

## Back to Earth SW Ltd

7 Tuns Lane  
Silverton  
Exeter  
EX5 4HY

### Project Information

Reference

Date 4 December 2023

### Construction Type

Element : Wall - Wall-masonry-solid-external-timber clad

Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m <sup>2</sup> K/W)	Pitch (°)	Bridge details Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.040		
Ampatop Protecta	-	-	-		
Beltermo Ultra	80.0	0.042	1.900		L:0 0.000W/m <sup>2</sup> K
Baunit RK38/39	18.0	0.900	0.020		
Brick outer leaf	105.0	0.770	0.136		
Brick inner leaf	105.0	0.560	0.188		
Render, lime-sand	25.0	0.800	0.031		
Inside surface resistance	-	-	0.130		
<b>Total thickness</b>	<b>333.0mm</b>				

### U-value = 0.43W/m<sup>2</sup>K

U-value, Combined Method : 0.431W/m<sup>2</sup>K (upper/lower limit 2.445 / 2.445m<sup>2</sup>K/W, dUf 0.0217, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

### Correction factors

Mechanical fasteners :-

Insulation Fixings

Alpha : 0.80 per m lambda f : 50.0000W/mK nf : 6.000 per m<sup>2</sup> Af : 12.000mm<sup>2</sup> Recess : 0.0mm

Delta Uf for Beltermo Ultra : 0.0217

nf = fasteners per m<sup>2</sup> Af = fasteners cross-sectional area

Air gaps, Delta Ug = 0.000W/m<sup>2</sup>K

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m <sup>2</sup> K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.040	-	-
Ampatop Protecta	-	-	-	-	0.50
Beltermo Ultra	80.0	0.042	1.900	25.00	2.00
Baumit RK38/39	18.0	0.900	0.020	50.00	0.90
Brick outer leaf	105.0	0.770	0.136	50.00	5.25
Brick inner leaf	105.0	0.560	0.188	50.00	5.25
Render, lime-sand	25.0	0.800	0.031	50.00	1.25
Inside surface resistance	-	-	0.130	-	-
<b>Total thickness</b>	<b>333.0mm</b>				

Structure element : Wall  
Condensation calculations performed in accordance with BS5250:2021

**Condensation is occurring at the following layers interfaces:-**

Month	Int (C°)	Int (%RH)	Ext (C°)	Ext (%RH)
Jan	21.00	45.10	3.10	85.00
Feb	21.00	44.60	3.10	83.50
Mar	21.00	45.40	5.20	79.50
Apr	21.00	46.70	7.60	75.50
May	21.00	51.40	10.60	76.00
Jun	21.00	57.20	14.00	74.50
Jul	21.00	61.90	15.80	75.00
Aug	21.00	62.60	15.40	77.50
Sep	21.00	58.60	13.20	79.50
Oct	21.00	53.90	10.00	83.00
Nov	21.00	48.00	6.00	84.00
Dec	21.00	46.40	4.20	85.50

Gc = Monthly moisture accumulation per area at an interface

Ma = Accumulated moisture content per area at an interface

Peak accumulated moisture content per area at interface (Ma) = 0.00000 Kg/m<sup>2</sup>

Annual moisture accumulation = 0.00000 Kg/m<sup>2</sup>

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Date 4 December 2023

**Thermal Mass Details**

	Thickness assessed (actual) (mm)	Density (kg/m <sup>3</sup> )	Specific heat capacity (J/kgK)	Heat capacity (kJ/m <sup>2</sup> K)
Ampatop Protecta	0.0 (-)	300.0	850.0	0.0
Beltermo Ultra	0.0 (80.0)	180.0	2100.0	0.0
Baumit RK38/39	0.0 (18.0)	1300.0	1000.0	0.0
Brick outer leaf	0.0 (105.0)	1700.0	840.0	0.0
Brick inner leaf	75.0 (105.0)	1700.0	840.0	107100000.0
Render, lime-sand	25.0 (25.0)	1600.0	1000.0	40000000.0
Total				147100000.0
kappa value				147.1000
Limiting condition:	100mm in			

Admittance : 4.37 W/m<sup>2</sup>K    Decrement : 0.11 factor    Decrement delay : -12.76 hours

