

### Project Information

Reference

Date 2 March 2012

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### Construction Type

Element : Flat roof - B120436 - Proposed - 02.03.2012

Conventional warm flat roof

Internal surface emissivity : High

External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m <sup>2</sup> K/W)	Vapour Resistivity (MN/gm)	Vapour Resistance (MN/g)
Outside surface resistance	-	-	0.040	-	-
Bauder Plant-E Capping Sheet	5.0	0.170	0.029	162240	811.20
Bauder KSA-Duo Underlayer	3.0	0.170	0.018	182000	546.00
Bauder PIR FA-TE Insulation	120.0	0.023	5.200	300.00	36.00
Bauder DS1-Duo Vapour Barrier	3.5	0.170	0.021	-	1500.00
Decking Plywood	18.0	0.170	0.106	3500.00	63.00
Inside surface resistance	-	-	0.100	-	-

### U-value = 0.18W/m<sup>2</sup>K

U-value, Combined Method : 0.18W/m<sup>2</sup>K (upper/lower limit 5.514 / 5.514m<sup>2</sup>K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m<sup>2</sup>K)

(Correction for air gaps, Delta Ug = 0.000W/m<sup>2</sup>K)

Admittance : 7.14 W/m<sup>2</sup>K Decrement : 39.38 factor Decrement delay : 0.00 hours

Advice from BS 5250:2011 regarding acceptable levels of condensate: "In flat roofs with a continuously supported waterproof covering the maximum predicted amount of condensate should not exceed 350g/m<sup>2</sup> and any condensate should dry out during the course of the year so as to avoid year on year accumulation. Organic materials should not be exposed to harmful and prolonged condensation".

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Structure element : Flat roof  
 Description : Conventional warm flat roof  
 Condensation calculations performed in accordance with BS5250:2002

Condensation is occurring at the following layers interfaces:-  
 Interface 1 : Bauder KSA-Duo Underlayer / Bauder PIR FA-TE Insulation

Month	Int (C°)	Int (%RH)	Ext (C°)	Ext (%RH)	Interface1 Gc (Kg/m²)	Ma (Kg/m²)
Jan	20.00	59.10	4.60	82.00	0.00085	0.00191
Feb	20.00	58.00	4.70	79.00	0.00039	0.00230
Mar	20.00	55.60	6.80	72.00	-0.00008	0.00222
Apr	20.00	52.40	8.90	64.00	-0.00069	0.00153
May	20.00	53.80	12.30	64.00	-0.00135	0.00018
Jun	20.00	57.50	15.50	65.00	-0.00188	0.00000
Jul	20.00	61.40	17.60	66.00	0.00000	0.00000
Aug	20.00	63.40	17.30	69.00	0.00000	0.00000
Sep	20.00	62.60	14.90	73.00	0.00000	0.00000
Oct	20.00	61.70	11.70	78.00	0.00000	0.00000
Nov	20.00	60.60	7.50	83.00	0.00023	0.00023
Dec	20.00	60.40	5.40	85.00	0.00082	0.00105

