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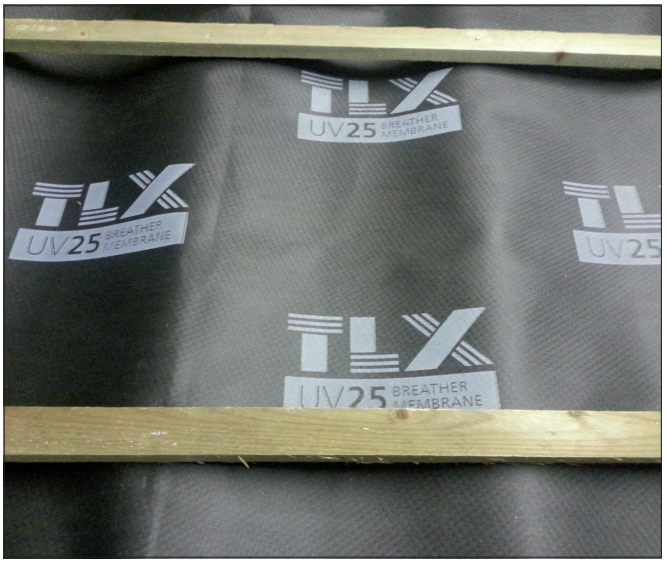
Agrément Certificate
14/5139
Product Sheet 1

TLX UV MEMBRANES

TLX UV10, UV15 AND UV25 ROOF TILE UNDERLAYS FOR USE IN COLD VENTILATED AND WARM NON-VENTILATED PITCHED ROOF SYSTEMS

This Agrément Certificate Product Sheet[1] relates to TLX UV10, UV15 and UV25 Roof Tile Underlays for use in cold ventilated and warm non-ventilated pitched roof systems.

(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

Weathertightness — as part of a complete roof, the products will resist the passage of water and wind-blown snow and dust into the interior of the building (see section 6).

Risk of condensation — the products are regarded as a low water vapour resistance (Type LR) underlay and can be used as part of a warm non-ventilated and cold ventilated roof system (see section 7).

Wind loading — when installed on appropriately spaced battens the products' physical properties are deemed adequate to resist the wind loads imposed on the underlay. The products will reduce the wind uplift forces acting on the roof covering (see section 8).

Strength — the products have adequate strength to resist the loads associated with the installation of the roof (see section 9).

Durability — under the normal conditions found in a roof space the products will have a service life comparable to a traditional roof tile underlay (see section 12).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 3 November 2014

Simon Wroe
Head of Approvals — Materials

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, TLX UV10, UV15 and UV25 Roof Tile Underlays, 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(b)	Resistance to moisture
Comment:		The products will contribute to a roof meeting this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the products satisfies the requirements of this Regulation. See sections 11 and 12 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a roof satisfying clauses 3.10.1[1][2] and 3.10.7[1][2] of this Standard. See section 6.1 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The products can contribute to meeting 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.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these products under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2]. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See section 6.1 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See sections: 1 *Description*, 4 *Use* (4.2) and 10 *Behaviour in relation to fire* (10.2) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of TLX UV10, UV15 and UV25 Roof Tile Underlays in cold ventilated and warm non-ventilated pitched roof systems, provided they are 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 products in accordance with harmonised European Standard BS EN 13859-1 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

TLX UV10, UV15 and UV25 Roof Tile Underlays are thermally-bonded film laminate composites of polyolefins, for use in cold ventilated and warm non-ventilated pitched roof systems. They have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	TLX UV Roof Underlays		
	TLX UV10	TLX UV15	TLX UV25
Thickness (mm)	0.10	0.15	0.25
Mass per unit area ($g \cdot m^{-2}$)	112	130	165
Roll length (m)[1]	50	50	50
Roll width (m)[1]	1 and 1.5	1 and 1.5	1 and 1.5
Colour[2]			
upper face	black	black	black
lower face	white	white	black
Tensile strength* (N/50mm)			
longitudinal	285	305	420
aged	270	300	375
transverse	180	195	245
aged	165	180	215
Tear resistance* (N)			
longitudinal	148	148	193
transverse	198	198	151
Flexibility at low temperature* (°C)	–40	–40	–40
Watertightness*			
unaged	W1	W1	W1
aged	W1	W1	W1
Water vapour transmission* (S_d)	0.022	0.025	0.025

