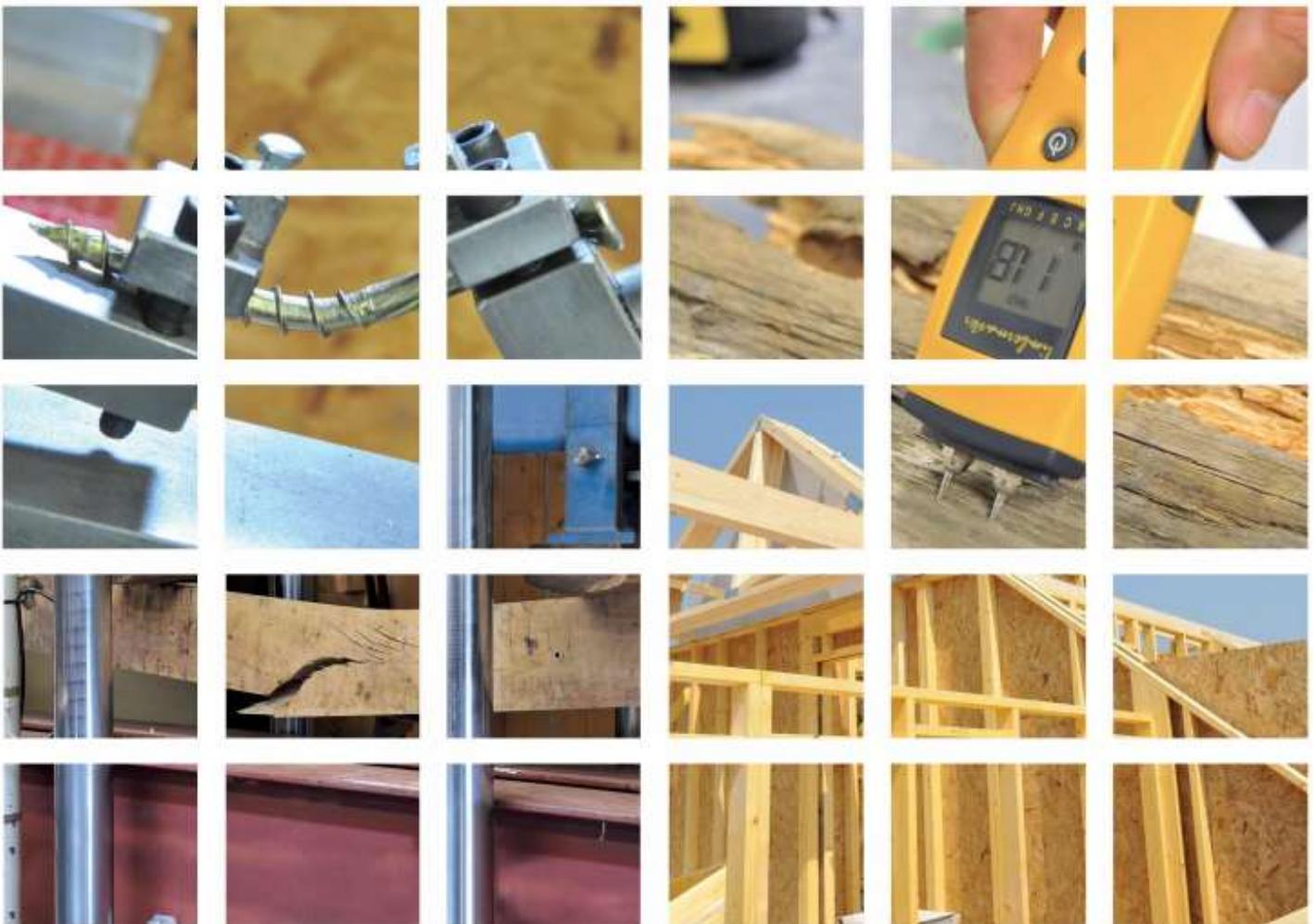


Q-Mark Registration Schedule

Reflective Vapour Control Layer

HControl Hybrid

ACTIS SA
30 Avenue de Catalogne
11300 Limoux
France



Q-Mark Registration Schedule

Holder of Q-Mark		ACTIS SA
Product Name		HControl Hybrid
Type and Use of Product		Reflective Vapour Control Membrane for use in Wall, Ceiling/Roof and Floor Constructions
Validity:	From	20/01/2020
	To	03/03/2022
Date of This Issue		20/01/2020
Issue Number		3
This Issue Replaces		Revision 04/03/2019
Relates to Certificate Number		CPS-013
Manufacturing Address/s		30 Avenue de Catalogne 11300 Limoux France
This Schedule Contains		34 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 Certification Ltd, trading as BM TRADA.

The Scheme is based on the principles of ISO 9001, EN 45011/12, ISO Guide 62/65 and in this case confirms compliance with EN 13984:2013, 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, 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 Construction 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 which 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

HControl Hybrid is a reflective vapour control layer, manufactured in accordance with BS EN 13984. It also provides complementary thermal insulation performance due to its thermal resistance and reflective surfaces, but these properties are outside of the scope of BS EN 13984. The thermal performance is however covered by a complementary certificate issued by Eurofins Expert Services Ltd.

The product consists of 20 separate elements, made up of two coated metal reinforced polyolefin films, eight coated metal polyolefin films, six polyolefin foams and four layers of polyester wadding.

The product is CE marked by the manufacturer on the basis of certificate number VTT-C-9190-12 issued by Eurofins Expert Services Ltd.

4.1.1 Table 1: Nominal Characteristics

Property	HControl Hybrid
Thickness (mm)	45
Mass/unit area (g/m ²)	850
Length (m)	10; 8.75; 7.5; 6.25
Width (mm)	1600

4.2 Intended Use

Under the scope of this certification, HControl Hybrid has been approved for use in:

- Wall Constructions
- Ceiling/Roof Constructions
- Timber Floor Constructions

and constructions in dwelling houses and buildings other than dwelling houses as a Vapour Control Layer and is considered to meet or contribute to meet 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.

HControl Hybrid can be installed directly on the adjacent structure (e.g. thermal insulation) or plasterboard with an unventilated air gap between it and the adjacent structure. The low emissivity of the two outer faces may contribute to the thermal performance of the product when accompanied by two air gaps.

5 BUILDING REGULATIONS

HControl 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 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, HControl Hybrid 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 System (QMS)

The manufacture of the products has been conducted under the control of an appropriate QMS.

The QMS 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 includes 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 QMS.

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

Procedures which enable appropriate traceability of production runs through to dispatch are in place.

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 Identification

The products are supplied to site in rolls. Each roll bears a label indicating the manufacturers name, the product name, nominal dimensions and the BM TRADA Q-Mark logo and Certificate Number. Installation instructions shall also be supplied with each roll/consignment.

10.3 Storage and Handling

- The rolls are stored in clean dry conditions, not exposed to direct sunlight and in such a way that dirt and dust cannot adhere to the surfaces.
- The product must be protected from being dropped or crushed.
- The product must not be exposed to an open flame or other ignition sources and must also be stored away from flammable materials and solvents.

10.4 Installation

10.4.1 General

Installation of HControl Hybrid shall be carried out in accordance with the Manufacturer's installation instructions in order to achieve the intended performance of the product.

10.4.2 Actual

- HControl Hybrid can be installed on either side of timber rafter's studs or joists. The installation can be carried out at normal temperature conditions.
- The product shall be installed and fixed vertically or horizontally. Joints shall have a 50mm overlap when installed vertically and 100mm when installed horizontally. All joints shall be sealed with a proprietary ACTIS reflective tape to prevent water and air infiltration. The product can also be butt-jointed and sealed with the recommended ACTIS tape to prevent water and air infiltration.
- HCONTROL HYBRID may also be available with a self-adhesive flap which facilitates sealing of joints between adjacent sheets
- The product shall also be appropriately sealed around windows, doors and ventilation pipes. Joints between vertical walls and the floor shall be sealed with mastic.
- Cross battens or Noggins are recommended in cases of horizontal installation. Noggins shall be fixed to support overlapping edges and the product shall be stapled to the battens or noggins and taped using a proprietary ACTIS adhesive tape. Staples shall also be covered with tape to ensure an air tight seal.
- Finished edges shall be folded under by at least 50mm and secured with a batten.
- Care must be taken to ensure that the product does not come into contact with chimneys, fire or any source of ignition. Mineral Wool is recommended for use around these areas. The product shall be stopped 50mm away from the chimney and packed with Mineral Wool or in accordance with the Flue manufacturer's installation instructions. See Figure 1 below.

