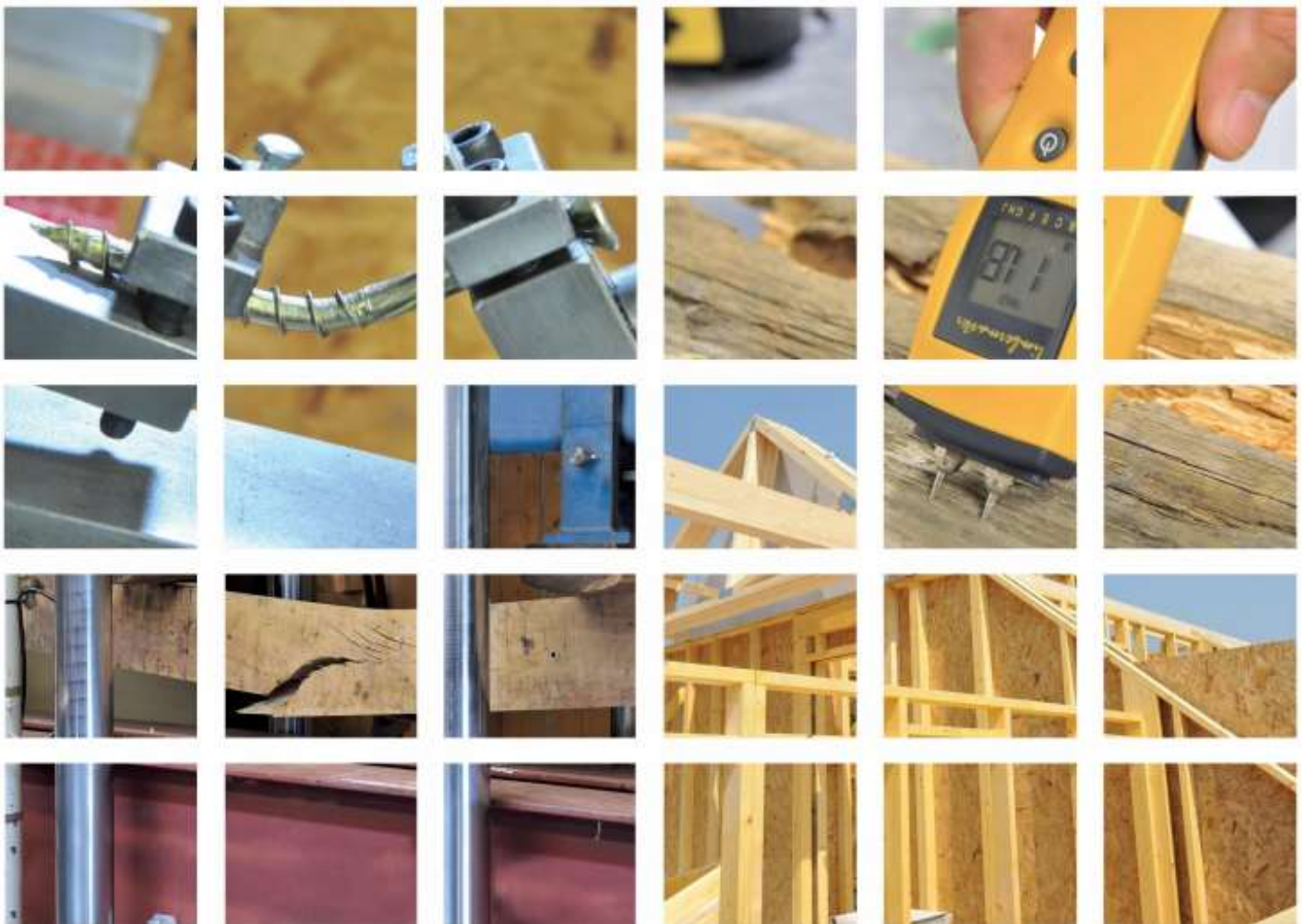


# Q-Mark Registration Schedule


## Vapour Permeable Roof/Wall Membrane

### Boost<sup>R</sup> Hybrid and Boost<sup>R</sup> Hybrid Roof

ACTIS SA  
30 Avenue de Catalogne  
11300 Limoux  
France



## Q-Mark Registration Schedule

<b>Holder of Q-Mark</b>		ACTIS SA
<b>Product Name</b>		Boost <sup>R</sup> Hybrid
<b>Type and Use of Product</b>		Vapour Permeable Membrane for use in Roofs, Walls and Floors
<b>Validity:</b>	<b>From</b>	20/01/2020
	<b>To</b>	03/03/2022
<b>Date of This Issue</b>		20/01/2020
<b>Issue Number</b>		3
<b>This Issue Replaces</b>		Revision 04/03/2019
<b>Relates to Certificate Number</b>		CPS-014
<b>Manufacturing Address/s</b>		30 Avenue de Catalogne 11300 Limoux France
<b>This Schedule Contains</b>		49 Pages, including 3 Annexes
		

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## 1 INTRODUCTION

The Q-Mark Scheme is a third-party Product Certification Scheme operated by BM TRADA.

The Scheme is based on the principles of ISO 9001, EN 45011, ISO 17021, and ISO Guide 62/65 and confirms compliance with EN 13859-1/2: 2010, together with a specific set of performance criteria set by BM TRADA (as defined in Clause 4 of this document) in order to attain a product which performs to a high standard. The relevant standards listed above are to be read in conjunction with this document.

The Scheme covers Factory Production Control (FPC), documentation and test/assessment evidence, and the resultant certification is specific to clearly defined products and their constituent components.

The objectives of the Scheme are:

- To improve the quality and performance of Building Products.
- To provide unambiguous evidence of compliance with the standards or methods listed.
- To provide specifiers, regulators and inspection authorities with the appropriate information for them to identify suitable products.

## 2 DEFINITIONS & ABBREVIATIONS

The following definitions and abbreviations are used throughout the document. Other definitions are as given in the relevant standards.

Assessment	A considered judgement to consider whether products meet the criteria laid down in the relevant Technical Specification
Audit	Visit by BM TRADA or other certification body to examine the quality management system and production processes of a manufacturer or supplier, usually to determine appropriate compliance to ISO 9001, with specific emphasis on the factory production control elements
Member	Company holding membership of the Q-Mark scheme
QMS	Quality Management System (e.g. one meeting BS EN ISO 9001)
Schedule	The certification schedule, which identifies the scope and range of products covered by the membership certificate
Scheme	The BM TRADA Q-Mark Construction Products Scheme

## 3 SCOPE

The Scheme is applicable to construction products that fall within the scopes of the product standards referenced in Clause 1 of this document, and applies to products as manufactured and supplied, and before being installed into the works.

## 4 PRODUCT DESCRIPTION

### 4.1 General

Boost<sup>R</sup> Hybrid is a vapour permeable Roof (warm pitched roofs only), Wall and Floor underlay manufactured in accordance with BS EN 13859-1/2. It also provides complementary insulating properties due to its thermal resistance and reflective properties. However, these properties are outside of the scope of BS EN 13859-1/2. The thermal performance is however covered by a complementary certificate issued by Eurofins Expert Services Ltd.

The product consists of a total of nine layers consisting of one watertight breathable coated metal membrane (outer side), four polyester fibre wadding layers, three perforated coated metal polyolefin films and a perforated coated metal reinforced polyolefin film (inner side). The internal layers are fastened together by ultrasonic welding, gluing or stitching.

Boost<sup>R</sup> Hybrid is available with or without a built in self-adhesive flap, which facilitates sealing of joints between adjacent sheets, see drawing below.

The product is CE marked by the manufacturer on the basis of certificate number C-9328-13 issued by Eurofins Expert Services Ltd.

The product may also be available with alternative CE marked membranes, e.g. Boost<sup>R</sup> Hybrid Roof has an opaque membrane. In these cases the Declaration of Performance should be consulted to ensure that the appropriate emissivity values are used.

#### 4.2 Table 1: Nominal Characteristics

Property	Boost <sup>R</sup> Hybrid
Thickness (mm)	35
Weight/unit area (g/m <sup>2</sup> )	650
Roll length (m)	6.7
Roll width (mm)	1500

#### 4.3 Intended Use

Under the scope of this certification, Boost<sup>R</sup> Hybrid has been approved for use as:

- Roof Underlay in Pitched Roofs
- Breather Membrane in Wall Constructions
- Breather Membrane in Timber Floor Constructions

The product is considered to meet or contribute to meeting the minimum requirements of the Building Regulations in the UK and Ireland. It is conditional on the use being in accordance with the guidelines detailed in this document.

When used in roofs, the space between the underlay and roofing surface material, e.g. tiles, must be ventilated. The underlay can also be installed directly on the thermal insulation or with an unventilated air gap between it and the thermal insulation.

Boost<sup>R</sup> Hybrid may also be used under tiles supported on OSB sarking boards, provided that a specific condensation risk calculation is carried out to confirm that there is no significant risk of condensation forming within the roof structure. Example calculations for this type of installation are included in Annex 3, but as BS 5250 suggests that ventilation would normally be required below the OSB in this case, it is important to conduct calculations for each specific design in order to demonstrate that condensation will not occur when this ventilation is not provided.

The product can be used as a breathable membrane in walls. It can be installed in direct contact with the thermal insulation of the wall or with a unventilated air gap between it and the thermal insulation or sheathing. The space between the product and the outer cladding must be drained and ventilated.

When used in Wall or Roof or Floor construction, a condensation risk assessment must be carried out in accordance with BS 5250.

## 5 BUILDING REGULATIONS

Boost<sup>R</sup> Hybrid is certified under the BM TRADA Q-Mark Construction Products Scheme. It is the opinion of BM TRADA that if used in accordance with the requirements of this Scheme and in accordance with the ACTIS installation manual, then the product will satisfy, or contribute to satisfying the relevant requirements of the following Regulations:

- The Building Regulations 2010 (England and Wales)
- The Building (Scotland) Regulations 2004

- The Building Regulations (Northern Ireland) 2000.
- The Building Regulations (Ireland) 1997

**Note:**

This schedule includes specific performance requirements against the following Essential Requirements:

- Mechanical Resistance and Stability – see Clause 10.2.1
- Hygiene, Health and Environment – see Clause 10.2.3
- Energy Economy and Heat Retention – see Clause 10.2.6

The performance data can be used in calculations to demonstrate compliance of a building with the appropriate sections of the above Building Regulations.

## **6 NHBC ACCEPTANCE**

When used strictly in accordance with the principles set out in this Q-Mark Schedule, Boost<sup>R</sup> Hybrid and BoostR Hybrid Roof can be used on homes covered by NHBC Warranty.

## **7 SCHEME REQUIREMENTS**

BM TRADA has determined that the Member conforms with the requirements within these Clauses by auditing and/or other forms of verification where appropriate.

### **7.1 Quality Management (QMS)**

The manufacture of the products has been conducted under the control of an appropriate Quality Management System.

The Quality Management System is subject to periodic audit (not less than once per year).

All new Members are subject to an initial inspection.

### **7.2 Documentation**

The following documents are controlled under the requirements of this Scheme:

- Manufacturing documentation (e.g. Quality Manual, procedures)
- Product specification/range documentation and Assessment
- Installation instructions
- Test Reports and Sampling
- Q-Mark Certificate and Schedule(s)

#### **7.2.1 Manufacturing Documentation**

The Member has supplied details of his manufacturing documentation to BM TRADA for review. This comprised of the Quality Manual, Procedures, works instructions and test data.

## **8 MINIMUM QMS REQUIREMENTS**

### **8.1 Quality Management System**

As part of the documented process control procedures the company has:

- Demonstrated that the products are being fabricated in accordance with documented manufacturing procedures, from purchase of raw material to the production of the finished product.
- These procedures control all critical aspects of the production.
- Target limits are defined at each one of these areas.

- All performance characteristics claimed are controlled in order to remain consistent by including appropriate checks or testing in the QMS to ensure a consistent and similar product is produced.

## **8.2 Management Responsibility**

The management of the company carries out regular reviews of the system, which shall include production records and any complaints that have been received. Notes are kept of any topics discussed and decisions made.

## **8.3 Company Representative**

A member of the management team is responsible for the FPC System.

## **8.4 Internal Audits**

Routine internal audits are carried out to ensure compliance with the requirements of the scheme is met.

## **8.5 Documentation**

Inspection and test records are kept in a format that is acceptable to BM TRADA Certification for a minimum of 5 years.

## **8.6 Work Instructions**

Work instructions and target values are placed at the critical production points throughout the manufacturing process.

## **8.7 Procedures for Non-conforming Product**

Where factory production control/target values are out of specification there is a procedure for identifying and correcting these deficiencies. The factory production control system has been assessed and found to be able to detect non-conforming product quickly enough so that affected product can be quarantined.

## **8.8 Traceability**

There are procedures, which enable appropriate traceability of production runs through to dispatch.

## **8.9 Training**

The company maintains records to show that staff have been satisfactorily trained to undertake the manufacturing and inspection tasks that they have been assigned. Records are kept of this training and the personnel's job description shall be clearly defined.

## **8.10 Complaints**

The company maintains a register of all complaints received on the quality of their product, which shows the steps they have taken to deal with the problem and their analysis of the causes. These records are kept for a minimum of 5 years.

## **8.11 Document Control**

There are procedures in place for effectively controlling the quality of documentation issued to the relevant personnel, so that they have up-to-date procedures.

## **8.12 Machinery Maintenance and Calibration**

All machinery and measuring / testing equipment that could affect the quality of the product is properly maintained and calibrated so that a consistent product can be produced and tested. There is a maintenance and calibration schedule. A record is kept of the maintenance and calibration carried out.



## **9 OTHER REQUIREMENTS OF THE SCHEME**

### **9.1 Product Specification/Range Documentation and Assessment**

The member has supplied BM TRADA with product details for review. These included material specifications, dimensions, tolerances and components. This product specification forms part of the manufacturing procedure.

Should the product specification of the certified product/s change, the member shall inform BM TRADA of the changes. A decision on the way forward shall be made to ensure continuation of certification.

## **10 TRANSPORT STORAGE AND INSTALLATION INSTRUCTIONS**

### **10.1 General**

The member shall ensure that adequate installation, storage and transport instructions are supplied with each pack or consignment of product. Any alterations to the instructions shall only be made following consultation with BM TRADA.

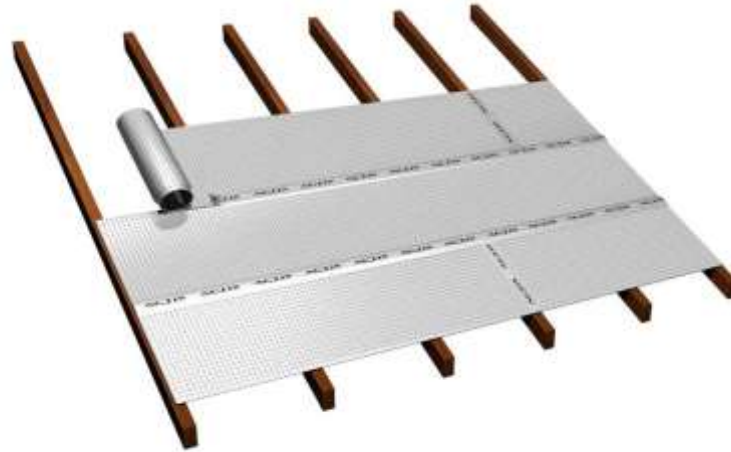
### **10.2 Transport and Storage**

The products shall be supplied in rolls wrapped in polyethylene on pallets. Each roll bears a label indicating the manufacturers name, the product name, nominal dimensions and the BM TRADA Q-Mark logo and Certificate Number.

### **10.3 Installation**

- Boost<sup>R</sup> Hybrid shall be installed horizontally or vertically in accordance with the manufacturers' installation instructions. Installation can be performed in ordinary temperature conditions for building works. See Annex for Roof, Wall and Floor drawings and other information.
- The maximum span between supports onto which the product is attached shall be 600 mm, and each row/joint shall be overlapped by at least 100 mm for roofs with slope greater than 18° or at least 200 mm for roofs with slope equal to or below 18°.
- The underlay shall be installed by use of corrosion resistant staples or nails, with the perforated side facing inwards and the watertight breather membrane facing outwards. For use in roofs the staples should have a minimum length of 14 mm. For wall applications the length of staples should be chosen in relation to the support thickness. The maximum distance between staples along end to end joints shall be 100 mm. Following stapling, the overlaps shall be covered using a proprietary ACTIS reflective adhesive tape.
- All joints, including those around windows and ventilation pipes must be sealed with an appropriate reflective adhesive tape. The product shall not come into contact with a chimney. A suitable fire resistant material must be used around a chimney and any other hot surfaces that might present a fire risk.
- Use of supports or noggins is advised between rafters when the product is laid horizontally. The product shall be stapled to these supports at spacing's of no greater than 50mm.
- Following stapling the overlaps shall be covered with the adhesive tape appropriate to the external membrane type, or by using the built in sealing flap, if that version of the product is used. Staples shall also be covered with the adhesive tape appropriate to the external membrane type to ensure an air tight seal (Refer to Figure 2).

