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-cavity-internal-plasterboard
Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Pitch (º)	Bridge details Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.130		
Brick outer leaf	105.0	0.770	0.000		
Airspace, heat flow horizontal, 50 mm thick	50.0	-	0.000		
Brick inner leaf	105.0	0.560	0.188		
Clay Plaster	10.0	0.800	0.013		
UdiTHERM	60.0	0.038	1.550		L:0 0.000W/m²K
Ampatex Variano	-	-	-		
SteicoFlex	50.0	0.036	1.350		11.800% Softwood (50.0mm) L:0 0.000W/m²K
Gyproc Wallboard	12.5	0.190	0.066		
Inside surface resistance	-	-	0.130		
Total thickness	**392.5mm**				

U-value = 0.32W/m²K

U-value, Combined Method : 0.324W/m²K (upper/lower limit 3.274 / 3.118m²K/W, dUf 0.0109, 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 : 4.000 per m² Af : 20.000mm² Recess : 0.0mm
Delta Uf for UdiTHERM : 0.0109
nf = fasteners per m² Af = fasteners cross-sectional area
Air gaps, Delta Ug = 0.000W/m²K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.130	-	-
Brick outer leaf	105.0	0.770	0.000	50.00	5.25
Airspace, heat flow horizontal, 50 mm thick	50.0	-	0.000	-	0.00
Brick inner leaf	105.0	0.560	0.188	50.00	5.25
Clay Plaster	10.0	0.800	0.013	25.00	0.25
UdiTHERM	60.0	0.038	1.550	25.00	1.50
Ampatex Variano	-	-	-	-	21.00
SteicoFlex	50.0	0.036	1.350	5.00	0.25
Gyproc Wallboard	12.5	0.190	0.066	50.00	0.63
Inside surface resistance	-	-	0.130	-	-
Total thickness	**392.5mm**				

Detailed U-value Calculation Results

Construction includes 1 bridged layer

Non-bridged layers	
Outside surface resistance	0.130 m²K/W
Brick inner leaf	0.188 m²K/W
Clay Plaster	0.013 m²K/W
UdiTHERM	1.550 m²K/W
Gyproc Wallboard	0.066 m²K/W
Inside surface resistance	0.130 m²K/W
Resistance of non-bridged layers, R_{NB} =	2.076 m²K/W

Bridged layer
SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex
Path 2 - Softwood

Resistance and fraction of heat flow paths
$R_{P1} = R_{NB} + R_{L1} = 2.076 + 1.350 = 3.426$ m²K/W $F_{P1} = 88.200\%$
$R_{P2} = R_{NB} + R_{L2} = 2.076 + 0.385 = 2.461$ m²K/W $F_{P2} = 11.800\%$

Upper resistance limit
$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$
$R_{upper} = 1 / ((0.882/3.426) + (0.118/2.461)) = 3.274$m²K/W

Lower resistance limit
$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$
$R_{lower} = 2.076 + 1 / ((0.882/1.350) + (0.118/0.385)) = 3.118$m²K/W

Total resistance of wall
$R_T = (R_{upper} + R_{lower}) / 2 = (3.274 + 3.118) / 2 = 3.20$ m²K/W

Mechanical fasteners :-
Calculations to BS EN ISO 6946:2007
Insulation Fixings
Alpha : 0.80 per m lambda f : 50.0000W/mK nf : 4.000 per m² Af : 20.000mm² Recess : 0.0mm
Delta Uf for UdiTHERM : 0.0109
Correction for air gaps, Delta Ug = 0.0000W/m²K

U = (1 / Rt) + (Delta Uf + Delta Ug + Delta Up + Delta Urc2 + Delta Urc2) = (1/3.1960) + 0.0109 + 0.0000 + 0.0000 + 0.0000 + 0.0000 = 0.32 W/m²K

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

Condensation is occuring 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/m²

Annual moisture accumulation = 0.00000 Kg/m²

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Thermal Mass Details

	Thickness assessed (actual) (mm)	Density (kg/m³)	Specific heat capacity (J/kgK)	Heat capacity (kJ/m²K)
Brick outer leaf	0.0 (105.0)	1700.0	840.0	0.0
Airspace, heat flow horizontal, 50 mm thick	0.0 (50.0)	1.2	1008.0	0.0
Brick inner leaf	0.0 (105.0)	1700.0	840.0	0.0
Clay Plaster	0.0 (10.0)	1700.0	1000.0	0.0
UdiTHERM	0.0 (60.0)	160.0	2100.0	0.0
Ampatex Variano	0.0 (-)	280.0	850.0	0.0
SteicoFlex	0.0 (50.0)	60.0	2100.0	0.0
Gyproc Wallboard	12.5 (12.5)	0.0	0.0	0.0
Total				0.0
kappa value				0.0000

