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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

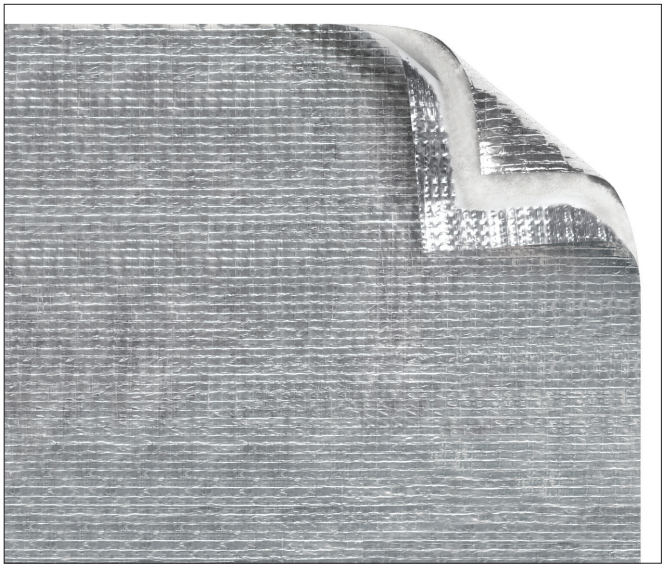
Agrément Certificate
11/4874
Product Sheet 2

ACTIS HCONTROL REFLEX+ AS REFLECTIVE VAPOUR CONTROL LAYER AND INSULATION

ACTIS HCONTROL REFLEX+ (FOR ROOFS)

This Agrément Certificate Product Sheet(1) relates to Actis HControl Reflex+, for use as a reflective vapour control layer and insulation material in new and existing dwellings for pitched roofs in conjunction with plasterboard.

(1) Hereinafter referred to as 'Certificate'.



CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the product has an emissivity of 0.05 for the outer foil and a thermal resistance of 0.25 $m^2 \cdot K \cdot W^{-1}$ (see section 6).

Condensation risk — the product can provide effective control to the passage of water vapour (see section 7).

Behaviour in relation to fire — the product is combustible but may be used in suitably-designed roofs (see section 9).

Durability — under normal conditions, the product will have a life equivalent to that of the building in which it is incorporated (see section 14).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 8 July 2016

Originally certificated on 29 November 2011

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Actis HControl Reflex+, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See sections 7.1 and 7.6 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations; however, compensating fabric/services measures will be required. See section 6.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to satisfying the requirements of this Regulation. See section 14 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1(1), 3.15.3(1) to 3.15.5(1) and 3.15.7(1). See sections 7.1 and 7.7 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a roof satisfying clauses (or parts of) 6.1.1(1), 6.1.2(1), 6.1.3(1), 6.1.6(1), 6.2.1(1), 6.2.3(1) to 6.2.7(1), 6.2.9(1) to 6.2.11(1) and 6.2.13(1) of these Standards. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1) [Aspects 1(1) and 2(1)], 7.1.6(1) [Aspects 1(1) and 2(1)] and 7.1.7(1) [Aspect 1(1)]. See section 6.1 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1) and Schedule 6(1).

(1) Technical Handbook (Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 3 *Delivery and site handling* (3.3) and 9 *Behaviour in relation to fire* (9.7) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Actis HControl Reflex+ for pitched roof applications, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards* Chapter 7.2 *Pitched Roofs*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13984 : 2013 for its vapour control layer property. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance (DoP).

Technical Specification

1 Description

1.1 Actis HControl Reflex+ is a reflective water Vapour Control Layer (VCL) which also enhances the thermal resistance of the unventilated air gap adjacent to it. It can also be used as an air barrier (see section 10). The product consists of three separate elements: two reinforced aluminised coated films and one polyester fibre wadding.

1.2 The dimensions and weights of the product are shown in Table 1.

Table 1 Nominal dimensions

Dimension (unit)	Actis HControl Reflex+
Nominal thickness (mm)	8.5
Nominal weight ($g \cdot m^{-2}$)	335
Roll length (m)	12.5 and 31.25
Width (mm)	1600
Area (m^2)	20 and 50

1.3 Ancillary items for use with the product but outside the scope of this Certificate are:

- pre-treated timber battens
- staples
- additional insulation materials
- Actis Isodhesif tape.

2 Manufacture

2.1 The outer layers of the product consist of non-woven polyester fabric adhesively laminated to a low emissivity foil film, coated to protect the reflective surface. The layers of foil/polyester wadding/foil are fastened together by three strips of glue, one on each edge and one in the centre.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Actis S.A. has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FR017924-1) and BS EN ISO 14001 : 2004 (Certificate FR017925-1) by Bureau Veritas Certification.

2.4 Actis HControl Reflex+ is manufactured in Limoux, France, and marketed/distributed in the UK by Actis Insulation Ltd, Unit 1 Cornbrash Park, Bumpers Way, Bumpers Farm Industrial Estate, Chippenham, Wiltshire SN14 6RA, Telephone: 01249 462888, Fax: 01249 446345, e-mail: solutions@insulation-actis.com, website: www.insulation-actis.com

3 Delivery and site handling

3.1 The product is wrapped in plastic packaging and delivered to site as rolls on pallets. Each pallet or roll is labelled with the product name and its type, weight and dimensions and the names of the manufacturer and Certificate holder.

3.2 The product should be stored in clean, dry conditions, preferably under cover and not in direct sunlight. Care must be taken to store the product away from solvents. The product must not be used if allowed to get wet or if damaged.

3.3 The product must not come into contact with naked flames or other ignition sources.

3.4 On site, to ensure maximum performance of the product when installed, precautions must be taken to protect it from mud and dirt.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Actis HControl Reflex+.

Design Considerations

4 General

4.1 Actis HControl Reflex+ is satisfactory for use as a flexible insulation used in conjunction with other insulation materials to reduce the thermal transmittance (U value) in new or existing domestic pitched roofs. When installed under the rafters, the product can perform as a VCL in the roof system (see section 7.4).

4.2 The product is for use in constructions where the ceiling follows the pitch of the roof and encloses a habitable space.

4.3 Care must be taken to ensure that the product is covered after installation, as it must not be exposed to rain.

4.4 Care must be taken to ensure that the product does not come into contact with heat sources greater than 80°C.

4.5 Roof tiles or slates are installed on pitched roofs in accordance with BS 5534 : 2014.

5 Practicability of installation

The product is designed to be installed by a competent builder, or a contractor, experienced with this type of product.

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the following values:

- 0.25 $m^2 \cdot K \cdot W^{-1}$ — *R* value for Actis HControl Reflex+ (8.5 mm thick) with no air gaps either side
- 0.05 — outer surface emissivity
- 0.45(1) $m^2 \cdot K \cdot W^{-1}$ — *R* value of an air cavity adjacent to the product ≥ 13 mm thick (upward heat flow)
- 0.00 $m^2 \cdot K \cdot W^{-1}$ — *R*(2) value of product when compressed between rafters and battens.

(1) Unventilated cavity with a width and length at least 10 times the thickness and one high emissivity surface.
(2) For guidance on U value calculations refer to BBA Information Bulletin No 3.

6.2 The U value of a completed element will depend largely on the thickness and conductivity of the additional insulation used and the extent and arrangement of timber bridging. Example pitched roof constructions are shown in Figures 1a and 1b and the resulting U values are shown in Table 2.