**Figure 1: Horizontal Installation**

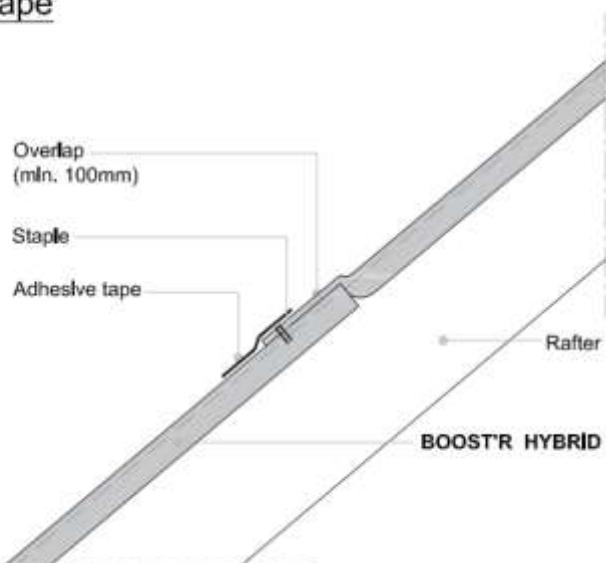


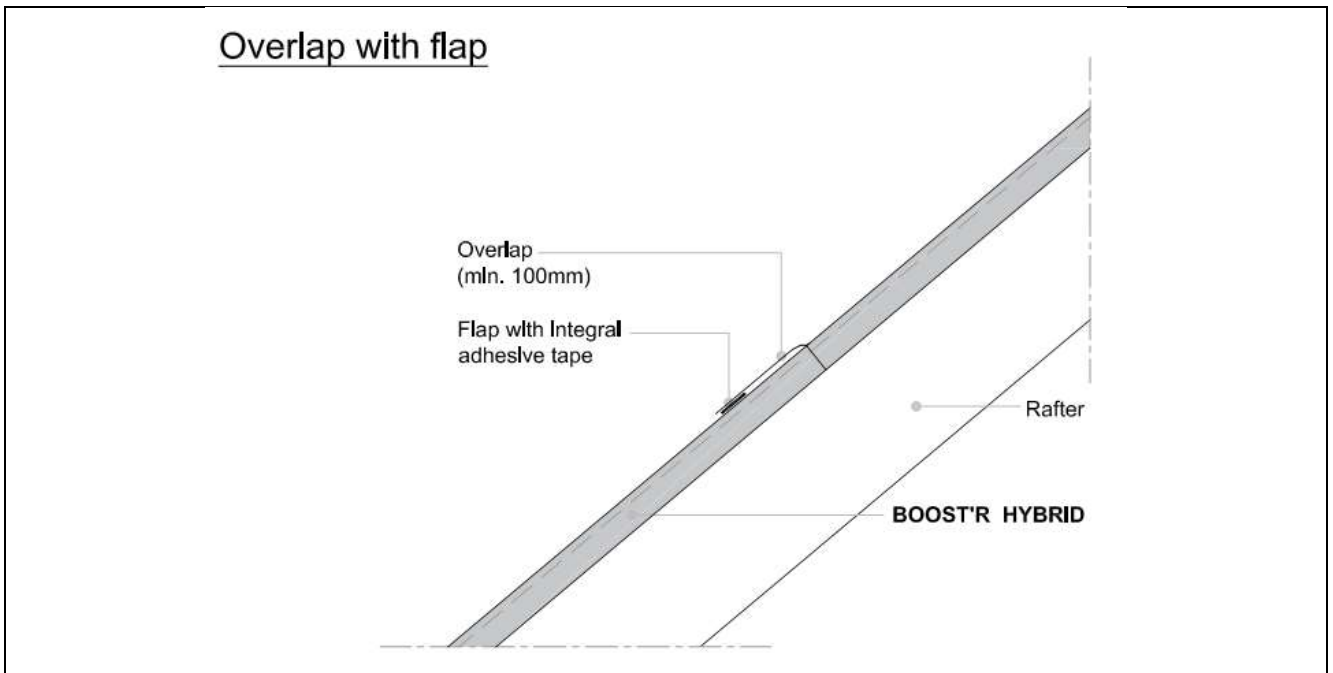
**Figure 2: Vertical Installation**



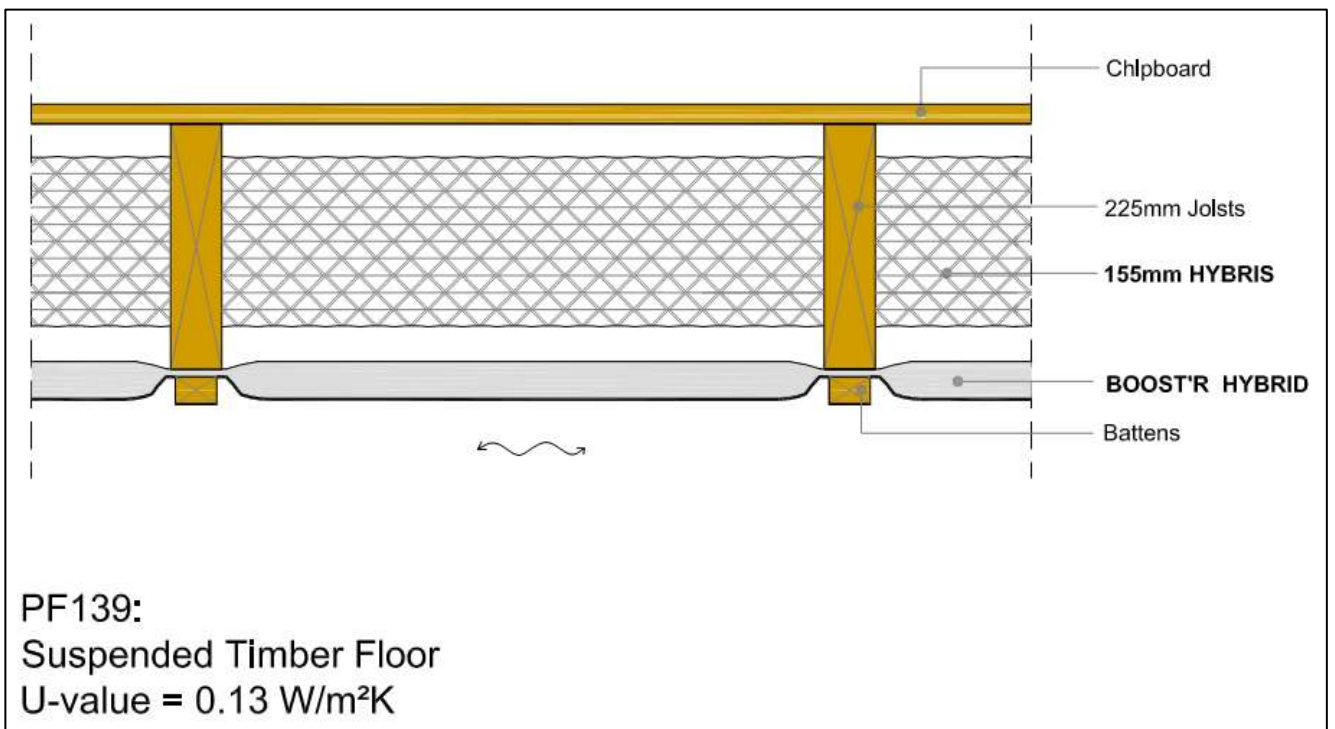
**Figure 3: Overlaps**

Overlap with tape





## 10.4 Floor Construction



## 11 TEST AND VERIFICATION REQUIREMENTS

### 11.1 Test Reports and Sampling

BM TRADA has assessed the results of testing and sampling, and/or calculation that has been carried out to demonstrate compliance with BS EN 13859-1/2, in accordance with the scheme rules. Many of the values quoted are derived from the existing certificate number C-9328-13 issued for this product by Eurofins Expert Services Ltd.

## 11.2 Initial Type Testing

### 11.2.1 Mechanical Resistance and Stability

Testing of the product has been carried out to determine the following properties and performance characteristics:

- Tensile Strength before and after ageing
- Resistance to nail tearing (nail shank)
- Water Tightness before and after aging
- Water Vapour Transmission
- Dimensional stability
- Air permeability

The test results are summarised in the Tables below.

11.2.1.1 Table 2: Tensile Strength (N/50mm) to BS EN 12311-1 & EN 13859-1/2 Annex A

	Boost <sup>R</sup> Hybrid	
Direction	Before Ageing	After Ageing
Machine	429	545
Cross	217	250

11.2.1.2 Table 3: Resistance to Nail Tearing (N) to BS EN 12310-1 & EN 13859-1/2 Annex B

Direction	Boost <sup>R</sup> Hybrid
Machine	235
Cross	240

11.2.1.3 Table 4: Water Tightness to BS EN 1928, Method A

	Boost <sup>R</sup> Hybrid	
	Before Ageing	After Ageing
Class	W1	W1

11.2.1.4 Table 5: Water Vapour Transmission (Sd & MNs/g) (BS EN ISO 12572, Method C)

Direction	Boost <sup>R</sup> Hybrid
Sd (m)	0.11
MNs/g	0.55
	Breather Membrane Component
MNs/g	0.25

### 11.2.1.5 Table 6: Dimensional Stability (BS EN 1107, +80°C/6h)

	Boost <sup>R</sup> Hybrid
% Change	<1

## 11.2.2 Safety in Case of Fire

### 11.2.2.1 Reaction to Fire

With regards to Reaction to Fire, the manufacturer has declared No Performance Assessed (NPA).

### 11.2.2.2 Resistance to Fire

Resistance to Fire of the product has not been determined, but it is unlikely that Boost<sup>R</sup> Hybrid will contribute to the fire resistance of the structure. Where required, fire performance shall be determined for the structure as a whole.

## 11.2.3 Hygiene, Health and Environment

### 11.2.3.1 Risk of Condensation

The risk of condensation occurring within the roof/wall will depend upon the thermal properties and vapour resistance of other materials in the construction, the internal and external conditions and the effectiveness of the internal VCL.

Boost<sup>R</sup> Hybrid can help prevent surface or interstitial condensation by allowing water vapour to escape from the structure. However, for each application, condensation risk calculations, as defined in BS 5250, shall be carried out to ensure that condensation will not occur to a harmful extent. The Boost<sup>R</sup> Hybrid water vapour resistance value of  $\leq 0.55$  MNs/g meets the “breather membrane” definition given in Clause 3.2 of BS 5250.

Guidance on the application of design principles for walls is given in Annex G of BS 5250 and for roofs is given in Annex H. Examples of typical condensation risk calculations are given in Annex 3. It is important that the calculations use the specific construction details, including timber fraction and appropriate climatic conditions, of each design in the calculations.

## 11.2.4 Safety in Use

Not relevant.

## 11.2.5 Protection against Noise

Protection against noise has not been evaluated. Where required, this shall be evaluated for the structure as a whole.

## 11.2.6 Energy Economy and Heat Retention

Although thermal resistance is outside the scope of BS EN 13859-1/2, test data has been provided to BM TRADA. The thermal performance of Boost<sup>R</sup> Hybrid has been measured in accordance with BS EN 16012 and the results are given in Table 7. This shows the declared emissivity and the thermal resistance with and without an air gap on either side.

Example U-value calculations for a number of constructions are given in Annex 3.

### 11.2.6.1 Table 7: Thermal Performance

Characteristic		Units	Value
Declared Emissivity (Outer/Inner Side)		-	0.31/0.05
Declared R-Value <sup>(1)</sup>	R value of Boost Hybrid (with 2 unventilated air gaps)	m <sup>2</sup> K/W	2.40
	Core R value of Boost Hybrid	m <sup>2</sup> K/W	1.35

<sup>(1)</sup> In accordance with BS EN 16012

Boost<sup>R</sup> Hybrid may also be available with alternative CE marked outer membranes, having different emissivity values to those shown in the table. This may affect the thermal performance of the outer air cavity and the Declaration of Performance for the outer membrane should be consulted in this case.

### 11.2.6.2 Thermal Performance of Compressed Product

When compressed between rafters / studs and battens, the compressed nominal thickness of Boost<sup>R</sup> Hybrid has been determined as 7mm. The related R-value of the 7mm compressed product is 0.22 m<sup>2</sup>K/W (determined in accordance with EN 12667).

### 11.3 Wind Uplift

Boost<sup>R</sup> Hybrid has been tested for wind uplift in accordance with Annex A of BS 5534. The results demonstrate that Boost<sup>R</sup> Hybrid may be used in Zones 1 to 5 subject to the limits shown in Table 8.

#### 11.3.1.1 Table 8: Wind Uplift

Wind Uplift Assessment	Geographical Wind Zone	
	345mm batten gauge	250mm batten gauge
Boost <sup>R</sup> Hybrid / Boost <sup>R</sup> Hybrid Roof with taped lap	Zones 1 to 5	Zones 1 to 5
Boost <sup>R</sup> Hybrid / Boost <sup>R</sup> Hybrid Roof with taped lap and counter batten	Zones 1 to 5	Zones 1 to 5

### 11.4 Aspects of Durability

Boost<sup>R</sup> Hybrid will remain an effective roof underlay / wall membrane for the service life of the building provided that it is installed in accordance with the manufacturer's instructions and the provisions of this certificate.

## 12 IDENTIFICATION AND USE OF THE BM TRADA AND Q-MARK LOGOS

Correct identification of approved construction products is vital in order that purchasers and controlling authorities clearly understand the status of products presented to them. It is therefore a requirement that all products or at least the packaging of the products, covered under the scheme are identified as "BM TRADA Q-Mark Certified" or with other similar wording, and/or display the Q-Mark logo. This will assist subsequent inspection authorities to recognise acceptable products. For similar reasons, Members are encouraged to make use of the Marks on marketing and Technical documentation.

### **13 GUARANTEES**

The Scheme makes no requirement on its Members to give a minimum guarantee. This is entirely up to the discretion of the Member.

**14 ANNEX 1: EVIDENCE/DOCUMENTS USED IN THIS ASSESSMENT**

1. Eurofins Expert Services Ltd - Certificate Number C-9328-13, Dated 14/12/2018
2. ACTIS Technical Report, Reference 12-18, Dated 19/11/2012
3. BRE Test Report, Reference b137751-01, Issue 2, Dated 09/07/15



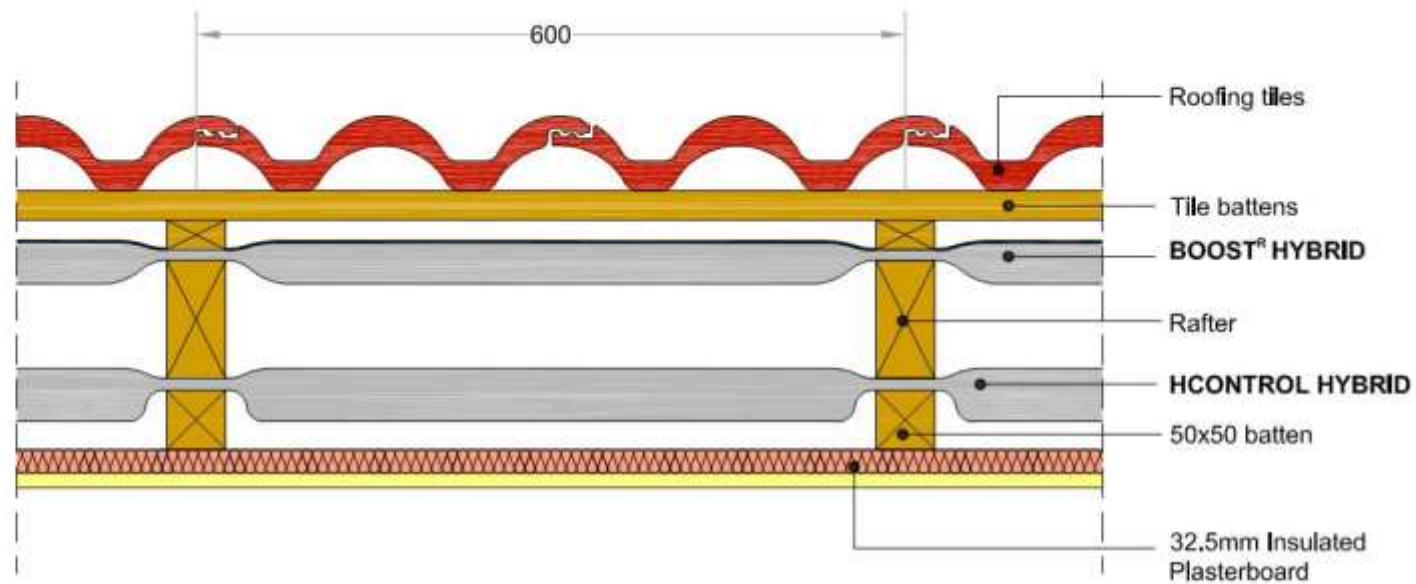
## 15 ANNEX 2: NORMATIVE REFERENCES

BS EN 1107-2:2001	Flexible Sheets for Waterproofing. Determination of Dimensional Stability. Plastic and rubber sheets for roof waterproofing.
BS EN 1849-2:2001	Flexible Sheets for Waterproofing. Determination of thickness and mass per unit area. Plastic and rubber sheets for roof waterproofing
BS EN 12310-2:2000	Flexible Sheets for Waterproofing. Determination of Resistance to tearing (nail shank). Plastic and rubber sheets for roof waterproofing.
BS EN 12311-2:2000	Flexible Sheets for Waterproofing. Determination of Tensile Properties. Plastic and rubber sheets for roof waterproofing.
BS EN 13111-2:2001	Flexible Sheets for Waterproofing. Underlay's for discontinuous roofing and walls. Determination of Resistance to water penetration
BS EN 13859:2010	Flexible Sheets for Waterproofing. Definitions and Characteristics for Underlay's. Underlay's for Walls
BS EN ISO 6946:1997	Building Components and Building Elements. Thermal Resistance and thermal transmittance. Calculation method.
BS EN ISO 12572:2001	Hygrothermal performance of building materials and products. Determination of water vapour transmission properties.
BS EN ISO 13788:2002	Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation method.
BS 5250:2011	Code of practice for control of condensation in buildings.
BS EN 16012:2012	Thermal insulation for buildings. Reflective insulation products. Determination of the declared thermal performance
BS 5534:2014	Slating and tiling for pitched roofs and vertical cladding – Code of Practice: Annex A – Method of test and classification of roof underlays for wind uplift resistance.

## 16 ANNEX 3: EXAMPLE U-VALUE AND CONDENSATION RISK CALCULATIONS

The following example sections show typical design details and calculation of U-values and condensation risks, which have been independently verified by BM TRADA.

