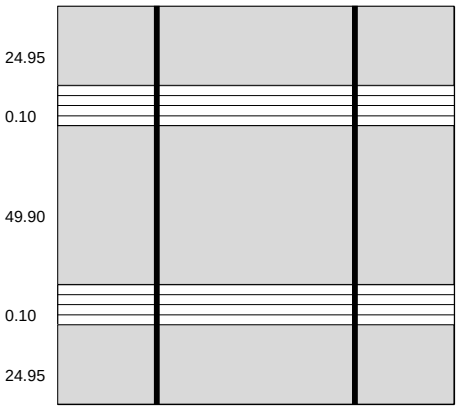
$R_T = p*R_T' + (1-p)*R_T'' = 4.36$ m²K/W

$U = b * 1/R_T = 0.23$ 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
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Source: **own catalogue - Internal walls**
Component: **NCHE16552- Downley Drive, Manchester, Int Wall 01**

Steel percentage: 0.30 %



Light steel-frame, inhomogeneous layer: sections

A	consisting of material layers: 1, 2, 3a, 4a, 5, 6, 7, 8a, 9a, 10a, 11, 12, 13	= 99.50%
B	consisting of material layers: 1, 2, 3b, 4b, 5, 6, 7, 8b, 9a, 10b, 11, 12, 13	= 0.30%
C	consisting of material layers: 1, 2, 3a, 4a, 5, 6, 7, 8a, 9b, 10a, 11, 12, 13	= 0.20%
D	consisting of material layers: 1, 2, 3b, 4b, 5, 6, 7, 8b, 9b, 10b, 11, 12, 13	= 0.00%

Upper limit of the thermal transfer resistance R

U_A [W/(m²K)] = $\frac{1}{(\Sigma R_{i,A}) + R_{si} + R_{se}} = \frac{1}{7.74 + 0.13 + 0.13}$ = 0.12

U_B [W/(m²K)] = $\frac{1}{(\Sigma R_{i,B}) + R_{si} + R_{se}} = \frac{1}{4.89 + 0.13 + 0.13}$ = 0.19

U_C [W/(m²K)] = $\frac{1}{(\Sigma R_{i,C}) + R_{si} + R_{se}} = \frac{1}{3.41 + 0.13 + 0.13}$ = 0.27

U_D [W/(m²K)] = $\frac{1}{(\Sigma R_{i,D}) + R_{si} + R_{se}} = \frac{1}{0.55 + 0.13 + 0.13}$ = 1.23

$$R_T' = \frac{1}{A * U_A + B * U_B + C * U_C + D * U_D} = 7.97\ m^2K/W$$

Lower limit of the thermal transfer resistance R

R_{se} [m²K/W]		= 0.13
R_1'' [m²K/W] = d_1/λ_1 =	0.0125 / 0.210	= 0.06
R_2'' [m²K/W] = d_2/λ_2 =	0.0125 / 0.210	= 0.06
R_3'' [m²K/W] = $d_3/(\lambda_{3a} * (A + B) + \lambda_{3b} * (C + D))$ =	0.0700 /(0.035 * 99.80% + 50.000 * 0.20%)	= 0.52
R_4'' [m²K/W] = $d_4/(\lambda_{4a} * (A + B) + \lambda_{4b} * (C + D))$ =	0.0700 /(0.035 * 99.80% + 50.000 * 0.20%)	= 0.52
R_5'' [m²K/W] = d_5/λ_5 =	0.0350 / 0.188	= 0.19
R_6'' [m²K/W] = d_6/λ_6 =	0.0150 / 0.250	= 0.06
R_7'' [m²K/W] = d_7/λ_7 =	0.0150 / 0.250	= 0.06
R_8'' [m²K/W] = $d_8/(\lambda_{8a} * (A + B) + \lambda_{8b} * (C + D))$ =	0.0150 /(0.088 * 99.80% + 50.000 * 0.20%)	= 0.08
R_9'' [m²K/W] = $d_9/(\lambda_{9a} * (A + C) + \lambda_{9b} * (B + D))$ =	0.1000 /(0.035 * 99.70% + 50.000 * 0.30%)	= 0.54
R_{10}'' [m²K/W] = $d_{10}/(\lambda_{10a} * (A + B) + \lambda_{10b} * (C + D))$ =	0.0150 /(0.088 * 99.80% + 50.000 * 0.20%)	= 0.08
R_{11}'' [m²K/W] = d_{11}/λ_{11} =	0.0002 / 0.170	= 0.00
R_{12}'' [m²K/W] = d_{12}/λ_{12} =	0.0150 / 0.250	= 0.06
R_{13}'' [m²K/W] = d_{13}/λ_{13} =	0.0150 / 0.250	= 0.06
R_{si} [m²K/W]		= 0.13

$$R_T'' = \Sigma R_i'' + R_{si} + R_{se} = 2.54\ m^2K/W$$

Kind of frame:	Hybrid frame
Flange width:	known not to exceed 50 mm
Stud spacing s [m]:	0.600
Stud depth d [m]:	0.100
Web thickness t [m]:	0.00180
Steel percentage [%]:	0.30

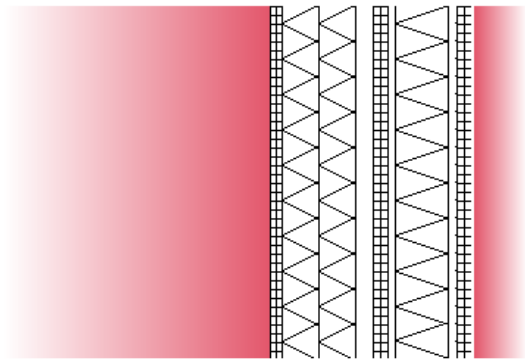
Weight factor p
Formula: $p = 0{,}8 * (R_T''/R_T') + 0{,}32 - 0{,}2 * (0{,}6/s) - 0{,}04 * (d/0{,}1) =$**0.335**

$$R_T = p*R_T' + (1-p)*R_T'' = 4.36\ m^2K/W$$

Source: **own catalogue - Internal walls**

Component: **NCHE16552- Downley Drive, Manchester, Int Wall 01**

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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.

This calculation of the Condensation risk analysis according to BS EN ISO 13788 has been performed on a construction containing inhomogeneous layers. This calculation is only valid through the selected section. It is advisable that you should also select the alternative position and recalculate the Condensation Risk Analysis for a more complete assessment of the construction. For further information the user is advised to follow the guidance in BS 5250:2021 Management of moisture in buildings

Assignment: Internal wall

Name	Thickn. [m]	lambda [W/(mK)]	Q	μ [-]	Q	sd [m]	R [m²K/W]
Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	4.00	D	0.05	0.0595
Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	4.00	D	0.05	0.0595
RWA45	0.0700	0.035	E	1.00	E	0.07	2.0000
RWA45	0.0700	0.035	E	1.00	E	0.07	2.0000
Unventilated airspace large: horizontal heat flow	0.0350	0.188	D	1.00	D	0.04	0.1864
Gyproc SoundBloc	0.0150	0.250	D	10.00	D	0.15	0.0600
Gyproc SoundBloc	0.0150	0.250	D	10.00	D	0.15	0.0600
Unventilated air layer: 15 mm, horiz. heat flow	0.0150	0.088	D	1.00	D	0.02	0.1705
RWA45	0.1000	0.035	E	1.00	E	0.10	2.8571
Unventilated air layer: 15 mm, horiz. heat flow	0.0150	0.088	D	1.00	D	0.02	0.1705
Polyethylene 0.15 mm	0.0002	0.170	D	300000.00	D	45.00	0.0009
Gyproc SoundBloc	0.0150	0.250	D	10.00	D	0.15	0.0600
Gyproc SoundBloc	0.0150	0.250	D	10.00	D	0.15	0.0600

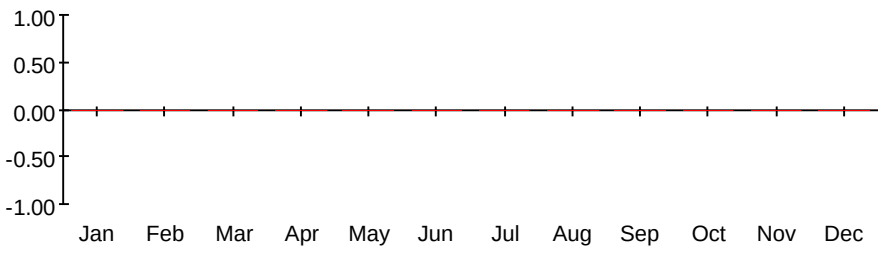
Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
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B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
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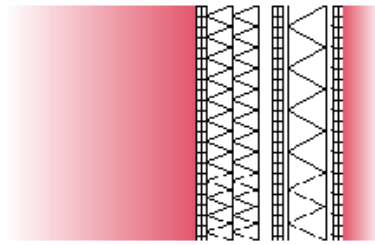
Condensation risk analysis - summary of main results
Calculation according BS EN ISO 13788

