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Whitebridge Way
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Project Information

Reference 2000082(LR)
Date 12 March 2020
Project Beauvoir, Rue Des Monts, St Sampson, GUERNSEY, GY2 4HT

Construction Type

Element : Wall - Uvalue - Proposed Basic 1-80mm
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	-	-	0.040		
Silitect T	1.5	0.000	0.000		
Armatop MP	5.0	1.000	0.005		
EPS Insulation 032 Graphite Enhanced 20mm - 400mm	80.0	0.032	2.500		L:0 0.000W/m²K
Armatop MP	5.0	1.000	0.005		
Render (BS5250)	15.0	0.800	0.019		
Brick, Dense, external	215.0	1.099	0.196		17.185% Mortar (215.0mm)
Inside surface resistance	-	-	0.130		
Total thickness	**321.5mm**				

U-value = 0.34 W/m²K

U-value, Combined Method : 0.34 W/m²K (upper/lower limit 2.900 / 2.899m²K/W, dUf 0.0070, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Mechanical fasteners :-
Point thermal transmittance : 0.0010W/K nf : 7.000 per m²
Delta Uf for EPS Insulation 032 Graphite Enhanced 20mm - 400mm : 0.0070
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 (m^2K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.040	-	-
Silitect T	1.5	0.000	0.000	335.00	0.50
Armatop MP	5.0	1.000	0.005	50.00	0.25
EPS Insulation 032 Graphite Enhanced 20mm - 400mm	80.0	0.032	2.500	145.00	11.60
Armatop MP	5.0	1.000	0.005	50.00	0.25
Render (BS5250)	15.0	0.800	0.019	100.00	1.50
Brick, Dense, external	215.0	1.099	0.196	80.00	17.20
Inside surface resistance	-	-	0.130	-	-
Total thickness	**321.5mm**				

Detailed U-value Calculation Results

Construction includes 1 bridged layer

Non-bridged layers

Outside surface resistance	0.040 m²K/W
Armatop MP	0.005 m²K/W
EPS Insulation 032 Graphite Enhanced 20mm - 400mm	2.500 m²K/W
Armatop MP	0.005 m²K/W
Render (BS5250)	0.019 m²K/W
Inside surface resistance	0.130 m²K/W
Resistance of non-bridged layers, R_{NB} =	2.699 m²K/W

Bridged layer

Brick, Dense, external (L1) bridged by Mortar (B1)

Path 1 - Brick, Den

Path 2 - Mortar

Resistance and fraction of heat flow paths

$R_{P1} = R_{NB} + R_{L1} = 2.699 + 0.196 = 2.894$ m²K/W $F_{P1} = 82.815\%$

$R_{P2} = R_{NB} + R_{L2} = 2.699 + 0.229 = 2.927$ m²K/W $F_{P2} = 17.185\%$

Upper resistance limit

$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$

$R_{upper} = 1 / ((0.828/2.894) + (0.172/2.927)) = 2.900$m²K/W

Lower resistance limit

$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$

$R_{lower} = 2.699 + 1 / ((0.828/0.196) + (0.172/0.229)) = 2.899$m²K/W

Total resistance of wall

$R_T = (R_{upper} + R_{lower}) / 2 = (2.900 + 2.899) / 2 = 2.90$ m²K/W

Mechanical fasteners :-

Calculations to BS EN ISO 6946:2007

Point thermal transmittance : 0.0010W/K nf : 7.000 per m²

Delta Uf for EPS Insulation 032 Graphite Enhanced 20mm - 400mm : 0.0070

Correction for air gaps, Delta Ug = 0.0000W/m²K

(Delta Uf + Delta Ug + Delta Up + Delta Ur) is less than 3% of (1 / Rt) so U = (1 / Rt) + (Delta Ur) + (Delta Urc) = 0.34 W/m²K

Structure element : Wall
Condensation calculations performed in accordance with BS5250:2011

Condensation is occuring at the following layers interfaces:-

Month	Int (C°)	Int (%RH)	Ext (C°)	Ext (%RH)
Jan	20.00	59.70	5.90	85.50
Feb	20.00	58.70	5.70	83.50
Mar	20.00	59.10	6.90	82.00
Apr	20.00	59.80	8.80	79.50
May	20.00	63.00	11.50	79.00
Jun	20.00	68.40	14.30	79.50
Jul	20.00	73.20	16.10	80.50
Aug	20.00	73.70	16.00	81.50
Sep	20.00	70.80	14.30	83.00
Oct	20.00	67.20	11.90	85.00
Nov	20.00	61.90	8.50	84.50
Dec	20.00	60.70	7.00	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)
Silitect T	0.0 (1.5)	1800.0	0.0	0.0
Armatop MP	0.0 (5.0)	1400.0	0.0	0.0
EPS Insulation 032 Graphite Enhanced 20mm - 400mm	0.0 (80.0)	15.0	0.0	0.0
Armatop MP	0.0 (5.0)	1400.0	0.0	0.0
Render (BS5250)	0.0 (15.0)	1600.0	0.0	0.0
Brick, Dense, external	100.0 (215.0)	1850.0	0.0	0.0
Total				0.0
kappa value				0.0000