Figure 1: Installation of H Control Hybrid around Chimneys

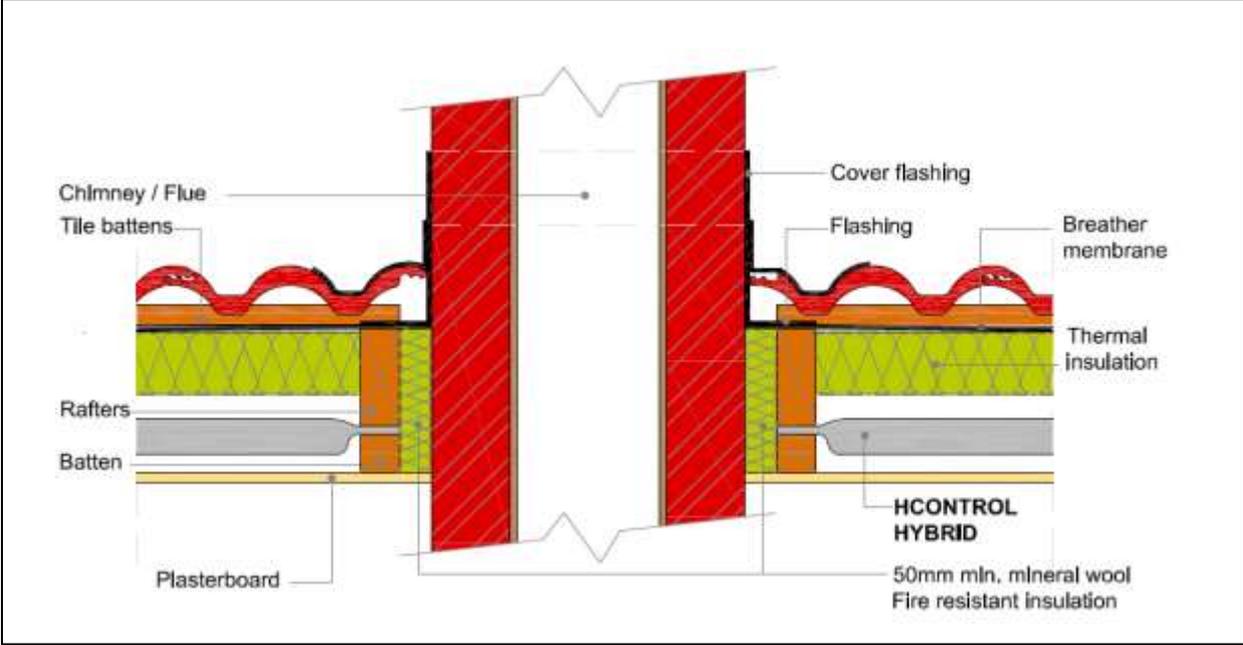


Figure 3: Installation under Rafters

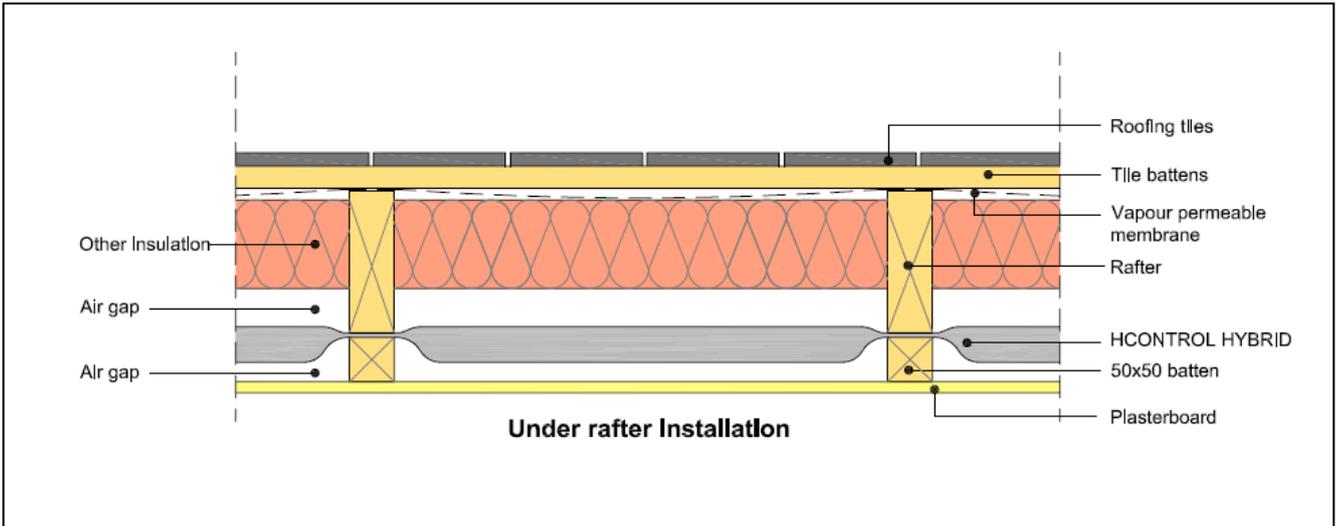


Figure 4: Installation under Rafters without Battens

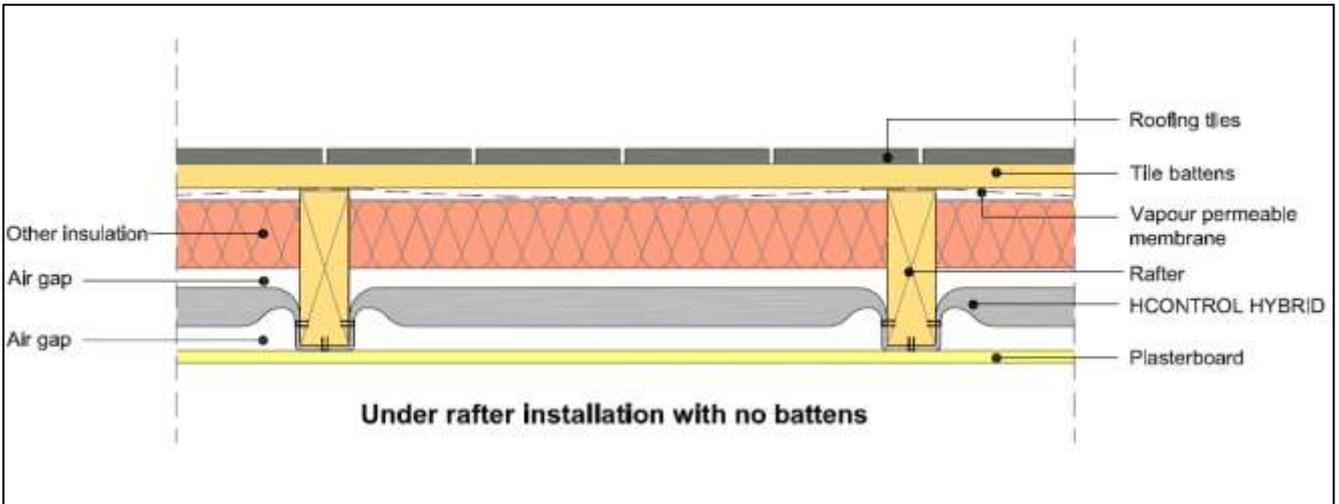
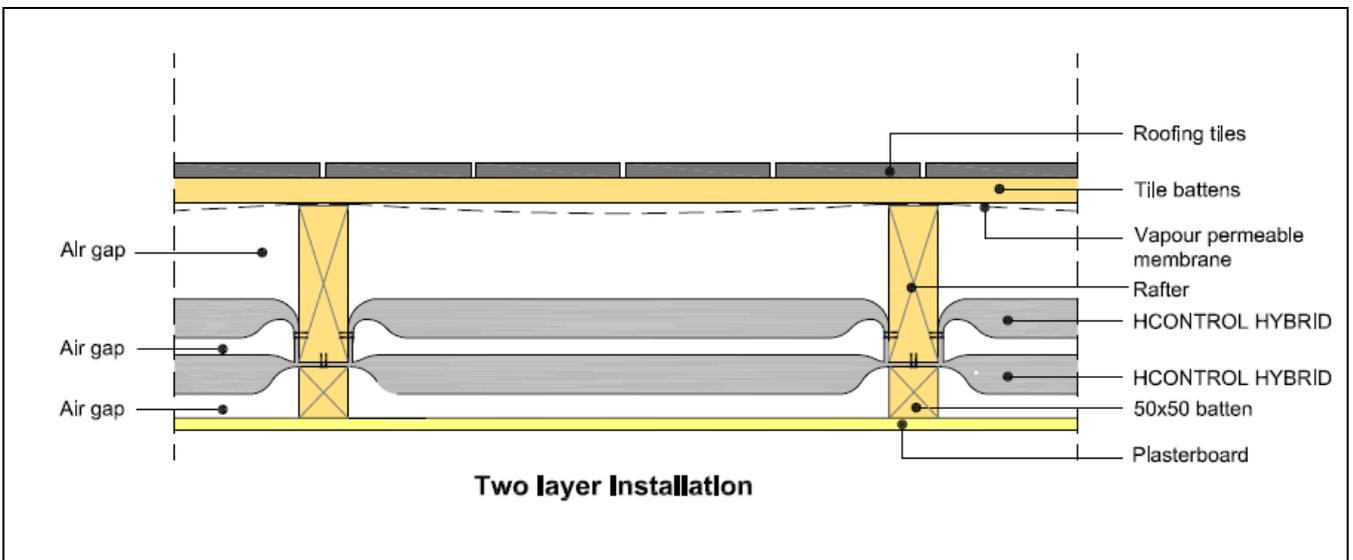