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

Condensation Risk Analysis calculations according to BS EN ISO 13788 are used as a guide in predicting interstitial condensation. This methodology uses some simplifications of the dynamic processes involved and subsequently does have some limitations. For further information the user is advised to follow the prescriptive guidance in BS 5250:2021 Management of moisture in buildings – Code of practice & BRE Information Paper:IP2/O5 (Feb. 2005) 'Modelling and controlling interstitial condensation

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: 3 Buildings with unknown occupancy; Return period according BS 5250:2021 Once in 10 years (-1°C Ext Temp, +4% Ext RH)

		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	3.2	0.870	20.0	0.584	668	696	1365	1706	15.0	0.703	19.5	3.3
	February	3.1	0.840	20.0	0.574	641	700	1341	1676	14.7	0.689	19.5	3.2
	March	4.8	0.800	20.0	0.568	688	640	1327	1659	14.6	0.644	19.5	4.9
	April	6.8	0.750	20.0	0.560	741	569	1309	1637	14.4	0.574	19.6	6.9
	May	10.3	0.720	20.0	0.576	902	444	1346	1682	14.8	0.464	19.7	10.3
	June	13.1	0.750	20.0	0.631	1130	345	1475	1844	16.2	0.453	19.8	13.1
	July	15.1	0.760	20.0	0.675	1304	274	1578	1972	17.3	0.446	19.8	15.1
	August	14.8	0.780	20.0	0.683	1312	285	1597	1996	17.5	0.515	19.8	14.8
	September	12.3	0.810	20.0	0.655	1158	373	1531	1914	16.8	0.587	19.8	12.3
	October	9.3	0.850	20.0	0.631	995	480	1475	1844	16.2	0.647	19.7	9.4
	November	5.7	0.860	20.0	0.597	787	608	1395	1744	15.4	0.675	19.6	5.8
	December	4.2	0.880	20.0	0.593	725	661	1386	1733	15.3	0.700	19.5	4.3

- The critical month is January with $f_{Rsi,max}$ = 0.703
  f_{Rsi} = 0.969

$f_{Rsi} > f_{Rsi,max}$, 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 $T_{se} = T_e + R_{se} * U * (T_i - T_e)$

Interstitial condensation - main results
Calculation according BS EN ISO 13788

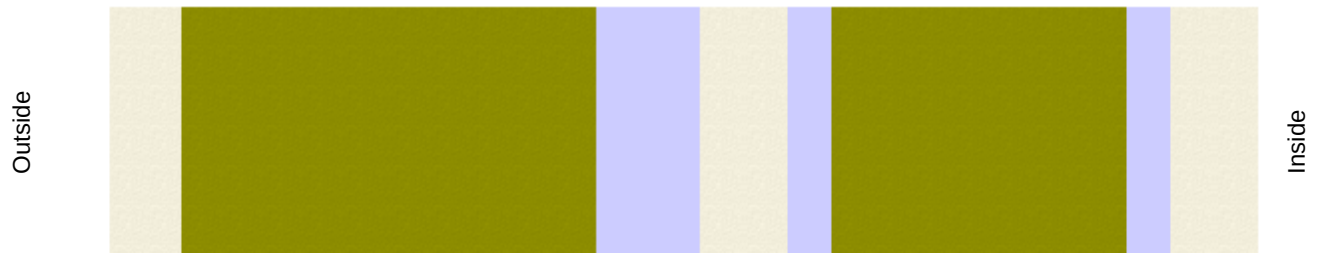
No condensation is predicted at any interface in any month.

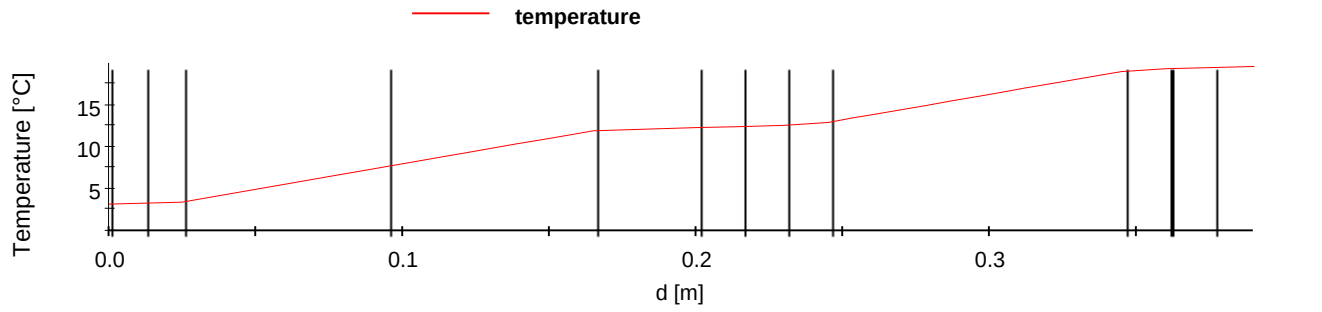
Climatic conditions
Location: Manchester Airport; Humidity class according BS EN ISO 13788 annex A: 3 Buildings with unknown occupancy; Return period according BS 5250:2021 Once in 10 years (-1°C Ext Temp, +4% Ext RH)

		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	58.4	57.4	56.8	56.0	57.6	63.1	67.5	68.3	65.5	63.1	59.7	59.3
External temperature [°C]	Te	3.2	3.1	4.8	6.8	10.3	13.1	15.1	14.8	12.3	9.3	5.7	4.2
External rel. humidity [%]	phi_e	87.0	84.0	80.0	75.0	72.0	75.0	76.0	78.0	81.0	85.0	86.0	88.0

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
1. Month of balance: January	20.0	0.584	3.2	0.870





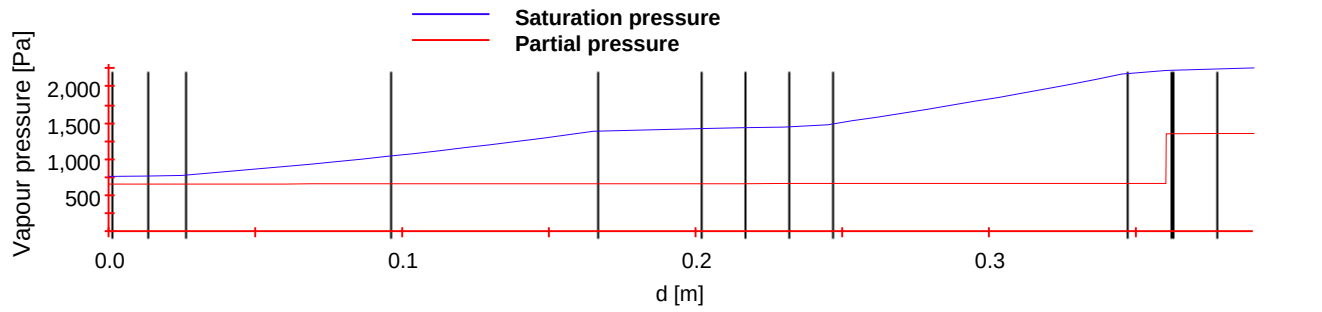
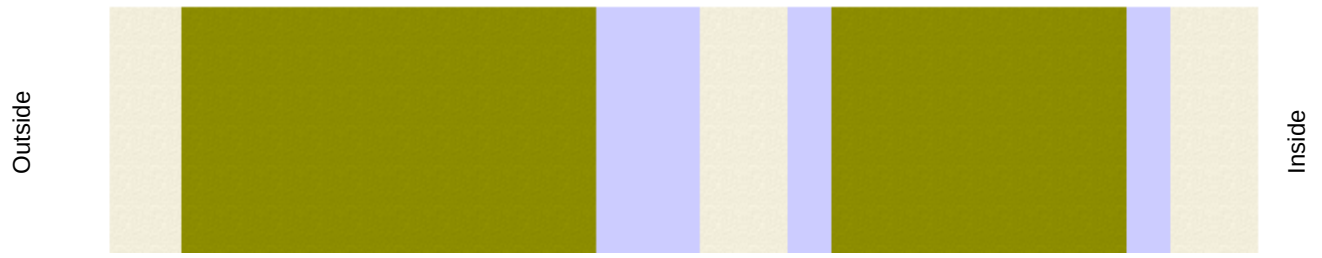