Figure 1 Example roof constuctions — (a) Existing roof

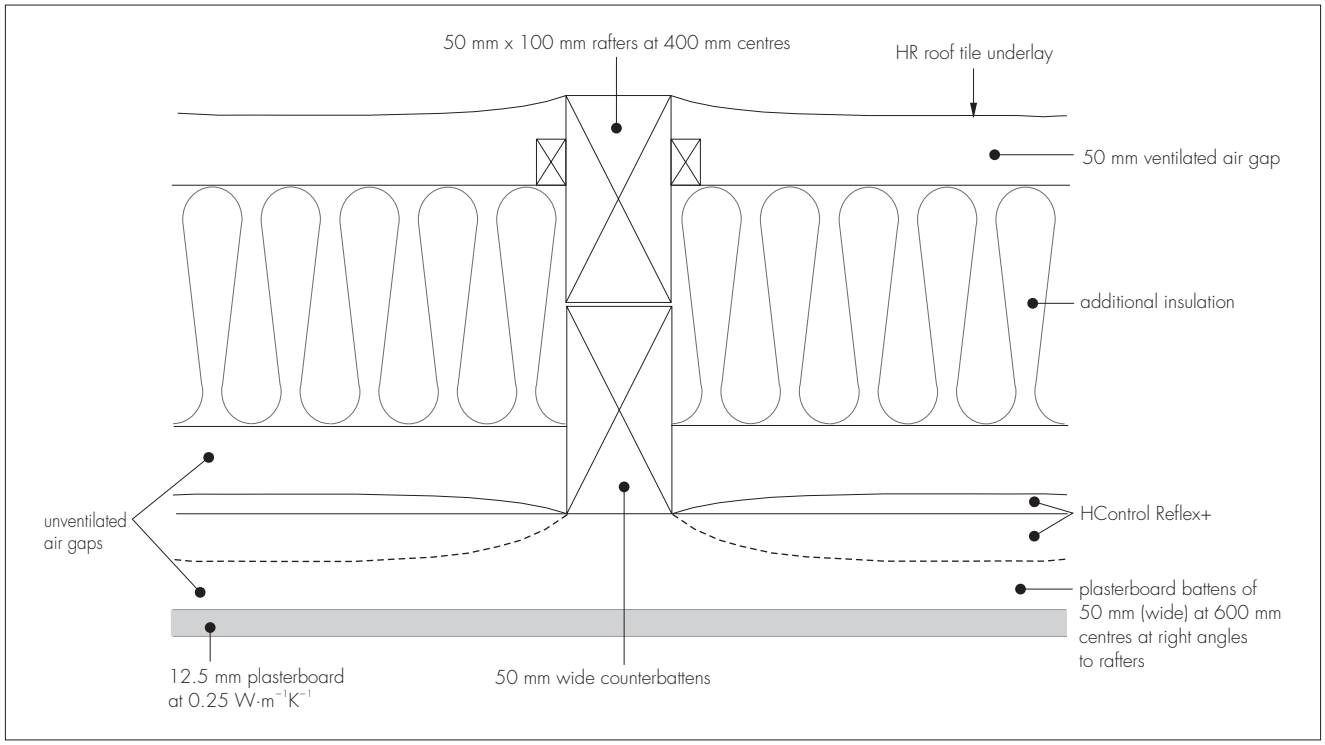


Figure 1 Example roof constuctions — (b) New roof

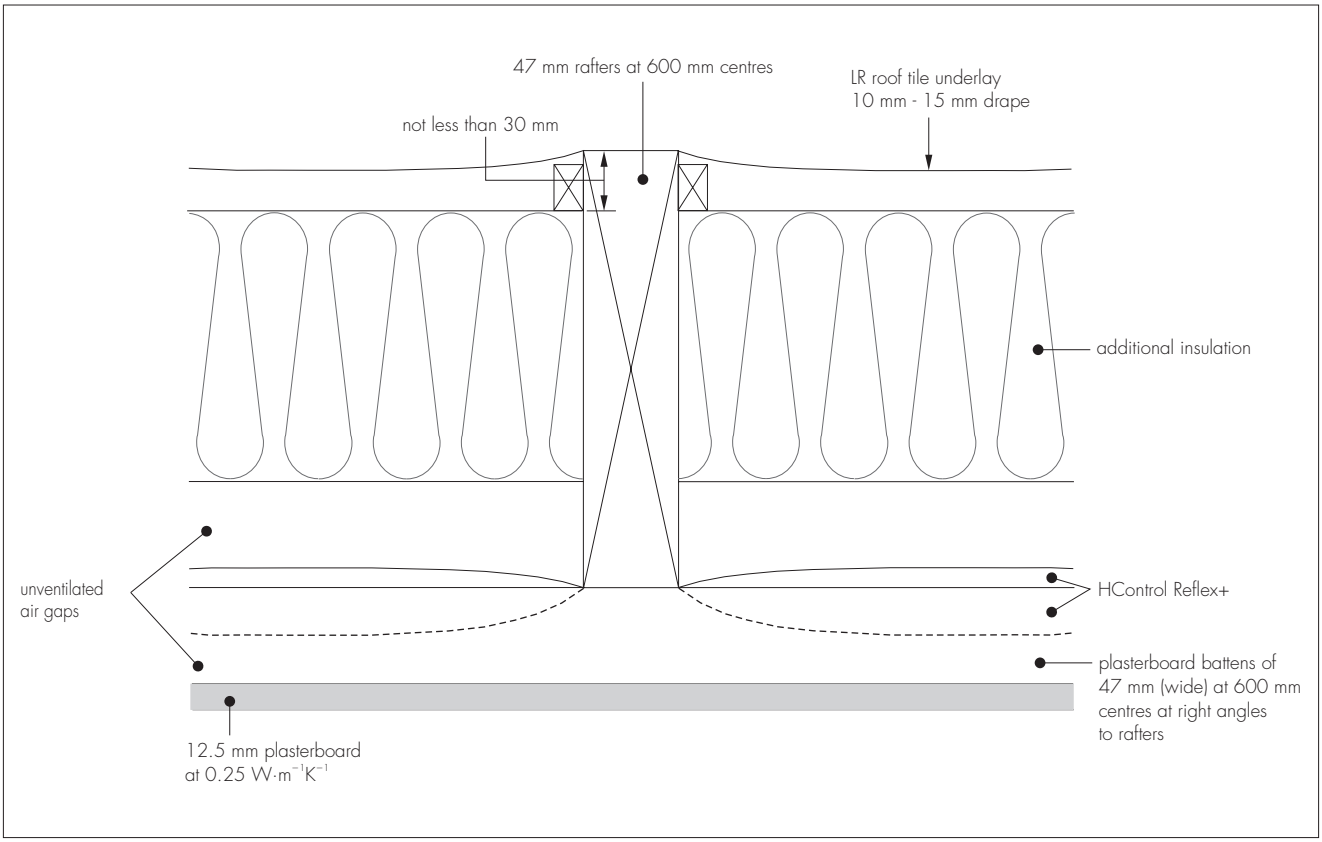


Table 2 U values for pitched roof construction

Construction	Total rafter depth (mm)	Batten depth (mm)	Additional insulation thickness[1] (mm)	U value ($W \cdot m^{-2} \cdot K^{-1}$)[2]
Existing roof Figure 1(a)	200	25	125 phenolic	0.18
New roof Figure 1(b)	200	25	145 phenolic	0.14

(1) Phenolic insulation (conductivity 0.020 $W \cdot m^{-1} \cdot K^{-1}$ and emissivity 0.2, thickness rounded to nearest 5 mm).

(2) Assumes $\Delta U_g = 0$, ie no gaps exceeding 5 mm width penetrating the insulation layer.

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Condensation risk

Interstitial condensation

7.1 Roofs incorporating the product will adequately limit the risk of interstitial condensation when designed and constructed in accordance with BS 5250 : 2011 Annexes D and H and BRE Report BR 262 : 2002.

7.2 The product acts as a VCL and has a typical water vapour resistance of 900 $MN \cdot s \cdot g^{-1}$ in accordance with BS EN 1931 : 2000.

7.3 The risk of interstitial condensation is greatest when the building is drying out after construction. Guidance on preventing condensation from this and other sources is given in BRE Digest 369 : 1992 and BRE Report BR 262 : 2002.

7.4 The product has a high water vapour resistance (μ) factor and can act as a VCL. In all cases where high vapour resistance roof tile underlays are used, ventilation to the air space should be in accordance with the recommendations of BS 5250 : 2011 or relevant BBA Certificate for the roof tile underlay. When the product is installed in conjunction with other insulation materials, the water vapour resistance and installation instructions of the additional insulation should also be taken into consideration.

7.5 When using this type of product, due consideration must be taken of the overall installation to minimise perforations by services, eg light switches and power outlets, and the joints at ceiling and skirting level must be well sealed.

Surface condensation

7.6 Roofs incorporating the product will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.35 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the junctions with walls are designed in accordance with the guidance referred to in section 6.3 of this Certificate.

7.7 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, Annex H, and BRE Report BR 262 : 2002.

8 Infestation

The use of the product does not in itself promote infestation. The creation of voids may provide habitation for insects or rodents in areas already infested. Care should be taken to ensure that, wherever possible, all voids are sealed as any infestation may be difficult to eradicate. There is no food value in the materials used.

9 Behaviour in relation to fire

9.1 Actis HControl Reflex+ has a reaction to fire classification Class F* in accordance with BS EN 13501-1 : 2007.

9.2 The insulation must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance. The continuity of fire resistance must be maintained, for example as described in:

England and Wales — Approved Document B, Volume 1, sections 5.11 and 5.12

Scotland — Mandatory Standard 2.2, clause 2.2.10(1)

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet E, paragraph 4.21.

9.3 When the product is installed with an internal lining board, eg 12.5 mm thick plasterboard, the insulation will be contained between the roof and internal lining board, until one is destroyed; therefore, the insulation will not contribute to the development stage of a fire or present a smoke or toxic hazard.

9.4 The use of the product will not affect the fire rating achieved by tile or slated roofs.

9.5 When the product is installed with other additional insulation materials, the fire properties of these materials must be taken into consideration.

9.6 The product will melt and shrink away from heat, but will burn in the presence of a naked flame.

9.7 When the product is used unsupported, there is a risk that fire can spread if it is accidentally ignited during maintenance works, eg by a roofer's or plumber's torch. Care should be taken during building and maintenance to avoid the material being ignited.

10 Air leakage

10.1 When the product was tested to BS EN 12114 : 2000 with a positive pressure of 100 Pa, no airflow was detected and hence it was found to be airtight.

10.2 When used as a VCL and an air barrier, the product's effectiveness is reliant on the careful sealing of the laps, joints, perimeters and penetrations, in accordance with the Certificate holder's instructions.

10.3 The airtightness of the building will also be dependent on the performance of the other building elements.

11 De-rating of electrical cables

As with other insulation products, it may be necessary in some cases to de-rate electrical cables buried in insulation. BS 7671 : 2008 suggests that, where wiring is completely surrounded by insulation, it may need to be de-rated to as low as half its free air current carrying capacity. Guidance should be sought from a qualified electrician.

12 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat-producing appliances, the following provisions to the national Building Regulations are acceptable:

England and Wales — Approved Document J, paragraph 2.15

Scotland — Mandatory Standard 3.19, clauses 3.19.1(1) and 3.19.4(1)

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet L, paragraph 3.9.

13 Maintenance

As the product is confined within a roof structure and has suitable durability (see section 14), maintenance is not required.