Figure 5: Two Layer Insulation



10.4.2.1.2 HControl Hybrid in Wall Systems

Figure 6: HControl Hybrid on Timber Frame Wall

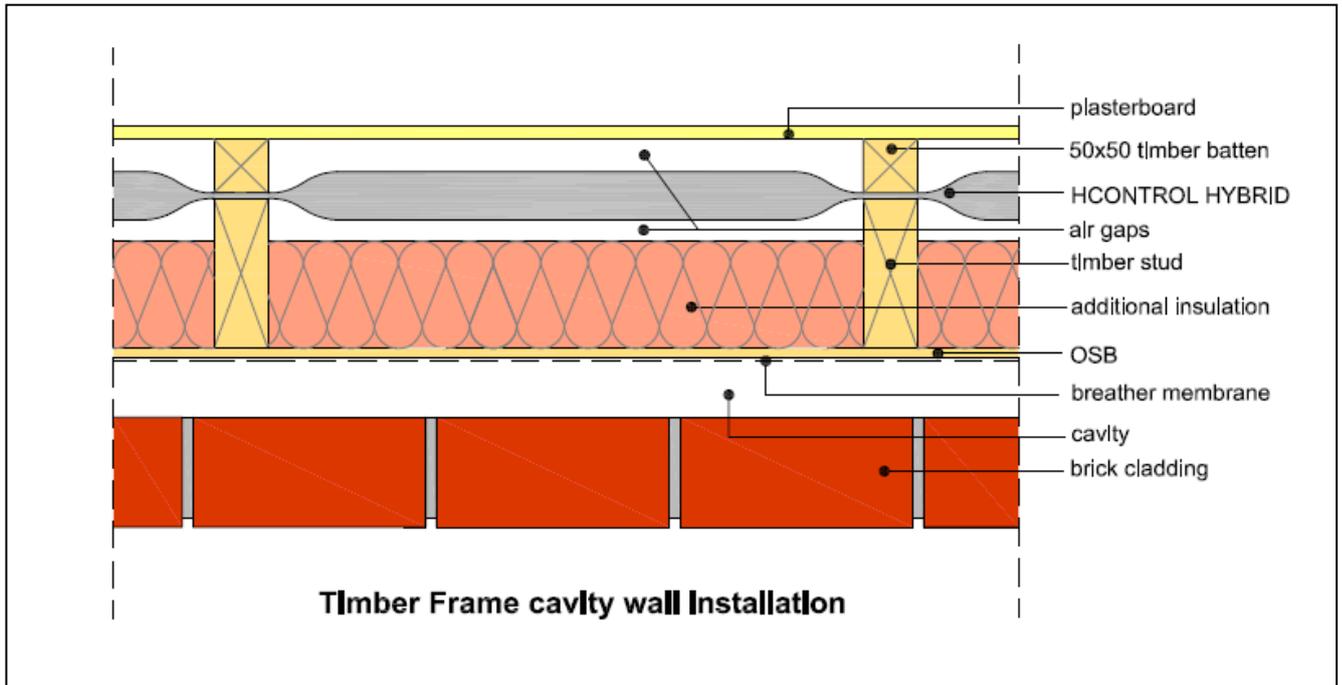


Figure 7: Two Layers of HControl Hybrid on Timber Frame Wall

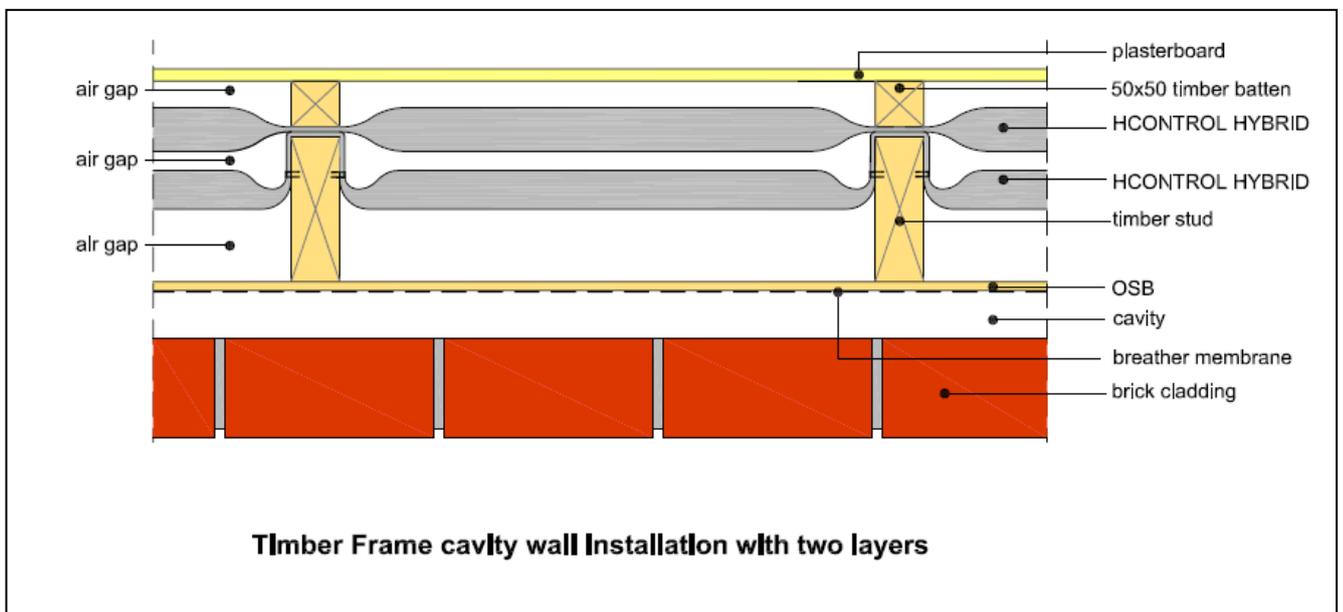
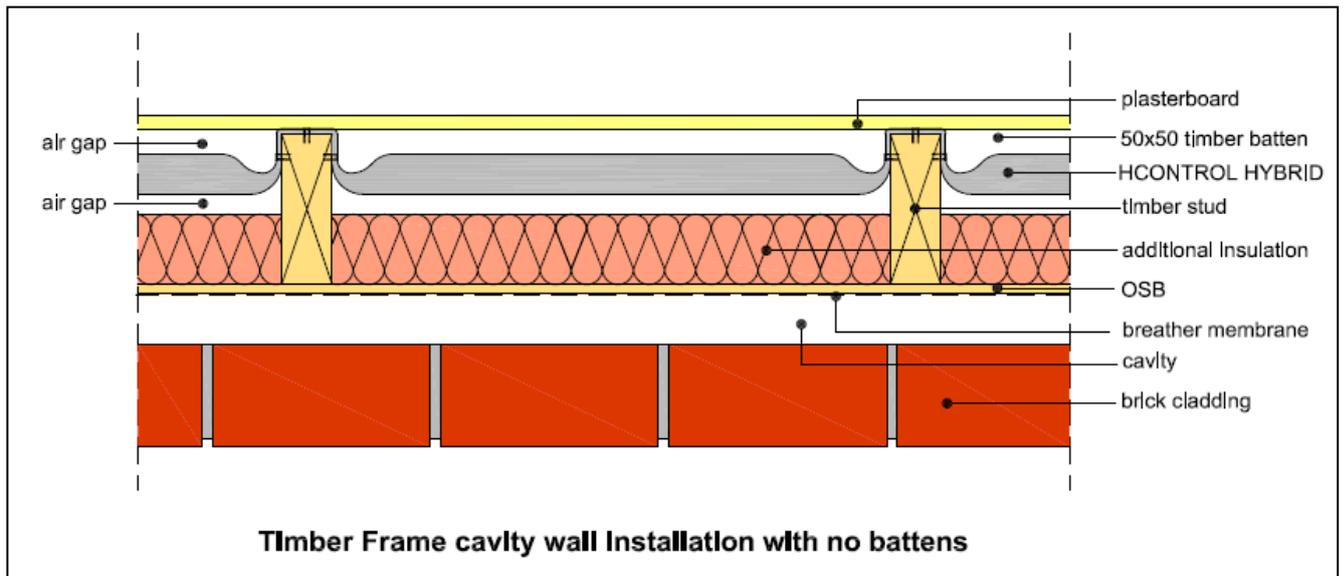
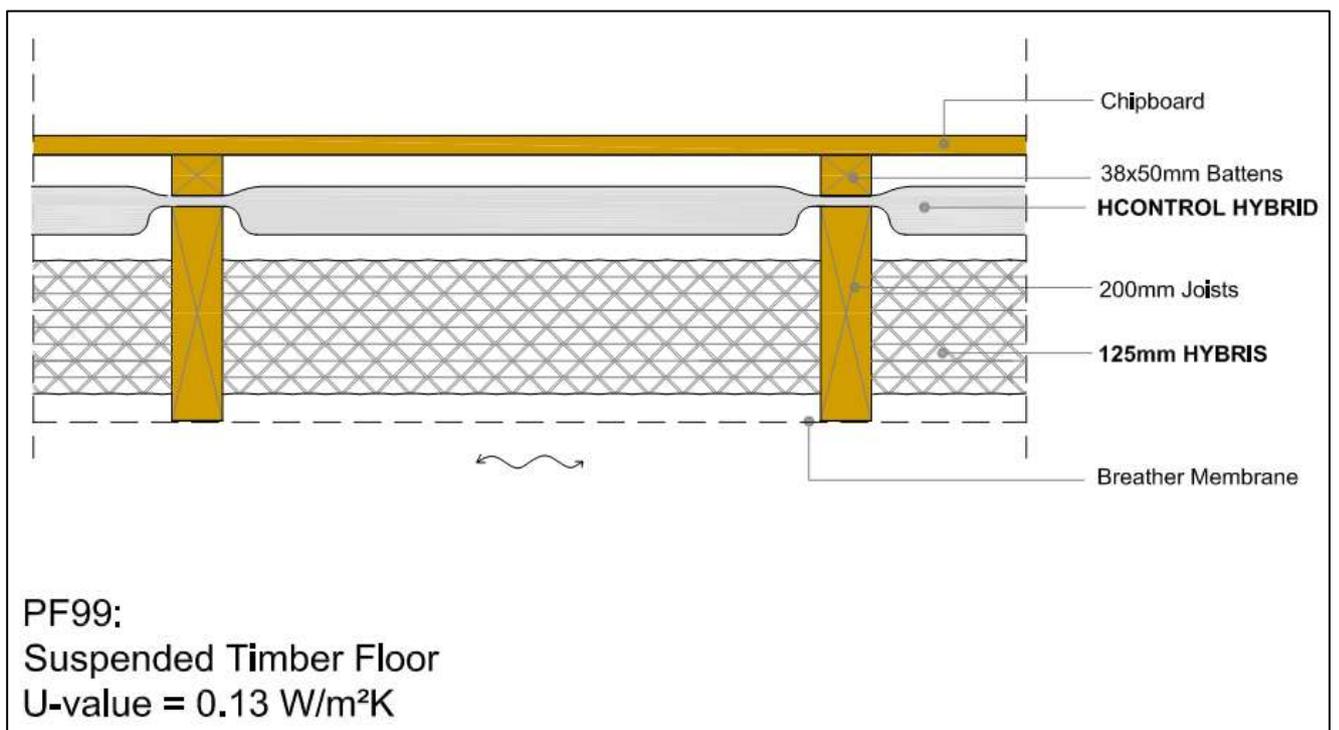