(1) Other sizes available to order

(2) Other colours available to order

2 Manufacture

2.1 The membranes are manufactured by thermally bonding two layers of spunbond polypropylene with a microporous film between them, to form a breathable waterproof membrane.

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 the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 68919).

3 Delivery and site handling

3.1 Rolls are delivered to site packaged with a label bearing the marketing company's name, the grade identification and the BBA logo incorporating the number of this Certificate.

3.2 The rolls should be stored on their sides, on a level, clean surface, under cover and protected from sunlight.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on TLX UV10, UV15 and UV25 Roof Tile Underlays.

Design Considerations

4 Use

4.1 TLX UV10, UV15 and UV25 Roof Tile Underlays are satisfactory for use as fully-supported or unsupported underlays in tiled and slated cold ventilated and warm pitched roofs constructed in accordance with the relevant clauses of BS 5534 : 2003.

4.2 The products have a high coefficient of friction when dry, giving a slip-resistant surface for increased safety during the installation of the covering. Care should be taken in wet conditions during installation work owing to a reduction in slip resistance.

4.3 When used in direct contact with treated timber the advice of the Certificate holder should be sought on compatibility.

5 Practicability of installation

The products are designed to be installed by competent slaters/tilers experienced with this type of installation.

6 Weathertightness

6.1 The products are class W1* in accordance with BS EN 13859-1 : 2014. Tests indicate that the products will resist the passage of water and wind-blown snow and dust into a building, under all conditions to be found in a roof constructed in accordance with the relevant clauses of BS 5534 : 2003.

6.2 The products resist penetration of liquid water and consequently may be used as temporary waterproofing prior to the installation of slates or tiles. The period of such use should, however, be kept to a minimum. Advice should be sought from the Certificate holder. Further information is given in BBA Information Bulletin No 2 — *Permeable Roof Tile Underlay — Guide to Good Site Practice*.

7 Risk of condensation

7.1 For design purposes, the products' water vapour resistance may be taken as not more than 0.25 $MN \cdot s \cdot g^{-1}$, and for roofs designed in accordance with BS 5534 : 2003 or BS 5250 : 2011, Annex H, they may be regarded as a Type LR membrane.

7.2 In common with all roofs, care must be taken in the overall design and installation to minimise the risk of water vapour coming into contact with cold parts of the construction. Factors to be considered and minimised include: moisture diffusion through the ceiling, infiltration through unsealed openings/penetrations in the ceiling, and services evaporating or venting moisture into cold spaces.

7.3 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading owing to wet trades, such as in-situ cast concrete slabs or plaster. The risk of condensation diminishes as the building naturally dries out. See BBA Information Bulletin No 1 — *Roof Tile Underlays in Cold Roofs during the Drying-out Period*.

Ceiling and insulation horizontal (cold ventilated roof)

7.4 Roofs designed and constructed in accordance with BS 5250 : 2011 will adequately limit the risk of condensation.

Ceiling and insulation inclined (warm roof)

7.5 For roofs with an insulated inclined ceiling, ventilation above or below the underlay will not be required provided the passage of moisture by diffusion and by convection is controlled, eg by a vapour control layer or a continuous envelope of insulation with a high vapour resistance. Ventilation may be required if specified by the manufacturer.

Ceiling and insulation partially inclined (warm roof and cold non-ventilated roof)

7.6 Where an insulated ceiling spans only part of the roofline, resulting in cold roof spaces, the installation should be ventilated in accordance with BS 5250 : 2011, Annex H.