14 Durability

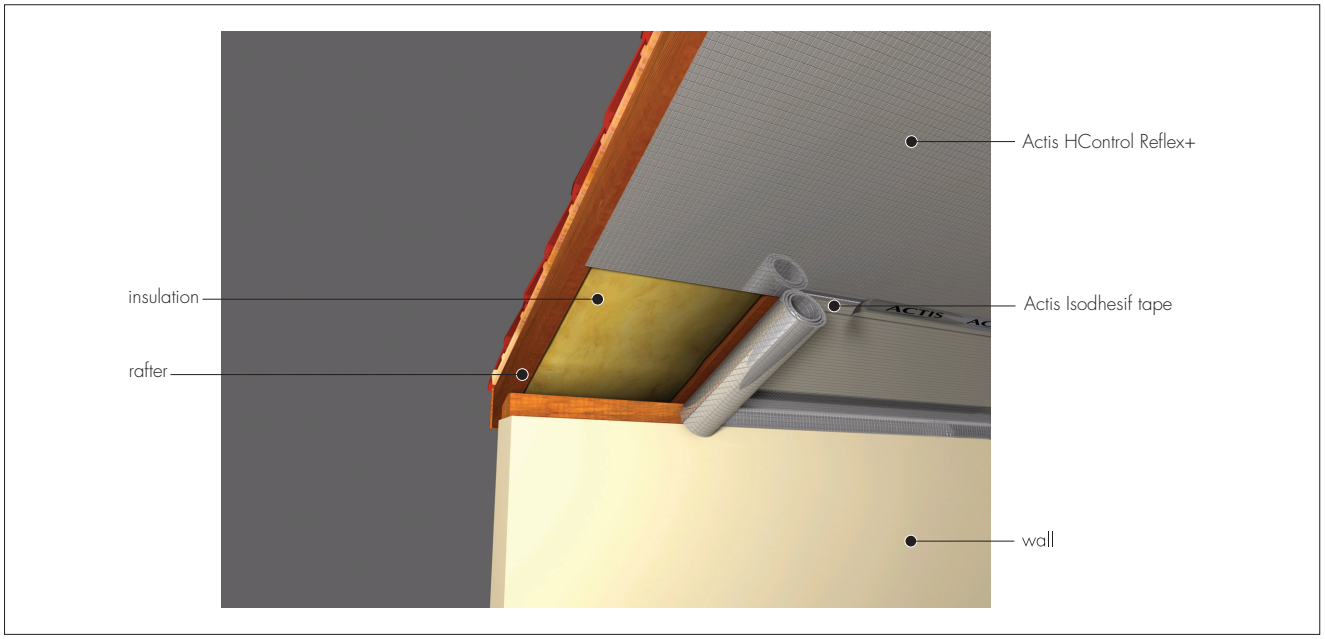
The product will have a life equivalent to that of the roof structure in which it is incorporated.

15 General

15.1 The design data given in this Certificate are based on the assumption that construction and fastening methods and other details given in this Certificate are followed, as well as the Certificate holder's installation instructions.

15.2 The product when acting as a reflective VCL is installed from inside the room. It should be installed and fixed either horizontally or vertically as shown in Figures 2 and 3 according to the instructions of the Certificate holder.

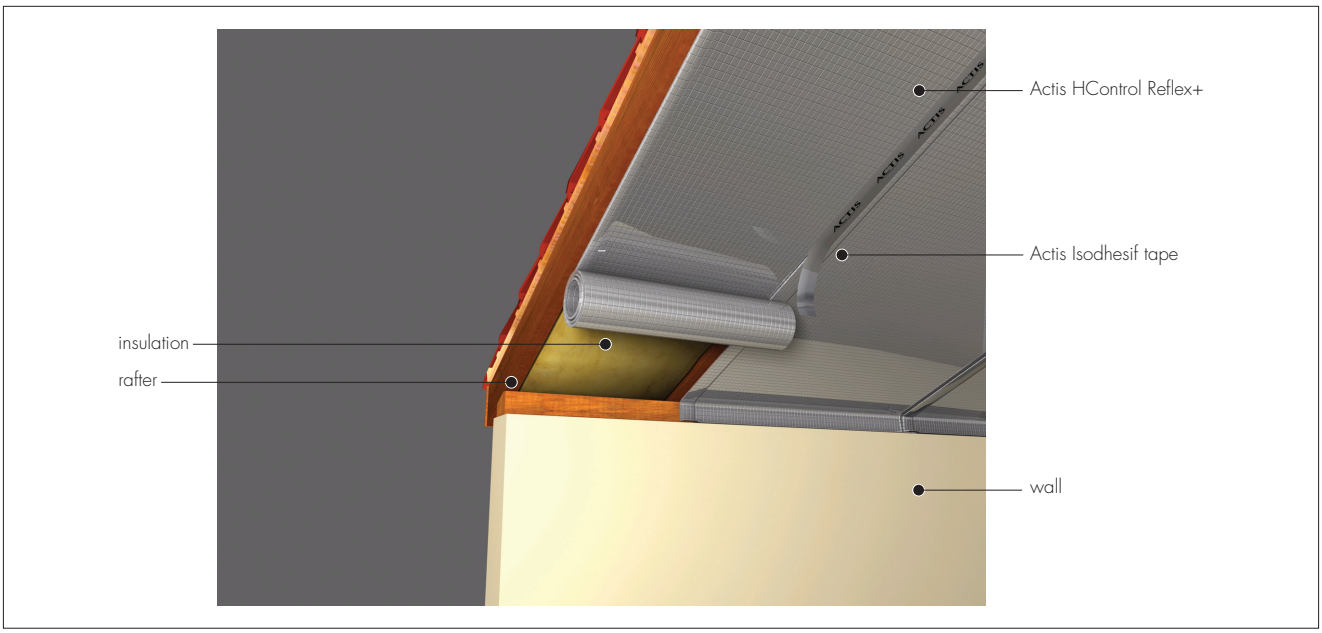
Figure 2 Horizontal installation



15.3 When allowed by the span between supports, vertical installation is the preferred method. Installation should only be performed on an element which is weathertight and dry.

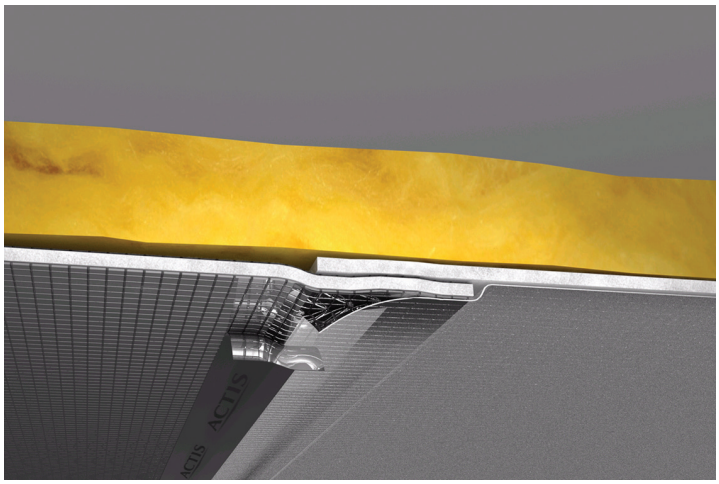
15.4 All VCL joints should have an overlap of at least 50 mm.

Figure 3 Vertical installation



15.5 The product is fastened with corrosion-resistant nails or staples with a minimum length of 10 mm. Maximum nail or staple distance along the edges is 100 mm. After fixing, the overlaps are covered with Actis Isodhesif tape, as shown in Figure 4.

Figure 4 Overlap joint installation



15.6 The installation of the joints around openings such as roof windows and ventilation pipes should be completed with adhesive tape to maximise the vapour tightness of the VCL. Particular attention should be paid to the fastening of penetrations through the product acting as a VCL.

15.7 In the case of horizontal installation, using intermediate supports between rafters should be used. The product is nailed or stapled every 500 mm on the intermediate support. After the product is nailed or stapled into position, any overlaps must be covered with Actis Isodhesif tape, so that the nails or staples are covered to maximise airtightness.

15.8 For best results, the overlaps should be nailed or stapled after removing the external film from the edge. Once fixed into position, the external film is repositioned on to the stapling area and covered with Actis Isodhesif tape (see Figure 4).

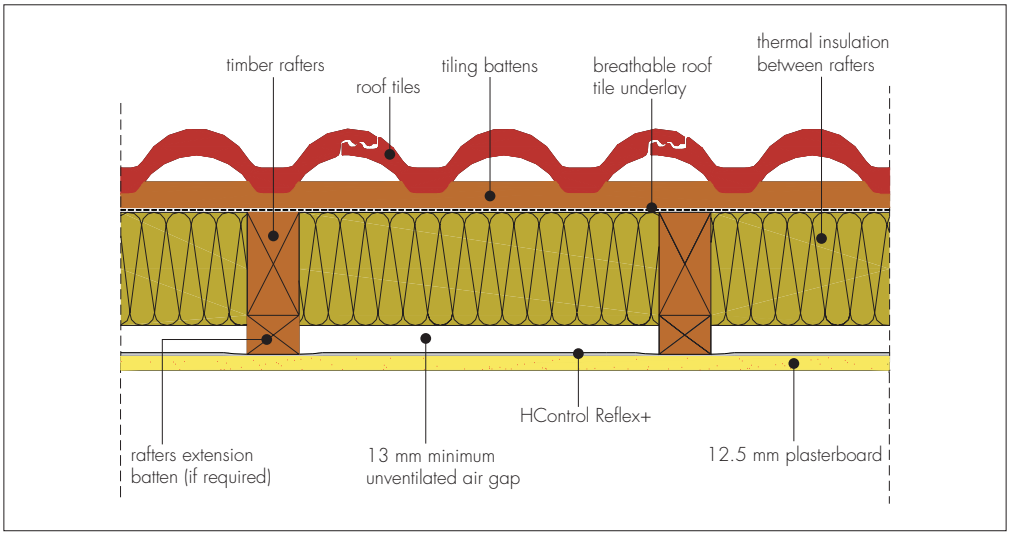
16 Procedure

Pitched roof applications

16.1 The product is laid under the rafters or the battens and fixed using corrosion-resistant nails or staples. The product should be installed with two unventilated air gaps as shown in Figures 1(a) and 1(b).