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) = 0.00230 Kg/m²

Annual moisture accumulation = 0.00000 Kg/m²

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

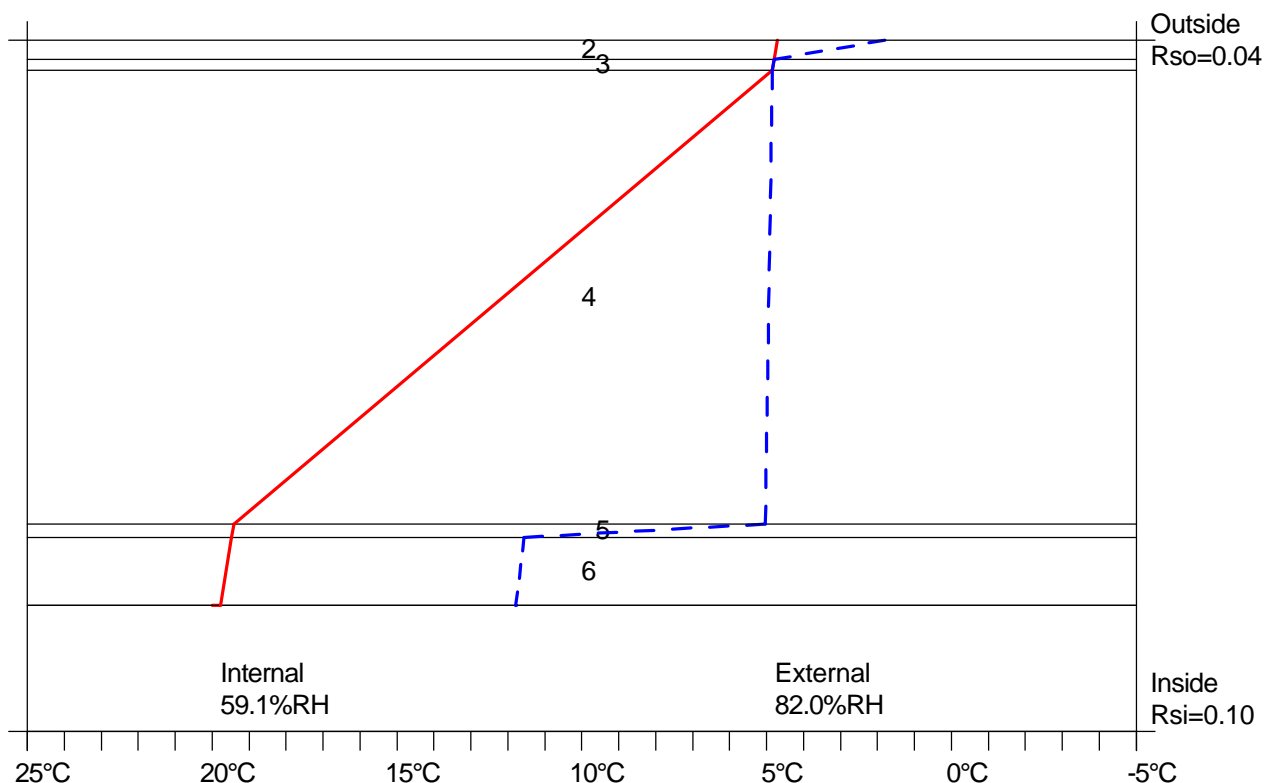
### 3 - Dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.0C 59.1%	20.0C 58.0%	20.0C 55.6%	20.0C 52.4%	20.0C 53.8%	20.0C 57.5%	20.0C 61.4%	20.0C 63.4%	20.0C 62.6%	20.0C 61.7%	20.0C 60.6%	20.0C 60.4%
4.6C 82.0%	4.7C 79.0%	6.8C 72.0%	8.9C 64.0%	12.3C 64.0%	15.5C 65.0%	17.6C 66.0%	17.3C 69.0%	14.9C 73.0%	11.7C 78.0%	7.5C 83.0%	5.4C 85.0%

	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							
2 Bauder Plant-E Capping Sheet	4.7	1.8	0.70	0.85			No
3 Bauder KSA-Duo Underlayer	4.8	4.8	0.86	0.86			No
4 Bauder PIR FA-TE Insulation	4.8	4.8	0.86	0.86	0.9 in Jan	2 in Feb	Yes
5 Bauder DS1-Duo Vapour Barrier	19.4	5.0	0.87	2.25			No
6 Decking Plywood	19.5	11.6	1.36	2.26			No
7 Inside surface resistance	19.8	11.8	1.38	2.30			No

Worst case internal / external conditions for graph : 20.0°C @ 59.1%RH / 4.6°C @ 82.0%RH