Limiting condition: 100mm in

Admittance : 5.88 W/m²K Decrement : 17.03 factor Decrement delay : 0.00 hours

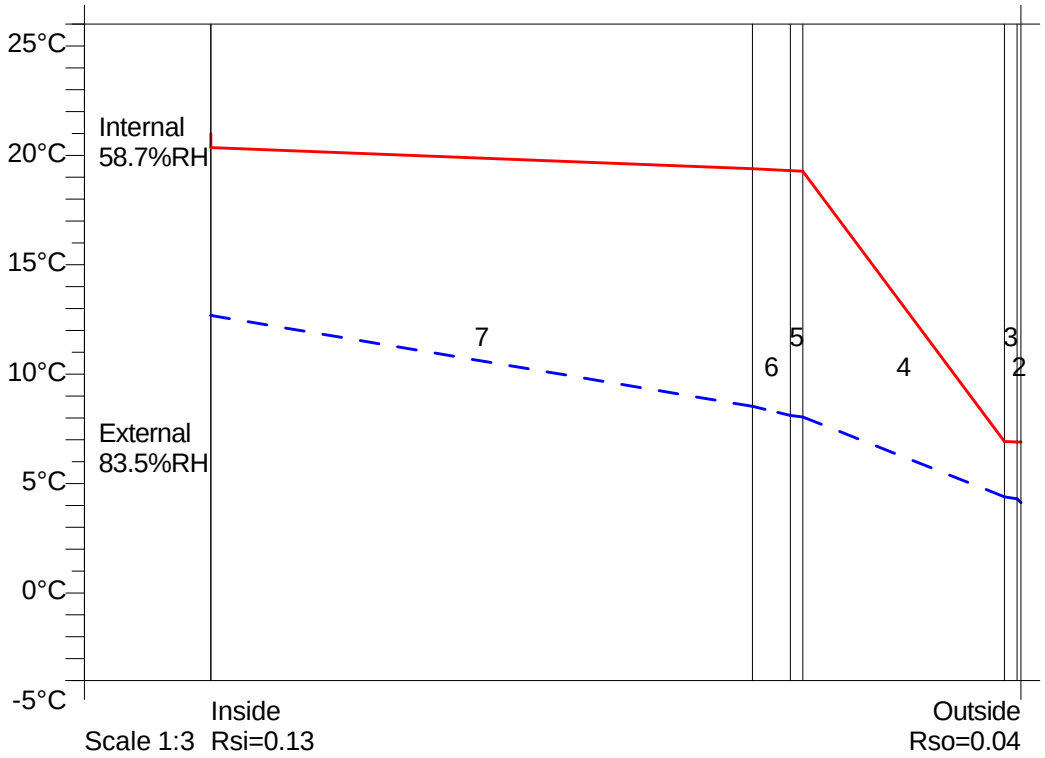
Condensation Risk Analysis (no account taken of thermal bridges)

3 - Dwellings with low occupancy

Jan		Feb (worst)		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
20.0C	59.7%	20.0C	58.7%	20.0C	59.1%	20.0C	59.8%	20.0C	63.0%	20.0C	68.4%	20.0C	73.2%	20.0C	73.7%	20.0C	70.8%	20.0C	67.2%	20.0C	61.9%	20.0C	60.7%
5.9C	85.5%	5.7C	83.5%	6.9C	82.0%	8.8C	79.5%	11.5C	79.0%	14.3C	79.5%	16.1C	80.5%	16.0C	81.5%	14.3C	83.0%	11.9C	85.0%	8.5C	84.5%	7.0C	85.5%

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance	5.9	3.1	0.76	0.93			No
2 Silitect T	5.9	3.3	0.77	0.93			No
3 Armatop MP	5.9	3.4	0.78	0.93			No
4 EPS Insulation 032 Graphite Enhanced 20mm - 400mm	18.3	7.0	1.00	2.10			No
5 Armatop MP	18.3	7.1	1.01	2.10			No
6 Render (BS5250)	18.4	7.5	1.04	2.11			No
7 Brick, Dense, external	19.4	11.7	1.37	2.25			No
8 Inside surface resistance							

Worst case internal / external conditions for graph : 20.0°C @ 58.7%RH / 5.7°C @ 83.5%RH



Condensation Risk Analysis (no account taken of thermal bridges)

3 - Dwellings with low occupancy

Jan		Feb (worst)		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
20.0C	59.7%	20.0C	58.7%	20.0C	59.1%	20.0C	59.8%	20.0C	63.0%	20.0C	68.4%	20.0C	73.2%	20.0C	73.7%	20.0C	70.8%	20.0C	67.2%	20.0C	61.9%	20.0C	60.7%
5.9C	85.5%	5.7C	83.5%	6.9C	82.0%	8.8C	79.5%	11.5C	79.0%	14.3C	79.5%	16.1C	80.5%	16.0C	81.5%	14.3C	83.0%	11.9C	85.0%	8.5C	84.5%	7.0C	85.5%

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance	16.2	12.8	1.47	1.84			No
2 Silitect T	16.2	12.8	1.48	1.84			No
3 Armatop MP	16.2	12.8	1.48	1.84			No
4 EPS Insulation 032 Graphite Enhanced 20mm - 400mm	19.5	13.7	1.57	2.27			No
5 Armatop MP	19.5	13.7	1.57	2.27			No
6 Render (BS5250)	19.6	13.8	1.58	2.27			No
7 Brick, Dense, external	19.8	15.1	1.71	2.31			No
8 Inside surface resistance							

Worst case internal / external conditions for graph : 20.0°C @ 73.2%RH / 16.1°C @ 80.5%RH