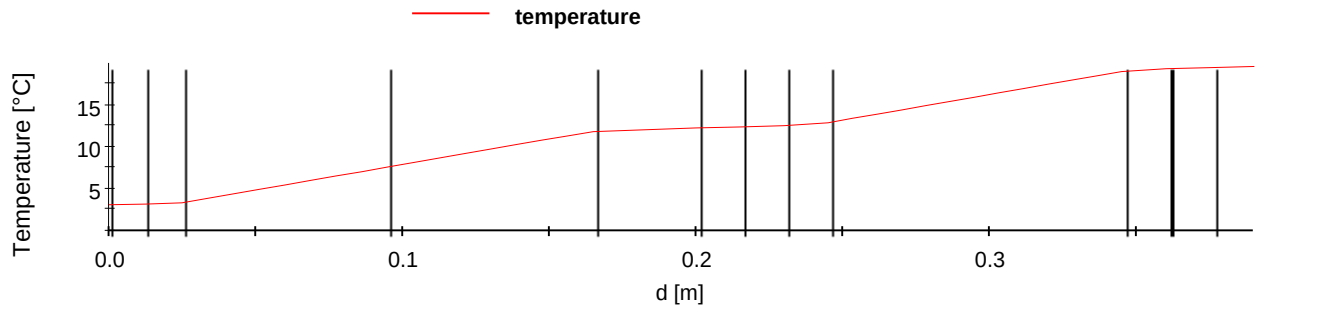
Table of month January:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	3.3	0.390	773	668
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	3.4	0.378	780	669
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	3.5	0.365	786	670
RWA45 / RWA45	7.7	0.295	1052	671
RWA45 / Unventilated airspace large: horizontal heat flow	11.9	0.225	1392	672
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	12.3	0.190	1429	672
Gyproc SoundBloc / Gyproc SoundBloc	12.4	0.175	1440	675
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	12.5	0.160	1452	677
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	12.9	0.145	1487	677
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	18.9	0.045	2178	679
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.2	0.030	2227	679
Polyethylene 0.15 mm / Gyproc SoundBloc	19.2	0.030	2227	1360
Gyproc SoundBloc / Gyproc SoundBloc	19.4	0.015	2245	1362
Gyproc SoundBloc / Internal	19.5	0.000	2262	1365

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
2. Month of balance: February	20.0	0.574	3.1	0.840





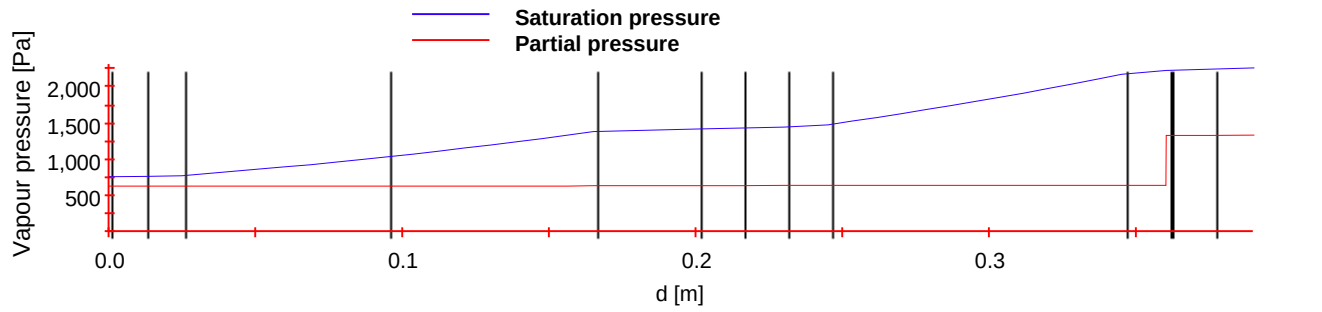
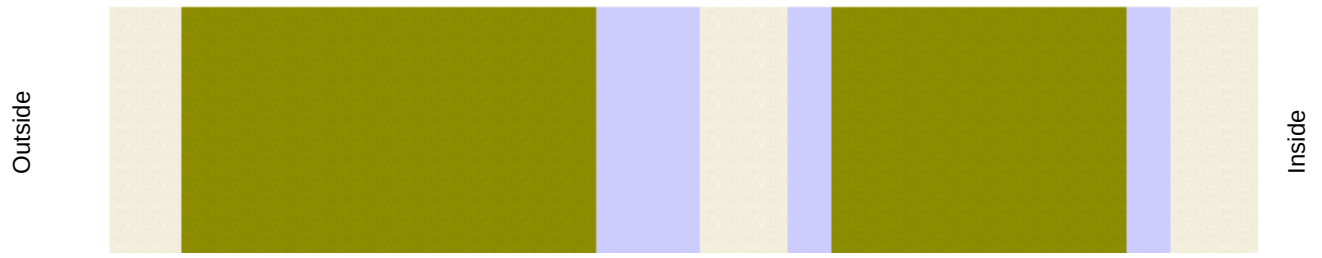


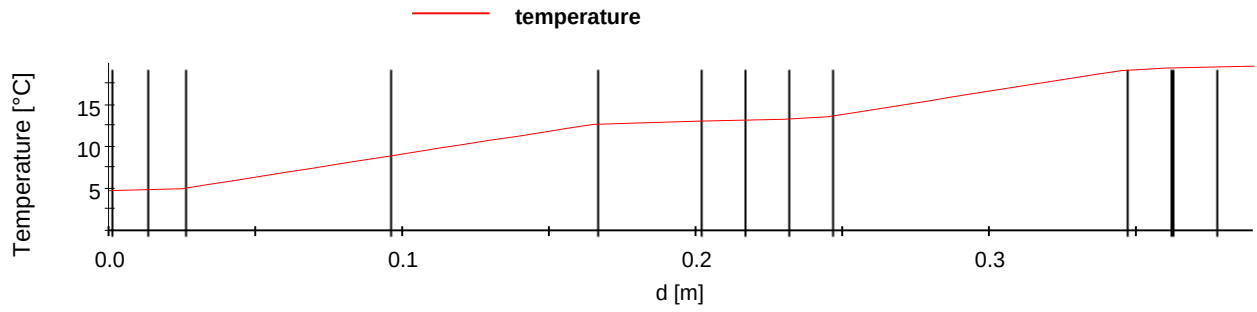
Table of month February:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	3.2	0.390	767	641
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	3.3	0.378	774	641
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	3.4	0.365	781	642
RWA45 / RWA45	7.6	0.295	1046	643
RWA45 / Unventilated airspace large: horizontal heat flow	11.8	0.225	1388	644
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	12.2	0.190	1424	645
Gyproc SoundBloc / Gyproc SoundBloc	12.4	0.175	1436	647
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	12.5	0.160	1448	649
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	12.9	0.145	1482	650
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	18.9	0.045	2177	651
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.2	0.030	2226	651
Polyethylene 0.15 mm / Gyproc SoundBloc	19.2	0.030	2227	1336
Gyproc SoundBloc / Gyproc SoundBloc	19.3	0.015	2244	1338
Gyproc SoundBloc / Internal	19.5	0.000	2262	1341

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
3. Month of balance: March	20.0	0.568	4.8	0.800





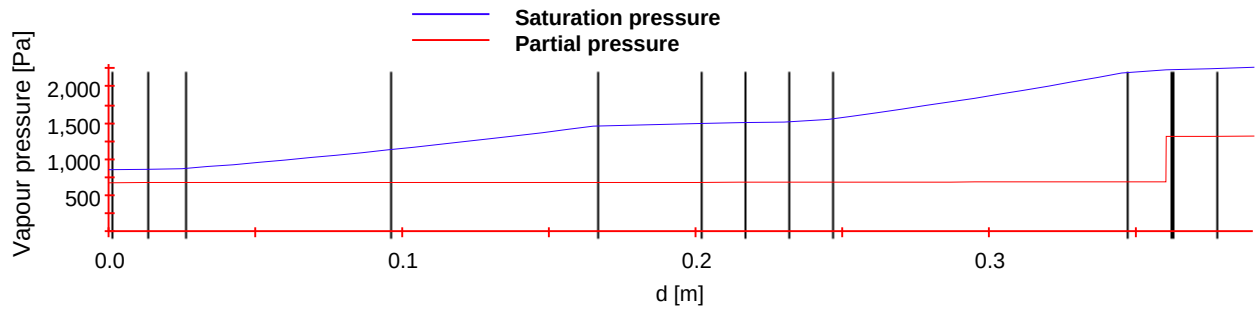
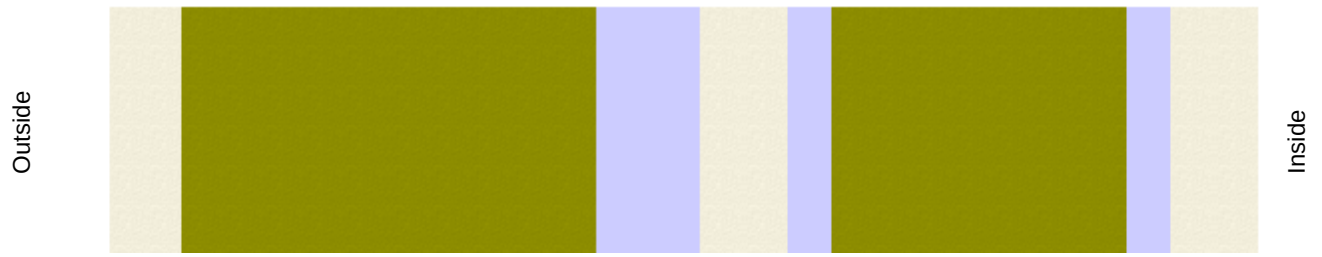