8 Wind loading

8.1 Project design wind speeds should be determined and wind uplift forces calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex.

8.2 The products, when fully supported or draped over rafters, have adequate resistance to wind uplift forces.

8.3 For a cold ventilated system, wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7. Acceptable wind loads with specific batten spacings for the draped product, using a 25 mm deep tiling batten, are given in Table 2.

Table 2 Resistance to wind loads

Batten spacing (mm)	Maximum pressure (kPa)		
	TLX UV10	TLX UV15	TLX UV25
350	0.5	1.0	1.0
300	0.5	1.5	1.5
250	1.5	2.0	2.0
200	2.5	2.5	2.5

9 Strength

The products will resist the loads associated with the installation of the roof.

10 Behaviour in relation to fire

10.1 The products are Class E* in accordance with BS EN 13501 -1 : 2007.

10.2 When the products are used unsupported, there is a risk that fire can spread if they are accidentally ignited during maintenance works, eg by a roofer's or plumber's torch. As with all types of underlay, care should be taken during building and maintenance to avoid ignition.

10.3 When the products are used in a fully-supported situation, the reaction to fire will be determined by the support.

11 Maintenance

As the products are confined to a roof space and have suitable durability (see section 12), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

12 Durability

The products will be virtually unaffected by the normal conditions found in a roof space and will have a life comparable with that of traditional roof tile underlays, provided they are not exposed to sunlight for long periods (see section 14.5). Advice regarding exposure can be obtained from the Certificate holder.

13 Reuse and recyclability

The products comprise polypropylene, which can be recycled.

Installation

14 General

14.1 TLX UV10, UV15 and UV25 Roof Tile Underlays must be installed and fixed in accordance with the Certificate holder's instructions, the provisions of this Certificate and the relevant recommendations of BS 5534 : 2003, BS 8000-6 : 2013 and BS 8000-0 : 2014. Installation can be carried out under all conditions normal to roofing work.

14.2 The products are installed with the printed side uppermost and lapped to shed water out and down the slope.

14.3 Overlaps must be provided with the minimum dimensions given in Table 3. Vertical laps should be staggered a minimum of 300 mm and detailed to occur along the rafter lines. All horizontal laps can be taped and sealed using a double-sided tape, if required.

Table 3 Minimum overlaps

Roof pitch (°)	Horizontal lap (mm)		Vertical laps (mm)
	Not fully supported	Fully supported	
12.5 to 14	225	150	100
15 to 34	150	100	100
35+	100	75	100

14.4 Minimum overlaps at hips should be 150 mm, and in valleys 300 mm.

14.5 Where possible, eaves guards should be used to protect the products from sunlight and to direct water into the gutter.

15 Procedure

Fully supported

15.1 The products may be used over sarking boards of softwood or other sarking materials as defined in BS 5534 : 2003, and installed in accordance with BS 5250 : 2011, and with either continuous insulation or insulation placed between the rafters.

15.2 The products are secured to the support with counter battens at least 25 mm thick to create drainage and vapour dispersal space(1) between the products and the tiles.

(1) This space should be ventilated in accordance with BS 5250 : 2011 when using tight-fitting roof coverings.

15.3 The counter battens are fixed with galvanised clout nails at a maximum of 300 mm centres coinciding with the rafters. Tiling battens are secured to the counter battens and rafters with appropriate fixings.

15.4 Care must be taken to minimise the risk of interstitial condensation as described in section 7.5, particularly for timber sarking which may be below the dew-point for extended periods during winter months.

Unsupported

15.5 The products, when installed as an unsupported system, are fixed in the traditional method for roof tile underlays, ie draped between the rafters to allow drainage of liquid water under the tiling battens.

16 Repair

Damage to the products can be repaired prior to the installation of slates or tiles, by replacing the damaged areas by patching and sealing. Care should be taken to ensure that the watertightness of the roof is maintained.