Figure 8: HControl Hybrid on Timber Frame Wall without Battens



10.4.2.1.1 HControl Hybrid in Floor Systems



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 13984, in accordance with the Scheme rules. Many of the values quoted are derived from the existing certificate number C-9190-12 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
- Resistance to nail tearing (nail shank)
- Joint Strength
- Water Vapour Transmission before and after ageing
- Water-tightness (Resistance to Water Penetration)
- Air Permeability
- Resistance to Impact

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, Annex C

Direction	HControl Hybrid
	Before Ageing
Machine	300
Cross	200

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

Direction	HControl Hybrid	
	Before Ageing	After Ageing
Machine	250	250
Cross	200	200

11.2.1.3 Table 4: Joint Strength (N/50mm) to EN 12317-2

	HControl Hybrid
Strength	55N/50mm

11.2.1.4 Table 5: Resistance to Water Penetration to BS EN 1928 Method A

	HControl Hybrid	
	Before Aging	After Aging
Class	W1	W1

11.2.1.5 Table 6: Water Vapour Transmission (Sd & MNs/g) (BS EN 1931)

	HControl Hybrid	
	Before Ageing	After Ageing
Sd (m)	≥200	≥200
MNs/g	>1000	>1000

Note:

For condensation risk analysis of specific applications (e.g. flat roofs) the vapour resistance value of $Z=7700\text{MNs/g}$ ($sd=1512\text{m}$) should be used for HControl Hybrid.

11.2.2 Safety in Case of Fire

The fire performance of the products has not been determined. Where required, fire performance shall be determined for the structure as a whole.

11.2.2.1 Reaction to Fire

No Performance Determined.

11.2.2.2 Resistance to Fire

HControl Hybrid has been tested within a loadbearing timber frame wall assembly in accordance with EN1365-1. The tested assembly achieved a performance of 34 minutes. The result should only be used in conjunction with walls that fall within the "Field of Direct Application" stated in the test report.

11.2.3 Hygiene, Health and Environment

11.2.3.1 Risk of Condensation

When installed in accordance with BS 5250, HControl Hybrid will help prevent surface or interstitial condensation by reducing the amount of moisture penetrating into the wall or roof/ceiling. 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.

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. Example condensation risk calculations are given in Annex 3 of this Schedule.

11.2.4 Safety in Use

Not relevant

11.2.5 Protection against Noise

Protection against noise has not been evaluated. This shall be evaluated for the structure as a whole.

11.2.6 Energy Economy and Heat Retention

The thermal performance of HControl Hybrid has been determined by testing in accordance with BS EN 16012. The results are summarised in Table 7. The actual thermal performance of the product will depend on the construction of the wall or roof into which it is installed. The two values show the thermal performance with and without air spaces on either side of the product. The emissivity of the surface layers is also given.

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		-	0.06
R-Value ⁽¹⁾	R value of HControl Hybrid Insulation (With two unventilated air gaps)	m ² K/W	3.2
	Core R value of HControl Hybrid Product	m ² K/W	1.9

⁽¹⁾ In accordance with BS EN 16012

11.2.6.2 Thermal Performance of Compressed Product

When compressed between rafters / studs and battens, the compressed nominal thickness of HControl Hybrid has been determined as 9mm. The related R-value of the 9mm compressed product is 0.33 m²K/W (determined in accordance with EN 12667).

11.3 Aspects of Durability

HControl Hybrid is expected to remain as an effective vapour control layer in a wall, ceiling/roof or floor construction/s 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. Artificial ageing has also been carried out for Nail Tear and Tensile Strength.

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 Assessed" or with other similar wording, and/or display the Q-Mark badges. 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-9190-12, dated 14/12/2018

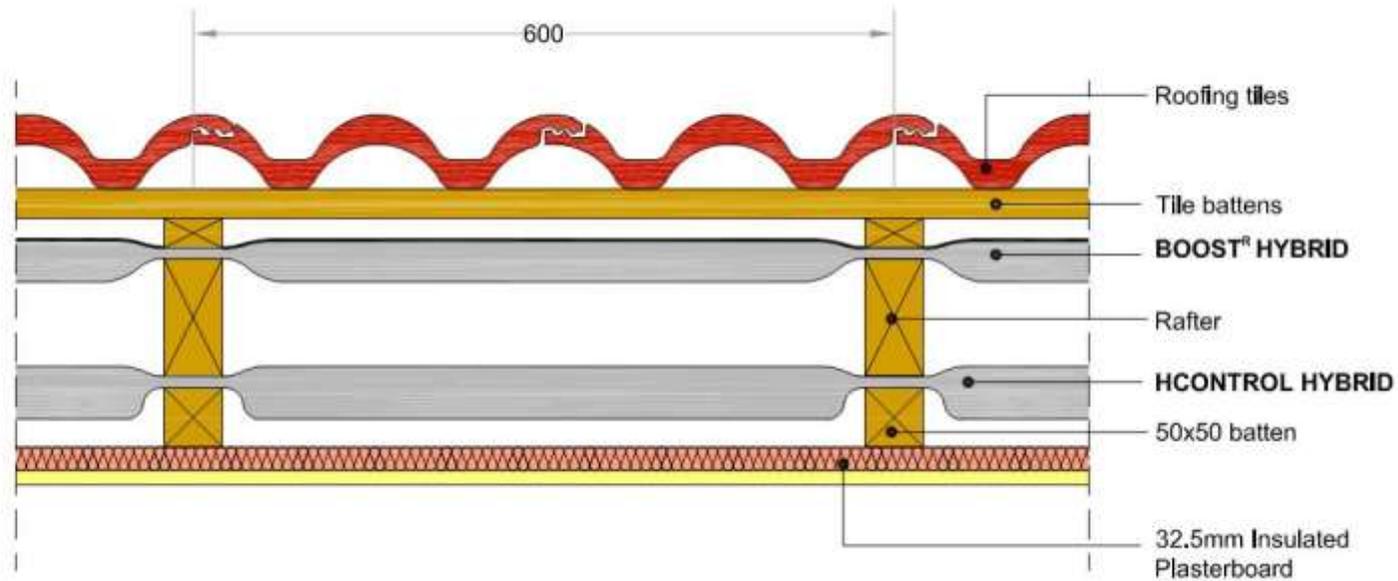
15 ANNEX 2: NORMATIVE REFERENCES

1. BS 5250:2011 Code of Practice for the control of Condensation in Buildings.
2. BS EN 1109:2002 Flexible Sheets for Waterproofing.
 - Bitumen sheets for roof waterproofing
 - Determination of flexibility at low temperature
3. BS EN 1849: Part 2 Flexible Sheets for Waterproofing.
 - Determination of Length, Width, Straightness and Flatness – Part 2: Plastic and rubber sheets for roof waterproofing
4. BS EN 1928:2001 Flexible Sheets for Waterproofing.
 - Bitumen, plastic and rubber sheets for roof waterproofing – determination of water-tightness
5. BS EN 1931:2001 Flexible Sheets for Waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing – determination of water vapour transmission properties
6. BS EN ISO 6946:1997 Building Components and Building Elements. Thermal Resistance and thermal transmittance. Calculation method.
7. BS EN 12310-1:2000 Flexible sheets for waterproofing. Determination of resistance to tearing. Part 1: Bitumen sheets for waterproofing.
8. BS EN 12311-1:200 Flexible sheets for waterproofing. Determination of tensile properties. Part 1: Bitumen sheets for roof waterproofing.
9. BS EN ISO 13984:2013 Flexible sheets for waterproofing – Plastic and rubber vapour control layers – Definitions and Characteristics.
10. SABS 1381.4:1985 Materials for thermal insulation of buildings Part 4: Reflective foil laminates. (Rolls, sheets and sections)
11. BS EN 16012:2012 Thermal insulation for buildings. Reflective insulation products. Determination of the declared thermal performance

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 Certification.