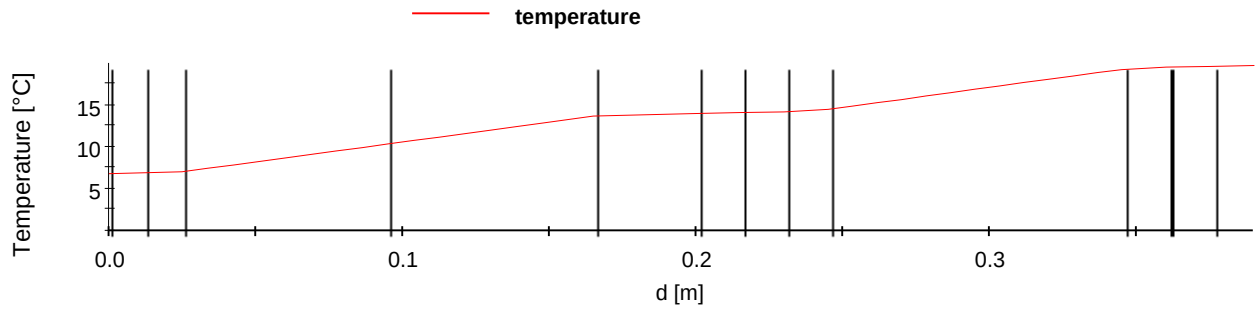
Table of month March:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	4.9	0.390	864	688
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	5.0	0.378	871	689
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	5.1	0.365	878	689
RWA45 / RWA45	8.9	0.295	1139	690
RWA45 / Unventilated airspace large: horizontal heat flow	12.7	0.225	1465	691
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	13.0	0.190	1499	692
Gyproc SoundBloc / Gyproc SoundBloc	13.1	0.175	1510	694
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	13.2	0.160	1521	696
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	13.6	0.145	1554	696
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.0	0.045	2193	697
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.3	0.030	2237	698
Polyethylene 0.15 mm / Gyproc SoundBloc	19.3	0.030	2238	1323
Gyproc SoundBloc / Gyproc SoundBloc	19.4	0.015	2253	1325
Gyproc SoundBloc / Internal	19.5	0.000	2269	1327

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
4. Month of balance: April	20.0	0.560	6.8	0.750





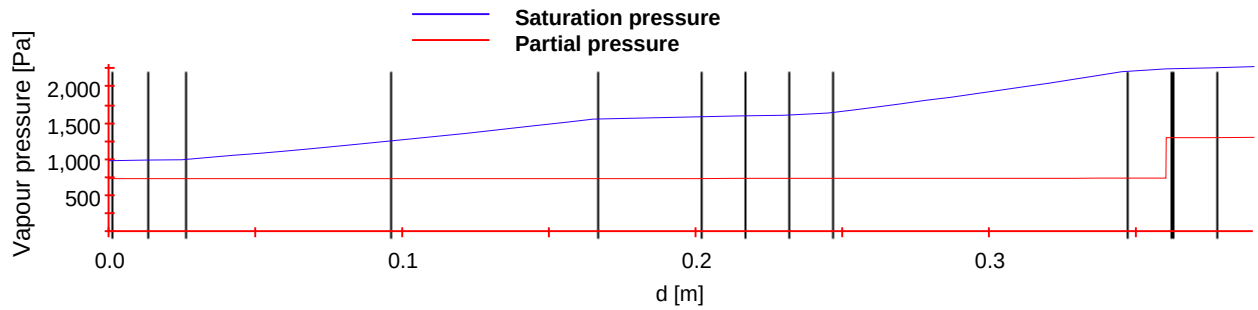


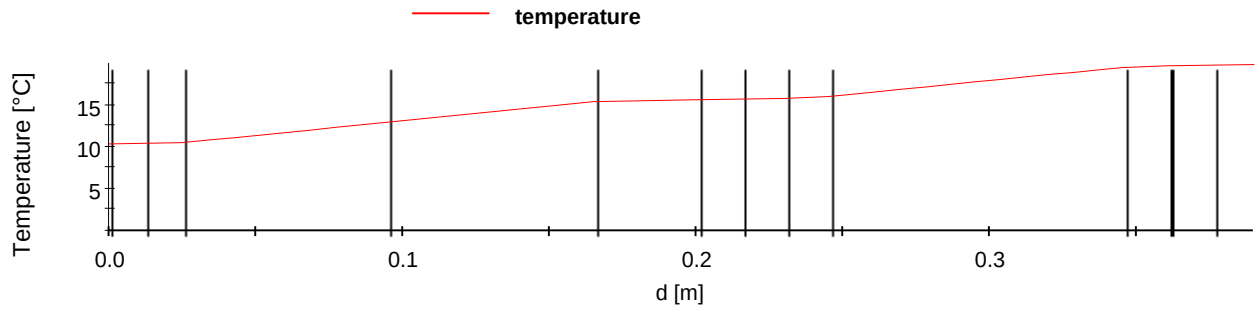
Table of month April:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	6.9	0.390	992	741
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	7.0	0.378	999	741
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	7.1	0.365	1006	742
RWA45 / RWA45	10.3	0.295	1256	743
RWA45 / Unventilated airspace large: horizontal heat flow	13.6	0.225	1560	744
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	13.9	0.190	1591	744
Gyproc SoundBloc / Gyproc SoundBloc	14.0	0.175	1602	746
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	14.1	0.160	1612	748
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	14.4	0.145	1641	748
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.1	0.045	2211	749
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.4	0.030	2250	749
Polyethylene 0.15 mm / Gyproc SoundBloc	19.4	0.030	2250	1306
Gyproc SoundBloc / Gyproc SoundBloc	19.5	0.015	2264	1307
Gyproc SoundBloc / Internal	19.6	0.000	2278	1309

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
5. Month of balance: May	20.0	0.576	10.3	0.720





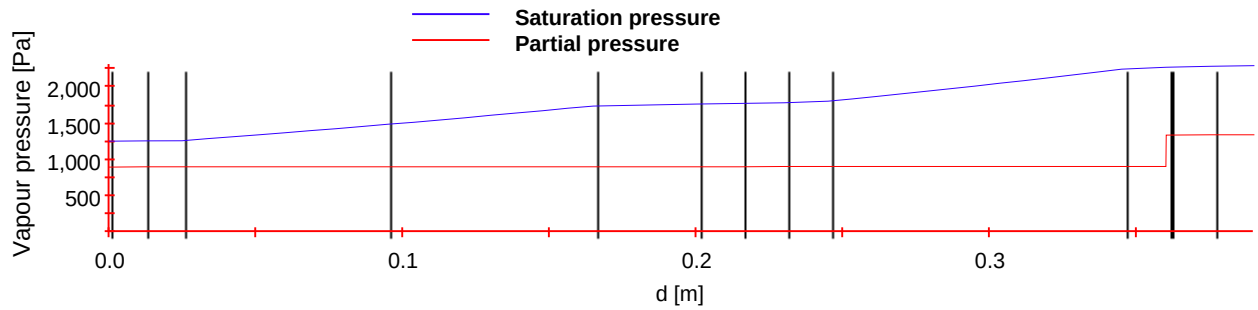


Table of month May:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	10.3	0.390	1256	902
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	10.4	0.378	1262	902
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	10.5	0.365	1268	903
RWA45 / RWA45	12.9	0.295	1488	903
RWA45 / Unventilated airspace large: horizontal heat flow	15.3	0.225	1740	904
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	15.5	0.190	1765	904
Gyproc SoundBloc / Gyproc SoundBloc	15.6	0.175	1773	906
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	15.7	0.160	1782	907
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	15.9	0.145	1805	907
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.3	0.045	2244	908
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.6	0.030	2273	908
Polyethylene 0.15 mm / Gyproc SoundBloc	19.6	0.030	2273	1343
Gyproc SoundBloc / Gyproc SoundBloc	19.6	0.015	2283	1344
Gyproc SoundBloc / Internal	19.7	0.000	2294	1346

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
6. Month of balance: June	20.0	0.631	13.1	0.750