16.2 In situations where an existing insulation already fills the rafter depth, the product can be installed on counter battens with only one unventilated air gap as shown in Figure 5.

Figure 5 Product installed in pitched roof with one unventilated air gap



16.3 The product is then covered with plasterboard, which is fixed to the battens.

Technical Investigations

17 Tests

Test were carried out by the BBA on the outer surfaces of Actis HControl Reflex+ to determine emissivity before and after ageing.

18 Investigations

18.1 The following investigations were carried out on the product, based on independent test data and BBA analysis, to determine:

- dimensions
- watertightness
- air permeability
- water vapour resistance
- tensile strength
- elongation
- resistance to tearing
- resistance to impact
- joint strength
- water vapour resistance after ageing
- core thermal resistance
- emissivity
- durability checks after ageing
- calculation of thermal resistance of air gaps adjacent to the product in its different applications
- U value calculations and condensation risk analysis.

18.2 A quality plan was drawn up for production control at the factory.

18.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 5534 : 2014 + A1 : 2015 *Slating and tiling for pitched roofs and vertical cladding — Code of practice*

BS 7671 : 2008 + A3 : 2015 *Requirements for electrical installations — IEE Wiring Regulations — Seventeenth Edition*

BS EN 1931 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of water vapour transmission properties*

BS EN 12114 : 2000 *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*

BS EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements — Classification using test data from reaction fire tests*

BS EN 13984 : 2013 *Flexible sheets for waterproofing — Plastic and rubber vapour control layers — Definitions and characteristics*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

BRE Digest DG 369 : 1992 *Interstitial condensation and fabric degradation*

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

BRE Report BR 443 : 2006 *Conventions for U-value calculations*

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

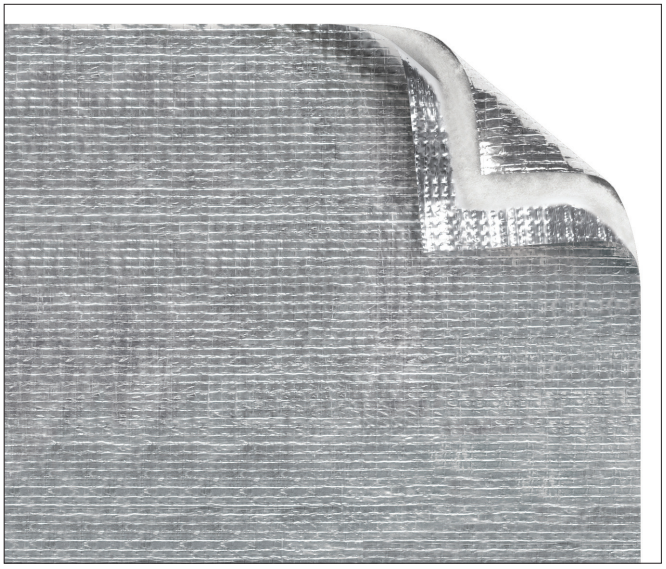
Agrément Certificate
11/4874
Product Sheet 1

ACTIS HCONTROL REFLEX+ AS REFLECTIVE VAPOUR CONTROL LAYER AND INSULATION

ACTIS HCONTROL REFLEX+ (FOR WALLS)

This Agrément Certificate Product Sheet(1) relates to Actis HControl Reflex+, for use as a reflective vapour control layer and insulation material in new and existing dwellings for timber framed and masonry walls in conjunction with plasterboard.

(1) Hereinafter referred to as 'Certificate'.



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Thermal performance — the product has an emissivity of 0.05 for the outer foil and a thermal resistance of 0.25 $m^2 \cdot K \cdot W^{-1}$ (see section 6).

Condensation risk — the product can provide effective control to the passage of water vapour (see section 7).

Behaviour in relation to fire — the product is combustible but may be used in suitably-designed walls (see section 9).

Durability — under normal conditions, the product will have a life equivalent to that of the building in which it is incorporated (see section 14).

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On behalf of the British Board of Agrément

Date of Second issue: 8 July 2016

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Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Actis HControl Reflex+, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See sections 7.1 and 7.7 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations; however, compensating fabric/services measures will be required. See section 6.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to satisfying the requirements of this Regulation. See section 14 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1[1], 3.15.4[1] and 3.15.5[1]. See sections 7.1 and 7.8 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a wall satisfying clauses (or parts of) 6.1.1[1], 6.1.2[1], 6.1.3[1] and 6.1.6[1], 6.2.1[1], 6.2.3[1] to 6.2.7[1], 6.2.9[1], 6.2.11[1] and 6.2.13[1] of these Standards. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction achieving a bronze level of sustainability as defined in this Standard. In addition, the product can contribute to a construction achieving a higher level of sustainability as defined in this standard, with reference to clauses 7.1.4[1] [Aspects 1[1] and 2[1]], 7.1.6[1] [Aspects 1[1] and 2[1]] and 7.1.7[1] [Aspect 1[1]]. See section 6.1 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[1] and Schedule 6[1].

(1) Technical Handbook (Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 3 *Delivery and site handling* (3.3) and 9 *Behaviour in relation to fire* (9.6) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Actis HControl Reflex+, for timber frame and masonry wall applications, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.1 *External masonry walls* and Chapter 6.2 *External timber framed walls*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13984 : 2013 for its vapour control layer property. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance (DoP).

Technical Specification

1 Description

1.1 Actis HControl Reflex+ is a reflective water Vapour Control Layer (VCL) which also enhances the thermal resistance of the unventilated air gap adjacent to it. It can also be used as an air barrier (see section 10). The product consists of three separate elements: two reinforced aluminised coated films and one polyester fibre wadding.

1.2 The dimensions and weights of the product are shown in Table 1.

Table 1 Nominal dimensions

Dimension (unit)	Actis HControl Reflex+
Nominal thickness (mm)	8.5
Nominal weight ($g \cdot m^{-2}$)	335
Roll length (m)	12.5 and 31.25
Width (mm)	1600
Area (m^2)	20 and 50

1.3 Ancillary items for use with the product but outside the scope of this Certificate are:

- pre-treated timber battens
- staples
- additional insulation materials
- Actis Isodhesif tape.

2 Manufacture

2.1 The outer layers of the product consist of non-woven polyester fabric adhesively laminated to a low emissivity foil film, coated to protect the reflective surface. The layers of foil/polyester wadding/foil are fastened together by three strips of glue, one on each edge and one in the centre.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Actis S.A. has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FR017924-1) and BS EN ISO 14001 : 2004 (Certificate FR017925-1) by Bureau Veritas Certification.

2.4 Actis HControl Reflex+ is manufactured in Limoux, France, and marketed/distributed in the UK by Actis Insulation Ltd, Unit 1 Cornbrash Park, Bumpers Way, Bumpers Farm Industrial Estate, Chippenham, Wiltshire SN14 6RA, Telephone: 01249 462888, Fax: 01249 446345, e-mail: solutions@insulation-actis.com, website: www.insulation-actis.com

3 Delivery and site handling

3.1 The product is wrapped in plastic packaging and delivered to site as rolls on pallets. Each pallet or roll is labelled with the product name and its type, weight and dimensions and the names of the manufacturer and Certificate holder.

3.2 The product should be stored in clean, dry conditions, preferably under cover, and not in direct sunlight. Care must be taken to store the product away from solvents. The product must not be used if allowed to get wet or if damaged.

3.3 The product must not come into contact with naked flames or other ignition sources.

3.4 On site, to ensure maximum performance of the product when installed, precautions must be taken to protect it from mud and dirt.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Actis HControl Reflex+.

Design Considerations

4 General

4.1 Actis HControl Reflex+ is a flexible reflective VCL used in conjunction with other insulation materials to reduce the thermal transmittance (U value) of timber framed and masonry walls, in conjunction with plasterboard, of new and existing dwellings (see *Installation* section).

4.2 The product is installed on top of the studs/battens before the plasterboard is installed and hence can perform as a VCL (see section 6).

4.3 The product should not be installed where it is likely to come into contact with heat sources greater than 80°C.

4.4 The plasterboard must be manufactured in accordance with BS EN 520 : 2004 and installed in accordance with BS 8212 : 1995.

4.5 Penetration of the product by services should be kept to a minimum, to limit possible penetration by water vapour.

Masonry and timber frame walls

4.6 The wall or sub-frame should be structurally sound and have been designed and constructed in accordance with the following standards:

- masonry — BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2006, BS EN 1996-2 : 2006 and their UK National Annexes
- timber — BS EN 1995-1-1 : 2004 and its UK National Annex, and BS EN 351-1 : 2007.

4.7 The installation requires careful detailing around doors and windows to achieve a satisfactory surface for finishing. In addition, every attempt should be made to minimise the risk of thermal bridging at reveals and where heavy separating walls are attached to the external wall. In new work, the construction must be designed to accommodate the thickness of the dry lining, particularly at reveals, heads and sills.

4.8 In timber frame constructions, services can be incorporated behind the dry lining, making chasing of the wall unnecessary.

4.9 Installation of plasterboard must be in accordance with the relevant sections of BS 8212 : 1995.

5 Practicability of installation

The product is designed to be installed by a competent builder, or a contractor, experienced with this type of product.