- Unventilated pitched roof with Boost<sup>R</sup> Hybrid and HControl Hybrid
- Timber frame wall Boost<sup>R</sup> Hybrid and HControl Hybrid
- Suspended Timber Floor
- Various combinations of Boost<sup>R</sup> Hybrid, HControl Hybrid and Hybris with other membranes in pitched roofs with OSB sarking



Roof 4: 600mm rafter spacing - Non ventilated pitched roof

**BOOST'R HYBRID**

**HCONTROL HYBRID**

**32.5mm INSULATED PLASTERBOARD**

**U-VALUE = 0.18 W/m<sup>2</sup>K**

## UVALUE CALCULATION

Users Ref: Actis Pack - UK Configurations

Issued on: 26.February.2013

Prop Type Ref:

Property:

Carbon Index: 0,0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor:  
Address:  
Client:  
Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build  
Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof 4 non vent - BRHybrid+HCRHybrid+25IPB= 0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.040	
<b>Layer1</b>	<b>Tiling, concrete</b>				
	Main construction	15 mm	1.500	0.010	100.00 %
<b>Layer2</b>	<b>25mm batten cavity</b>				
	Main construction	25 mm	0.100	0.250	92.17 %
	Bridging - Timber	25 mm	0.130	0.000	7.83 %
<b>Layer3</b>	<b>BRHybrid</b>				
	Main construction	35 mm	0.026	1.350	92.17 %
	Bridging - Timber	35 mm	0.130	0.000	7.83 %
<b>Layer4</b>	<b>Rafter cavity</b>				
	Main construction	85 mm	0.131	0.650	92.17 %
	Bridging - Timber	85 mm	0.130	0.000	7.83 %
<b>Layer5</b>	<b>HRHybrid</b>				
	Main construction	45 mm	0.024	1.900	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	45 mm	0.130	0.000	7.83 %
<b>Layer6</b>	<b>50mm batten cavity</b>				
	Main construction	20 mm	0.031	0.650	92.17 %
	Bridging - Timber	20 mm	0.130	0.000	7.83 %
<b>Layer7</b>	<b>PU bonded to plasterboard</b>				
	Main construction	25 mm	0.021	1.190	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
<b>Layer8</b>	<b>Plasterboard, standard</b>				
	Main construction	13 mm	0.066	0.190	100.00 %
<b>Internal surface</b>				0.100	
<b>Total resistance:</b>		Upper limit = 6.024 m <sup>2</sup> K/W Lower limit = 5.377 m <sup>2</sup> K/W Average = 5.701 m <sup>2</sup> K/W			
		U-value (unrounded) = 0.1754 W/m <sup>2</sup> K			
Unheated space: None					
<b>Total thickness: 263 mm</b>		<b>U-value: 0.18 W/m<sup>2</sup>K</b>			

## CONDENSATION RISK ANALYSIS

Users Ref: Actis Pack - UK Configurations

Issued on: 26.February.2013

Prop Type Ref:

Property:

Carbon Index: 0,0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor:

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

**Roof 4 non vent - BRHybrid+HCRHybrid+25IPB= 0.18**

### Environmental conditions:

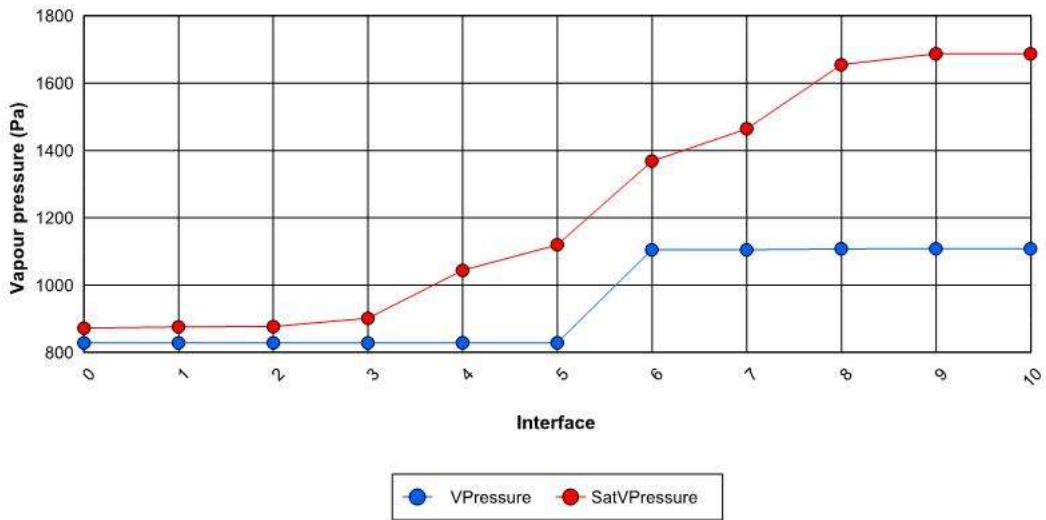
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 65 %

### Table of layers:

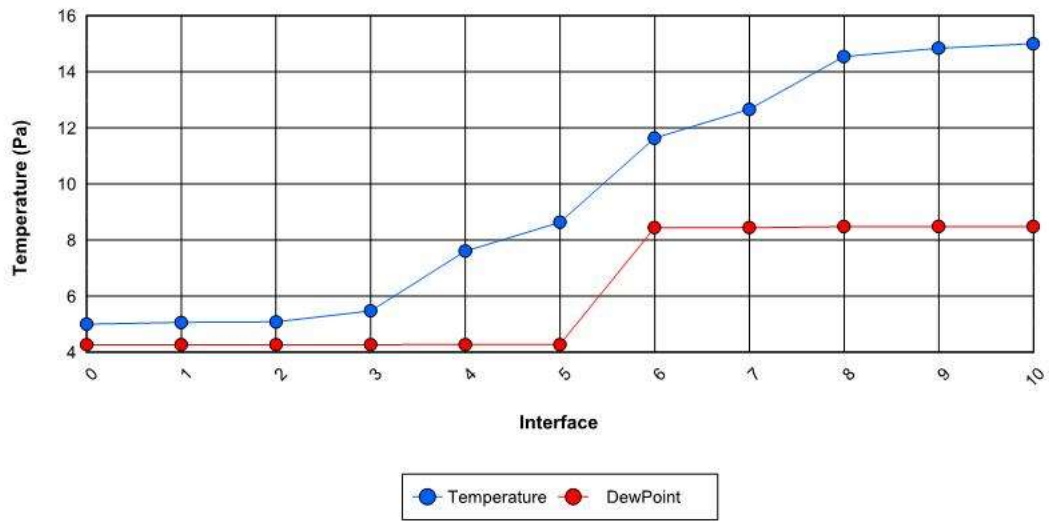
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.040	0.040	0.000	0.000	0.00
1. Tiling, concrete	15.0	1.500	0.010	0.050	0.000	0.000	0.00
2. 25mm batten cavity	25.0	0.100	0.250	0.300	0.000	0.000	0.00
3. BRHybrid	35.0	0.000	1.350	1.650	0.000	0.60	0.60
4. Rafter cavity	85.0	0.000	0.650	2.300	0.000	0.000	0.60
5. HRHybrid	45.0	0.000	1.900	4.200	0.000	1,000.00	1,000.60
6. 50mm batten cavity	20.0	0.000	0.650	4.850	0.000	0.000	1,000.60
7. PU bonded to plasterboard	25.0	0.021	1.190	6.040	400.0	10.00	1,010.60
8. Plasterboard, standard	12.5	0.066	0.190	6.230	45.0	0.56	1,011.16
Internal surface	-	0.000	0.100	6.230	0.000	0.000	1,011.16

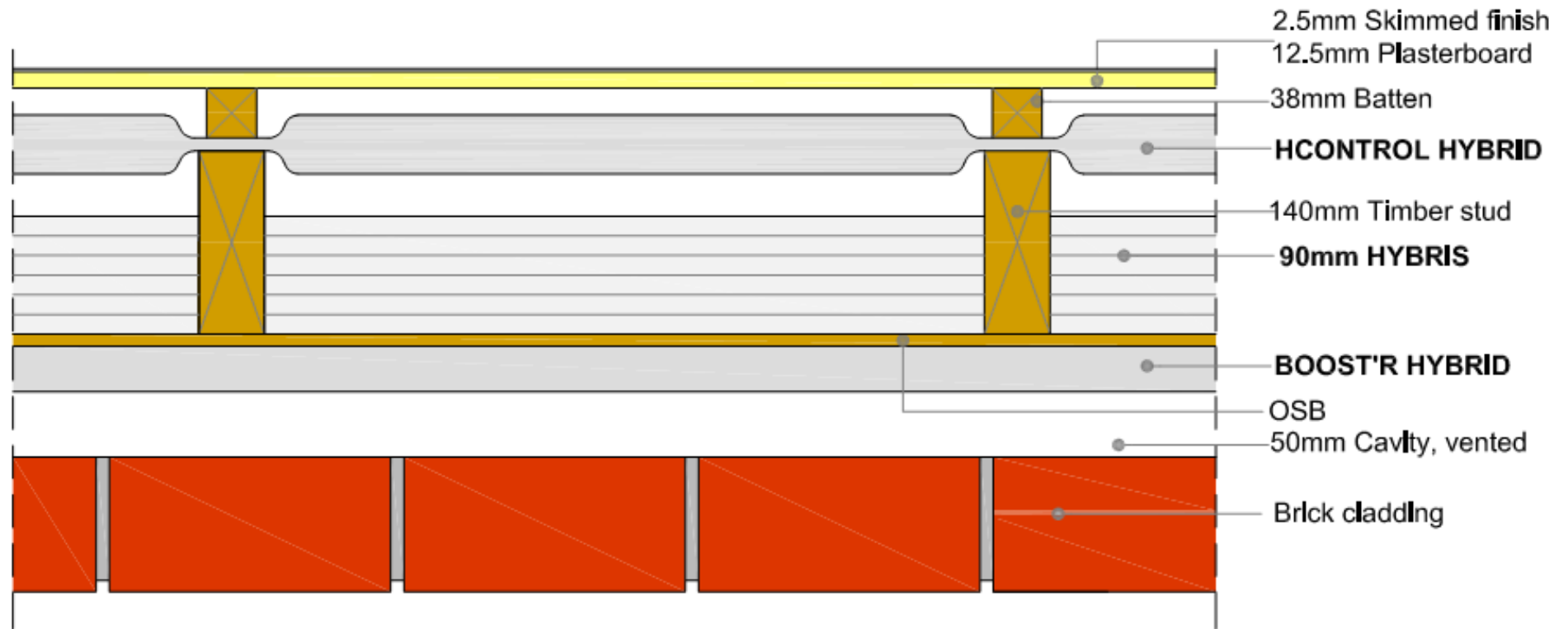
**Vapour pressure table:**

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	5.00	828.3	871.9	4.27	0.00	0.00	No
1. External surface / Tiling, concrete	5.06	828.3	875.7	4.27	0.00	0.00	No
2. Tiling, concrete / 25mm batten cavity	5.08	828.3	876.7	4.27	0.00	1.43	No
3. 25mm batten cavity / BRHybrid	5.47	828.3	901.1	4.27	0.00	1.43	No
4. BRHybrid / Rafter cavity	7.61	828.4	1 043.8	4.27	0.00	0.00	No
5. Rafter cavity / HRHybrid	8.63	828.4	1 119.3	4.27	0.00	0.00	No
6. HRHybrid / 50mm batten cavity	11.63	1 104.9	1 368.4	8.44	0.00	0.00	No
7. 50mm batten cavity / PU bonded to plasterboard	12.66	1 104.9	1 464.1	8.44	0.00	0.00	No
8. PU bonded to plasterboard / Plasterboard, standard	14.54	1 107.7	1 654.8	8.48	0.00	0.00	No
9. Plasterboard, standard / Internal surface	14.84	1 107.9	1 687.2	8.48	0.00	0.00	No
Internal surface	15.00	1 107.9	1 687.2	8.48	0.00	0.00	No



Interface temperature / Dew point graphical representation:





PF23:  
 Timber Frame Wall  
 U-value = 0.14 W/m<sup>2</sup>K



## UVALUE CALCULATION

Users Ref: 00 PATHFINDER 2014-09

Issued on: 17.November.2016

Prop Type Ref:

Property:

Carbon Index: 0,0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Wall PF23 - w-tf HCH+90H+BRH @600c =0.14

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.040	
<b>Layer1</b>	<b>Brick, outer leaf</b>				
	Main construction	105 mm	0.770	0.136	82.81 %
	Bridging - Mortar	105 mm	0.941	0.000	17.19 %
<b>Layer2</b>	<b>Air Gap vented, e=0.31</b>				
	Main construction	50 mm	0.140	0.358	100.00 %
<b>Layer3</b>	<b>BoostR Hybrid</b>				
	Main construction	35 mm	0.026	1.350	100.00 %
<b>Layer4</b>	<b>OSB</b>				
	Main construction	11 mm	0.130	0.085	100.00 %
<b>Layer5</b>	<b>Hybris / Stud 140mm</b>				
	Main construction	90 mm	0.033	2.727	85.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	90 mm	0.130	0.000	15.00 %
<b>Layer6</b>	<b>Hybris - Associated Air Gap / Stud 140mm</b>				
	Main construction	28 mm	0.038	0.717	85.00 %
	Bridging - Timber	28 mm	0.130	0.000	15.00 %
<b>Layer7</b>	<b>HControl Hybrid</b>				
	Main construction	45 mm	0.024	1.900	90.50 %
	Bridging - Timber	45 mm	0.130	0.000	9.50 %
<b>Layer8</b>	<b>HControl Hybrid - Associated AirGap / Batten 38mm</b>				
	Main construction	20 mm	0.031	0.650	90.50 %
	Bridging - Timber	20 mm	0.130	0.000	9.50 %
<b>Layer9</b>	<b>Plasterboard</b>				
	Main construction	13 mm	0.190	0.066	100.00 %
<b>Layer10</b>	<b>Plaster, skim</b>				
	Main construction	3 mm	0.400	0.006	100.00 %
<b>Internal surface</b>				0.130	
<b>Total resistance:</b> Upper limit = 7.456 m <sup>2</sup> K/W Lower limit = 6.416 m <sup>2</sup> K/W Average = 6.936 m <sup>2</sup> K/W					
U-value (unrounded) = 0.1442 W/m <sup>2</sup> K					
Unheated space: None					
<b>Total thickness: 399 mm</b>			<b>U-value: 0.14 W/m<sup>2</sup>K</b>		

## CONDENSATION RISK ANALYSIS

Users Ref: 00 PATHFINDER 2014-09

Issued on: 17.November.2016

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

**Wall PF23 - w-tf HCH+90H+BRH @600c =0.14**

### Environmental conditions:

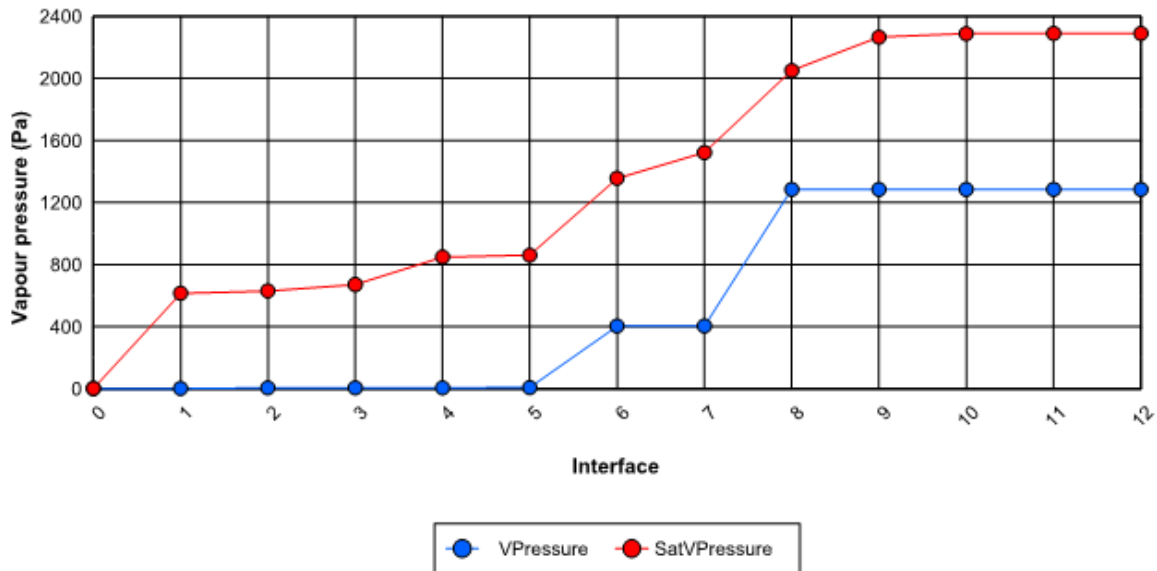
External conditions:	Temperature: 0 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 20 °C	Relative Humidity: 55 %

### Table of layers:

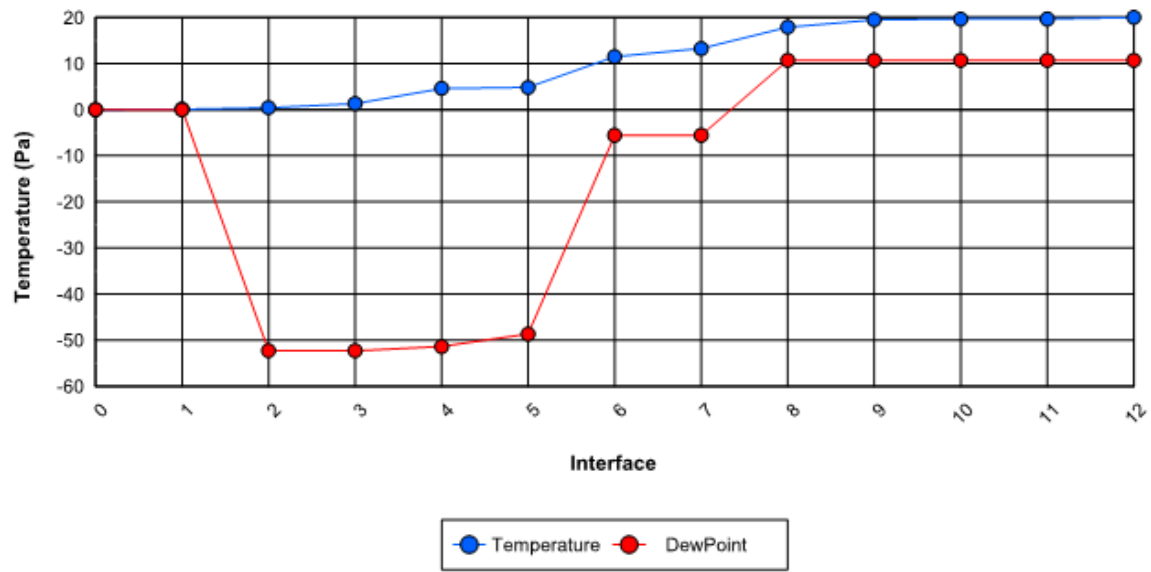
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m <sup>2</sup> .K/W	Cumulative thermal resistance m <sup>2</sup> .K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.040	0.040	0.000	0.000	0.00
1. Brick, outer leaf	105.0	0.770	0.136	0.176	50.0	5.25	5.25
2. Air Gap vented, c=0.31	50.0	0.000	0.358	0.534	0.000	0.000	5.25
3. BoostR Hybrid	35.0	0.000	1.350	1.884	0.000	0.60	5.85
4. OSB	11.0	0.130	0.085	1.969	200.0	2.20	8.05
5. Hybris / Stud 140mm	90.0	0.033	2.727	4.696	0.000	450.00	458.05
6. Hybris - Associated Air Gap / Stud 140mm	27.5	0.000	0.717	5.413	0.000	0.000	458.05
7. HControl Hybrid	45.0	0.000	1.900	7.313	0.000	1,000.00	1,458.05
8. HControl Hybrid - Associated AirGap / Batten	20.0	0.000	0.650	7.963	0.000	0.000	1,458.05
9. Plasterboard	12.5	0.190	0.066	8.029	40.0	0.50	1,458.55
10. Plaster, skim	2.5	0.400	0.006	8.035	60.0	0.15	1,458.70
Internal surface	-	0.000	0.130	8.035	0.000	0.000	1,458.70