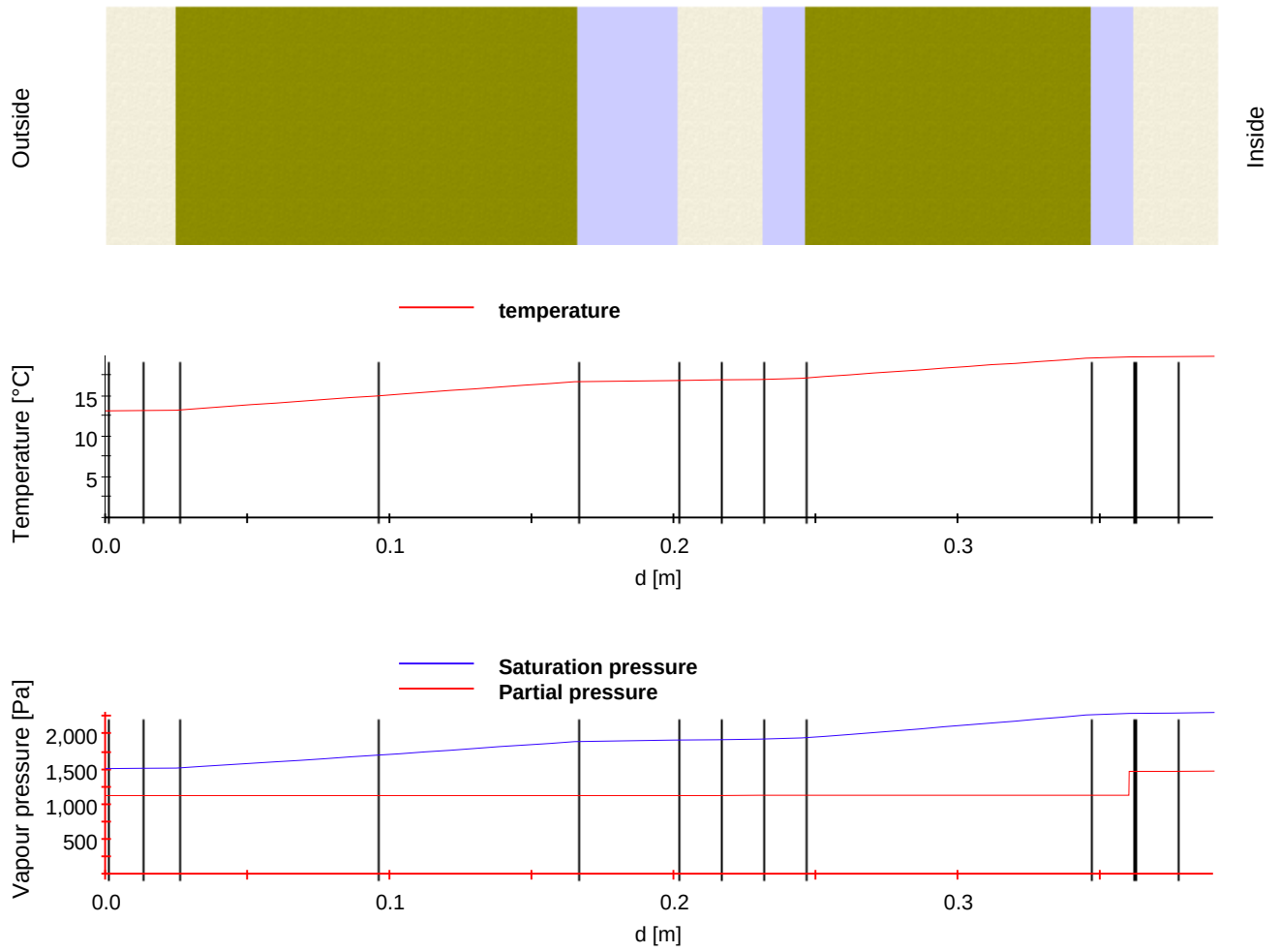
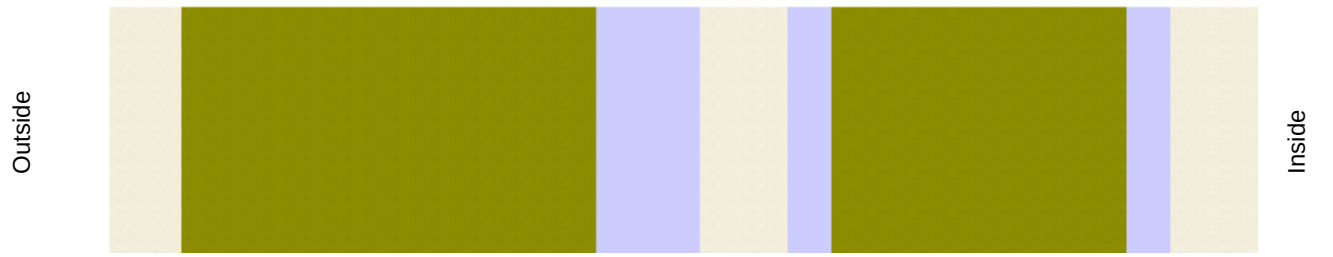


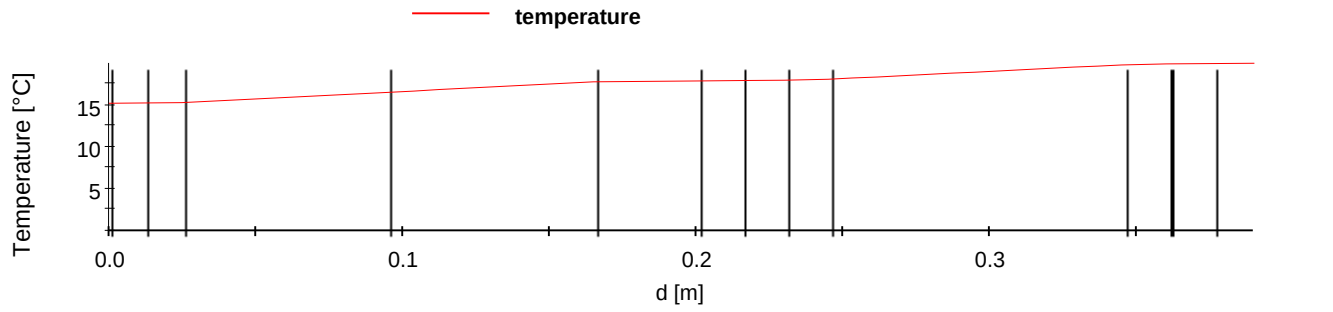
Table of month June:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	13.1	0.390	1510	1130
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	13.2	0.378	1515	1130
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	13.2	0.365	1520	1131
RWA45 / RWA45	15.0	0.295	1699	1131
RWA45 / Unventilated airspace large: horizontal heat flow	16.7	0.225	1897	1132
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	16.8	0.190	1916	1132
Gyproc SoundBloc / Gyproc SoundBloc	16.9	0.175	1922	1133
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	16.9	0.160	1929	1134
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	17.1	0.145	1947	1135
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.5	0.045	2271	1135
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.7	0.030	2291	1135
Polyethylene 0.15 mm / Gyproc SoundBloc	19.7	0.030	2291	1473
Gyproc SoundBloc / Gyproc SoundBloc	19.7	0.015	2299	1474
Gyproc SoundBloc / Internal	19.8	0.000	2306	1475

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
7. Month of balance: July	20.0	0.675	15.1	0.760





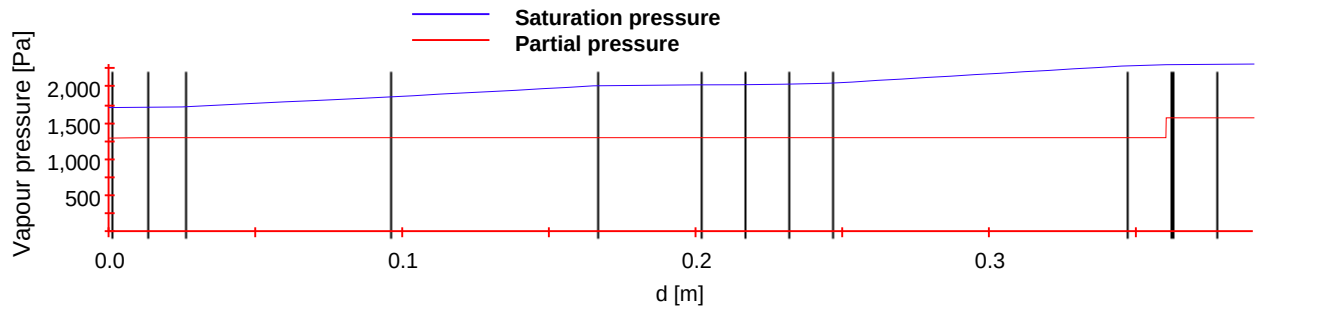


Table of month July:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	15.1	0.390	1718	1304
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	15.2	0.378	1722	1304
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	15.2	0.365	1726	1304
RWA45 / RWA45	16.4	0.295	1866	1305
RWA45 / Unventilated airspace large: horizontal heat flow	17.6	0.225	2016	1305
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	17.8	0.190	2031	1305
Gyproc SoundBloc / Gyproc SoundBloc	17.8	0.175	2035	1306
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	17.8	0.160	2040	1307
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	17.9	0.145	2053	1307
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.7	0.045	2290	1308
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.8	0.030	2304	1308
Polyethylene 0.15 mm / Gyproc SoundBloc	19.8	0.030	2305	1576
Gyproc SoundBloc / Gyproc SoundBloc	19.8	0.015	2310	1577
Gyproc SoundBloc / Internal	19.8	0.000	2315	1578