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the following values:

- 0.25 $m^2 \cdot K \cdot W^{-1}$ — *R* value for Actis HControl Reflex+ (8.5 mm thick) with no air gaps either side
- 0.05 — outer surface emissivity
- 0.66[1] $m^2 \cdot K \cdot W^{-1}$ — *R* value of an air cavity adjacent to the product ≥ 20 mm thick (horizontal heat flow)
- 0.00 $m^2 \cdot K \cdot W^{-1}$ — *R*[2] value of product when compressed between studs and battens.

(1) Unventilated cavity with a width and length at least 10 times the thickness and one high emissivity surface.

(2) This value has not been assessed. For guidance on U value calculations refer to BBA Information Bulletin No 3.

6.2 The U value of a completed element will depend largely on the thickness and conductivity of the additional insulation used and the extent and arrangement of timber bridging. Example wall constructions are shown in Figures 1a and 1b and the resulting U values are shown in Table 2.

Figure 1 Example wall constuctions — (a) Existing wall

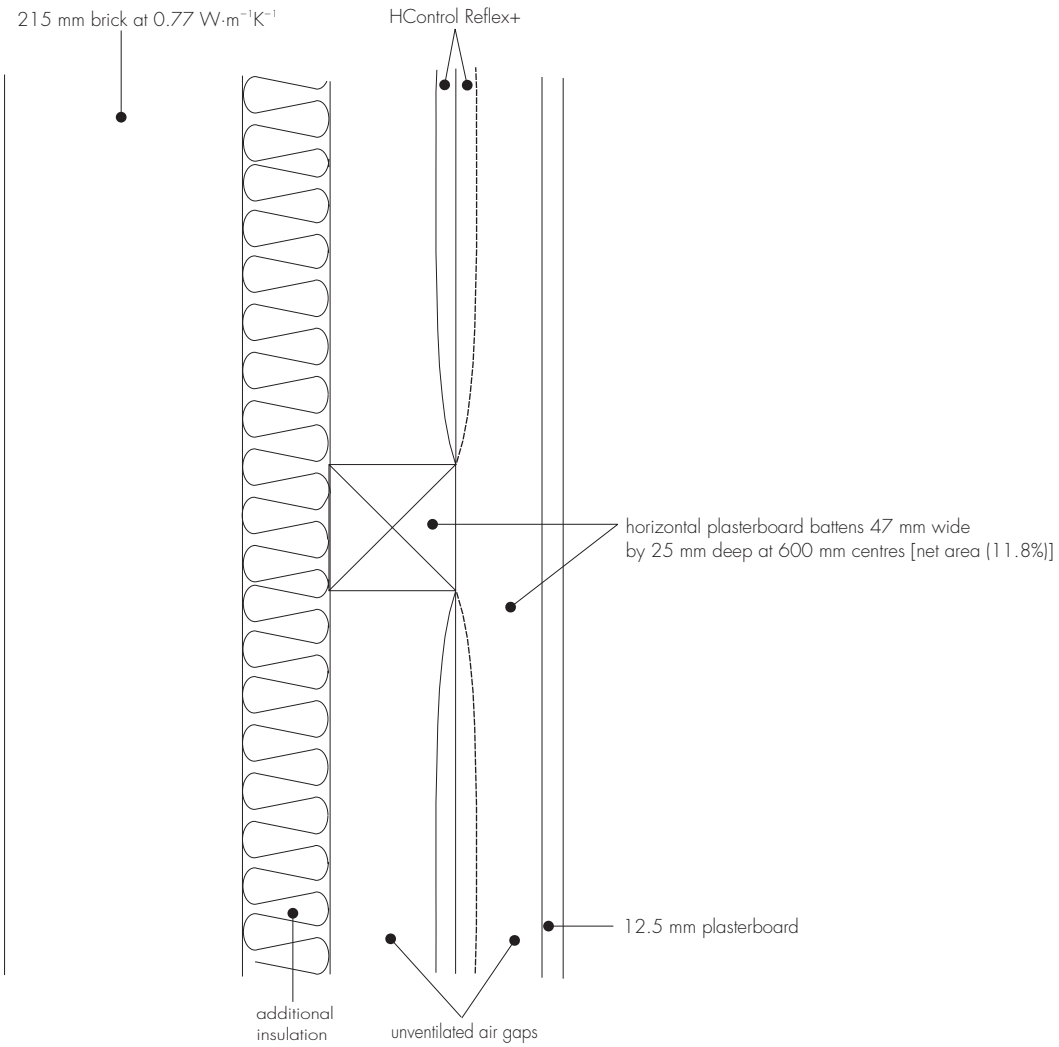


Figure 1 Example wall constuctions — (b) New wall

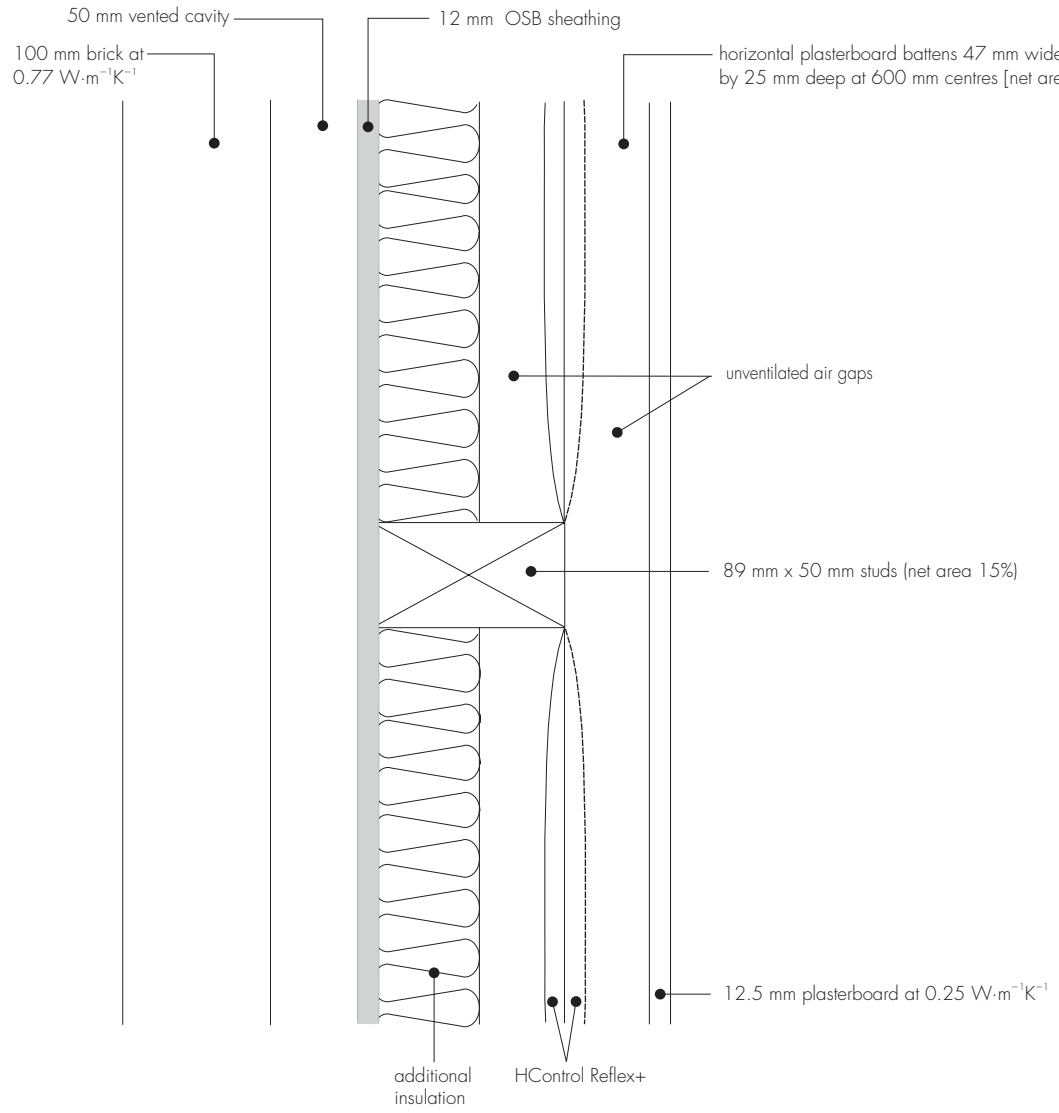


Table 2 U values for wall constructions

Construction		Additional insulation thickness[1] (mm)	U value (W·m⁻²·K⁻¹)
Brick wall Figure 1(a)		35 phenolic	0.28
		70 phenolic	0.19
		75 phenolic	0.18
	Studs depth (mm)		
Timber frame wall Figure 5(b)	89	50 phenolic	0.28
	140	105 phenolic	0.19
	140	115 phenolic	0.18

(1) Phenolic insulation (thickness < 45 mm , thermal conductivity = 0.021 W·m⁻¹·K⁻¹, thickness > 45 mm , thermal conductivity = 0.020 W·m⁻¹·K⁻¹ and emissivity 0.2 of the foil-face, thickness rounded to nearest 5 mm).

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Condensation risk

Interstitial condensation

7.1 Walls incorporating the product will contribute to limiting the risk of interstitial condensation when designed and constructed in accordance with BS 5250 : 2011 (Annexes D and G).

7.2 The product acts as a VCL and has a typical water vapour resistance of 900 $MN \cdot s \cdot g^{-1}$ in accordance with BS EN 1931 : 2000.

7.3 The product has a high water vapour resistance (μ) factor and will, therefore, provide significant resistance to the passage of water vapour and would be considered a vapour control layer (VCL) as defined in BS 5250 : 2011 provided all laps and joints are sealed. When the product is installed in conjunction with other insulation materials, the water vapour resistance and installation instructions of the additional insulation should be taken into consideration.