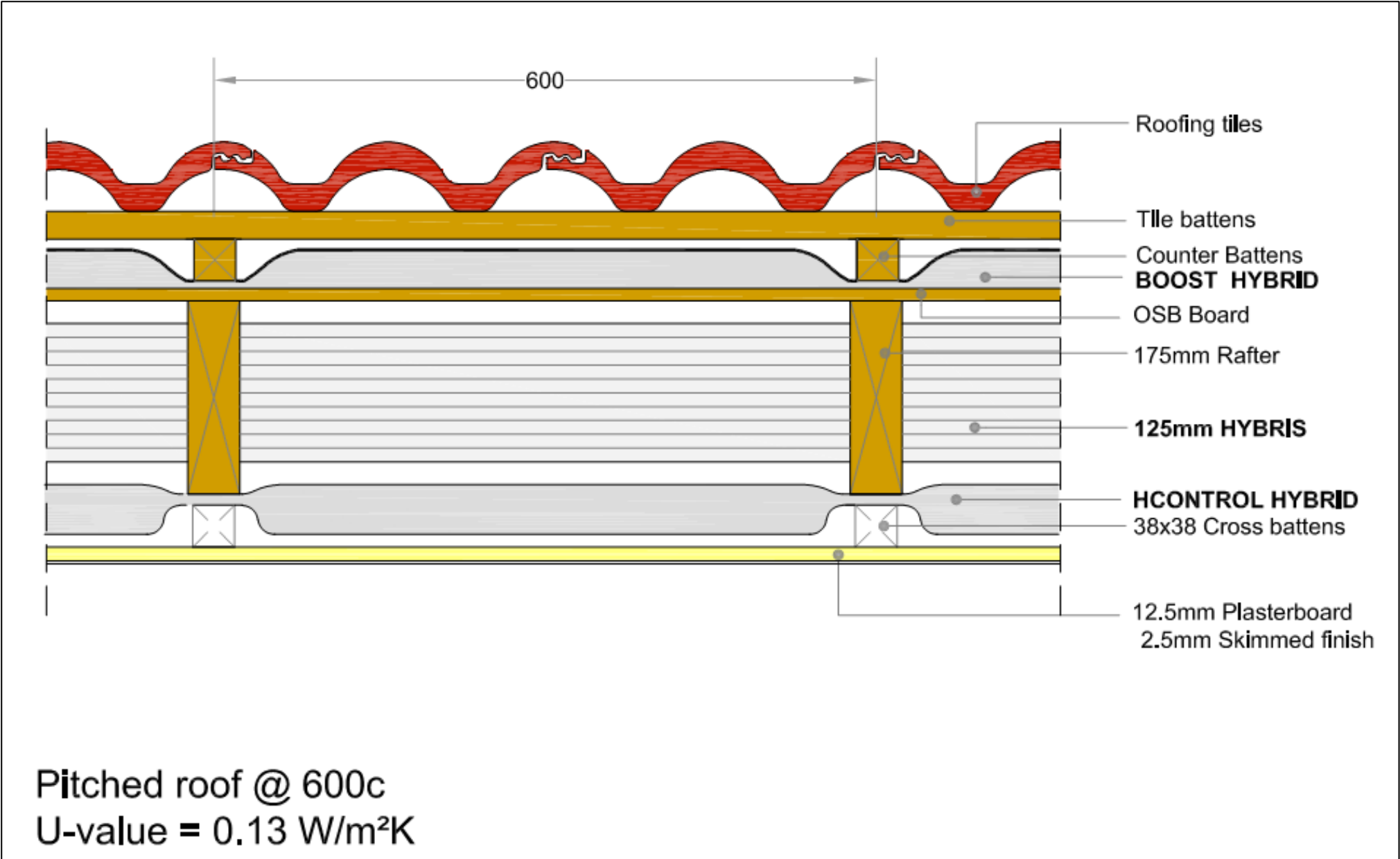
**Vapour pressure table:**

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	0.00	0.0	0.0	0.00	0.00	0.00	No
1. External surface / Brick, outer leaf	0.10	0.0	614.9	0.00	0.00	0.00	No
2. Brick, outer leaf / Air Gap vented, e=0.31	0.43	4.6	630.0	-52.30	0.00	0.00	No
3. Air Gap vented, e=0.31 / BoostR Hybrid	1.31	4.6	671.2	-52.30	0.00	0.00	No
4. BoostR Hybrid / OSB	4.62	5.2	848.7	-51.40	0.00	0.00	No
5. OSB / Hybris / Stud 140mm	4.82	7.1	861.1	-48.66	0.00	0.00	No
6. Hybris / Stud 140mm / Hybris - Associated Air Gap / Stud 140mm	11.50	403.6	1 356.5	-5.55	0.00	0.00	No
7. Hybris - Associated Air Gap / Stud 140mm / HControl Hybrid	13.26	403.6	1 522.5	-5.55	0.00	0.00	No
8. HControl Hybrid / HControl Hybrid - Associated AirGap / Batten 38mm	17.91	1 284.8	2 051.6	10.68	0.00	0.00	No
9. HControl Hybrid - Associated AirGap / Batten 38mm / Plasterboard	19.51	1 284.8	2 266.3	10.68	0.00	0.00	No
10. Plasterboard / Plaster, skim	19.67	1 285.2	2 289.1	10.69	0.00	0.00	No
11. Plaster, skim / Internal surface	19.68	1 285.3	2 291.3	10.69	0.00	0.00	No
Internal surface	20.00	1 285.3	2 291.3	10.69	0.00	0.00	No



## Interface temperature / Dew point graphical representation:





## UVALUE CALCULATION

**Users Ref:** 00 TECHNICAL EXERCISES

**Issued on:** 31.July.2017

**Prop Type Ref:**

**Property:**

**Carbon Index:** 0.0

**SAP Rating:** 0

**Fuel Bill:** £0.00

**CO2 Emissions:** 0.00 t/year

**Energy used:** 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof TE1078 - r-tp HCH+H125+BRH@600c=0.13

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, clay</b>				
	Main construction	15 mm	1.000	0.000	100.00 %
<b>Layer2</b>	<b>Tile battens cavity</b>				
	Main construction	25 mm	0.250	0.000	87.33 %
	Corrections - Cavity Ventilated, Emissivity: Low 0.2				
	Bridging - Timber	25 mm	0.130	0.000	12.67 %
<b>Layer3</b>	<b>Counter Battens - 10mm residual cavity</b>				
	Main construction	10 mm	0.100	0.000	93.67 %
	Corrections - Cavity Ventilated, Emissivity: Normal				
	Bridging - Timber	10 mm	0.130	0.000	6.33 %
<b>Layer4</b>	<b>*Correction roof protected by wind, e=0.31</b>				
	Main construction	1 mm	0.018	0.056	100.00 %
<b>Layer5</b>	<b>BoostR Hybrid</b>				
	Main construction	35 mm	0.026	1.350	93.67 %
	Bridging - Timber	35 mm	0.130	0.000	6.33 %
<b>Layer6</b>	<b>OSB</b>				
	Main construction	11 mm	0.130	0.085	100.00 %
<b>Layer7</b>	<b>Hybris - Associated Air Gap / Rafter 175mm</b>				
	Main construction	21 mm	0.050	0.407	92.17 %
	Bridging - Timber	21 mm	0.130	0.000	7.83 %
<b>Layer8</b>	<b>Hybris / Rafter 175mm</b>				
	Main construction	125 mm	0.033	3.788	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	125 mm	0.130	0.000	7.83 %
<b>Layer9</b>	<b>Hybris - Associated Air Gap / Rafter 175mm</b>				
	Main construction	21 mm	0.043	0.474	92.17 %
	Bridging - Timber	21 mm	0.130	0.000	7.83 %
<b>Layer10</b>	<b>HControl Hybrid</b>				
	Main construction	45 mm	0.024	1.900	93.67 %
	Bridging - Timber	45 mm	0.130	0.000	6.33 %
<b>Layer11</b>	<b>HControl Hybrid - Associated Air Gap / Batten 50mm</b>				
	Main construction	11 mm	0.028	0.388	93.67 %
	Bridging - Timber	11 mm	0.130	0.000	6.33 %
<b>Layer12</b>	<b>Plasterboard</b>				
	Main construction	13 mm	0.190	0.066	100.00 %

## UVALUE CALCULATION

**Users Ref:** 00 TECHNICAL EXERCISES

**Issued on:** 31.July.2017

**Prop Type Ref:**

**Property:**

**Carbon Index:** 0,0

**SAP Rating:** 0

**Fuel Bill:** £0.00

**CO2 Emissions:** 0.00 t/year

**Energy used:** 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof TE1078 - r-tp HCH+H125+BRH@600c=0.13

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer13</b>	<b>Plaster, skim</b> Main construction	3 mm	0.400	0.006	100.00 %
<b>Internal surface</b>				0.100	
<b>Total resistance:</b> Upper limit = 8.135 m <sup>2</sup> K/W Lower limit = 7.136 m <sup>2</sup> K/W Average = 7.635 m <sup>2</sup> K/W U-value (unrounded) = 0.1310 W/m <sup>2</sup> K					

Unheated space: None

**Total thickness: 334 mm**

**U-value: 0.13 W/m<sup>2</sup>K**

## CONDENSATION RISK ANALYSIS

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Roof TE1078 - r-tp HCH+H125+BRH@600c=0.13

### Environmental conditions:

External conditions:	Temperature: -2 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 21 °C	Relative Humidity: 60 %

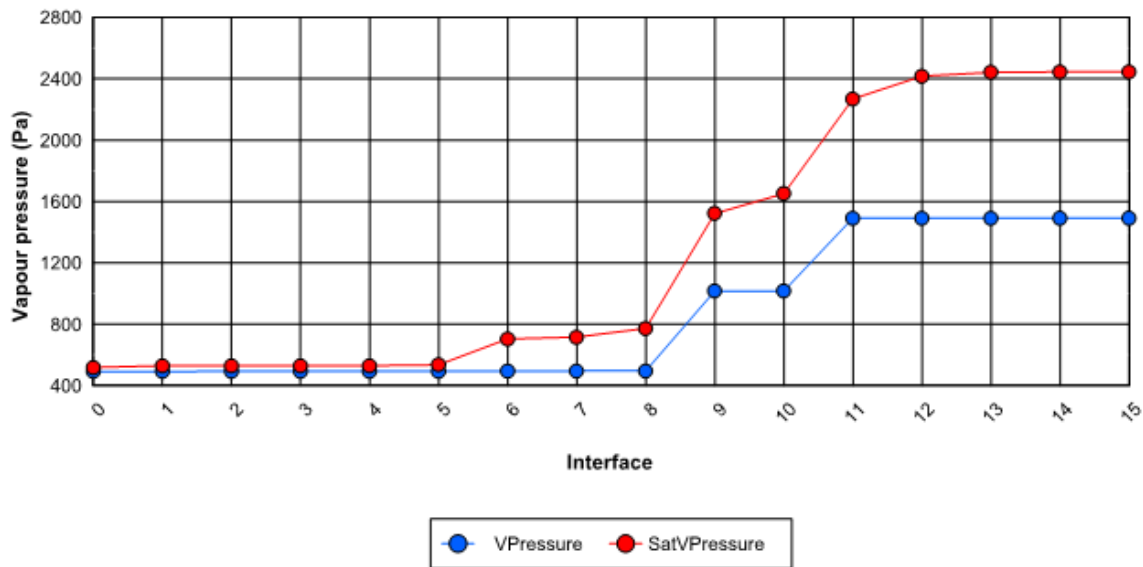
### Table of layers:

Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, clay	15.0	1.000	0.000	0.100	250.0	3.75	3.75
2. Tile battens cavity	25.0	0.000	0.000	0.100	0.000	0.000	3.75
3. Counter Battens - 10mm residual cavity	10.0	0.000	0.000	0.100	0.000	0.000	3.75
4. *Correction roof protected by wind, e=0.31	1.0	0.000	0.056	0.156	0.000	0.000	3.75
5. BoostR Hybrid	35.0	0.000	1.350	1.506	0.000	0.60	4.35
6. OSB	11.0	0.130	0.085	1.591	250.0	2.75	7.10
7. Hybris - Associated Air Gap / Rafter 175mm	20.5	0.000	0.407	1.998	0.000	0.000	7.10
8. Hybris / Rafter 175mm	125.0	0.033	3.788	5.785	0.000	1,100.00	1,107.10
9. Hybris - Associated Air Gap / Rafter 175mm	20.5	0.000	0.474	6.259	0.000	0.000	1,107.10
10. HControl Hybrid	45.0	0.000	1.900	8.159	0.000	1,000.00	2,107.10
11. HControl Hybrid - Associated Air Gap / Battens	11.0	0.000	0.388	8.547	0.000	0.000	2,107.10
12. Plasterboard	12.5	0.190	0.066	8.613	45.0	0.56	2,107.66
13. Plaster, skim	2.5	0.400	0.006	8.620	60.0	0.15	2,107.81
Internal surface	-	0.000	0.100	8.620	0.000	0.000	2,107.81

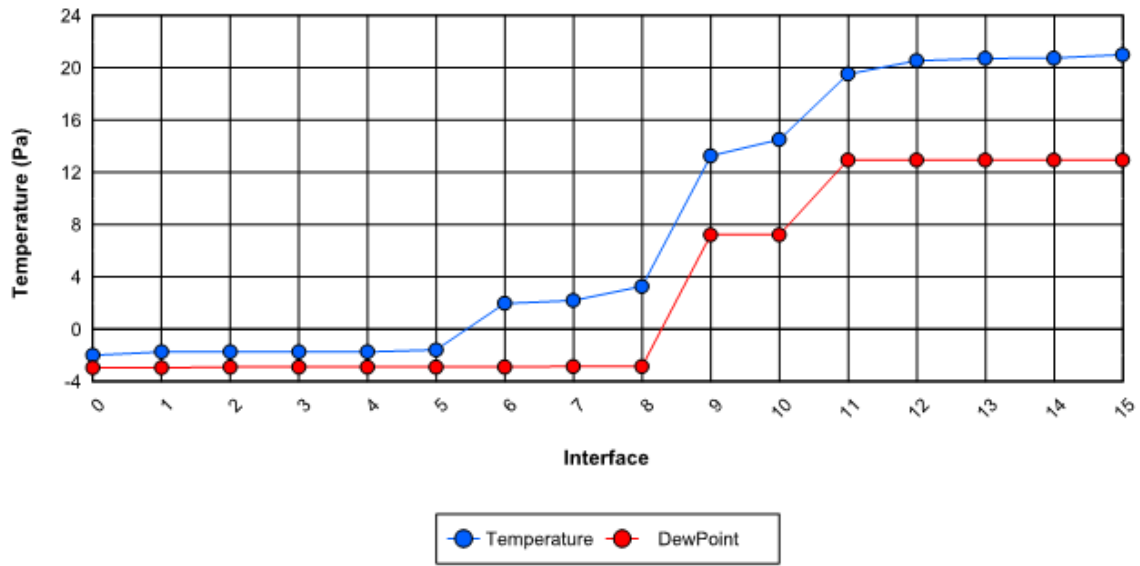


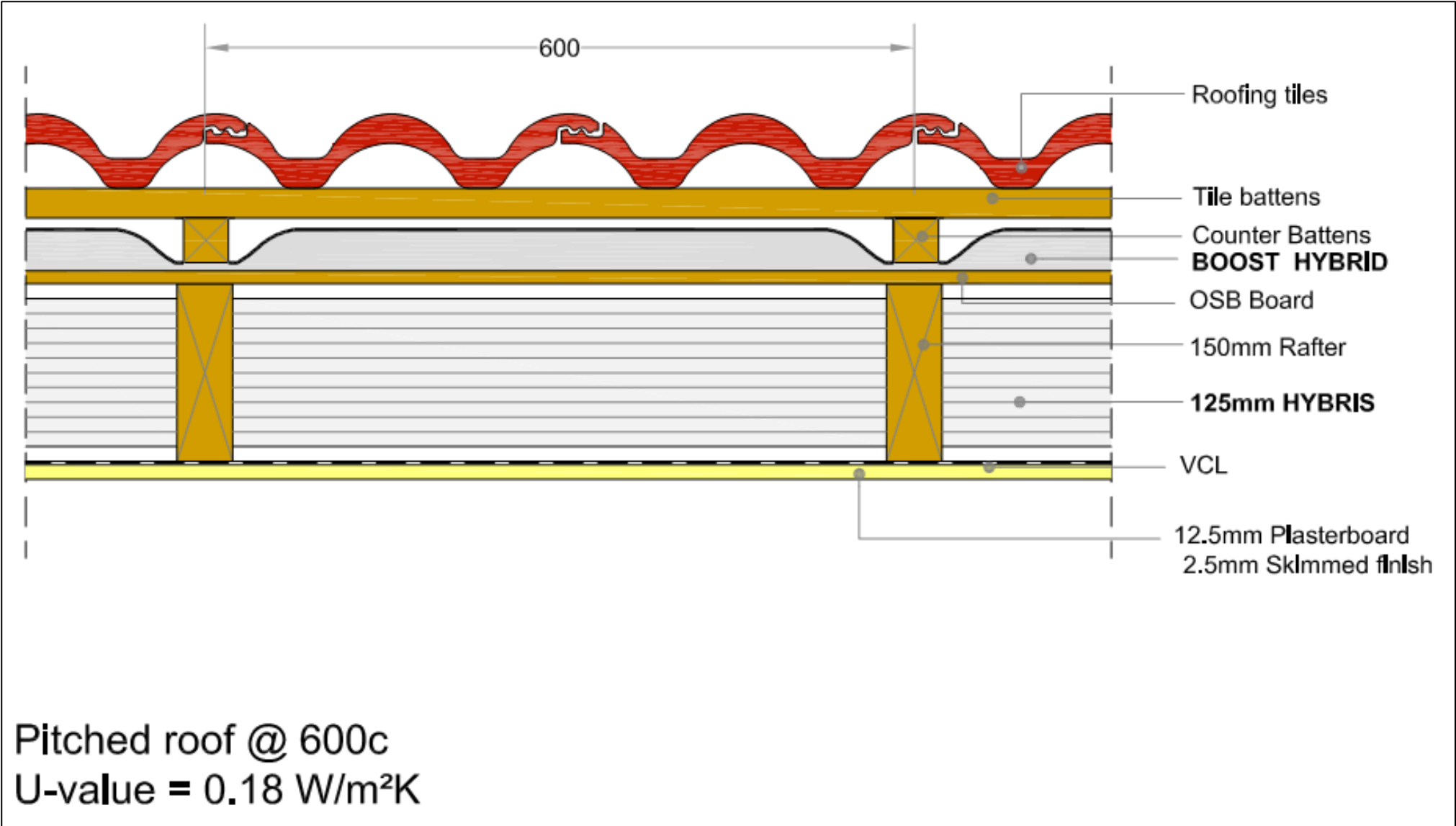
## Vapour pressure table:

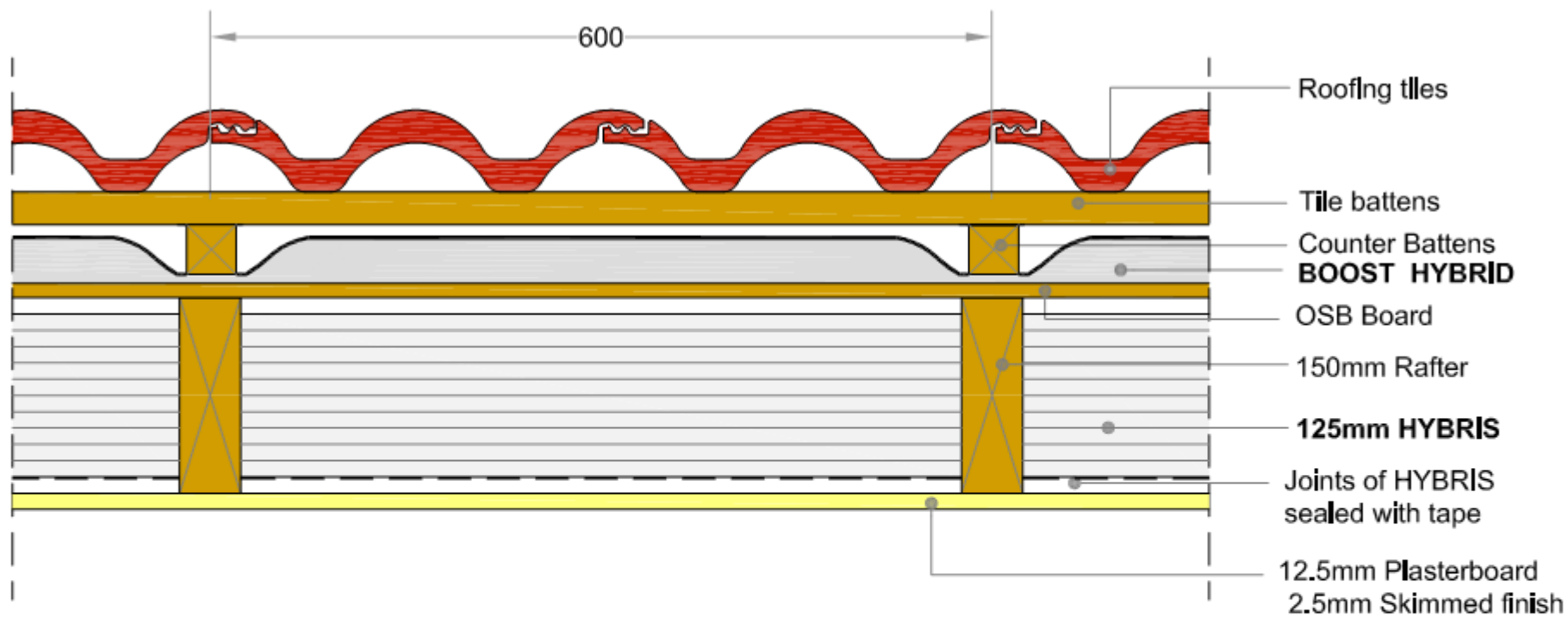
Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	-2.00	491.2	517.1	-2.95	0.00	0.00	No
1. External surface / Tiling, clay	-1.74	491.2	528.6	-2.95	0.00	0.00	No
2. Tiling, clay / Tile battens cavity	-1.74	493.0	528.6	-2.90	0.00	0.00	No
3. Tile battens cavity / Counter Battens - 10mm residual cavity	-1.74	493.0	528.6	-2.90	0.00	0.00	No
4. Counter Battens - 10mm residual cavity / *Correction roof protected by v	-1.74	493.0	528.6	-2.90	0.00	0.00	No
5. *Correction roof protected by wind, e=0.31 / BoostR Hybrid	-1.59	493.0	535.2	-2.90	0.00	0.00	No
6. BoostR Hybrid / OSB	1.97	493.3	703.9	-2.89	0.00	0.00	No
7. OSB / Hybris - Associated Air Gap / Rafter 175mm	2.20	494.6	715.2	-2.86	0.00	0.00	No
8. Hybris - Associated Air Gap / Rafter 175mm / Hybris / Rafter 175mm	3.27	494.6	772.0	-2.86	0.00	0.00	No
9. Hybris / Rafter 175mm / Hybris - Associated Air Gap / Rafter 175mm	13.26	1 016.5	1 522.7	7.22	0.00	0.00	No
10. Hybris - Associated Air Gap / Rafter 175mm / HControl Hybrid	14.51	1 016.5	1 651.5	7.22	0.00	0.00	No
11. HControl Hybrid / HControl Hybrid - Associated Air Gap / Batten 50mm	19.52	1 491.0	2 268.8	12.94	0.00	0.00	No
12. HControl Hybrid - Associated Air Gap / Batten 50mm / Plasterboard	20.55	1 491.0	2 417.1	12.94	0.00	0.00	No
13. Plasterboard / Plaster, skim	20.72	1 491.3	2 443.1	12.94	0.00	0.00	No
14. Plaster, skim / Internal surface	20.74	1 491.3	2 445.6	12.94	0.00	0.00	No
Internal surface	21.00	1 491.3	2 445.6	12.94	0.00	0.00	No



Interface temperature / Dew point graphical representation:







Pitched roof @ 600c  
 U-value = 0.18 W/m<sup>2</sup>K



## UVALUE CALCULATION

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof TE1079 - r-tp H125+BRH@600c=0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, clay</b>				
	Main construction	15 mm	1.000	0.000	100.00 %
<b>Layer2</b>	<b>Tile battens cavity</b>				
	Main construction	25 mm	0.250	0.000	87.33 %
	Corrections - Cavity Ventilated, Emissivity: Low 0.2				
	Bridging - Timber	25 mm	0.130	0.000	12.67 %
<b>Layer3</b>	<b>Counter Battens - 10mm residual cavity</b>				
	Main construction	10 mm	0.100	0.000	93.67 %
	Corrections - Cavity Ventilated, Emissivity: Normal				
	Bridging - Timber	10 mm	0.130	0.000	6.33 %
<b>Layer4</b>	<b>*Correction roof protected by wind, e=0.31</b>				
	Main construction	1 mm	0.018	0.056	100.00 %
<b>Layer5</b>	<b>BoostR Hybrid</b>				
	Main construction	35 mm	0.026	1.350	93.67 %
	Bridging - Timber	35 mm	0.130	0.000	6.33 %
<b>Layer6</b>	<b>OSB</b>				
	Main construction	11 mm	0.130	0.085	100.00 %
<b>Layer7</b>	<b>Hybris - Associated Air Gap / Rafter 150mm</b>				
	Main construction	13 mm	0.031	0.399	92.17 %
	Bridging - Timber	13 mm	0.130	0.000	7.83 %
<b>Layer8</b>	<b>Hybris / Rafter 150mm</b>				
	Main construction	125 mm	0.033	3.788	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	125 mm	0.130	0.000	7.83 %
<b>Layer9</b>	<b>Hybris - Associated Air Gap / Rafter 150mm</b>				
	Main construction	13 mm	0.029	0.434	92.17 %
	Bridging - Timber	13 mm	0.130	0.000	7.83 %
<b>Layer10</b>	<b>Polythene, 500 gauge</b>				
	Main construction	0 mm	0.000	0.000	100.00 %
<b>Layer11</b>	<b>Plasterboard</b>				
	Main construction	13 mm	0.190	0.066	100.00 %
<b>Layer12</b>	<b>Plaster, skim</b>				
	Main construction	3 mm	0.400	0.006	100.00 %

## CONDENSATION RISK ANALYSIS

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Roof TE1079 - r-tp H125+BRH@600c=0.18

### Environmental conditions:

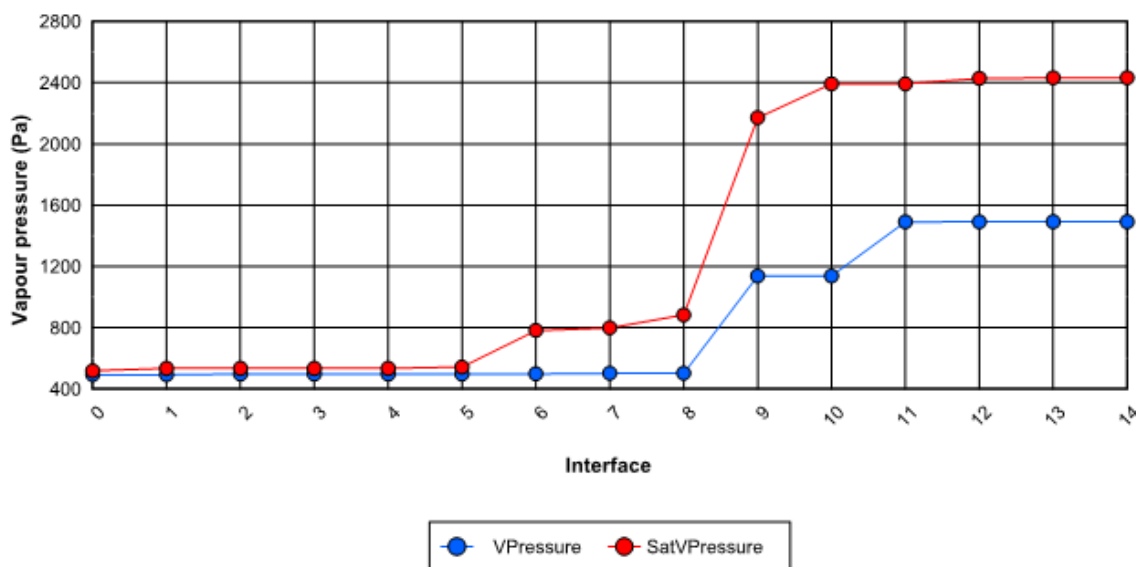
External conditions:	Temperature: -2 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 21 °C	Relative Humidity: 60 %

### Table of layers:

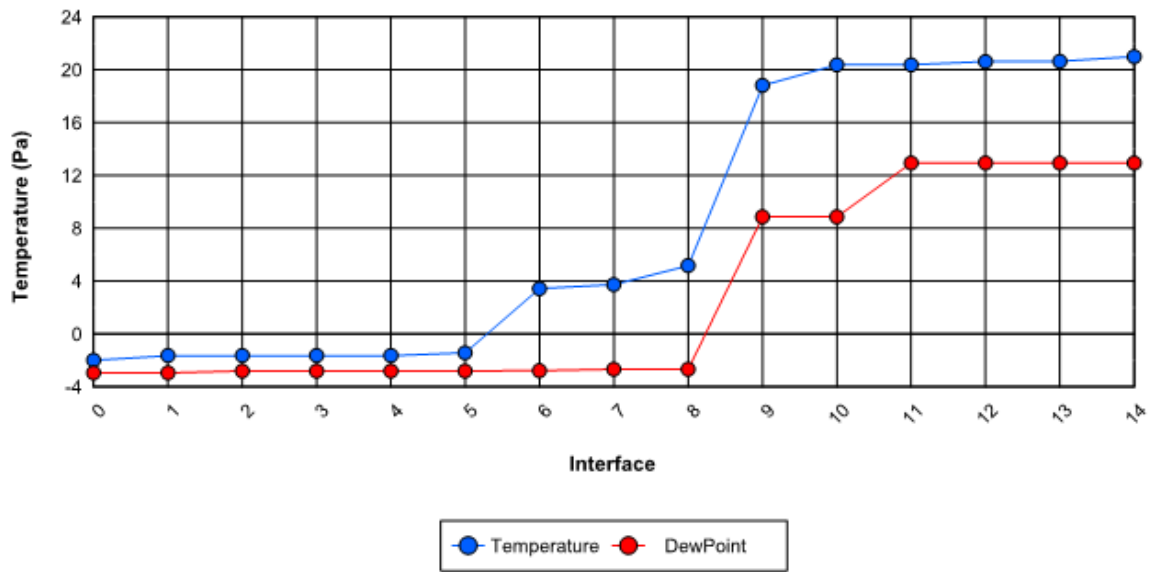
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, clay	15.0	1.000	0.000	0.100	250.0	3.75	3.75
2. Tile battens cavity	25.0	0.000	0.000	0.100	0.000	0.000	3.75
3. Counter Battens - 10mm residual cavity	10.0	0.000	0.000	0.100	0.000	0.000	3.75
4. *Correction roof protected by wind, e=0.31	1.0	0.000	0.056	0.156	0.000	0.000	3.75
5. BoostR Hybrid	35.0	0.000	1.350	1.506	0.000	0.60	4.35
6. OSB	11.0	0.130	0.085	1.591	250.0	2.75	7.10
7. Hybris - Associated Air Gap / Rafter 150mm	12.5	0.000	0.399	1.990	0.000	0.000	7.10
8. Hybris / Rafter 150mm	125.0	0.033	3.788	5.777	0.000	450.00	457.10
9. Hybris - Associated Air Gap / Rafter 150mm	12.5	0.000	0.434	6.211	0.000	0.000	457.10
10. Polythene, 500 gauge	0.3	0.000	0.000	6.211	0.000	250.00	707.10
11. Plasterboard	12.5	0.190	0.066	6.277	45.0	0.56	707.66
12. Plaster, skim	2.5	0.400	0.006	6.284	60.0	0.15	707.81
Internal surface	-	0.000	0.100	6.284	0.000	0.000	707.81

**Vapour pressure table:**

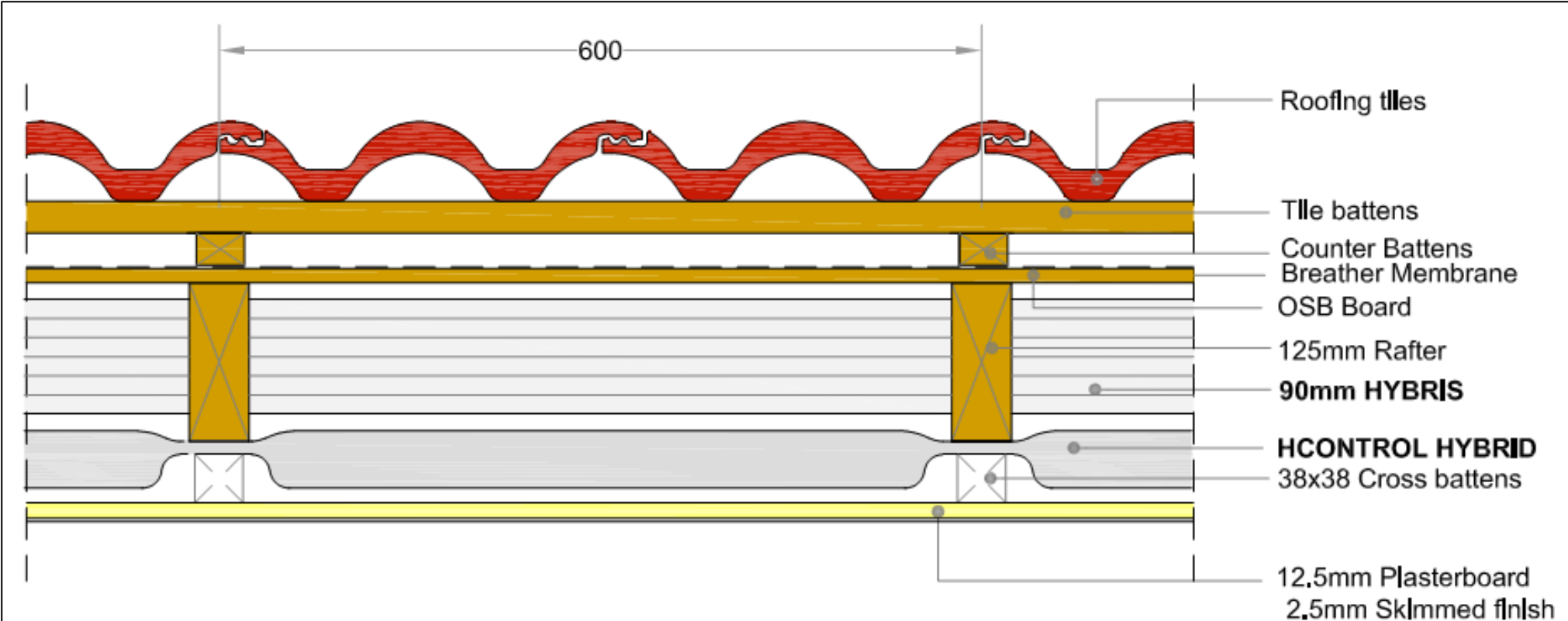
Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	-2.00	491.2	517.1	-2.95	0.00	0.00	No
1. External surface / Tiling, clay	-1.64	491.2	532.9	-2.95	0.00	0.00	No
2. Tiling, clay / Tile battens cavity	-1.64	496.5	532.9	-2.81	0.00	0.00	No
3. Tile battens cavity / Counter Battens - 10mm residual cavity	-1.64	496.5	532.9	-2.81	0.00	0.00	No
4. Counter Battens - 10mm residual cavity / *Correction roof protected by wind, e=0.31 / BoostR Hybrid	-1.64	496.5	532.9	-2.81	0.00	0.00	No
5. *Correction roof protected by wind, e=0.31 / BoostR Hybrid	-1.44	496.5	541.9	-2.81	0.00	0.00	No
6. BoostR Hybrid / OSB	3.43	497.4	780.6	-2.78	0.00	0.00	No
7. OSB / Hybris - Associated Air Gap / Rafter 150mm	3.73	501.3	797.6	-2.68	0.00	0.00	No
8. Hybris - Associated Air Gap / Rafter 150mm / Hybris / Rafter 150mm	5.17	501.3	882.2	-2.68	0.00	0.00	No
9. Hybris / Rafter 150mm / Hybris - Associated Air Gap / Rafter 150mm	18.82	1 137.1	2 171.1	8.87	0.00	0.00	No
10. Hybris - Associated Air Gap / Rafter 150mm / Polythene, 500 gauge	20.38	1 137.1	2 392.5	8.87	0.00	0.00	No
11. Polythene, 500 gauge / Plasterboard	20.38	1 490.3	2 392.5	12.93	0.00	0.00	No
12. Plasterboard / Plaster, skim	20.62	1 491.1	2 427.7	12.94	0.00	0.00	No
13. Plaster, skim / Internal surface	20.64	1 491.3	2 431.1	12.94	0.00	0.00	No
Internal surface	21.00	1 491.3	2 431.1	12.94	0.00	0.00	No



Interface temperature / Dew point graphical representation:







Pitched roof @ 600c  
 U-value = 0.18 W/m<sup>2</sup>K

## UVALUE CALCULATION

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof TE1080 - r-tp HCH+H90@600c=0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, concrete</b>				
	Main construction	15 mm	1.500	0.000	100.00 %
<b>Layer2</b>	<b>Airspace/tile battens</b>				
	Main construction	25 mm	0.156	0.000	87.33 %
	Corrections - Cavity Unventilated, Emissivity: Normal				
	Bridging - Timber	25 mm	0.156	0.000	12.67 %
<b>Layer3</b>	<b>Airspace/counter battens</b>				
	Main construction	25 mm	0.250	0.000	91.67 %
	Corrections - Cavity Ventilated, Emissivity: Normal				
	Bridging - Timber	25 mm	0.130	0.000	8.33 %
<b>Layer4</b>	<b>Breather membrane</b>				
	Main construction	0 mm	0.084	0.005	100.00 %
<b>Layer5</b>	<b>OSB</b>				
	Main construction	11 mm	0.130	0.085	100.00 %
<b>Layer6</b>	<b>Hybris - Associated Air Gap / Rafter 125mm</b>				
	Main construction	13 mm	0.032	0.407	92.17 %
	Bridging - Timber	13 mm	0.130	0.000	7.83 %
<b>Layer7</b>	<b>Hybris / Rafter 125mm</b>				
	Main construction	90 mm	0.033	2.727	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	90 mm	0.130	0.000	7.83 %
<b>Layer8</b>	<b>Hybris - Associated Air Gap / Rafter 125mm</b>				
	Main construction	13 mm	0.027	0.474	92.17 %
	Bridging - Timber	13 mm	0.130	0.000	7.83 %
<b>Layer9</b>	<b>HControl Hybrid</b>				
	Main construction	45 mm	0.024	1.900	93.67 %
	Bridging - Timber	45 mm	0.130	0.000	6.33 %
<b>Layer10</b>	<b>HControl Hybrid - Associated Air Gap / Batten 38mm</b>				
	Main construction	11 mm	0.028	0.388	93.67 %
	Bridging - Timber	11 mm	0.130	0.000	6.33 %
<b>Layer11</b>	<b>Plasterboard</b>				
	Main construction	13 mm	0.190	0.066	100.00 %
<b>Internal surface</b>				0.100	
<b>Total resistance:</b>		Upper limit = 5.811 m <sup>2</sup> K/W Lower limit = 5.063 m <sup>2</sup> K/W Average = 5.437 m <sup>2</sup> K/W			
		U-value (unrounded) = 0.1839 W/m <sup>2</sup> K			