Limiting condition: insulation

Admittance : 0.55 W/m²K Decrement : 0.12 factor Decrement delay : -12.80 hours

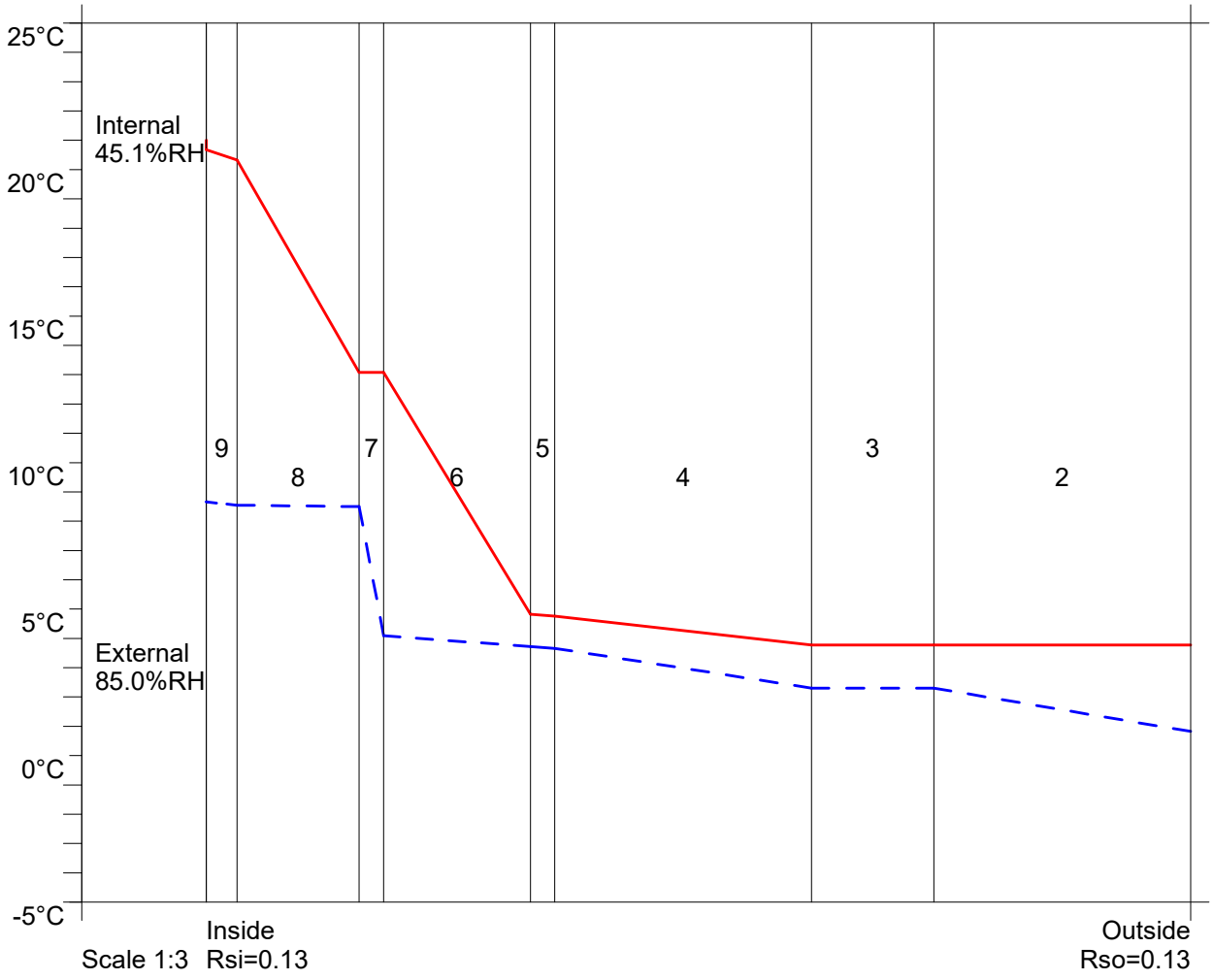
Condensation Risk Analysis (no account taken of thermal bridges)

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. ºC	Dewpoint Temp. ºC	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance	3.8	0.8	0.65	0.80			No
2 Brick outer leaf	3.8	2.3	0.72	0.80			No
3 Airspace, heat flow horizontal, 50 mm thick	3.8	2.3	0.72	0.80			No
4 Brick inner leaf	4.8	3.7	0.79	0.86			No
5 Clay Plaster	4.8	3.7	0.80	0.86			No
6 UdiTHERM	13.1	4.1	0.82	1.50			No
7 Ampatex Variano	13.1	8.5	1.11	1.50			No
8 SteicoFlex	20.3	8.5	1.11	2.39			No
9 Gyproc Wallboard	20.7	8.7	1.12	2.44			No
10 Inside surface resistance							

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. ºC	Dewpoint Temp. ºC	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance	16.0	11.4	1.35	1.82			No
2 Brick outer leaf	16.0	11.7	1.38	1.82			No
3 Airspace, heat flow horizontal, 50 mm thick	16.0	11.7	1.38	1.82			No
4 Brick inner leaf	16.3	12.0	1.41	1.85			No
5 Clay Plaster	16.3	12.1	1.41	1.85			No
6 UdiTHERM	18.7	12.2	1.41	2.16			No
7 Ampatex Variano	18.7	13.4	1.53	2.16			No
8 SteicoFlex	20.8	13.4	1.54	2.46			No
9 Gyproc Wallboard	20.9	13.4	1.54	2.47			No
10 Inside surface resistance							

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