7.4 The use of the product does not preclude the normal precautions against formation of condensation, especially in rooms expected to have high humidity.

7.5 When using these types of product, due consideration must be taken of the overall installation to minimise perforations by services, eg light switches and power outlets, and the joints at ceiling and skirting level must be well sealed.

7.6 As with any other insulation applied to the inside of a wall, there may be risk of thermal bridging from the floor or ceiling, particularly in concrete slab construction. It has been demonstrated that the use of coving at the wall ceiling point will significantly reduce the problem.

Surface condensation

7.7 Walls incorporating the product will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the junctions with walls are designed in accordance with the guidance referred to in section 6.3 of this Certificate.

7.8 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, Annex G. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

8 Infestation

The use of the product does not in itself promote infestation. The creation of voids may provide habitation for insects or rodents in areas already infested. Care should be taken to ensure that, wherever possible, all voids are sealed as any infestation may be difficult to eradicate. There is no food value in the materials used.

9 Behaviour in relation to fire

9.1 Actis HControl Reflex+ has a reaction to fire classification of Class F* in accordance with BS EN ISO 11925-2 : 2010.

9.2 When installed with an internal lining board, eg 12.5 mm thick plasterboard, the insulation will be contained between the wall and internal lining board, until one is destroyed; therefore, the insulation will not contribute to the development stages of a fire.

9.3 When installed with other additional insulation materials, the fire properties of these materials must be taken into consideration.

9.4 Construction elements must incorporate cavity barriers at edges, around openings, and at junctions with fire-resisting elements in accordance with the relevant provisions of the national Building Regulations. The design and installation of cavity barriers must take into account any anticipated differential movement.

9.5 The product will melt and shrink away from heat, but will burn in the presence of a naked flame.

9.6 When the product is used unsupported, there is a risk that fire can spread if it is accidentally ignited during maintenance works, eg plumber's torch. Care should be taken during building and maintenance to avoid the material being ignited.

10 Air leakage

10.1 When the product was tested to BS EN 12114 : 2000 with a positive pressure of 100 Pa, no airflow was detected and hence it was found to be airtight. This product can be used as an air barrier when installed correctly.

10.2 When used as a VCL and an air barrier, the product's effectiveness is reliant on the careful sealing of the laps, joints, perimeters and penetrations in accordance with the Certificate holder's instructions.

10.3 The airtightness of the building will also be dependent on the performance of the other building elements.

11 De-rating of electrical cables

As with other insulation products, it may be necessary in some cases to de-rate electrical cables buried in insulation. BS 7671 : 2008 suggests that, where wiring is completely surrounded by insulation, it may need to be de-rated to as low as half its free air current carrying capacity. Guidance should be sought from a qualified electrician.

12 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat-producing appliances, the following provisions to the national Building Regulations are acceptable:

England and Wales — Approved Document J, paragraph 2.15

Scotland — Mandatory Standard 3.19, clauses 3.19.1(1) and 3.19.4(1)

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet L, paragraph 3.9.

13 Maintenance

As the product is confined within a wall structure and has suitable durability (see section 14), maintenance is not required.

14 Durability

The product will have a life equivalent to that of the wall structure in which it is incorporated.

Installation

15 General

15.1 The design data given in this Certificate are based on the assumption that construction and fastening methods and other details given in this Certificate are followed, as well as the Certificate holder's installation instructions.

15.2 All VCL joints should have an overlap of at least 50 mm.

15.3 The product is fastened with corrosion-resistant nails or staples with a minimum length of 10 mm. Maximum nail or staple distance along the edges is 100 mm. After fixing, the overlaps are covered with Actis Isodhesif tape.

15.4 The installation of the joints around openings such as windows and ventilation pipes should be completed with adhesive tape to maximise the vapour tightness of the VCL. Particular attention should be paid to the fastening of penetrations through the product.

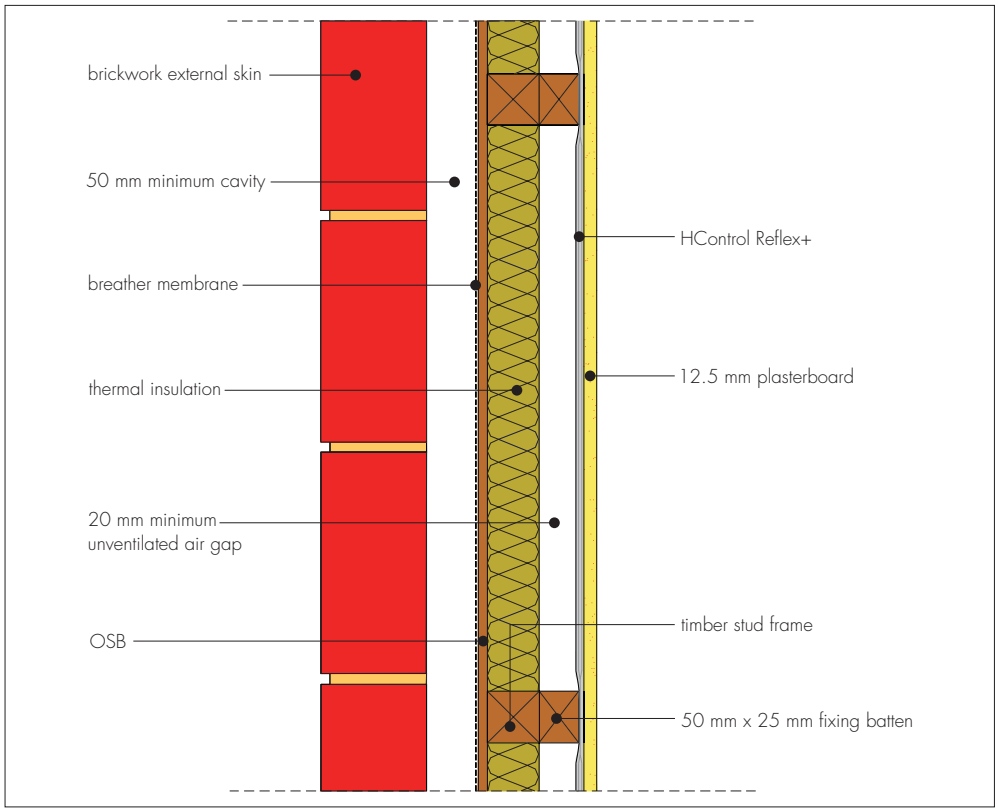
16 Procedure

Wall applications

16.1 The product is installed onto timber studs or wooden battens using corrosion-resistant nails or staples. The product should be installed with two unventilated air gaps as shown in Figure 1 (a and b).

16.2 In situations where an existing insulation fills the depth of the studs, the product can be installed with only one unventilated air gap, as shown in Figure 2.

Figure 2 Wall installation with one unventilated air gap



17 Tests

Test were carried out by the BBA on Actis HControl Reflex+ to determine emissivity before and after ageing.

18 Investigations

18.1 The following investigations were carried out on the product, based on independent test data and BBA analysis, to determine:

- dimensions
- watertightness
- air permeability
- water vapour resistance
- tensile strength
- elongation
- resistance to tearing
- resistance to impact
- joint strength
- water vapour resistance after ageing
- core thermal resistance
- emissivity
- durability after ageing
- calculation of thermal resistance of air gaps adjacent to the product in its different applications
- a quality plan was drawn up for production control at the manufacturing factory
- U value calculations and condensation risk analysis.

18.2 A quality plan was drawn up for production control at the manufacturing factory.

18.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 7671 : 2008 + A3 : 2015 *Requirements for electrical installations — IEE Wiring Regulations*

BS 8212 : 1995 *Code of practice for dry lining and partitioning using gypsum plasterboard*

BS EN 351-1 : 2007 *Durability of wood and wood-based products — Preservative-treated solid wood — Classification of preservative penetration and retention*

BS EN 520 : 2004 + A1 : 2009 *Gypsum plasterboards — Definitions, requirements and test methods*

BS EN 1931 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of water vapour transmission properties*

BS EN 1995-1-1 : 2004 + A2 : 2014 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
NA to BS EN 1995-1-1 : 2004 + A1 : 2008 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*

BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
BS EN 1996-1-2 : 2005 *Eurocode 6 : Design of masonry structures — General rules — Structural fire design*
NA to BS EN 1996-1-2 : 2005 *Eurocode 6 : Design of masonry structures — General rules — Structural fire design*
BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*

BS EN 12114 : 2000 *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*

BS EN 13984 : 2013 *Flexible sheets for waterproofing — Plastic and rubber vapour control layers — Definitions and characteristics*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

BS EN ISO 11925-2 : 2010 *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Single-flame source test*

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

BRE Report BR 443 : 2006 *Conventions for U-value calculations*

Conditions of Certification

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

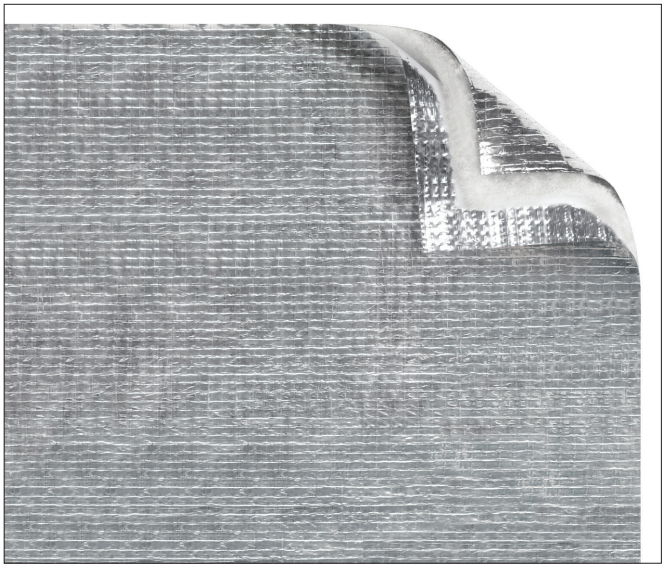
Agrément Certificate
11/4874
Product Sheet 3

ACTIS HCONTROL REFLEX+ AS REFLECTIVE VAPOUR CONTROL LAYER AND INSULATION

ACTIS HCONTROL REFLEX+ (FOR FLOORS)

This Agrément Certificate Product Sheet(1) relates to Actis HControl Reflex+, for use as a reflective vapour control layer and insulation material in new and existing dwellings for floors.