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
8. Month of balance: August	20.0	0.683	14.8	0.780

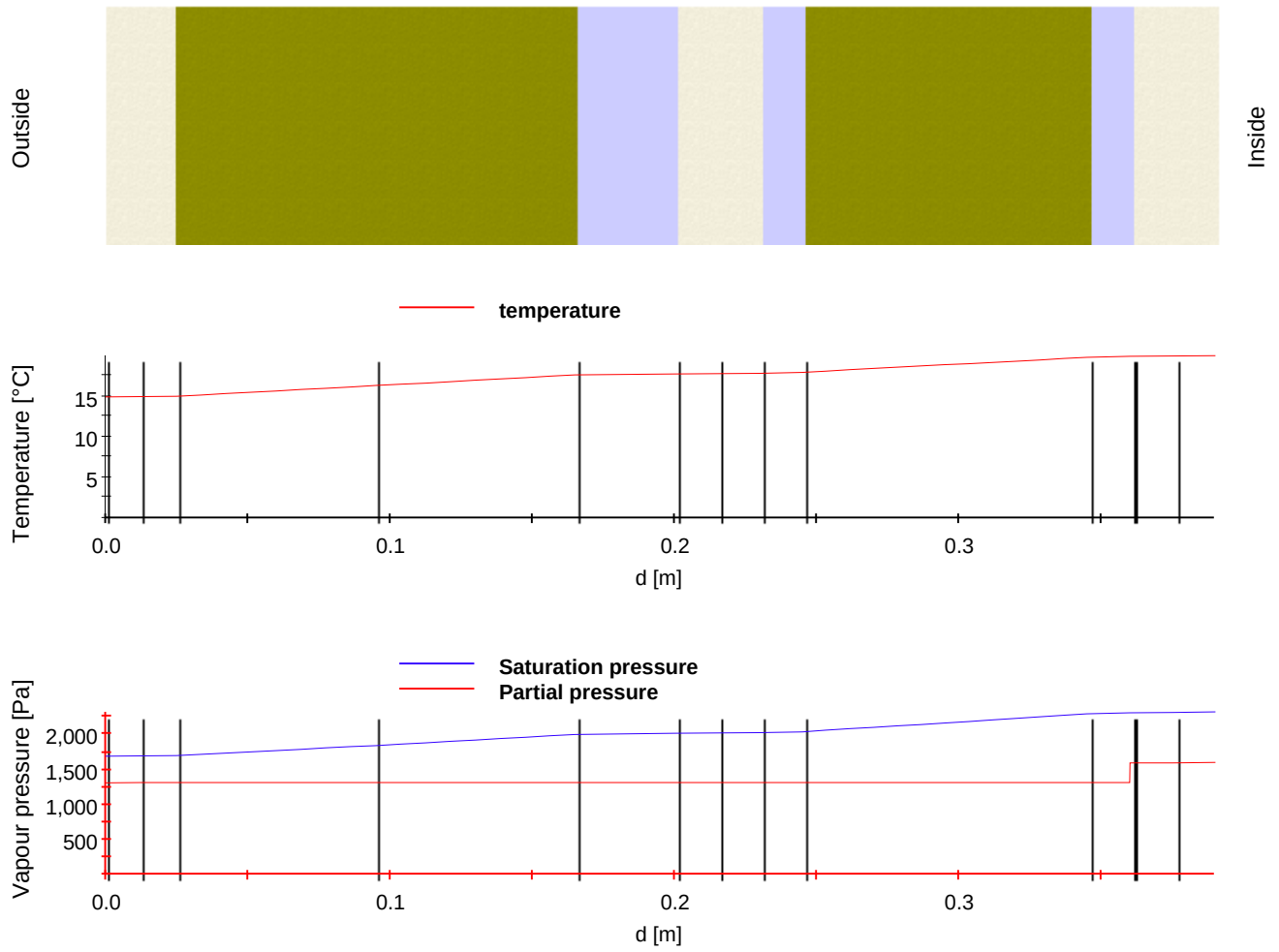


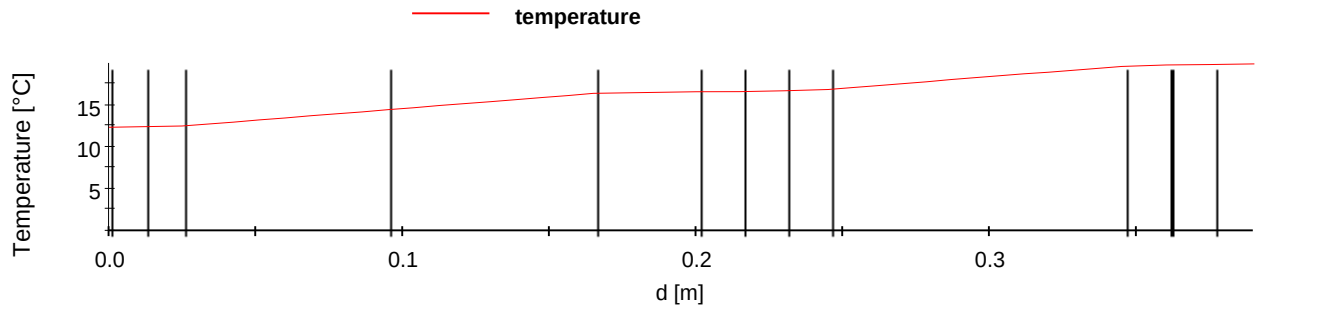
Table of month August:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	14.8	0.390	1685	1312
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	14.9	0.378	1690	1313
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	14.9	0.365	1694	1313
RWA45 / RWA45	16.2	0.295	1840	1313
RWA45 / Unventilated airspace large: horizontal heat flow	17.5	0.225	1998	1314
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	17.6	0.190	2013	1314
Gyproc SoundBloc / Gyproc SoundBloc	17.7	0.175	2018	1315
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	17.7	0.160	2023	1316
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	17.8	0.145	2037	1316
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.6	0.045	2287	1317
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.8	0.030	2302	1317
Polyethylene 0.15 mm / Gyproc SoundBloc	19.8	0.030	2303	1595
Gyproc SoundBloc / Gyproc SoundBloc	19.8	0.015	2308	1596
Gyproc SoundBloc / Internal	19.8	0.000	2314	1597

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
9. Month of balance: September	20.0	0.655	12.3	0.810





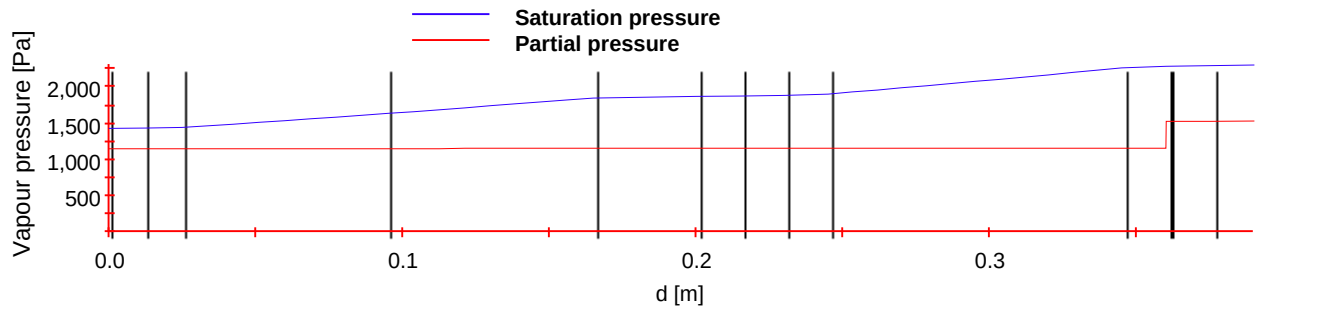
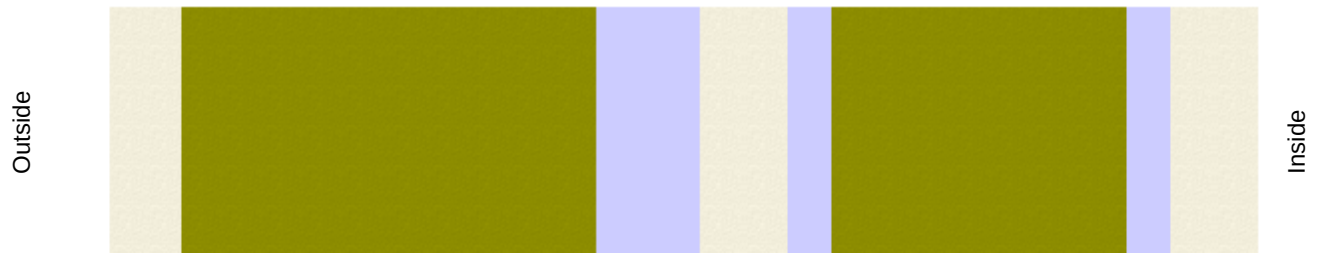