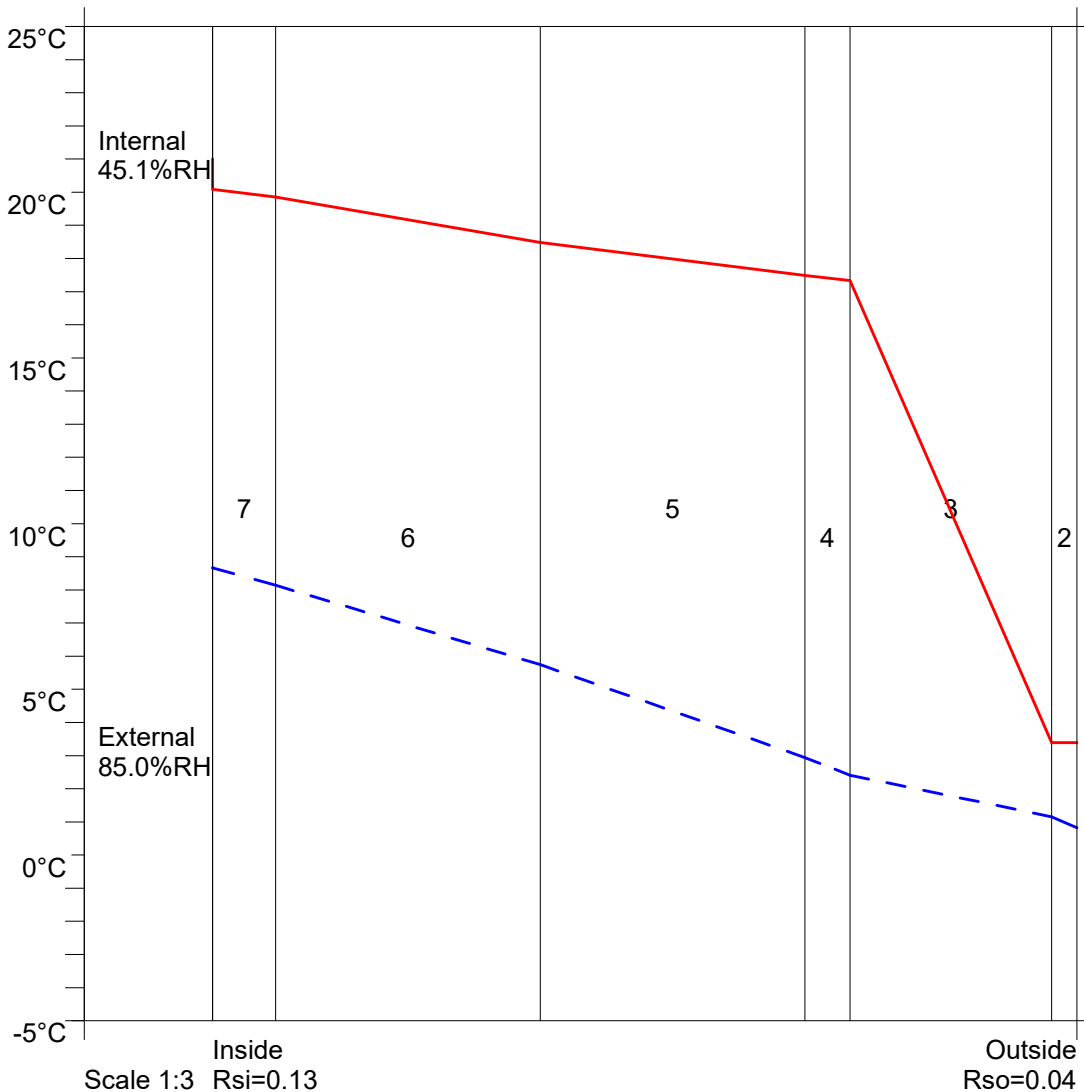
## Condensation Risk Analysis (no account taken of thermal bridges)

### 2 - Offices, shops and dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
21.0C 45.1%	21.0C 44.6%	21.0C 45.4%	21.0C 46.7%	21.0C 51.4%	21.0C 57.2%	21.0C 61.9%	21.0C 62.6%	21.0C 58.6%	21.0C 53.9%	21.0C 48.0%	21.0C 46.4%
3.1C 85.0%	3.1C 83.5%	5.2C 79.5%	7.6C 75.5%	10.6C 76.0%	14.0C 74.5%	15.8C 75.0%	15.4C 77.5%	13.2C 79.5%	10.0C 83.0%	6.0C 84.0%	4.2C 85.5%

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m <sup>2</sup> )	Peak Buildup (g/m <sup>2</sup> )	Condensation
1 Outside surface resistance							
2 Ampatop Protecta	3.4	0.8	0.65	0.78			No
3 Beltermo Ultra	3.4	1.2	0.66	0.78			No
4 Baumit RK38/39	17.3	2.4	0.73	1.98			No
5 Brick outer leaf	17.5	2.9	0.75	2.00			No
6 Brick inner leaf	18.5	5.7	0.92	2.13			No
7 Render, lime-sand	19.9	8.1	1.08	2.32			No
8 Inside surface resistance	20.1	8.7	1.12	2.35			No

Worst case internal / external conditions for graph : 21.0°C @ 45.1%RH / 3.1°C @ 85.0%RH



## Condensation Risk Analysis (no account taken of thermal bridges)

### 2 - Offices, shops and dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
21.0C 45.1%	21.0C 44.6%	21.0C 45.4%	21.0C 46.7%	21.0C 51.4%	21.0C 57.2%	21.0C 61.9%	21.0C 62.6%	21.0C 58.6%	21.0C 53.9%	21.0C 48.0%	21.0C 46.4%
3.1C 85.0%	3.1C 83.5%	5.2C 79.5%	7.6C 75.5%	10.6C 76.0%	14.0C 74.5%	15.8C 75.0%	15.4C 77.5%	13.2C 79.5%	10.0C 83.0%	6.0C 84.0%	4.2C 85.5%

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m <sup>2</sup> )	Peak Buildup (g/m <sup>2</sup> )	Conden-sation
1 Outside surface resistance							
2 Ampatop Protecta	15.9	11.4	1.35	1.80			No
3 Beltermo Ultra	15.9	11.5	1.35	1.80			No
4 Baumit RK38/39	19.9	11.7	1.38	2.33			No
5 Brick outer leaf	20.0	11.9	1.39	2.33			No
6 Brick inner leaf	20.3	12.6	1.46	2.38			No
7 Render, lime-sand	20.7	13.3	1.52	2.44			No
8 Inside surface resistance	20.7	13.4	1.54	2.45			No

Worst case internal / external conditions for graph : 21.0°C @ 61.9%RH / 15.8°C @ 75.0%RH