17 Finishing

17.1 Detailing of abutments, verges and hips must be in accordance with the Certificate holder's instructions. Ingress of moisture to the roof space should be restricted by sealing around pipes and other penetrations and details.

17.2 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003, BS 8000-6 : 2013, BS 8000-0 : 2014 and the Certificate's holder's instructions, especially when using tightly-jointed slates or tiles.

Technical Investigations

18 Tests

18.1 An assessment was made of data to BS EN 13859-1 : 2014 in relation to:

- dimensional stability
- tensile strength and elongation*
- resistance to tear*
- resistance to water penetration*
- resistance to artificial ageing*
- water vapour transmission*
- flexibility at low temperature*
- resistance to fire*.

18.2 Tests were carried out to determine:

- slip resistance
- resistance to streaming water
- mullen burst strength
- resistance to wind loads

to assess:

- safety during installation
- performance under typical service condition
- robustness during installation
- properties when installed.

19 Investigations

19.1 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.

19.2 The condensation risk in warm roof constructions incorporating the products, and specifically for those containing sarking boards, was examined.

Bibliography

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

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

BS 8000-6 : 2013 *Workmanship on construction sites — Code of practice for slating and tiling of roofs and walls*

BS EN 1991-1-4 : 2005 *Eurocode 1: Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 UK National Annex to *Eurocode 1: Actions on structures — General actions — Wind actions*

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

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

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

20 Conditions

20.1 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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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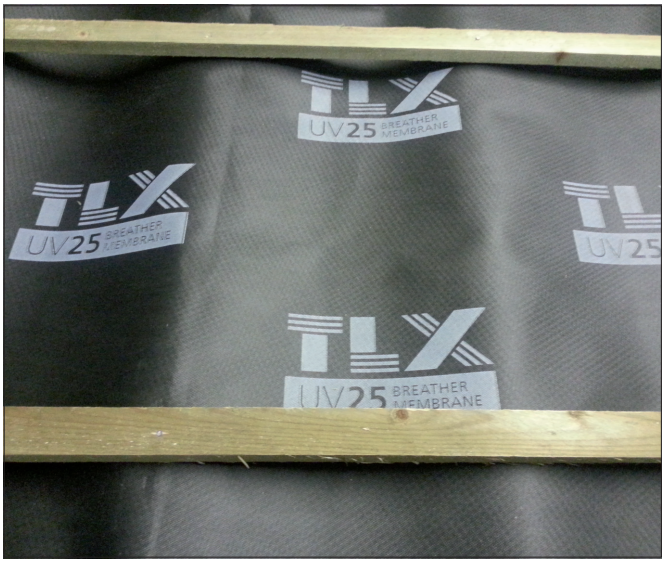
Agrément Certificate
14/5139
Product Sheet 2

TLX UV MEMBRANES

TLX UV10, UV15 AND UV25 ROOF TILE UNDERLAYS FOR USE IN COLD NON-VENTILATED PITCHED ROOF SYSTEMS

This Agrément Certificate Product Sheet[1] relates to TLX UV10, UV15 and UV25 Roof Tile Underlays for use in cold non-ventilated pitched roof systems.

(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

Weathertightness — as part of a complete roof, the products will resist the passage of water and wind-blown snow and dust into the interior of the building (see section 6).

Risk of condensation — the products are regarded as a low water vapour resistance (Type LR) underlay and can be used as part of a cold non-ventilated roof system (see section 7).

Wind loading — when installed on appropriately spaced battens the products' physical properties are deemed adequate to resist the wind loads imposed on the underlay. The products will reduce the wind uplift forces acting on the roof covering (see section 8).

Strength — the products have adequate strength to resist the loads associated with the installation of the roof (see section 9).