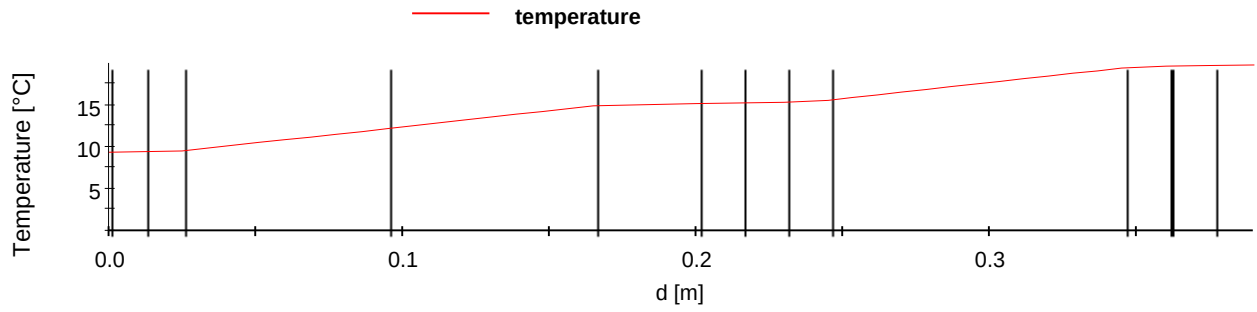
Table of month September:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	12.3	0.390	1433	1158
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	12.4	0.378	1439	1159
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	12.5	0.365	1444	1159
RWA45 / RWA45	14.4	0.295	1636	1160
RWA45 / Unventilated airspace large: horizontal heat flow	16.3	0.225	1851	1160
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	16.5	0.190	1872	1160
Gyproc SoundBloc / Gyproc SoundBloc	16.5	0.175	1879	1162
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	16.6	0.160	1886	1163
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	16.7	0.145	1905	1163
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.5	0.045	2263	1164
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.6	0.030	2286	1164
Polyethylene 0.15 mm / Gyproc SoundBloc	19.6	0.030	2286	1529
Gyproc SoundBloc / Gyproc SoundBloc	19.7	0.015	2294	1530
Gyproc SoundBloc / Internal	19.8	0.000	2303	1531

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
10. Month of balance: October	20.0	0.631	9.3	0.850





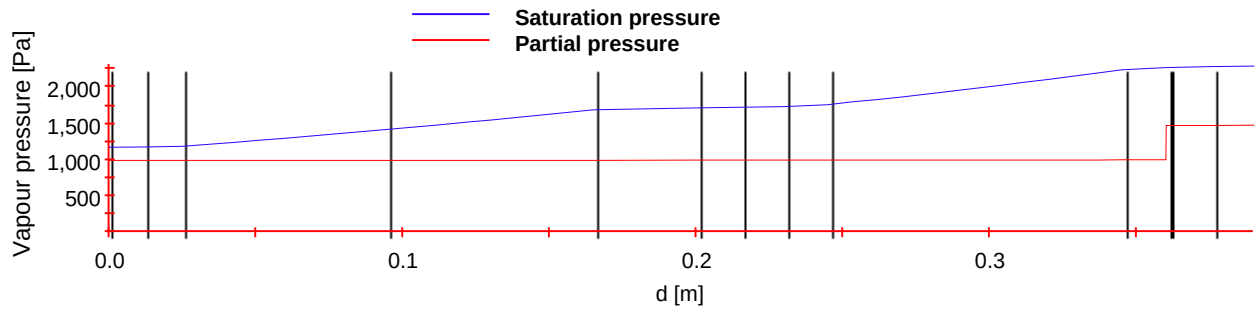


Table of month October:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	9.4	0.390	1175	995
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	9.4	0.378	1181	996
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	9.5	0.365	1188	996
RWA45 / RWA45	12.2	0.295	1418	997
RWA45 / Unventilated airspace large: horizontal heat flow	14.8	0.225	1687	998
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	15.1	0.190	1714	998
Gyproc SoundBloc / Gyproc SoundBloc	15.2	0.175	1723	1000
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	15.2	0.160	1732	1001
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	15.5	0.145	1757	1001
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.3	0.045	2235	1002
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.5	0.030	2266	1003
Polyethylene 0.15 mm / Gyproc SoundBloc	19.5	0.030	2267	1472
Gyproc SoundBloc / Gyproc SoundBloc	19.6	0.015	2278	1474
Gyproc SoundBloc / Internal	19.7	0.000	2289	1475

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
11. Month of balance: November	20.0	0.597	5.7	0.860