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## UVALUE CALCULATION

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

Unheated space: None

Total thickness: 261 mm

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

## CONDENSATION RISK ANALYSIS

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Roof TEI080 - r-tp HCH+H90@600c=0.18

Environmental conditions:

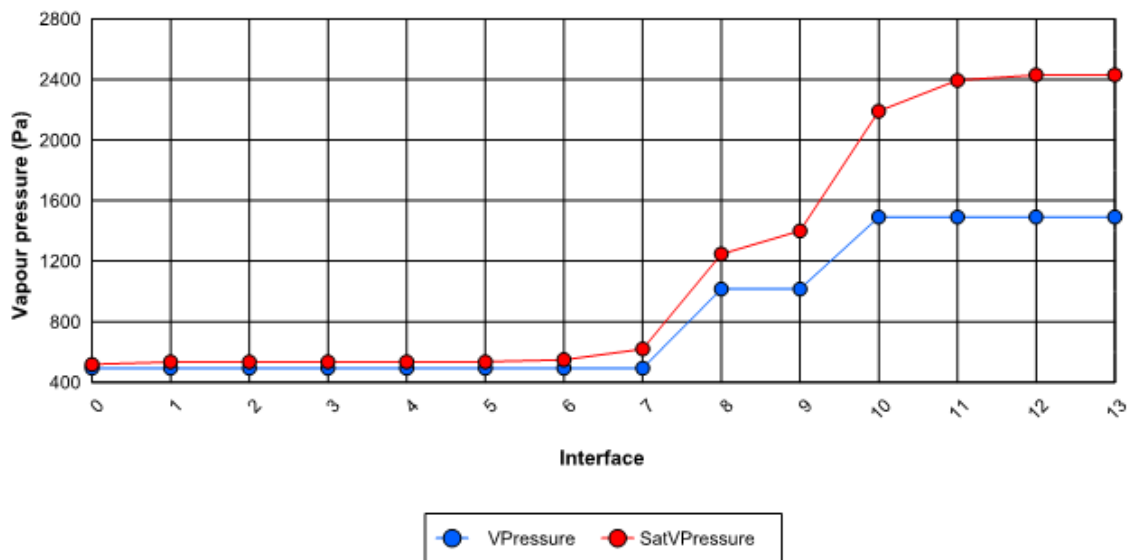
External conditions:	Temperature: -2 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 21 °C	Relative Humidity: 60 %

Table of layers:

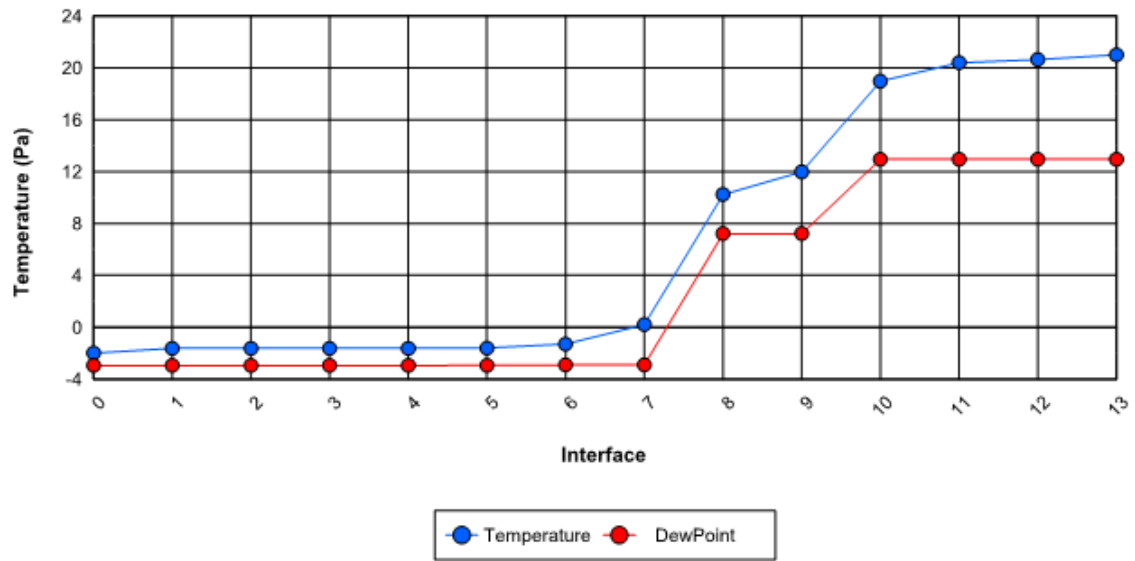
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, concrete	15.0	1.500	0.000	0.100	0.000	0.000	0.00
2. Airspace/tile battens	25.0	0.000	0.000	0.100	0.000	0.000	0.00
3. Airspace/counter battens	25.0	0.000	0.000	0.100	0.000	0.000	0.00
4. Breather membrane	0.4	0.084	0.005	0.105	0.000	0.40	0.40
5. OSB	11.0	0.130	0.085	0.190	250.0	2.75	3.15
6. Hybris - Associated Air Gap / Rafter 125mm	13.0	0.000	0.407	0.597	0.000	0.000	3.15
7. Hybris / Rafter 125mm	90.0	0.033	2.727	3.324	0.000	1,100.00	1,103.15
8. Hybris - Associated Air Gap / Rafter 125mm	13.0	0.000	0.474	3.798	0.000	0.000	1,103.15
9. HControl Hybrid	45.0	0.000	1.900	5.698	0.000	1,000.00	2,103.15
10. HControl Hybrid - Associated Air Gap / Batte	11.0	0.000	0.388	6.086	0.000	0.000	2,103.15
11. Plasterboard	12.5	0.190	0.066	6.152	45.0	0.56	2,103.71
Internal surface	-	0.000	0.100	6.152	0.000	0.000	2,103.71

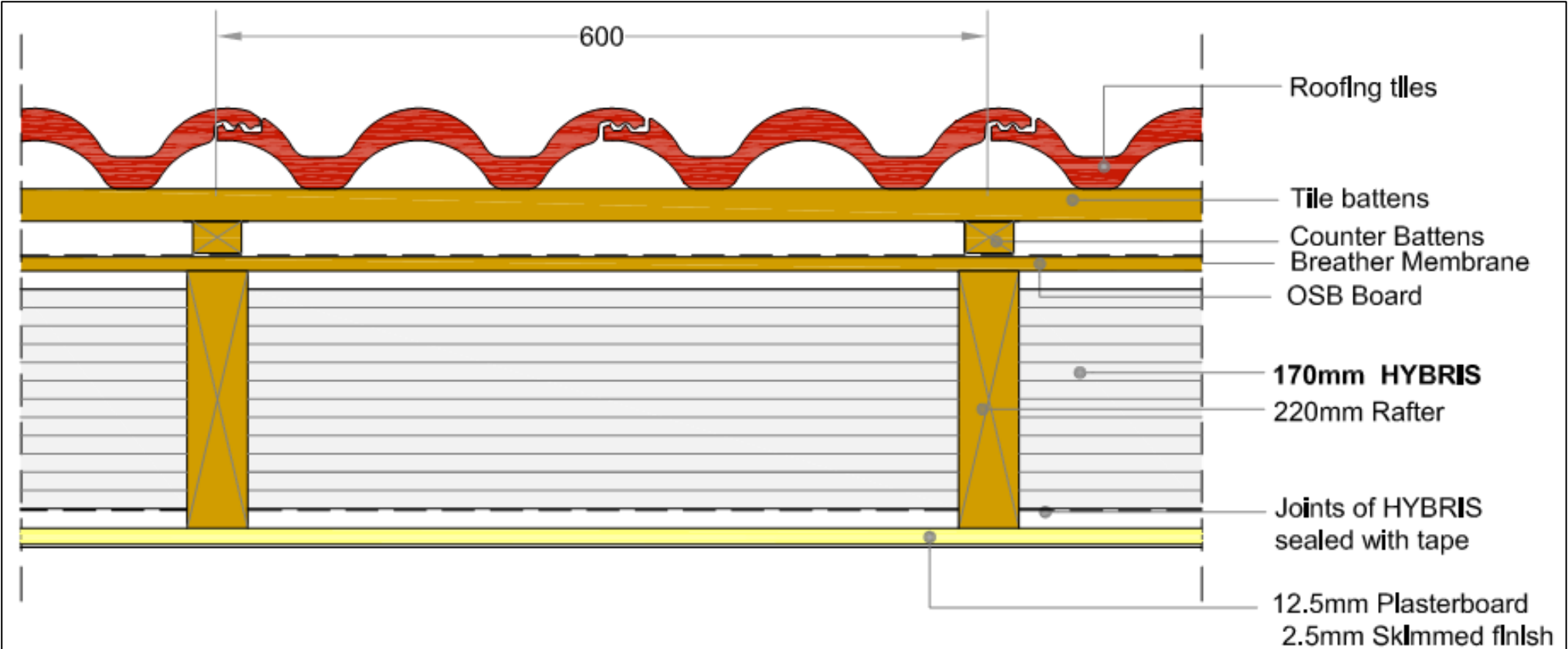
## Vapour pressure table:

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	-2.00	491.2	517.1	-2.95	0.00	0.00	No
1. External surface / Tiling, concrete	-1.63	491.2	533.2	-2.95	0.00	0.00	No
2. Tiling, concrete / Airspace/tile battens	-1.63	491.2	533.2	-2.95	0.00	2.46	No
3. Airspace/tile battens / Airspace/counter battens	-1.63	491.2	533.2	-2.95	0.00	2.46	No
4. Airspace/counter battens / Breather membrane	-1.63	491.2	533.2	-2.95	0.00	2.46	No
5. Breather membrane / OSB	-1.61	491.4	534.1	-2.94	0.00	0.00	No
6. OSB / Hybris - Associated Air Gap / Rafter 125mm	-1.30	492.7	548.1	-2.91	0.00	0.00	No
7. Hybris - Associated Air Gap / Rafter 125mm / Hybris / Rafter 125mm	0.19	492.7	619.2	-2.91	0.00	0.00	No
8. Hybris / Rafter 125mm / Hybris - Associated Air Gap / Rafter 125mm	10.23	1 015.7	1 246.2	7.21	0.00	0.00	No
9. Hybris - Associated Air Gap / Rafter 125mm / HControl Hybrid	11.97	1 015.7	1 399.3	7.21	0.00	0.00	No
10. HControl Hybrid / HControl Hybrid - Associated Air Gap / Batten 38mm	18.96	1 491.1	2 191.0	12.94	0.00	0.00	No
11. HControl Hybrid - Associated Air Gap / Batten 38mm / Plasterboard	20.39	1 491.1	2 394.0	12.94	0.00	0.00	No
12. Plasterboard / Internal surface	20.63	1 491.3	2 430.0	12.94	0.00	0.00	No
Internal surface	21.00	1 491.3	2 430.0	12.94	0.00	0.00	No



## Interface temperature / Dew point graphical representation:





Pitched roof @ 600c  
 U-value = 0.18 W/m<sup>2</sup>K

## UVALUE CALCULATION

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0,0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof TE1081 - r-tp H170 @600c=0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, concrete</b>				
	Main construction	15 mm	1.500	0.000	100.00 %
<b>Layer2</b>	<b>Airspace/tile battens</b>				
	Main construction	25 mm	0.156	0.000	87.33 %
	Corrections - Cavity Unventilated, Emissivity: Normal				
	Bridging - Timber	25 mm	0.156	0.000	12.67 %
<b>Layer3</b>	<b>Airspace/counter battens</b>				
	Main construction	25 mm	0.250	0.000	91.67 %
	Corrections - Cavity Ventilated, Emissivity: Normal				
	Bridging - Timber	25 mm	0.130	0.000	8.33 %
<b>Layer4</b>	<b>Breather membrane</b>				
	Main construction	0 mm	0.084	0.005	100.00 %
<b>Layer5</b>	<b>OSB</b>				
	Main construction	11 mm	0.130	0.085	100.00 %
<b>Layer6</b>	<b>Hybris - Associated Air Gap / Rafter 200mm</b>				
	Main construction	15 mm	0.037	0.407	92.17 %
	Bridging - Timber	15 mm	0.130	0.000	7.83 %
<b>Layer7</b>	<b>Hybris / Rafter 200mm</b>				
	Main construction	170 mm	0.033	5.152	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	170 mm	0.130	0.000	7.83 %
<b>Layer8</b>	<b>Hybris - Associated Air Gap / Rafter 200mm</b>				
	Main construction	15 mm	0.034	0.443	92.17 %
	Bridging - Timber	15 mm	0.130	0.000	7.83 %
<b>Layer9</b>	<b>Polythene, 500 gauge</b>				
	Main construction	0 mm	0.000	0.000	100.00 %
<b>Layer10</b>	<b>Plasterboard</b>				
	Main construction	13 mm	0.190	0.066	100.00 %
<b>Internal surface</b>				0.100	
<b>Total resistance:</b>		Upper limit = 5.618 m <sup>2</sup> K/W Lower limit = 5.245 m <sup>2</sup> K/W Average = 5.431 m <sup>2</sup> K/W			
		U-value (unrounded) = 0.1841 W/m <sup>2</sup> K			
Unheated space: None					
<b>Total thickness: 289 mm</b>		<b>U-value: 0.18 W/m<sup>2</sup>K</b>			



## CONDENSATION RISK ANALYSIS

Users Ref: 00 TECHNICAL EXERCISES

Issued on: 31.July.2017

Prop Type Ref:

Property:

Carbon Index: 0,0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Roof TE1081 - r-tp H170 @600c=0.18

#### Environmental conditions:

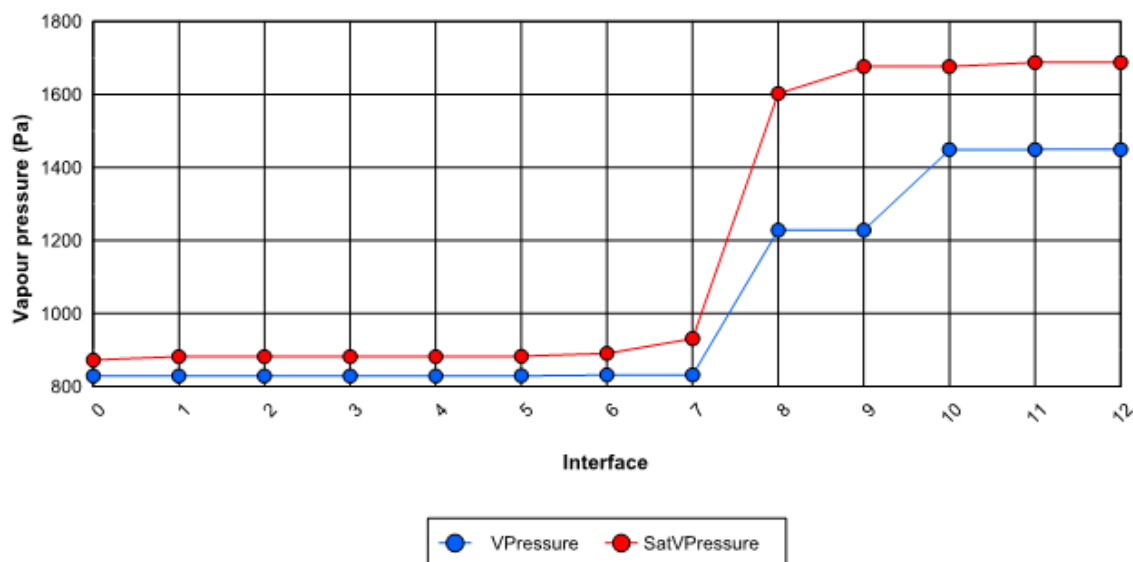
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 85 %

#### Table of layers:

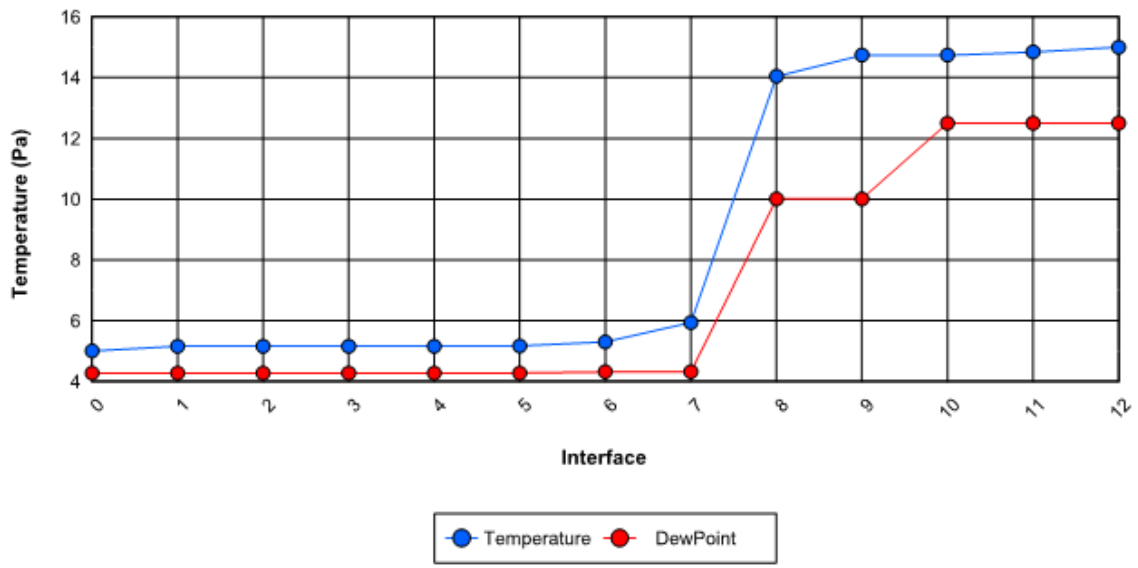
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, concrete	15.0	1.500	0.000	0.100	0.000	0.000	0.00
2. Airspace/tile battens	25.0	0.000	0.000	0.100	0.000	0.000	0.00
3. Airspace/counter battens	25.0	0.000	0.000	0.100	0.000	0.000	0.00
4. Breather membrane	0.4	0.084	0.005	0.105	0.000	0.40	0.40
5. OSB	11.0	0.130	0.085	0.190	250.0	2.75	3.15
6. Hybris - Associated Air Gap / Rafter 200mm	15.0	0.000	0.407	0.597	0.000	0.000	3.15
7. Hybris / Rafter 200mm	170.0	0.033	5.152	5.748	0.000	450.00	453.15
8. Hybris - Associated Air Gap / Rafter 200mm	15.0	0.000	0.443	6.191	0.000	0.000	453.15
9. Polythene, 500 gauge	0.1	0.000	0.000	6.191	0.000	250.00	703.15
10. Plasterboard	12.5	0.190	0.066	6.257	45.0	0.56	703.71
Internal surface	-	0.000	0.100	6.257	0.000	0.000	703.71