Durability — under the normal conditions found in a roof space the products will have a service life comparable to a traditional roof tile underlay (see section 12).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 3 November 2014

Simon Wroe
Head of Approvals — Materials

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Chief Executive

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Regulations

In the opinion of the BBA, TLX UV10, UV15 and UV25 Roof Tile Underlays, 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(b)	Resistance to moisture
Comment:		The products will contribute to a roof meeting this Requirement. See section 6.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The products will contribute to a roof meeting this Requirement with respect to interstitial condensation. See section 7 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the products satisfies the requirements of this Regulation. See sections 11 and 12 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a roof satisfying clauses 3.10.1[1][2] and 3.10.7[1][2] of this Standard. See section 6.1 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The products can contribute to meeting 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.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these products under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See section 6.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The products can enable a roof to satisfy this Regulation. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See sections: 1 *Description* and 10 *Behaviour in relation to fire* (10.2) of this Certificate.

Additional Information

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13859-1 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

TLX UV10, UV15 and UV25 Roof Tile Underlays are thermally-bonded film laminate composites of polyolefins, for use in cold non-ventilated pitched roof systems. They have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	TLX UV Roof Underlays		
	TLX UV10	TLX UV15	TLX UV25
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Roll width (m)(1)	1 and 1.5	1 and 1.5	1 and 1.5
Colour(2)			
upper face	black	black	black
lower face	white	white	black
Tensile strength* (N/50mm)			
longitudinal	285	305	420
aged	270	300	375
transverse	180	195	245
aged	165	180	215
Tear resistance* (N)			
longitudinal	148	148	193
transverse	198	198	151
Flexibility at low temperature* (°C)	–40	–40	–40
Watertightness*			
unaged	W1	W1	W1
aged	W1	W1	W1
Water vapour transmission* (S_d)	0.022	0.025	0.025

(1) Other sizes available to order

(2) Other colours available to order

2 Manufacture

2.1 The membranes are manufactured by thermally bonding two layers of spunbond polypropylene with a microporous film between them, to form a breathable waterproof membrane.

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 the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 68919).

3 Delivery and site handling

3.1 Rolls are delivered to site packaged with a label bearing the marketing company's name, the grade identification and the BBA logo incorporating the number of this Certificate.

3.2 The rolls should be stored on their sides, on a level, clean surface, under cover and protected from sunlight.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on TLX UV10, UV15 and UV25 Roof Tile Underlays.

Design Considerations

4 Use

4.1 TLX UV10, UV15 and UV25 Roof Tile Underlays are satisfactory for use in dwellings with cold non-ventilated tiled or slated roofs of any conventional plan and size. Features(1) successfully assessed include:

- duo pitched
- gable ends
- room-in-roof[2]
- mono-pitched
- verges
- dormers
- hipped
- abutments
- timber sarking[3][4]
- mansard
- valleys.

(1) For roofs incorporating other features, non-conventional roof geometries or construction materials, the advice of the Certificate holder should be sought.

(2) Where a room-in-roof results in part of a roof pitch being insulated (ie a warm roof), design and detailing of that part of the roof should comply with relevant guidance given in Product Sheet 1.

(3) As in Scottish practice, where slates are nailed through the breather membrane directly onto timber planks (nominally 150 mm wide with a 2 mm gap) without battens.

(4) Sheet sarking materials should not be used.

4.2 It is important that the designers, planners, contractors and/or installers ensure that the roof and ceiling are constructed in accordance with the Certificate holder's instructions and the information given in this Certificate.

4.3 The products can be installed by draping over rafters and securing with tiling battens, or installed taut over rafters and secured with counter battens and tiling battens.

4.4 In conventionally-ventilated roof constructions, energy loss by ventilation can account for up to 25% of the total heat loss through the roof. The non-ventilated system will significantly reduce this mechanism of heat loss.

4.5 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that for conventionally-ventilated cold roof systems (see section 7).

4.6 When used in direct contact with treated timber the advice of the Certificate holder should be sought on compatibility.