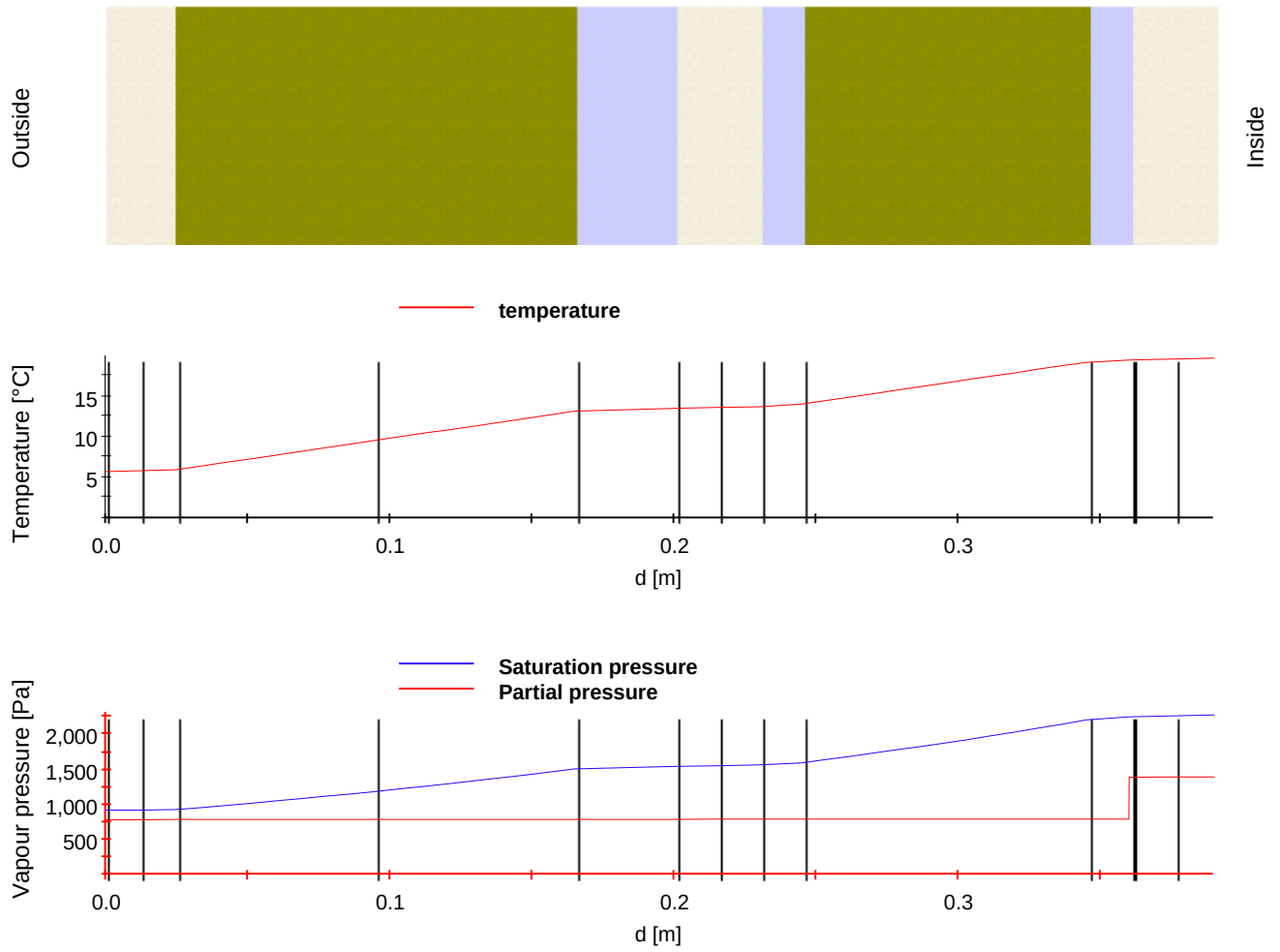


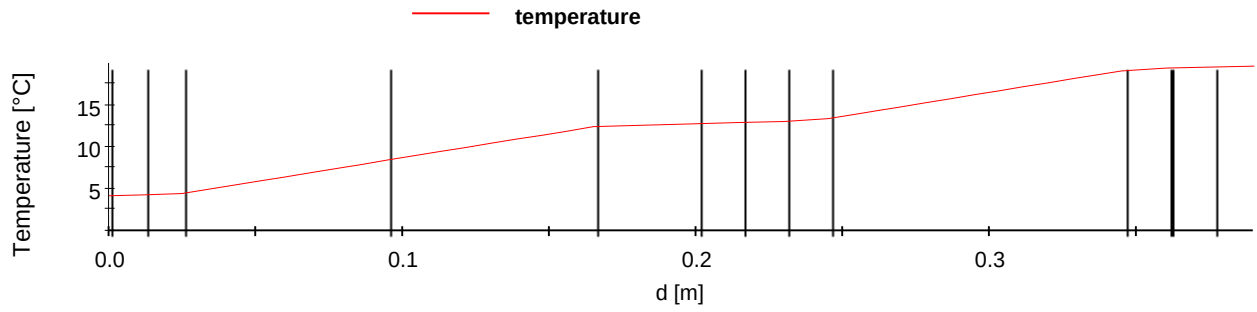
Table of month November:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	5.8	0.390	920	787
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	5.9	0.378	927	788
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	6.0	0.365	934	789
RWA45 / RWA45	9.5	0.295	1190	789
RWA45 / Unventilated airspace large: horizontal heat flow	13.1	0.225	1507	790
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	13.4	0.190	1540	791
Gyproc SoundBloc / Gyproc SoundBloc	13.5	0.175	1551	793
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	13.6	0.160	1562	795
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	14.0	0.145	1593	795
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	19.0	0.045	2201	796
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.3	0.030	2243	797
Polyethylene 0.15 mm / Gyproc SoundBloc	19.3	0.030	2243	1391
Gyproc SoundBloc / Gyproc SoundBloc	19.4	0.015	2258	1393
Gyproc SoundBloc / Internal	19.6	0.000	2273	1395

Vapour pressure distribution
Calculation according BS EN ISO 13788

	Ti [°C]	phi_i [-]	Te [°C]	phi_e [-]
12. Month of balance: December	20.0	0.593	4.2	0.880





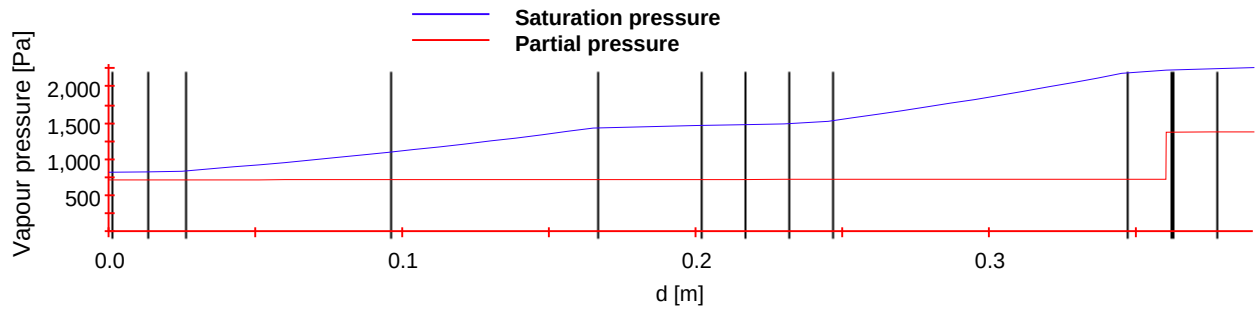
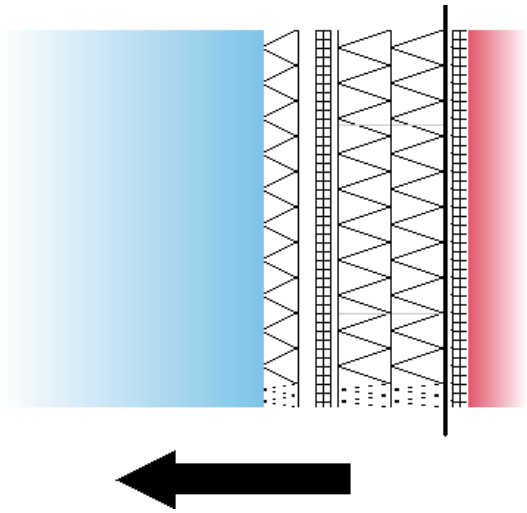


Table of month December:

Name	T[°C]	d[m]	psat[Pa]	p[Pa]
External / Standard wallboard (plasterboard up to 700kg/m³)	4.3	0.390	829	725
Standard wallboard (plasterboard up to 700kg/m³) / Standard wallboard (plasterboard up to 700kg/m³)	4.4	0.378	836	726
Standard wallboard (plasterboard up to 700kg/m³) / RWA45	4.5	0.365	843	727
RWA45 / RWA45	8.4	0.295	1105	728
RWA45 / Unventilated airspace large: horizontal heat flow	12.4	0.225	1437	729
Unventilated airspace large: horizontal heat flow / Gyproc SoundBloc	12.7	0.190	1472	729
Gyproc SoundBloc / Gyproc SoundBloc	12.9	0.175	1484	732
Gyproc SoundBloc / Unventilated air layer: 15 mm, horiz. heat flow	13.0	0.160	1495	734
Unventilated air layer: 15 mm, horiz. heat flow / RWA45	13.3	0.145	1528	734
RWA45 / Unventilated air layer: 15 mm, horiz. heat flow	18.9	0.045	2187	735
Unventilated air layer: 15 mm, horiz. heat flow / Polyethylene 0.15 mm	19.3	0.030	2234	736
Polyethylene 0.15 mm / Gyproc SoundBloc	19.3	0.030	2234	1382
Gyproc SoundBloc / Gyproc SoundBloc	19.4	0.015	2250	1384
Gyproc SoundBloc / Internal	19.5	0.000	2267	1386

INSIDE 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	Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	1.00	D	700.0	D	~~8.8~~	A, -, C
2	Standard wallboard (plasterboard up to 700kg/m³)	0.0125	0.210	D	1.00	D	700.0	D	~~8.8~~	A, -, C
3	Inhomogeneous material layer consisting of:	0.0700							~~0.5~~	A, -, C
3a	RWA45	99.80%	0.035	E	1.03	E	45.0	E	~~3.2~~	A, -, C
3b	Steel	00.20%	50.000	D	0.45	D	7800.0	D	~~0.5~~	A, -, C
4	Inhomogeneous material layer consisting of:	0.0700							~~0.5~~	A, -, C
4a	RWA45	99.80%	0.035	E	1.03	E	45.0	E	~~3.2~~	A, -, C
4b	Steel	00.20%	50.000	D	0.45	D	7800.0	D	~~0.5~~	A, -, C
5	Unventilated airspace large: horizontal heat flow	0.0350	0.188	D	1.01	D	1.2	D	~~0.0~~	A, -, C
6	Gyproc SoundBloc	0.0150	0.250	D	1.00	D	840.0	D	~~12.6~~	A, -, C
7	Gyproc SoundBloc	0.0150	0.250	D	1.00	D	840.0	D	~~12.6~~	A, -, C
8	Inhomogeneous material layer consisting of:	0.0150							~~0.1~~	A, -, C
8a	Unventilated air layer: 15 mm, horiz. heat flow	99.80%	0.088	D	1.01	D	1.2	D	~~0.0~~	A, -, C
8b	Steel	00.20%	50.000	D	0.45	D	7800.0	D	~~0.1~~	A, -, C
9	Light steel-frame consisting of:	0.0452							~~0.5~~	A, -, C
9a	RWA45	99.70%	0.035	E	1.03	E	45.0	E	~~2.1~~	A, -, C
9b	Steel	00.30%	50.000	D	0.45	D	7800.0	D	~~0.5~~	A, -, C
9	Light steel-frame consisting of:	0.0549							~~0.6~~	-, -, C
9a	RWA45	99.70%	0.035	E	1.03	E	45.0	E	~~2.5~~	-, -, C
9b	Steel	00.30%	50.000	D	0.45	D	7800.0	D	0.6	-, -, -
10	Inhomogeneous material layer consisting of:	0.0150							0.1	-, -, -
10a	Unventilated air layer: 15 mm, horiz. heat flow	99.80%	0.088	D	1.01	D	1.2	D	0.0	-, -, -
10b	Steel	00.20%	50.000	D	0.45	D	7800.0	D	0.1	-, -, -
11	Polyethylene 0.15 mm	0.0002	0.170	D	2.20	D	920.0	D	0.3	-, -, -
12	Gyproc SoundBloc	0.0150	0.250	D	1.00	D	840.0	D	12.6	-, -, -
13	Gyproc SoundBloc	0.0150	0.250	D	1.00	D	840.0	D	12.6	-, -, -
	Start of calculation - Warm									
		0.3902							**25.6**	

Heat capacity = 25.6 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)).

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.