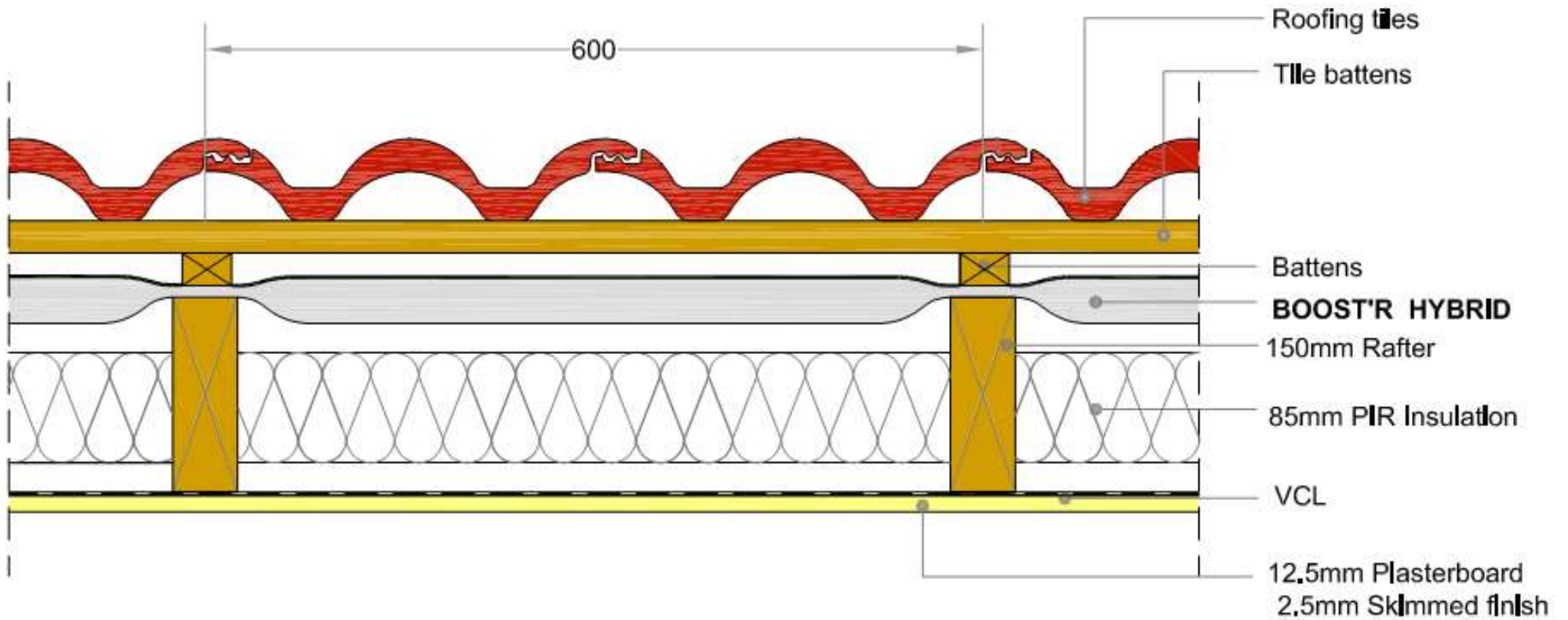
**Vapour pressure table:**

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	5.00	828.3	871.9	4.27	0.00	0.00	No
1. External surface / Tiling, concrete	5.16	828.3	881.5	4.27	0.00	0.00	No
2. Tiling, concrete / Airspace/tile battens	5.16	828.3	881.5	4.27	0.00	4.57	No
3. Airspace/tile battens / Airspace/counter battens	5.16	828.3	881.5	4.27	0.00	4.57	No
4. Airspace/counter battens / Breather membrane	5.16	828.3	881.5	4.27	0.00	4.57	No
5. Breather membrane / OSB	5.17	828.6	882.0	4.27	0.00	0.00	No
6. OSB / Hybris - Associated Air Gap / Rafter 200mm	5.30	831.0	890.2	4.32	0.00	0.00	No
7. Hybris - Associated Air Gap / Rafter 200mm / Hybris / Rafter 200mm	5.94	831.0	930.7	4.32	0.00	0.00	No
8. Hybris / Rafter 200mm / Hybris - Associated Air Gap / Rafter 200mm	14.04	1 227.8	1 602.1	10.01	0.00	0.00	No
9. Hybris - Associated Air Gap / Rafter 200mm / Polythene, 500 gauge	14.74	1 227.8	1 676.0	10.01	0.00	0.00	No
10. Polythene, 500 gauge / Plasterboard	14.74	1 448.3	1 676.0	12.50	0.00	0.00	No
11. Plasterboard / Internal surface	14.84	1 448.7	1 687.2	12.50	0.00	0.00	No
Internal surface	15.00	1 448.7	1 687.2	12.50	0.00	0.00	No



Interface temperature / Dew point graphical representation:





PF42:  
 Pitched roof @ 600c  
 U-value = 0.18 W/m<sup>2</sup>K

## UVALUE CALCULATION

Users Ref: 00 PATHFINDER 2014-09

Issued on: 15.September.2014

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof PF42 - r-tp 85PIR+BRH @600c=0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, clay</b>				
	Main construction	15 mm	1.000	0.000	100.00 %
<b>Layer2</b>	<b>Standard cavity / tile battens</b>				
	Main construction	25 mm	0.250	0.000	87.33 %
	Corrections - Cavity Ventilated, Emissivity: Normal				
	Bridging - Timber	25 mm	0.130	0.000	12.67 %
<b>Layer3</b>	<b>Air Gap Roof protected by wind, Emissivity: 0.31</b>				
	Main construction	25 mm	0.446	0.056	100.00 %
<b>Layer4</b>	<b>BoostR Hybrid</b>				
	Main construction	35 mm	0.026	1.350	93.67 %
	Bridging - Timber	35 mm	0.130	0.000	6.33 %
<b>Layer5</b>	<b>Non ventilated air layer - low e / Rafter 140mm</b>				
	Main construction	15 mm	0.031	0.480	92.17 %
	Bridging - Timber	15 mm	0.130	0.000	7.83 %
<b>Layer6</b>	<b>PIR / Rafter 140mm</b>				
	Main construction	85 mm	0.022	3.864	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	85 mm	0.130	0.000	7.83 %
<b>Layer7</b>	<b>Non ventilated air layer - low e</b>				
	Main construction	15 mm	0.033	0.453	92.17 %
	Bridging - Timber	15 mm	0.130	0.000	7.83 %
<b>Layer8</b>	<b>Vapour Control Layer</b>				
	Main construction	0 mm	0.500	0.001	100.00 %
<b>Layer9</b>	<b>Plasterboard, skimmed finish</b>				
	Main construction	15 mm	0.190	0.079	100.00 %
<b>Internal surface</b>				0.100	
<b>Total resistance:</b> Upper limit = 5.866 m <sup>2</sup> K/W Lower limit = 4.957 m <sup>2</sup> K/W Average = 5.411 m <sup>2</sup> K/W					
U-value (unrounded) = 0.1848 W/m <sup>2</sup> K					
Unheated space: None					
<b>Total thickness: 230 mm</b>			<b>U-value: 0.18 W/m<sup>2</sup>K</b>		

## CONDENSATION RISK ANALYSIS

Users Ref: 00 PATHFINDER 2014-09

Issued on: 15.September.2014

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Roof PF42 - r-tp 85PIR+BRH @600c=0.18

### Environmental conditions:

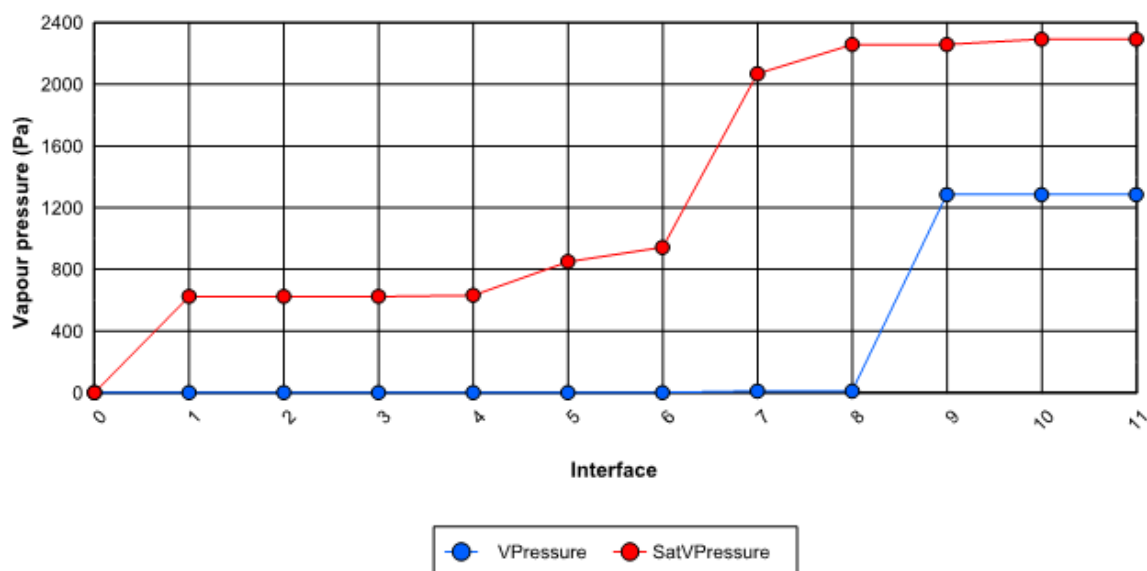
External conditions:	Temperature: 0 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 20 °C	Relative Humidity: 55 %

### Table of layers:

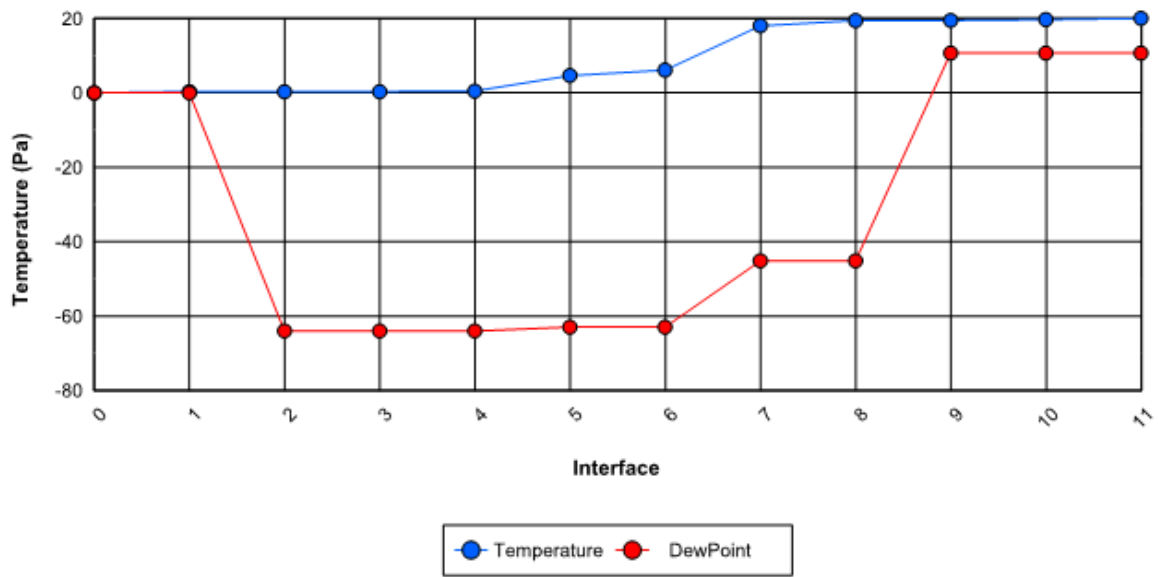
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, clay	15.0	1.000	0.000	0.100	250.0	3.75	3.75
2. Standard cavity / tile battens	25.0	0.000	0.000	0.100	0.000	0.000	3.75
3. Air Gap Roof protected by wind, Emissivity: 0	25.0	0.000	0.056	0.156	0.000	0.000	3.75
4. BoostR Hybrid	35.0	0.000	1.350	1.506	0.000	0.60	4.35
5. Non ventilated air layer - low e / Rafter 140mm	15.0	0.000	0.480	1.986	0.000	0.000	4.35
6. PIR / Rafter 140mm	85.0	0.022	3.864	5.850	400.0	34.00	38.35
7. Non ventilated air layer - low e	15.0	0.000	0.453	6.303	0.000	0.000	38.35
8. Vapour Control Layer	0.4	0.500	0.001	6.303	0.000	4,650.00	4,688.35
9. Plasterboard, skimmed finish	15.0	0.190	0.079	6.382	45.0	0.68	4,689.03
Internal surface	-	0.000	0.100	6.382	0.000	0.000	4,689.03

**Vapour pressure table:**

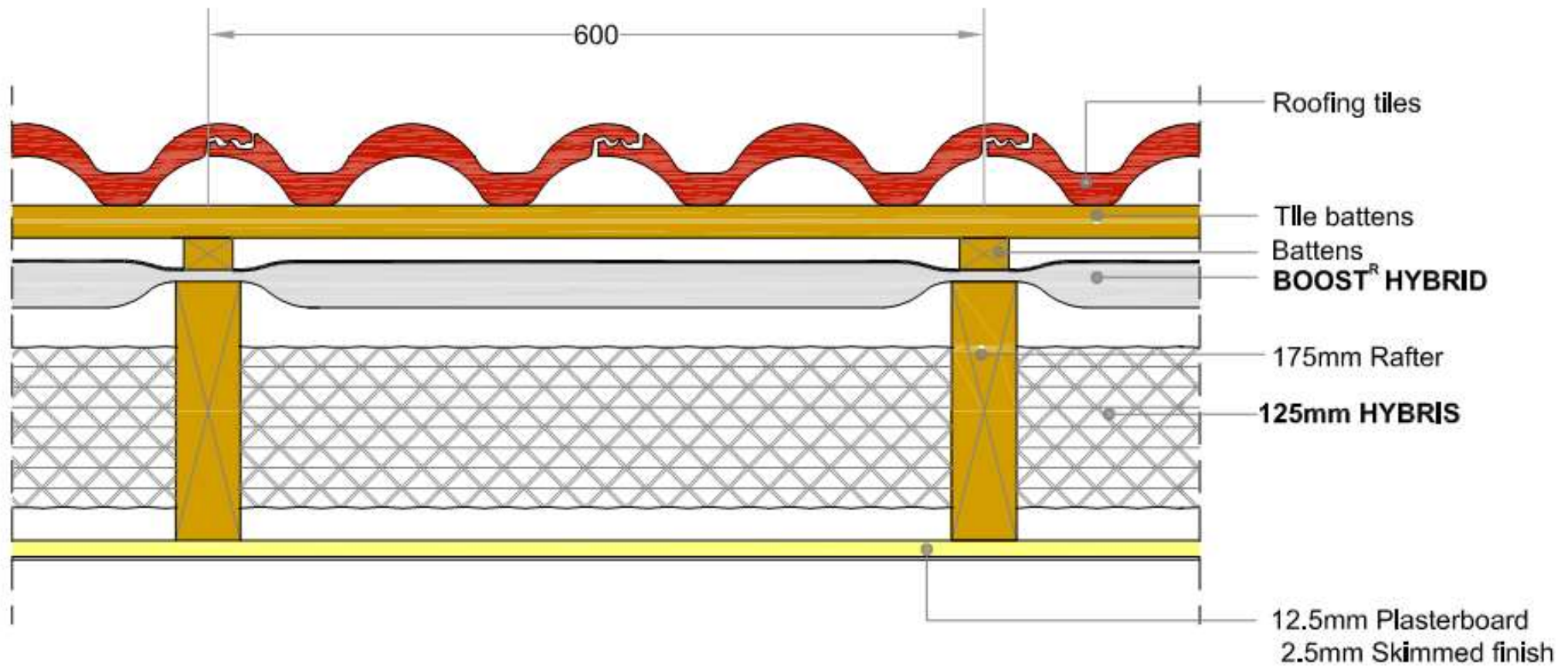
Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	0.00	0.0	0.0	0.00	0.00	0.00	No
1. External surface / Tiling, clay	0.31	0.0	624.3	0.00	0.00	0.00	No
2. Tiling, clay / Standard cavity / tile battens	0.31	1.0	624.3	-64.07	0.00	0.00	No
3. Standard cavity / tile battens / Air Gap Roof protected by wind, Emissivity	0.31	1.0	624.3	-64.07	0.00	0.00	No
4. Air Gap Roof protected by wind, Emissivity: 0.31 / BoostR Hybrid	0.48	1.0	632.2	-64.07	0.00	0.00	No
5. BoostR Hybrid / Non ventilated air layer - low e / Rafter 140mm	4.65	1.2	850.6	-62.97	0.00	0.00	No
6. Non ventilated air layer - low e / Rafter 140mm / PIR / Rafter 140mm	6.13	1.2	942.9	-62.97	0.00	0.00	No
7. PIR / Rafter 140mm / Non ventilated air layer - low e	18.05	10.5	2 069.0	-45.19	0.00	0.00	No
8. Non ventilated air layer - low e / Vapour Control Layer	19.45	10.5	2 257.9	-45.19	0.00	0.00	No
9. Vapour Control Layer / Plasterboard, skimmed finish	19.45	1 285.1	2 258.3	10.69	0.00	0.00	No
10. Plasterboard, skimmed finish / Internal surface	19.69	1 285.3	2 292.7	10.69	0.00	0.00	No
Internal surface	20.00	1 285.3	2 292.7	10.69	0.00	0.00	No



Interface temperature / Dew point graphical representation:







PF53b:  
 Pitched roof @ 600c  
 U-value = 0.18 W/m<sup>2</sup>K

## UVALUE CALCULATION

Users Ref: 00 PATHFINDER 2017

Issued on: 29.September.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

### Building Elements:

#### Building Element Roof PF53b - r-tp 125H+BRH @600c =0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	$\lambda$	R	Fraction
<b>External surface</b>				0.100	
<b>Layer1</b>	<b>Tiling, clay</b> Main construction	15 mm	1.000	0.000	100.00 %
<b>Layer2</b>	<b>air gap / Battens</b> Main construction Corrections - Cavity Ventilated, Emissivity: Normal Bridging - Timber	25 mm 25 mm	0.220 0.138	0.000 0.000	89.63 % 10.37 %
<b>Layer3</b>	<b>*Correction roof protected by wind, e=0.31</b> Main construction	25 mm	0.446	0.056	100.00 %
<b>Layer4</b>	<b>BoostR Hybrid</b> Main construction Bridging - Timber	35 mm 35 mm	0.026 0.130	1.350 0.000	92.17 % 7.83 %
<b>Layer5</b>	<b>Hybris - Associated Air Gap / Rafter 175mm</b> Main construction Bridging - Timber	15 mm 15 mm	0.031 0.130	0.470 0.000	92.17 % 7.83 %
<b>Layer6</b>	<b>Hybris / Rafter 175mm</b> Main construction Corrections - Air Gap: Level 0, Fasteners: None or plastic Bridging - Timber	125 mm 125 mm	0.033 0.130	0.000 3.788	92.17 % 7.83 %
<b>Layer7</b>	<b>Hybris - Associated Air Gap / Rafter 175mm</b> Main construction Bridging - Timber	15 mm 15 mm	0.033 0.130	0.443 0.000	92.17 % 7.83 %
<b>Layer8</b>	<b>Plasterboard</b> Main construction	13 mm	0.190	0.066	100.00 %
<b>Internal surface</b>				0.100	