- Non-ventilated pitched roof with Boost^R Hybrid and HControl Hybrid
- Non-ventilated pitched roof with HControl Hybrid and Hybris insulation
- Timber frame wall with Boost^R Hybrid, HControl Hybrid and Hybris insulation
- Suspended Timber Floor



Roof 4: 600mm rafter spacing - Non ventilated pitched roof
BOOST'R HYBRID
HCONTROL HYBRID
32.5mm INSULATED PLASTERBOARD
U-VALUE = 0.18 W/m²K

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	λ	R	Fraction
External surface				0.040	
Layer1	Tiling, concrete				
	Main construction	15 mm	1.500	0.010	100.00 %
Layer2	25mm batten cavity				
	Main construction	25 mm	0.100	0.250	92.17 %
	Bridging - Timber	25 mm	0.130	0.000	7.83 %
Layer3	BRHybrid				
	Main construction	35 mm	0.026	1.350	92.17 %
	Bridging - Timber	35 mm	0.130	0.000	7.83 %
Layer4	Rafter cavity				
	Main construction	85 mm	0.131	0.650	92.17 %
	Bridging - Timber	85 mm	0.130	0.000	7.83 %
Layer5	HRHybrid				
	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 %
Layer6	50mm batten cavity				
	Main construction	20 mm	0.031	0.650	92.17 %
	Bridging - Timber	20 mm	0.130	0.000	7.83 %
Layer7	PU bonded to plasterboard				
	Main construction	25 mm	0.021	1.190	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer8	Plasterboard, standard				
	Main construction	13 mm	0.066	0.190	100.00 %
Internal surface				0.100	
Total resistance:		Upper limit = 6.024 m ² K/W Lower limit = 5.377 m ² K/W Average = 5.701 m ² K/W			
		U-value (unrounded) = 0.1754 W/m ² K			
Unheated space: None					
Total thickness: 263 mm		U-value: 0.18 W/m²K			

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+HRHybrid+2SIPB= 0.18

Environmental conditions:

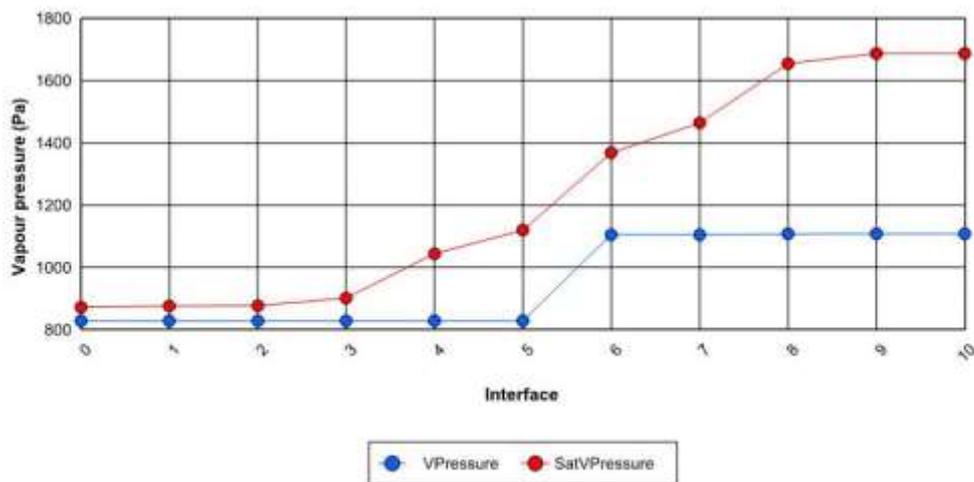
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 65 %

Table of layers:

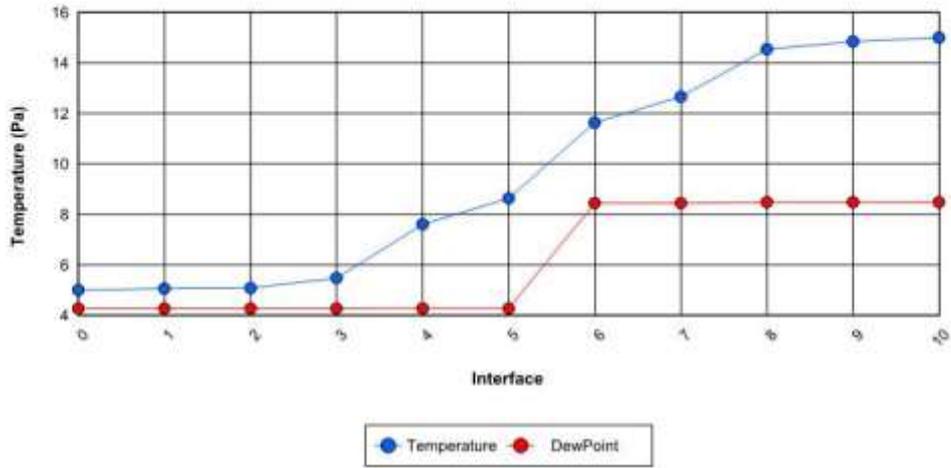
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.040	0.040	0.000	0.000	0.00
1. Tiling, concrete	15.0	1.500	0.010	0.050	0.000	0.000	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

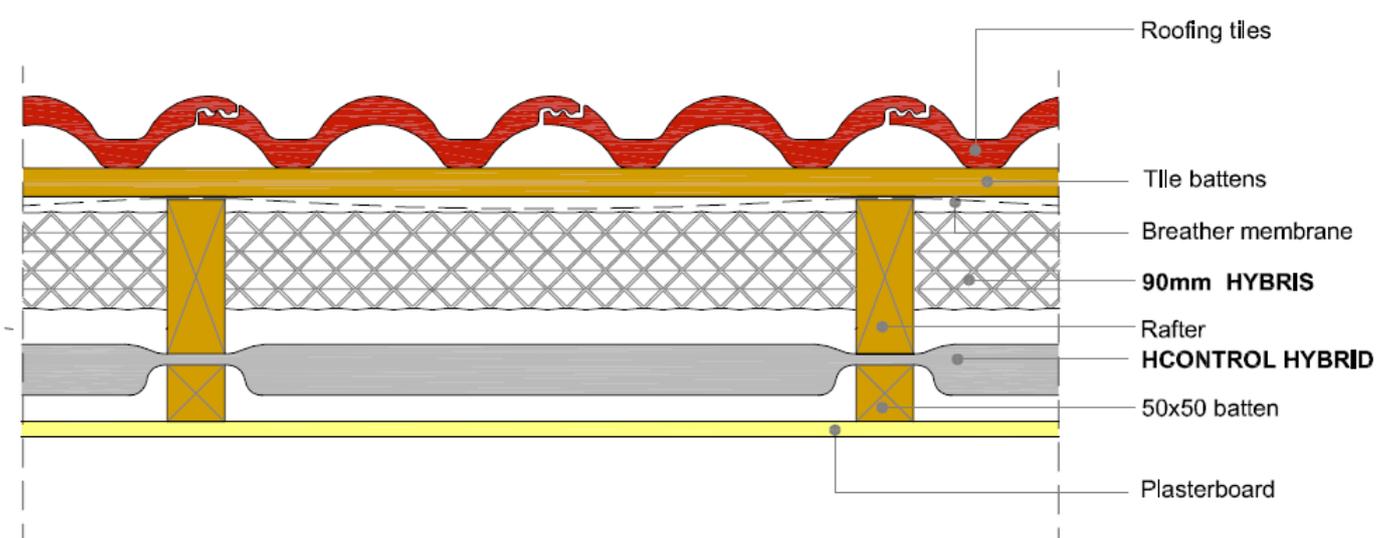
Vapour pressure table:

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 V/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:





Roof 7: 600mm rafter spacing - Non ventilated pitched roof

90mm HYBRIS

HCONTROL HYBRID

U-VALUE = 0.18 W/m²K

DRAFT

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 7 non vent - HCHybrid +Hybris=0.18