(1) Hereinafter referred to as 'Certificate'.



CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the product has an emissivity of 0.05 for the outer foil and a thermal resistance of 0.25 $m^2 \cdot K \cdot W^{-1}$ (see section 6).

Condensation risk — the product can provide effective control to the passage of water vapour (see section 7).

Behaviour in relation to fire — the product is combustible but may be used in suitably-designed floors (see section 9).

Durability — under normal conditions, the product will have a life equivalent to that of the building in which it is incorporated (see section 14).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 8 July 2016

Originally certificated on 29 November 2011

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

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Regulations

In the opinion of the BBA, Actis HControl Reflex+, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See sections 7.1 and 7.6 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations; however, compensating fabric/services measures will be required. See section 6.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to satisfying the requirements of this Regulation. See section 14 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1(1), 3.15.3(1) and 3.15.4(1). See sections 7.1 and 7.7 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a floor satisfying clauses (or parts of) 6.1.1(1), 6.1.6(1), 6.2.1(1), 6.2.3(1), 6.2.6(1) to 6.2.11(1) and 6.2.13(1) of these Standards. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1) [Aspects 1(1) and 2(1)], 7.1.6(1) [Aspects 1(1) and 2(1)] and 7.1.7(1) [Aspect 1(1)]. See section 6.1 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1) and Schedule 6(1).

(1) Technical Handbook (Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 14 and the *Installation* part of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 3 *Delivery and site handling* (3.3) and 9 *Behaviour in relation to fire* (9.5) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Actis HControl Reflex+, for floor applications provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standard, 5.2 Suspended ground floors.*

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13984 : 2013 for its vapour control layer property. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance (DoP).

Technical Specification

1 Description

1.1 Actis HControl Reflex+ is a reflective water Vapour Control Layer (VCL) which also enhances the thermal resistance of the unventilated air gap adjacent to it. It can also be used as an air barrier (see section 10). The product consists of three separate elements: two reinforced aluminised coated films and one polyester fibre wadding.

1.2 The dimensions and weights of the product are shown in Table 1.

Table 1 Nominal dimensions

Dimension (unit)	Actis HControl Reflex+
Nominal thickness (mm)	8.5
Nominal weight ($g \cdot m^{-2}$)	335
Roll length (m)	12.5 and 31.25
Width (mm)	1600
Area (m^2)	20 and 50

1.3 Ancillary items for use with the product but outside the scope of this Certificate are:

- pre-treated timber battens
- staples
- additional insulation materials
- Actis Isodhesif tape.

2 Manufacture

2.1 The outer layers of the product consist of non-woven polyester fabric adhesively laminated to a low emissivity foil film, coated to protect the reflective surface. The layers of foil/polyester wadding/foil are fastened together by three strips of glue, one on each edge and one in the centre.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Actis S.A. has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FR017924-1) and BS EN ISO 14001 : 2004 (Certificate FR017925-1) by Bureau Veritas Certification.

2.4 Actis HControl Reflex+ is manufactured in Limoux, France, and marketed/distributed in the UK by Actis Insulation Ltd, Unit 1 Cornbrash Park, Bumpers Way, Bumpers Farm Industrial Estate, Chippenham, Wiltshire SN14 6RA, Telephone: 01249 462888, Fax: 01249 446345, e-mail: solutions@insulation-actis.com, website: www.insulation-actis.com.

3 Delivery and site handling

3.1 The product is wrapped in plastic packaging and delivered to site as rolls on pallets. Each pallet or roll is labelled with the product name and its type, weight and dimensions and the names of the manufacturer and Certificate holder.

3.2 The product should be stored in clean, dry conditions, preferably under cover, and not in direct sunlight. Care must be taken to store the product away from solvents. The product must not be used if allowed to get wet or if damaged.

3.3 The product must not come into contact with naked flames or other ignition sources.

3.4 On site, to ensure maximum performance of the product when installed, precautions must be taken to protect it from mud and dirt.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Actis HControl Reflex+.

Design Considerations

4 General

4.1 Actis HControl Reflex+ is a flexible reflective VCL used in conjunction with other insulation materials to reduce the thermal transmittance (U value) in floors of new and existing dwellings (see *Installation* section).

4.2 The product should not be installed where it is likely to come into contact with heat sources greater than 80°C.

4.3 Penetration of the product by services should be kept to a minimum, to limit possible penetration by water vapour.

Floor

4.4 The product is installed on the joists before the floor finish is applied, to act as reflective insulation for the floor.

4.5 Suspended timber ground floors incorporating the product must include a damp-proof membrane (dpm), and/or suitable ventilation of the sub-floor as appropriate, laid in accordance with the relevant clauses of CP 102 : 1973.

4.6 The floor finish should be installed in accordance with BS EN 12871 : 2013.

5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the following values:

- 0.25 $m^2 \cdot K \cdot W^{-1}$ — *R* value for Actis HControl Reflex+ with no air gaps either side
- 0.05 — outer surface emissivity
- 0.66[1] $m^2 \cdot K \cdot W^{-1}$ — *R* value of an air cavity of 20 mm thick, adjacent to the product (downwards heat flow)
- 0.00 $m^2 \cdot K \cdot W^{-1}$ — *R*[2] value of product when compressed between joists and battens.

(1) Unventilated cavity with a width and length at least 10 times the thickness and one high emissivity surface.

(2) For guidance on U value calculations refer to BBA Information Bulletin No 3.

6.2 The U value of a completed element will depend largely on the thickness and conductivity of the additional insulation used and the extent and arrangement of timber bridging. An example floor construction is shown in Figure 1 and the resulting U values are shown in Table 2.

Figure 1 Example floor construction

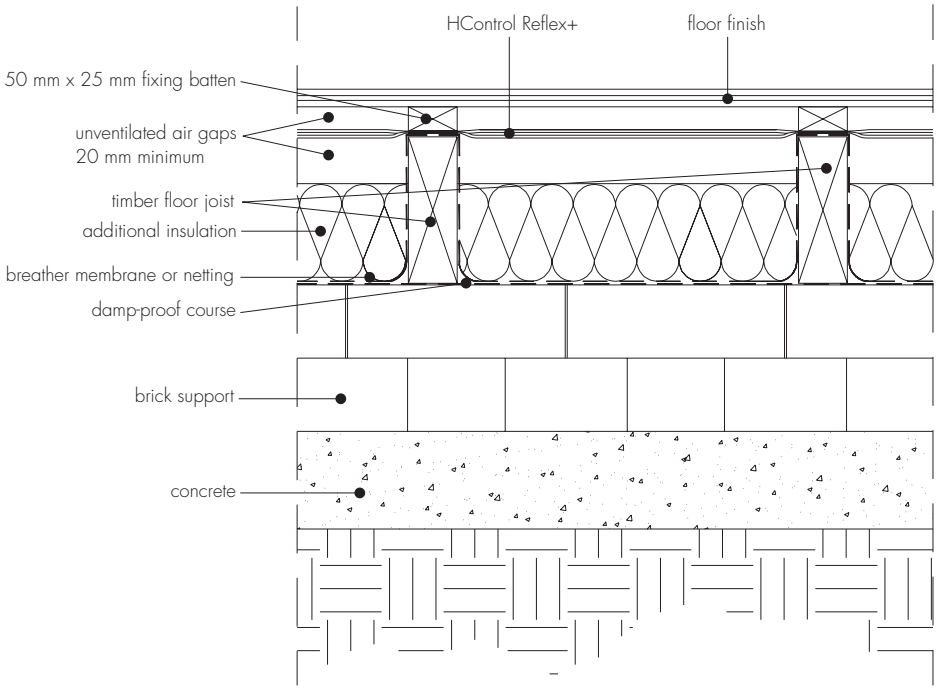


Table 2 U values for floor construction

P/A ratio	U value (timber suspended floor, 50 mm air gap) ($W \cdot m^{-2} \cdot K^{-1}$)
0.2	0.13
0.4	0.15
0.6	0.16
0.8	0.16
1.0	0.16

Note: example construction
Actis HControl Reflex+ laid over joist, leaving a 20 mm gap (R = 0.66 $m^2 \cdot K \cdot W^{-1}$) above the foil and 61.5 mm (R = 1.605 $m^2 \cdot K \cdot W$) gap below it, enclosed by 80 mm of phenolic foam, λ_D = 0.020 $W \cdot m^{-1} \cdot K^{-1}$. Assume μ = 0.

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Condensation risk

Interstitial condensation

7.1 Floors incorporating the product will adequately limit the risk of interstitial condensation when designed and constructed in accordance with BS 5250 : 2011, Annexes D and F.

7.2 The risk of interstitial condensation is greatest when the building is drying out after construction. Guidance on preventing condensation from this and other sources is given in BRE Digest 369 : 1992 and BRE Report BR 262 : 2002.

7.3 The product acts as a VCL and has a typical water vapour resistance of 900 $MN \cdot s \cdot g^{-1}$ in accordance with BS EN 1931 : 2000.