**Total resistance:** Upper limit = 5.829 m<sup>2</sup>K/W Lower limit = 5.163 m<sup>2</sup>K/W Average = 5.496 m<sup>2</sup>K/W  
U-value (unrounded) = 0.1819 W/m<sup>2</sup>K

Unheated space: None

**Total thickness: 267 mm**

**U-value: 0.18 W/m<sup>2</sup>K**

## CONDENSATION RISK ANALYSIS

Users Ref: 00 PATHFINDER 2017

Issued on: 29.September.2017

Prop Type Ref:

Property:

Carbon Index: 0.0

SAP Rating: 0

Fuel Bill: £0.00

CO2 Emissions: 0.00 t/year

Energy used: 0.0 GJ per annum

Surveyor: ,

Address:

Client:

Software

SAP version: 0.00 Regs Region: England and Wales, Calculation Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

**Roof PF53b - r-tp 125H+BRH @600c =0.18**

### Environmental conditions:

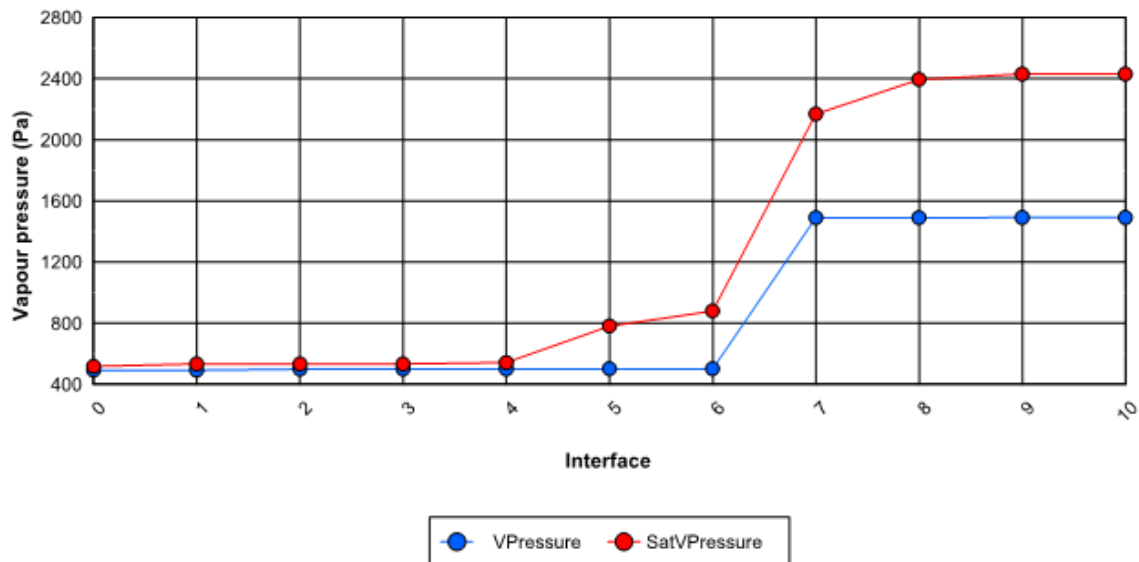
External conditions:	Temperature: -2 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 21 °C	Relative Humidity: 60 %

### Table of layers:

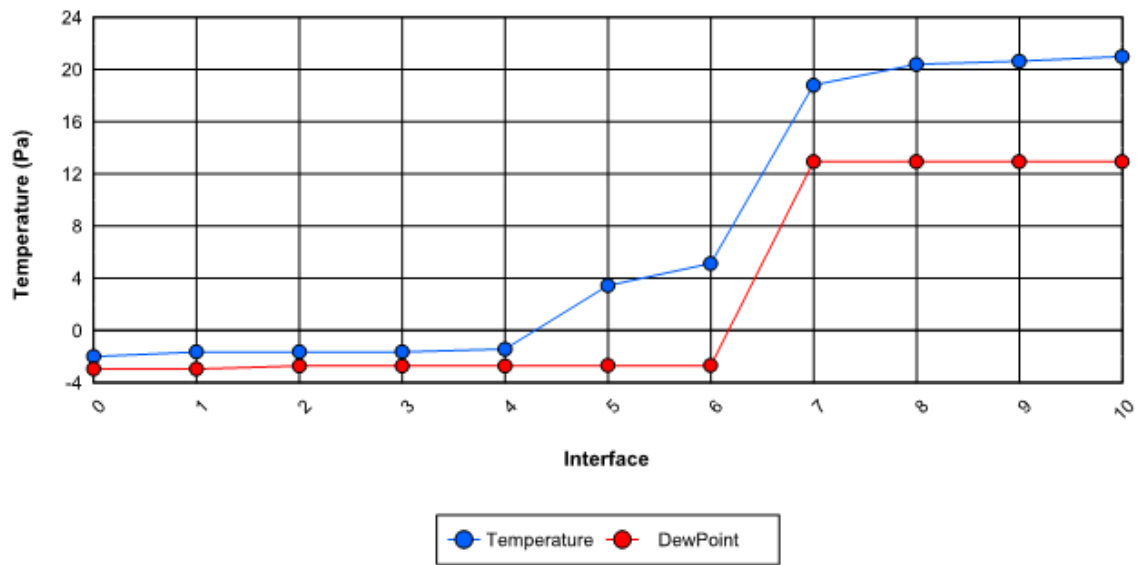
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.100	0.100	0.000	0.000	0.00
1. Tiling, clay	15.0	1.000	0.000	0.100	250.0	3.75	3.75
2. air gap / Battens	25.0	0.220	0.000	0.100	0.000	0.000	3.75
3. *Correction roof protected by wind, e=0.31	25.0	0.000	0.056	0.156	0.000	0.000	3.75
4. BoostR Hybrid	35.0	0.000	1.350	1.506	0.000	0.60	4.35
5. Hybris - Associated Air Gap / Rafter 175mm	14.5	0.000	0.470	1.976	0.000	0.000	4.35
6. Hybris / Rafter 175mm	125.0	0.033	3.788	5.764	0.000	450.00	454.35
7. Hybris - Associated Air Gap / Rafter 175mm	14.5	0.000	0.443	6.207	0.000	0.000	454.35
8. Plasterboard	12.5	0.190	0.066	6.273	45.0	0.56	454.91
Internal surface	-	0.000	0.100	6.273	0.000	0.000	454.91

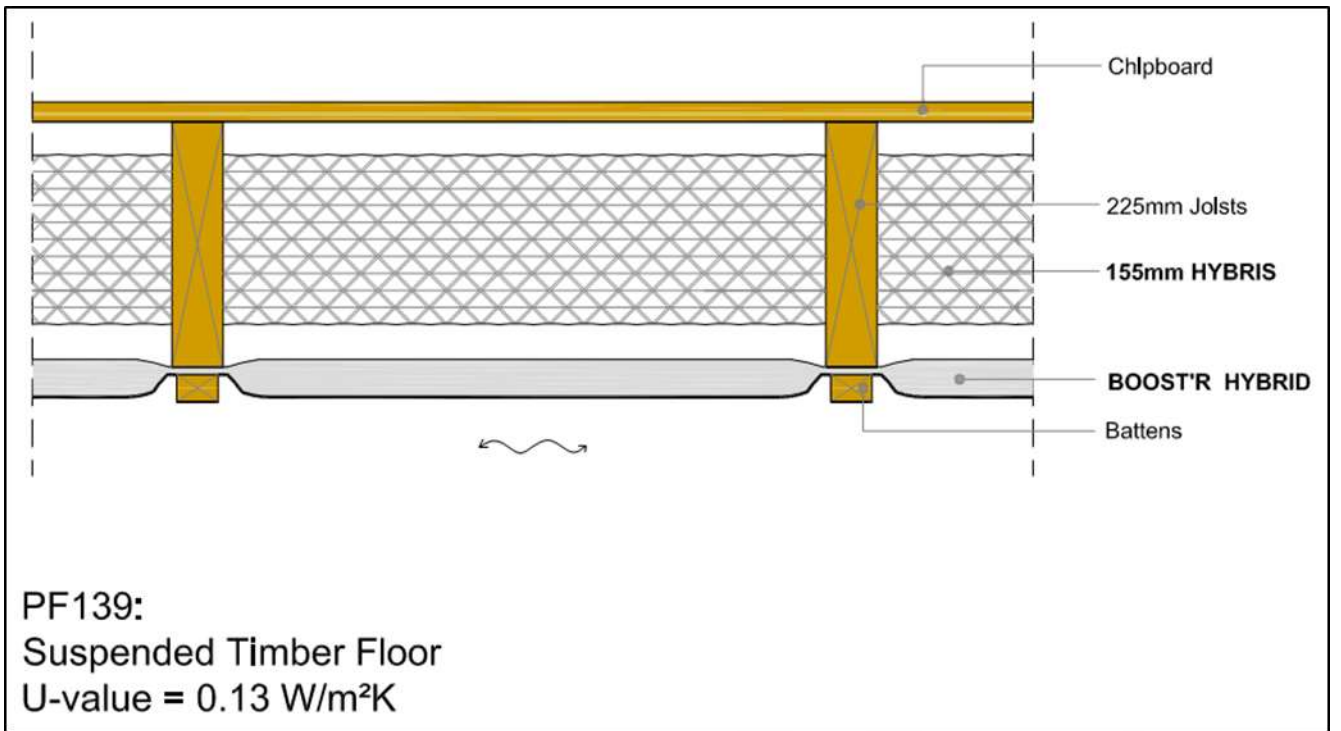
**Vapour pressure table:**

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m2.h	Cond. rate 60 days g/m2.h	Cond. risk Y/N
External surface	-2.00	491.2	517.1	-2.95	0.00	0.00	No
1. External surface / Tiling, clay	-1.64	491.2	532.9	-2.95	0.00	0.00	No
2. Tiling, clay / air gap / Battens	-1.64	499.5	532.9	-2.73	0.00	0.00	No
3. air gap / Battens / *Correction roof protected by wind, e=0.31	-1.64	499.5	532.9	-2.73	0.00	0.00	No
4. *Correction roof protected by wind, e=0.31 / BoostR Hybrid	-1.44	499.5	542.0	-2.73	0.00	0.00	No
5. BoostR Hybrid / Hybris - Associated Air Gap / Rafter 175mm	3.44	500.8	781.1	-2.69	0.00	0.00	No
6. Hybris - Associated Air Gap / Rafter 175mm / Hybris / Rafter 175mm	5.13	500.8	879.9	-2.69	0.00	0.00	No
7. Hybris / Rafter 175mm / Hybris - Associated Air Gap / Rafter 175mm	18.80	1 490.1	2 169.3	12.93	0.00	0.00	No
8. Hybris - Associated Air Gap / Rafter 175mm / Plasterboard	20.40	1 490.1	2 395.7	12.93	0.00	0.00	No
9. Plasterboard / Internal surface	20.64	1 491.3	2 431.0	12.94	0.00	0.00	No
Internal surface	21.00	1 491.3	2 431.0	12.94	0.00	0.00	No



## Interface temperature / Dew point graphical representation:





DRAFT

# U-VALUE CALCULATOR REPORT



Property Reference	- PATHFINDER 2018	Issued on Date	09/01/2019
Assessment Reference		Prop Type Ref	
Project			
Calculation Type	New Build (As Built)		

SAP Rating		DER		TER	
Environmental		% DER<TER			
CO <sub>2</sub> Emissions (t/year)		DFEE		TFEE	
General Requirements Compliance		% DFEE<TFEE			

Assessor Details	Mr. Thomas Wiedmer, Thomas Wiedmer, Tel: 01249 462888, thomas.wiedmer@insulation-actis.com	Assessor ID	T436-0001
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Client	
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## Building Elements

**Floor PF139 - f-ts 155h+brh @400c = 0.13**

Floor Type: Suspended Floor  
 Area = 85.90 m<sup>2</sup>, Perimeter = 42.95 m, Wall thickness = 257.00 mm, Soil: Unknown  
 Depth of underfloor space below ground: 0.300 m Floor wind shielding: Average (suburban)  
 Floor height above ground: h = 0.225 m  
 U-value of walls above ground: U<sub>w</sub> = 0.160 m  
 Ventilation openings per perimeter length: e = 0.0015 %  
 Mean wind speed: v = 5.000 m/s  
 Resistance on solum: R<sub>g</sub> = 0.000 m<sup>2</sup>K/W

Layer	Description	Thickness (mm)	Conductivity (W/m <sup>2</sup> K)	Resistance (m <sup>2</sup> K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	<b>Boost'R Hybrid / Battens</b>				
	Main construction	35	0.0259	1.3500	90.50
	Main construction	35	0.1300	0.2692	9.50
Layer 2	<b>Hybris - Associated Air Gap / Joists</b>				
	Main construction	31.5	0.0306	1.0300	88.25
	Main construction	31.5	0.1300	0.2423	11.75
Layer 3	<b>Hybris / Joists</b>				
	Main construction	155	0.0330	4.6970	88.25
	Main construction	155	0.1300	1.1923	11.75
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	<b>Hybris - Associated Air Gap / Joists</b>				
	Main construction	31.5	0.0347	0.9090	88.25
	Main construction	31.5	0.1300	0.2423	11.75
Layer 5	<b>Polythene, 500 gauge</b>				
	Main construction	0.25	0.0000	0.0000	100.00
Layer 6	<b>Chipboard</b>				
	Main construction	18	0.1300	0.1385	100.00
Int surface				0.1700	

Total resistance: Upper limit = 7.492 m<sup>2</sup> K/W Lower limit = 6.379 m<sup>2</sup> K/W Average = 6.935 m<sup>2</sup> K/W  
 Total correction = 0.0025 m<sup>2</sup> K/W U-value (unrounded) = 0.13 W/m<sup>2</sup> K

Unheated space:	None		
<b>Total thickness:</b>	<b>271 mm</b>	<b>U-value: 0.13 W/m<sup>2</sup> K</b>	<b>Kappa: n/a</b>





# CONDENSATION RISK ANALYSIS



Property Reference	- PATHFINDER 2018	Issued on Date	09/01/2019
Assessment Reference		Prop Type Ref	
Project			
Calculation Type	New Build (As Built)		

SAP Rating		DER		TER	
Environmental		% DER<TER			
CO <sub>2</sub> Emissions (t/year)		DFEE		TFEE	
General Requirements Compliance		% DFEE<TFEE			

Assessor Details	Mr. Thomas Wiedmer, Thomas Wiedmer, Tel: 01249 462888, thomas.wiedmer@insulation-actis.com	Assessor ID	T436-0001
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Client	
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## Floor - PF139

### Environmental conditions

External conditions	Temperature:	<input type="text" value="5"/>	°C	Relative Humidity:	<input type="text" value="95"/>	%
Internal conditions	Temperature:	<input type="text" value="15"/>	°C	Relative Humidity:	<input type="text" value="65"/>	%

### Table of layers

Layer	Thickness mm	Thermal conduct. W/m.K	Thermal resistance m <sup>2</sup> .K/W	Cumulative thermal resistance m <sup>2</sup> .K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg.m	Cumulative vapour resistance GN.s/kg.m
External surface	-	0.0000	0.1700	0.1700	0.0	0.00	0.00
1.Boost'R Hybrid / Battens	35.0	0.0000	1.3500	1.5200	0.000	0.55	0.55
2.Hybris - Associated Air Gap / Joists	31.5	0.0000	1.0300	2.5500	0.0	0.00	0.55
3.Hybris / Joists	155.0	0.0330	4.6970	7.2470	0.000	450.00	450.55
4.Hybris - Associated Air Gap / Joists	31.5	0.0000	0.9090	8.1560	0.0	0.00	450.55
5.Polythene, 500 gauge	0.3	0.0000	0.0000	8.1560	0.000	250.00	700.55
6.Chipboard	18.0	0.1300	0.1385	8.2944	300.0	5.40	705.95
Internal surface	-	0.0000	0.1700	8.2944	0.0	0.00	705.95

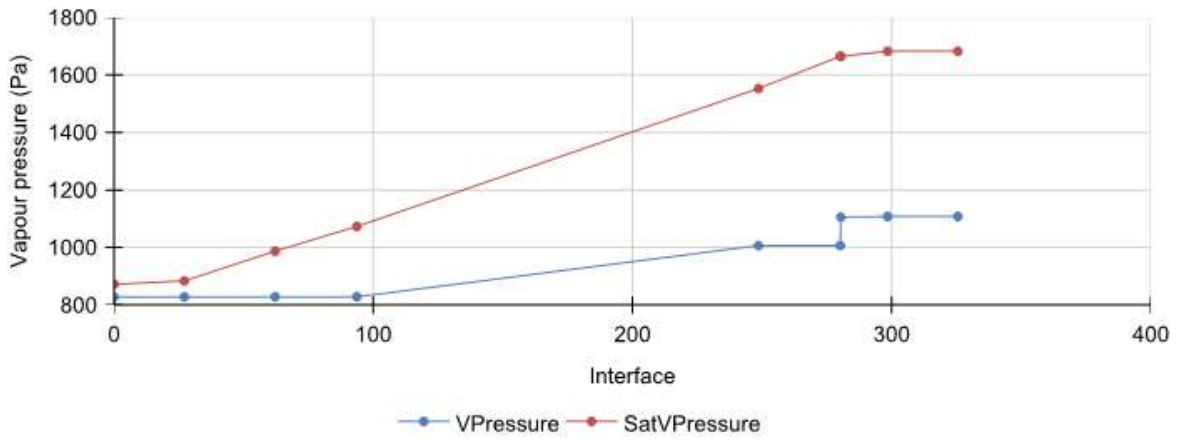
### Vapour pressure table

Interface - between layers	Interface temp. °C	Vapour pressure Pa	Satur. vapour pressure Pa	Dew point °C	Cond. rate g/m <sup>2</sup> h	Cond. rate 60 days g/m <sup>2</sup> h	Cond. risk Y/N
External surface	5.00	828.3	871.9	4.27	0.00	0.00	No
1. External surface / Boost'R Hybrid / Battens	5.20	828.3	884.2	4.3	0.00	0.00	No
2. Boost'R Hybrid / Battens / Hybris - Associated Air Gap / Joists	6.80	828.5	987.4	4.3	0.00	0.00	No
3. Hybris - Associated Air Gap / Joists / Hybris / Joists	8.01	828.5	1073.1	4.3	0.00	0.00	No
4. Hybris / Joists / Hybris - Associated Air Gap / Joists	13.56	1006.7	1552.8	7.1	0.00	0.00	No
5. Hybris - Associated Air Gap / Joists / Polythene, 500 gauge	14.64	1006.7	1664.8	7.1	0.00	0.00	No
6. Polythene, 500 gauge / Chipboard	14.64	1105.7	1664.8	8.5	0.00	0.00	No
Chipboard / Internal surface	14.80	1107.9	1682.5	8.5	0.00	0.00	No
Internal surface	15.00	1107.9	1682.5	8.48	0.00	0.00	No





# CONDENSATION RISK ANALYSIS



## Interface temperature / Dew point graphical representation