Roof Type: Pitched Roof, insulated sloping ceiling

Layer	Description	Thickness	λ	R	Fraction
External surface					0.040
Layer1	Tiling, concrete				
	Main construction	15 mm	1.500	0.010	100.00 %
Layer2	Tile batten cavity				
	Main construction	25 mm	0.147	0.170	92.17 %
	Corrections - Cavity Slightly ventilated, Emissivity: Low 0.2				
	Bridging - Timber	25 mm	0.130	0.000	7.83 %
Layer3	Reflective breather membrane				
	Main construction	1 mm	0.000	0.000	100.00 %
Layer4	Hybris				
	Main construction	90 mm	0.033	2.700	92.17 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	90 mm	0.130	0.000	7.83 %
Layer5	Rafter cavity				
	Main construction	20 mm	0.031	0.650	92.17 %
	Bridging - Timber	20 mm	0.130	0.000	7.83 %
Layer6	HCHybrid				
	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 %
Layer7	50mm batten cavity				
	Main construction	50 mm	0.077	0.650	92.17 %
	Bridging - Timber	50 mm	0.130	0.000	7.83 %
Layer8	Plasterboard, standard				
	Main construction	13 mm	0.210	0.060	100.00 %
Internal surface					0.100
Total resistance:		Upper limit = 5.828 m ² K/W Lower limit = 5.123 m ² K/W Average = 5.476 m ² K/W			
		U-value (unrounded) = 0.1826 W/m ² K			
Unheated space: None					
Total thickness: 259 mm		U-value: 0.18 W/m²K			

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 7 non vent - HCHybrid +Hybris=0.18

Environmental conditions:

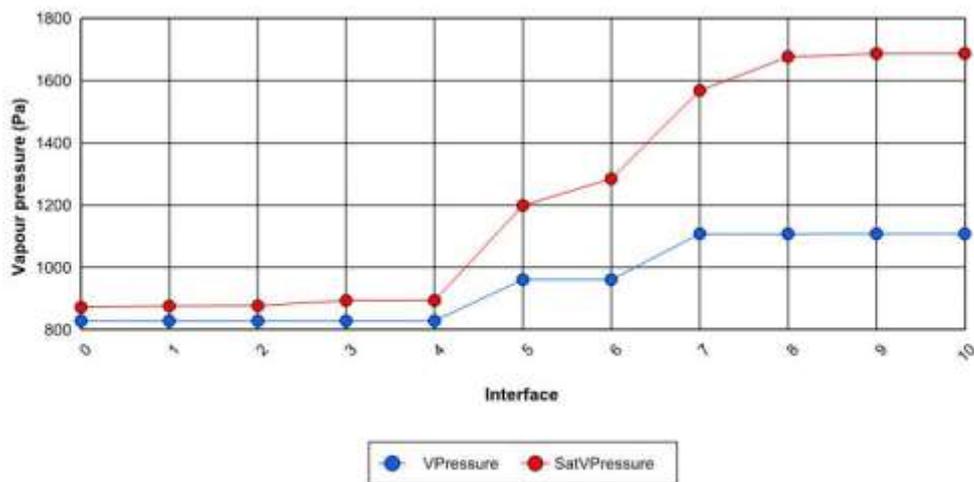
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 65 %

Table of layers:

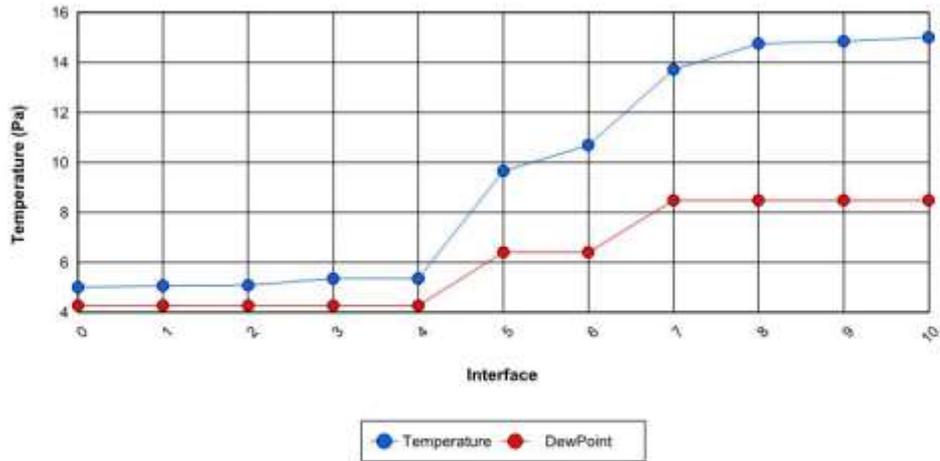
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.040	0.040	0.000	0.000	0.00
1. Tiling, concrete	15.0	1.500	0.010	0.050	0.000	0.000	0.00
2. Tile batten cavity	25.0	0.000	0.170	0.220	0.000	0.000	0.00
3. Reflective breather membrane	1.0	0.000	0.000	0.220	0.000	0.40	0.40
4. Hybris	90.0	0.033	2.700	2.920	0.000	900.00	900.40
5. Rafter cavity	20.0	0.000	0.650	3.570	0.000	0.000	900.40
6. HCHybrid	45.0	0.000	1.900	5.470	0.000	1,000.00	1,900.40
7. 50mm batten cavity	50.0	0.077	0.650	6.120	0.000	0.000	1,900.40
8. Plasterboard, standard	12.5	0.210	0.060	6.180	45.0	0.56	1,900.96
Internal surface	-	0.000	0.100	6.180	0.000	0.000	1,900.96

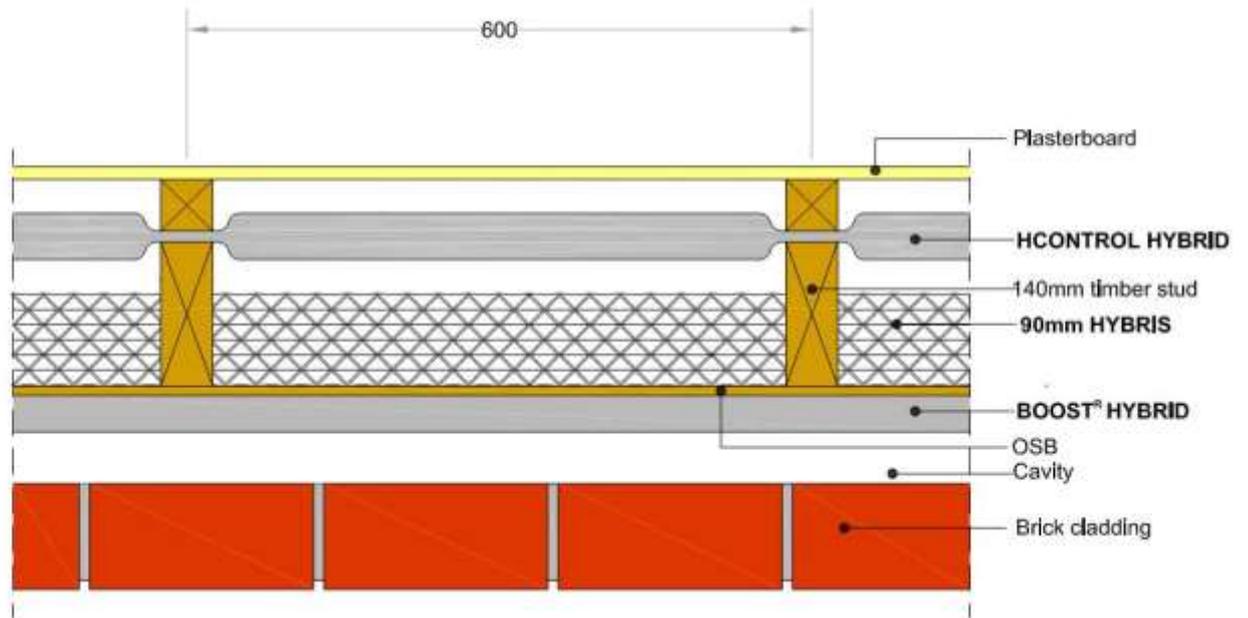
Vapour pressure table:

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 V/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 / Tile batten cavity	5.08	828.3	876.7	4.27	0.00	0.76	No
3. Tile batten cavity / Reflective breather membrane	5.35	828.3	893.4	4.27	0.00	0.76	No
4. Reflective breather membrane / Hybris	5.35	828.3	893.4	4.27	0.00	0.00	No
5. Hybris / Rafter cavity	9.65	960.7	1 198.8	6.40	0.00	0.00	No
6. Rafter cavity / HCHybrid	10.69	960.7	1 284.8	6.40	0.00	0.00	No
7. HCHybrid / 50mm batten cavity	13.71	1 107.8	1 568.0	8.48	0.00	0.00	No
8. 50mm batten cavity / Plasterboard, standard	14.75	1 107.8	1 676.7	8.48	0.00	0.00	No
9. Plasterboard, standard / Internal surface	14.84	1 107.9	1 687.0	8.48	0.00	0.00	No
Internal surface	15.00	1 107.9	1 687.0	8.48	0.00	0.00	No



Interface temperature / Dew point graphical representation:





Timber frame wall 7 : 140mm timber stud
 BOOST'R HYBRID
 90mm HYBRIS
 HCONTROL HYBRID
 U-VALUE = 0.14 W/m²K