7.4 The product has a high water vapour resistance (μ) factor and will, therefore, provide significant resistance to the passage of water vapour and would be considered a VCL as defined in BS 5250 : 2011 provided all laps and joints are sealed. When the product is installed in conjunction with other insulation materials, the water vapour resistance and installation instructions of the additional insulation should also be taken into consideration.

7.5 When using this type of product, due consideration must be taken of the overall installation to minimise perforations by services, eg power cables, pipes etc, and the joints at skirting level must be well sealed.

Surface condensation

7.6 Floors incorporating the product will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.70 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the junctions with walls are designed in accordance with the guidance referred to in section 6.3 of this Certificate.

7.7 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, Annex F, and BRE Report BR 262 : 2002.

8 Infestation

The use of the product does not in itself promote infestation. The creation of voids may provide habitation for insects or rodents in areas already infested. Care should be taken to ensure that, wherever possible, all voids are sealed as any infestation may be difficult to eradicate. There is no food value in the materials used.

9 Behaviour in relation to fire

9.1 Actis HControl Reflex+ has a reaction to fire classification of Class F* according to BS EN ISO 11925-2 : 2010.

9.2 When installed with an internal floor finish, eg 18 mm thick chipboard, the insulation will be contained between the ground and internal finish; therefore, the insulation will not contribute to the development stage of a fire or present a smoke or toxic hazard.

9.3 When installed with other additional insulation materials, the fire properties of these materials must be taken into consideration.

9.4 The product will melt and shrink away from heat, but will burn in the presence of a naked flame.

9.5 When the product is used unsupported, there is a risk that fire can spread if it is accidentally ignited during maintenance works, eg by a plumber's torch. Care should be taken during building and maintenance to avoid the material being ignited.

10 Air leakage

10.1 When the product was tested to BS EN 12114 : 2000 with a positive pressure of 100 Pa, no airflow was detected and hence it was found to be airtight.

10.2 When used as a VCL and an air barrier, the product's effectiveness is reliant on the careful sealing of the laps, joints, perimeters and penetrations, in accordance with the Certificate holder's instructions.

10.3 The airtightness of the building will also be dependent on the performance of the other building elements.

11 De-rating of electrical cables

As with other insulation products, it may be necessary in some cases to de-rate electrical cables buried in insulation. BS 7671 : 2008 suggests that, where wiring is completely surrounded by insulation, it may need to be de-rated to as low as half its free air current carrying capacity. Guidance should be sought from a qualified electrician.

12 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat-producing appliances, the following provisions to the national Building Regulations are acceptable:

England and Wales — Approved Document J, paragraph 2.15

Scotland — Mandatory Standard 3.19, clauses 3.19.1(1) and 3.19.4(1)

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet L, paragraph 3.9.

13 Maintenance

As the product is confined within a floor structure and has suitable durability (see section 14), maintenance is not required.

14 Durability

The product will have a life equivalent to that of the floor structure in which it is incorporated.

Installation

15 General

15.1 The design data given in this Certificate is based on the assumption that construction and fastening methods and other details given in this Certificate are followed, as well as the Certificate holder's installation instructions.

15.2 All VCL joints should have an overlap of at least 50 mm.

15.3 The product is fastened with corrosion-resistant nails or staples with a minimum length of 10 mm. Maximum nail or staple distance along the edges is 100 mm. After fixing, the overlaps are covered by Actis Isodhesif tape, to maximise the vapour tightness of the VCL.

15.4 The installation of the joints around openings such as ventilation pipes should be completed with adhesive tape to maximise the vapour tightness of the VCL. Particular attention should be paid to fastening of penetrations through the product acting as a VCL.

16 Procedure

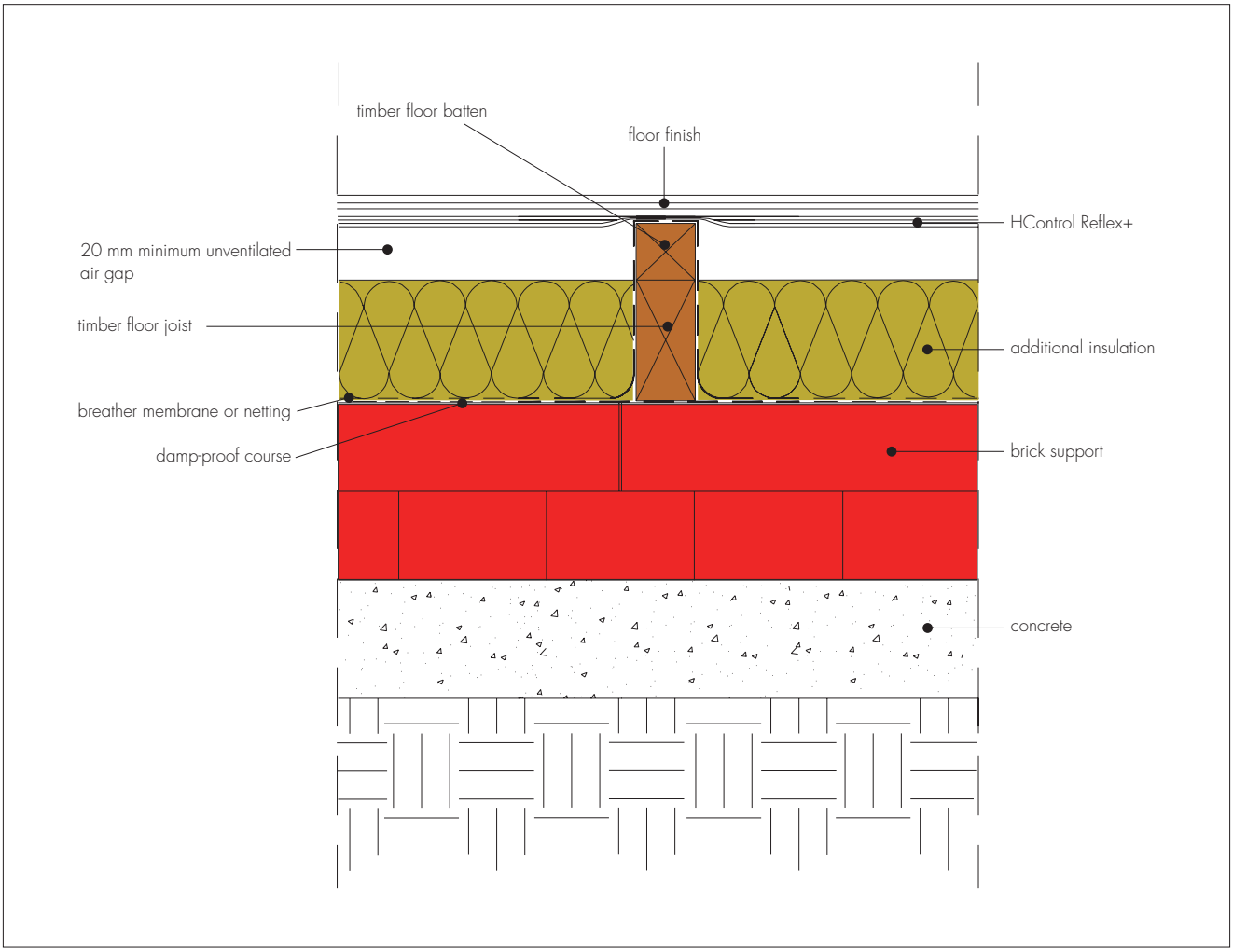
Floor applications

New floors

16.1 The product is installed on timber structures using corrosion-resistant nails or staples. The product should be installed with two unventilated air gaps as shown in Figure 1.

16.2 In situations where the existing insulation already fills the joist depth, the product can be installed with only one unventilated air gap, as shown in Figure 2. The floor finish is then fixed onto the battens over the joists.

Figure 2 Floor installation with one unventilated air gap



Existing floors

16.3 Once the floor finish is removed, the product should be fixed with either one air gap or two air gaps depending on the existing insulation (see Figures 1 and 2).

16.4 When battens are to be added to create two air gaps, consideration should be given to alterations that would be required to the rest of the structure of the room, such as door levels etc.

Additional insulation

16.5 When the product is used with other additional insulation materials, care should be taken to ensure that all air gaps are maintained in accordance with the instructions of the manufacturer of such materials, and further advice should be sought from the Certificate holder.

Technical Investigations

17 Tests

Test were carried out by the BBA on the outer surfaces of Actis HControl Reflex+ to determine emissivity before and after ageing.

18 Investigations

18.1 The following investigations were carried out on the product, based on independent test data and BBA analysis, to determine:

- dimensions
- water tightness
- air permeability
- water vapour resistance
- tensile strength
- elongation
- resistance to tearing
- resistance to impact
- joint strength
- water vapour resistance after ageing
- core thermal resistance
- emissivity
- durability checks after ageing
- calculation of thermal resistance of air gaps adjacent to the product in its different applications
- U value calculations and condensation risk analysis.

18.2 A quality plan was drawn up for production control at the factory.

18.3 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 7671 : 2008 + A3 : 2015 *Requirements for electrical installations — IEE Wiring Regulations*

BS EN 1931 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of water vapour transmission properties*

BS EN 12114 : 2000 *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*

BS EN 12871 : 2013 *Wood-based panels — Determination of performance characteristics for load bearing panels for use in floors, roofs and walls*

BS EN 13984 : 2013 *Flexible sheets for waterproofing — Plastic and rubber vapour control layers — Definitions and characteristics*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

BS EN ISO 11925-2 : 2010 *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Single-flame source test*

BRE Digest 369 : 1992 *Interstitial condensation and fabric degradation*

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

BRE Report BR 443 : 2006 *Conventions for U-value calculations*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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