Scale 1:2



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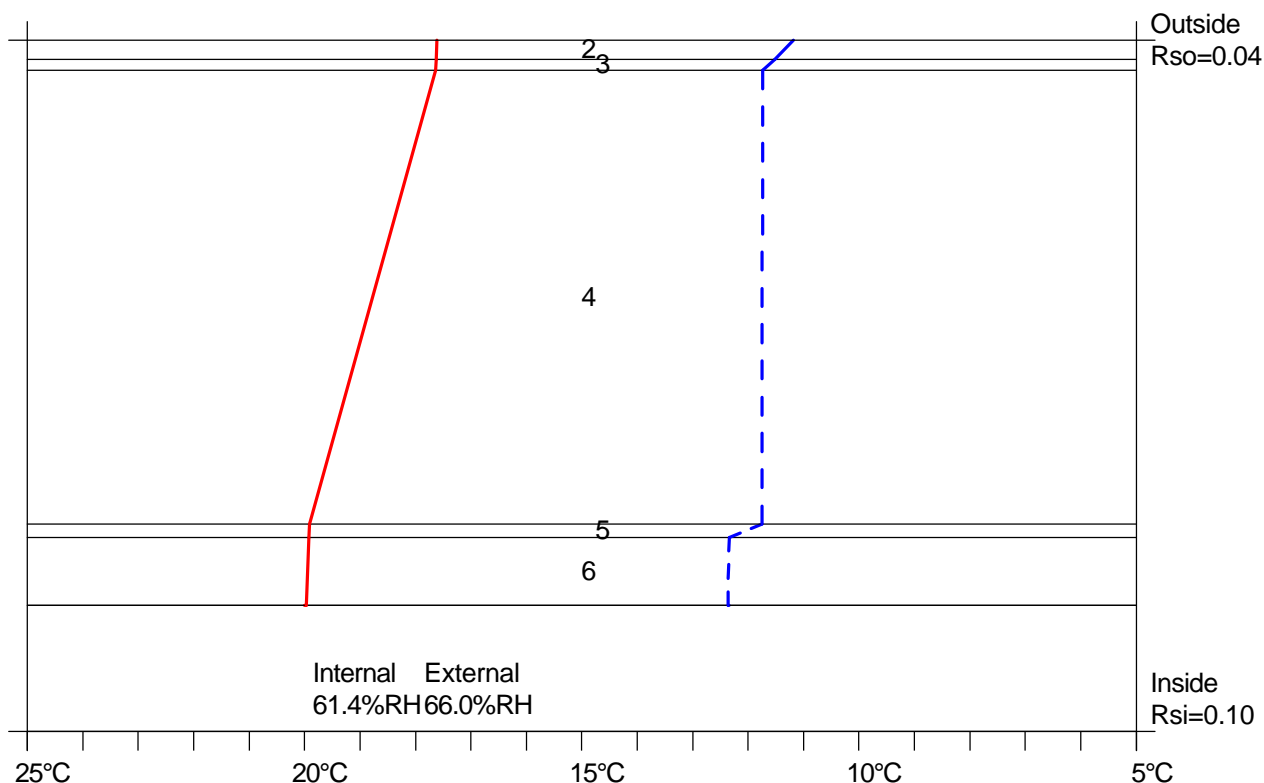
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4.6C 82.0%	4.7C 79.0%	6.8C 72.0%	8.9C 64.0%	12.3C 64.0%	15.5C 65.0%	17.6C 66.0%	17.3C 69.0%	14.9C 73.0%	11.7C 78.0%	7.5C 83.0%	5.4C 85.0%

	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	17.6	11.2	1.33	2.01			No
2 Bauder Plant-E Capping Sheet	17.6	11.5	1.36	2.02			No
3 Bauder KSA-Duo Underlayer	17.6	11.7	1.38	2.02	0.9 in Jan	2 in Feb	Yes
4 Bauder PIR FA-TE Insulation	19.9	11.8	1.38	2.32			No
5 Bauder DS1-Duo Vapour Barrier	19.9	12.3	1.43	2.33			No
6 Decking Plywood	20.0	12.4	1.43	2.33			No
7 Inside surface resistance							No

Worst case internal / external conditions for graph : 20.0°C @ 61.4%RH / 17.6°C @ 66.0%RH

Scale 1:2



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