UVALUE CALCULATION

Users Ref: Actis Pack - UK Configurations

Issued on: 26.February.2013

Property:

Prop Type Ref:

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 7 - 90Hybris+HCH+BRH=0.15

Layer	Description	Thickness	λ	R	Fraction
External surface				0.040	
Layer1	Brick, outer leaf				
	Main construction	100 mm	0.770	0.130	82.81 %
	Bridging - Mortar	100 mm	0.941	0.000	17.19 %
Layer2	50mm cavity				
	Main construction	50 mm	0.190	0.263	100.00 %
Layer3	BR Hybrid				
	Main construction	35 mm	0.026	1.350	100.00 %
Layer4	Orientated Strand Board				
	Main construction	9 mm	0.130	0.069	100.00 %
Layer5	Hybris				
	Main construction	90 mm	0.033	2.700	85.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	90 mm	0.130	0.000	15.00 %
Layer6	55mm stud cavity				
	Main construction	27 mm	0.042	0.650	85.00 %
	Bridging - Timber	27 mm	0.130	0.000	15.00 %
Layer7	HCHybrid				
	Main construction	45 mm	0.024	1.900	85.00 %
	Bridging - Other	45 mm	0.192	0.000	15.00 %
Layer8	50mm batten cavity				
	Main construction	27 mm	0.042	0.650	91.67 %
	Bridging - Timber	27 mm	0.130	0.000	8.33 %
Layer9	Plasterboard, standard				
	Main construction	13 mm	0.210	0.060	100.00 %
Internal surface				0.130	
Total resistance: Upper limit = 7.127 m ² K/W Lower limit = 5.882 m ² K/W Average = 6.505 m ² K/W					
U-value (unrounded) = 0.1537 W/m ² K					
Unheated space: None					
Total thickness: 396 mm			U-value: 0.15 W/m²K		

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

Wall 7 - 90Hybris+HCH+BRH=0.15

Environmental conditions:

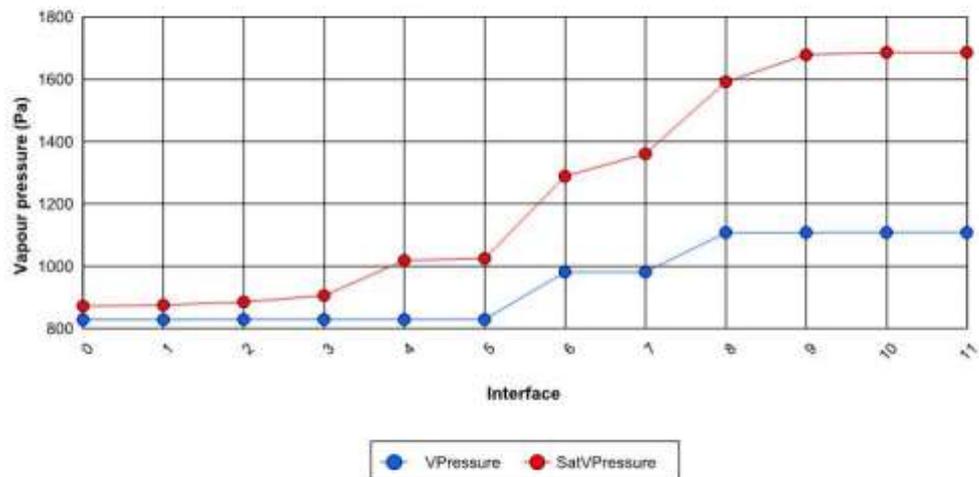
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 65 %

Table of layers:

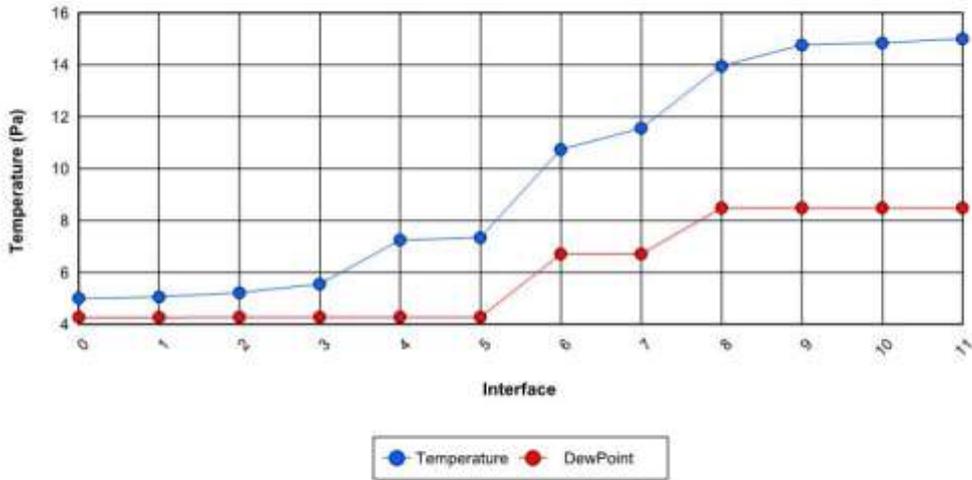
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.040	0.040	0.000	0.000	0.00
1. Brick, outer leaf	100.0	0.770	0.130	0.170	50.0	5.00	5.00
2. 50mm cavity	50.0	0.000	0.263	0.433	0.000	0.000	5.00
3. BR Hybrid	35.0	0.000	1.350	1.783	0.000	0.60	5.60
4. Orientated Strand Board	9.0	0.130	0.069	1.852	0.000	0.000	5.60
5. Hybris	90.0	0.033	2.700	4.552	0.000	1,200.00	1,205.60
6. 55mm stud cavity	27.0	0.000	0.650	5.202	0.000	0.000	1,205.60
7. HCHybrid	45.0	0.000	1.900	7.102	0.000	1,000.00	2,205.60
8. 50mm batten cavity	27.0	0.000	0.650	7.752	0.000	0.000	2,205.60
9. Plasterboard, standard	12.5	0.210	0.060	7.812	45.0	0.56	2,206.16
Internal surface	-	0.000	0.130	7.812	0.000	0.000	2,206.16

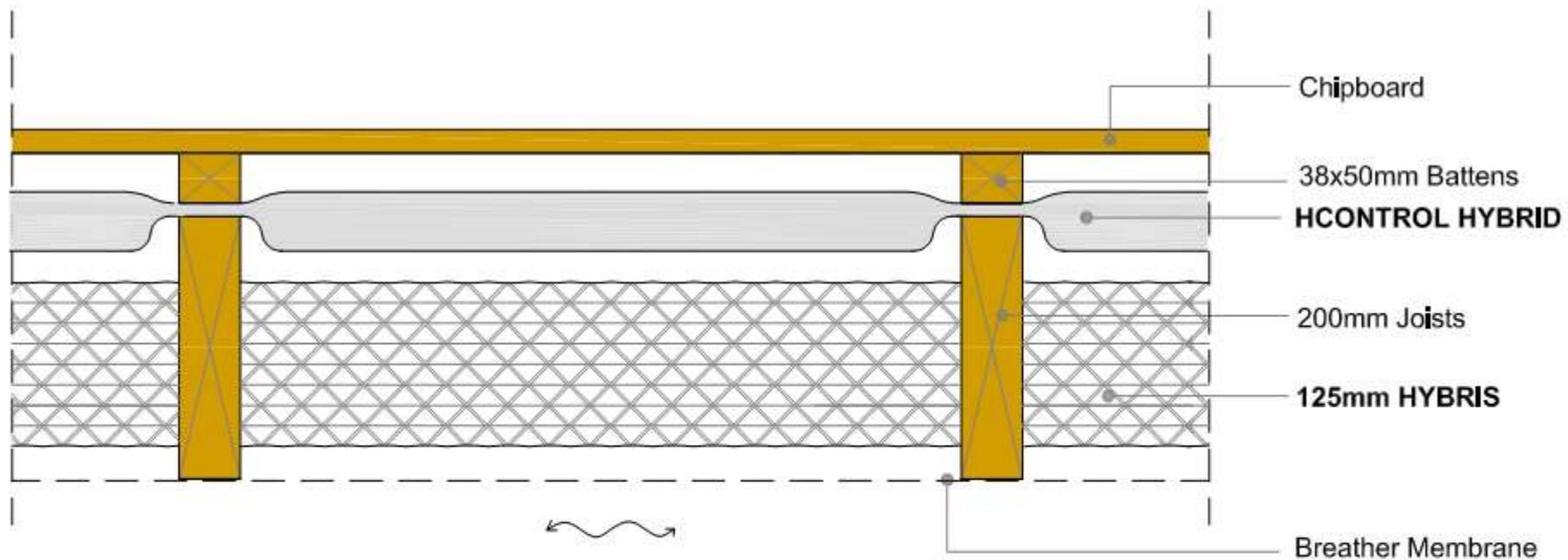
Vapour pressure table:

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 / Brick, outer leaf	5.05	828.3	874.9	4.27	0.00	0.00	No
2. Brick, outer leaf / 50mm cavity	5.21	828.9	885.0	4.28	0.00	0.00	No
3. 50mm cavity / BR Hybrid	5.55	828.9	905.6	4.28	0.00	0.00	No
4. BR Hybrid / Orientated Strand Board	7.24	829.0	1 018.3	4.28	0.00	0.00	No
5. Orientated Strand Board / Hybris	7.33	829.0	1 024.4	4.28	0.00	0.00	No
6. Hybris / 55mm stud cavity	10.73	981.1	1 288.8	6.70	0.00	0.00	No
7. 55mm stud cavity / HCHybrid	11.55	981.1	1 360.8	6.70	0.00	0.00	No
8. HCHybrid / 50mm batten cavity	13.94	1 107.8	1 591.8	8.48	0.00	0.00	No
9. 50mm batten cavity / Plasterboard, standard	14.76	1 107.8	1 678.4	8.48	0.00	0.00	No
10. Plasterboard, standard / Internal surface	14.84	1 107.9	1 686.5	8.48	0.00	0.00	No
Internal surface	15.00	1 107.9	1 686.5	8.48	0.00	0.00	No



Interface temperature / Dew point graphical representation:





PF99:
 Suspended Timber Floor
 U-value = 0.13 W/m²K



CONDENSATION RISK ANALYSIS

Users Ref: 00 PATHFINDER 2017

Issued on: 7.December.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

Floor PF99 - f-ts hch+125h @400c = 0.13

Environmental conditions:

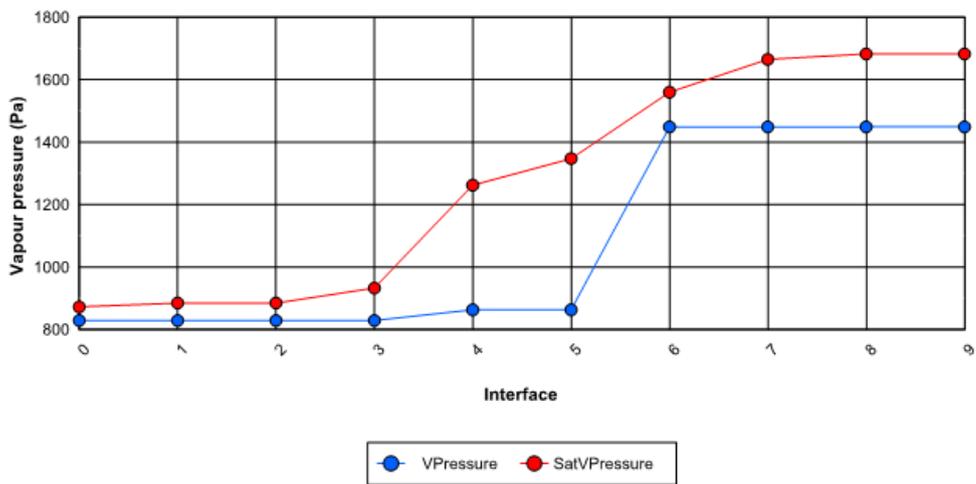
External conditions:	Temperature: 5 °C	Relative Humidity: 95 %
Internal conditions:	Temperature: 15 °C	Relative Humidity: 85 %

Table of layers:

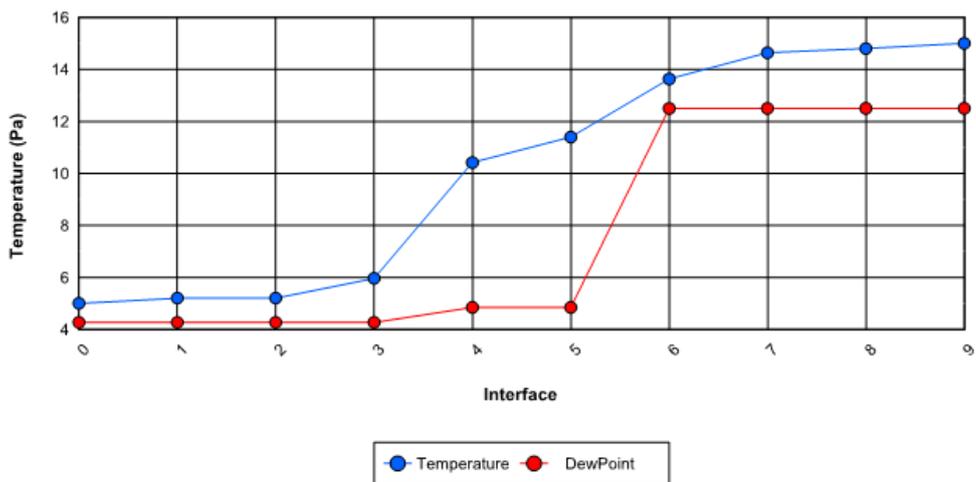
Layer	Width mm	Thermal conduct. W/m.K	Thermal resistance m2.K/W	Cumulative thermal resistance m2.K/W	Vapour resistivity GN.s/kg.m	Vapour resistance GN.s/kg	Cumulative vapour resistance GN.s/kg
External surface	-	0.000	0.170	0.170	0.000	0.000	0.00
1. Breather membrane	0.4	0.500	0.001	0.171	0.000	0.40	0.40
2. Hybris - Associated Air Gap / Joists	24.0	0.000	0.645	0.816	0.000	0.000	0.40
3. Hybris / Joists	125.0	0.033	3.788	4.604	0.000	450.00	450.40
4. HControl Hybrid - Associated Air Gap - Joists	24.0	0.000	0.833	5.437	0.000	0.000	450.40
5. HControl Hybrid / 38mm batten	45.0	0.000	1.900	7.337	0.000	7,700.00	8,150.40
6. HControl Hybrid - Associated Air Gap / 38mm	29.0	0.000	0.856	8.193	0.000	0.000	8,150.40
7. Chipboard	18.0	0.130	0.138	8.331	300.0	5.40	8,155.80
Internal surface	-	0.000	0.170	8.331	0.000	0.000	8,155.80

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 / Breather membrane	5.20	828.3	884.1	4.27	0.00	0.00	No
2. Breather membrane / Hybris - Associated Air Gap / Joists	5.20	828.3	884.2	4.27	0.00	0.00	No
3. Hybris - Associated Air Gap / Joists / Hybris / Joists	5.96	828.3	932.0	4.27	0.00	0.00	No
4. Hybris / Joists / HControl Hybrid - Associated Air Gap - Joists	10.42	862.5	1 261.9	4.85	0.00	0.00	No
5. HControl Hybrid - Associated Air Gap - Joists / HControl Hybrid / 38mm	11.40	862.5	1 346.9	4.85	0.00	0.00	No
6. HControl Hybrid / 38mm batten / HControl Hybrid - Associated Air Gap	13.63	1 448.3	1 559.8	12.50	0.00	0.00	No
7. HControl Hybrid - Associated Air Gap / 38mm batten / Chipboard	14.64	1 448.3	1 665.0	12.50	0.00	0.00	No
8. Chipboard / Internal surface	14.80	1 448.7	1 682.6	12.50	0.00	0.00	No
Internal surface	15.00	1 448.7	1 682.6	12.50	0.00	0.00	No



Interface temperature / Dew point graphical representation:



UVALUE CALCULATION

Users Ref: 00 PATHFINDER 2017

Issued on: 7.December.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 Floor PF99 - f-ts hch+125h @400c = 0.13

Floor Type: Suspended

Area = 85.90 m², Perimeter = 42.95 m, Wall thickness = 257 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_w = 0.160 m

Ventilation openings per perimeter length: e = 0.0015

Mean wind speed: v = 5.000 m/s

Resistance on solum: R_g = 0.000 m²K/W

Layer	Description	Thickness	λ	R	Fraction
External surface				0.170	
Layer1	Breather membrane				
	Main construction	0 mm	0.500	0.001	100.00 %
Layer2	Hybris - Associated Air Gap / Joists				
	Main construction	24 mm	0.037	0.645	88.25 %
	Bridging - Timber	24 mm	0.130	0.000	11.75 %
Layer3	Hybris / Joists				
	Main construction	125 mm	0.033	3.788	88.25 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
	Bridging - Timber	125 mm	0.130	0.000	11.75 %
Layer4	HControl Hybrid - Associated Air Gap - Joists				
	Main construction	24 mm	0.029	0.833	88.25 %
	Bridging - Timber	24 mm	0.130	0.000	11.75 %
Layer5	HControl Hybrid / 38mm batten				
	Main construction	45 mm	0.024	1.900	88.25 %
	Bridging - Timber	45 mm	0.130	0.000	11.75 %
Layer6	HControl Hybrid - Associated Air Gap / 38mm batten				
	Main construction	29 mm	0.034	0.856	87.50 %
	Bridging - Timber	29 mm	0.130	0.000	12.50 %
Layer7	Chipboard				
	Main construction	18 mm	0.130	0.138	100.00 %
Internal surface				0.170	

Total resistance: Upper limit = 7.569 m²K/W Lower limit = 6.259 m²K/W Average = 6.914 m²K/W

U-value (unrounded) = 0.1446 W/m²K

Suspended floor corrections:

B' = 4.0000

Total thickness: 265 mm

U-value: 0.13 W/m²K