5 Practicability of installation

The products are designed to be installed by competent slaters/tilers experienced with this type of installation.

6 Weathertightness

6.1 The products are class W1* in accordance with BS EN 13859-1 : 2014. The products will resist the passage of water and wind-blown snow and dust into a building, under all conditions to be found in a roof constructed in accordance with the relevant clauses of BS 5534 : 2003.

6.2 The products resist penetration of liquid water and consequently may be used as temporary waterproofing prior to the installation of slates or tiles. The period of such use should, however, be kept to a minimum. Advice should be sought from the Certificate holder. Further information is given in BBA Information Bulletin No 2 — *Permeable Roof Tile Underlay – Guide to Good Site Practice*.

7 Risk of condensation

7.1 For design purposes, the products' water vapour resistance may be taken as not more than 0.25 $MN \cdot s \cdot g^{-1}$, and for roofs designed in accordance with BS 5534 : 2003 or BS 5250 : 2011, Annex H, they may be regarded as a Type LR membrane.

7.2 The complete roof construction, ceiling boards to roof tiles, must be considered as a total system with regard to condensation risk. It is important that the products are laid in accordance with the Certificate holder's instructions and this Certificate to minimise the risk of condensation.

7.3 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading owing to wet trades, such as in-situ cast concrete slabs or plaster. The risk of condensation diminishes as the building naturally dries out. See BBA Information Bulletin No 1 — *Roof Tile Underlays in Cold Roofs during the Drying-out Period*.

7.4 All penetrations into and out of the roof space must be properly sealed in accordance with the Certificate holder's instructions. In addition, such features as vent stacks and boiler flues passing through the roof space must be sealed.

7.5 It is essential to minimise water vapour transfer into the loft space from the dwelling below. Appropriate measures include:

- ventilating the dwelling below in accordance with national Building Regulations and Standards for the dispersal and rapid dilution of water vapour, particularly from rooms that may experience high humidity (such as kitchens, utility rooms and bathrooms)
- covering all water tanks in the loft space and lagging pipework
- sealing penetrations in the ceiling and making loft hatches convection-tight by using a compressible draught seal
- ensuring that there is continuity of jointing with walls (and behind wall linings) at ceiling perimeters
- ensuring that masonry wall cavities do not interconnect with roof cavities.

7.6 For additional protection, the use of a vapour control layer/vapour check plasterboard can be considered.

8 Wind loading

8.1 Project design wind speeds should be determined and wind uplift forces calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex.

8.2 The products, when fully supported or draped over rafters, have adequate resistance to wind uplift forces.

8.3 For an unsupported system, wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7. Acceptable wind loads with specific batten spacings for the draped product, using a 25 mm deep tiling batten, are given in Table 2.

Table 2 Resistance to wind loads

Batten spacing (mm)	Maximum pressure (kPa)		
	TLX UV10	TLX UV15	TLX UV25
350	0.5	1.0	1.0
300	0.5	1.5	1.5
250	1.5	2.0	2.0
200	2.5	2.5	2.5

9 Strength

The products will resist the loads associated with the installation of the roof.

10 Behaviour in relation to fire

10.1 The products are Class E* in accordance with BS EN 13501 -1 : 2007.

10.2 When the products are used unsupported, there is a risk that fire can spread if they are accidentally ignited during maintenance works, eg by a roofer's or plumber's torch. As with all types of underlay, care should be taken during building and maintenance to avoid ignition.

10.3 When the products are used in a fully-supported situation, the reaction to fire will be determined by the support.

11 Maintenance

As the products are confined to a roof space and have suitable durability (see section 12), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

12 Durability

The products will be virtually unaffected by the normal conditions found in a roof space and will have a life comparable with that of traditional roof tile underlays, provided they are not exposed to sunlight for long periods (see section 14.5). Advice regarding exposure can be obtained from the Certificate holder.

13 Reuse and recyclability

The products comprise polypropylene, which can be recycled.

Installation

14 General

14.1 TLX UV10, UV15 and UV25 Roof Tile Underlays must be installed and fixed in accordance with the Certificate holder's instructions, the provisions of this Certificate and the relevant recommendations of BS 5534 : 2003, BS 8000-6 : 2013 and BS 8000-0 : 2014. Installation can be carried out under all conditions normal to roofing work.

14.2 The products are installed with the printed side uppermost and lapped to shed water out and down the slope.

14.3 Overlaps must be provided with the minimum dimensions given in Table 3. Vertical laps should be staggered a minimum of 300 mm and detailed to occur along the rafter lines. All horizontal laps can be taped and sealed using a double-sided tape, if required.

Table 3 Minimum overlaps

Roof pitch (°)	Horizontal lap (mm)		Vertical laps (mm)
	Not fully supported	Fully supported	
12.5 to 14	225	150	100
15 to 34	150	100	100
35+	100	75	100

14.4 Minimum overlaps at hips should be 150 mm, and in valleys 300 mm.

14.5 Where possible, eaves guards should be used to protect the products from sunlight and to direct water into the gutter.

15 Procedure

Draped and loose laps

15.1 The products should be installed as an unsupported system, and fixed in the traditional method for roof tile underlays, ie laid parallel to the eaves, draped between the rafters, with the black printed side uppermost.

Taut

15.2 When laid horizontally, the products must be pulled taut and stapled or nailed to hold securely in position. Counter battens (minimum thickness 25 mm) are then fixed to the rafter.

Timber plank sarking

15.3 For fully supported roofs (traditional Scottish), the slates can be nailed through the underlay into the timber plank sarking, normally 150 mm wide with a 2 mm gap.

16 Repair

Damage to the products can be repaired prior to the installation of slates or tiles, by replacing the damaged areas by patching and sealing. Care should be taken to ensure that the watertightness of the roof is maintained.

17 Finishing

17.1 Detailing of abutments, verges and hips must be in accordance with the Certificate holder's instructions. Ingress of moisture to the roof space should be restricted by sealing around pipes and other penetrations and details.

17.2 To achieve a convection-tight loft space, it is important that the following details are maintained (see also section 7.5):

- all penetrations, eg pipework and electrical fittings to the loft space, must be sealed
- the loft hatch must be securely sealed to ensure a draught-free fit
- the eaves must be constructed to minimise air penetration into the loft space
- the insulation must be pushed into the eaves and against the underlay to avoid gaps, taking care to avoid pushing the underlay against the tiling battens and blocking the drainage path.

17.3 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003, BS 8000-0 : 2014, BS 8000-6 : 2013 and the Certificate's holder's instructions, especially when using tightly-jointed slates or tiles.

Technical Investigations

18 Tests

18.1 An assessment was made of data to BS EN 13859-1 : 2014 in relation to:

- dimensional stability
- tensile strength and elongation*
- resistance to tear*
- resistance to water penetration*
- resistance to artificial ageing*
- water vapour transmission*
- flexibility at low temperature*
- resistance to fire*.

18.2 Tests were carried out to determine:

- slip resistance
- resistance to streaming water
- mullen burst strength
- resistance to wind loads

to assess:

- safety during installation
- performance under typical service condition
- robustness during installation
- properties when installed.

19 Investigations

19.1 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.

19.2 Using computer modelling, cold non-ventilated roofs (as described in section 4.1) were analysed for risk of condensation.

Bibliography

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

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*
BS 8000-6 : 2013 *Workmanship on construction sites — Code of practice for slating and tiling of roofs and walls*

BS EN 1991-1-4 : 2005 *Eurocode 1: Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 UK National Annex to *Eurocode 1: Actions on structures — General actions — Wind actions*

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

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

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

Conditions of Certification

20 Conditions

20.1 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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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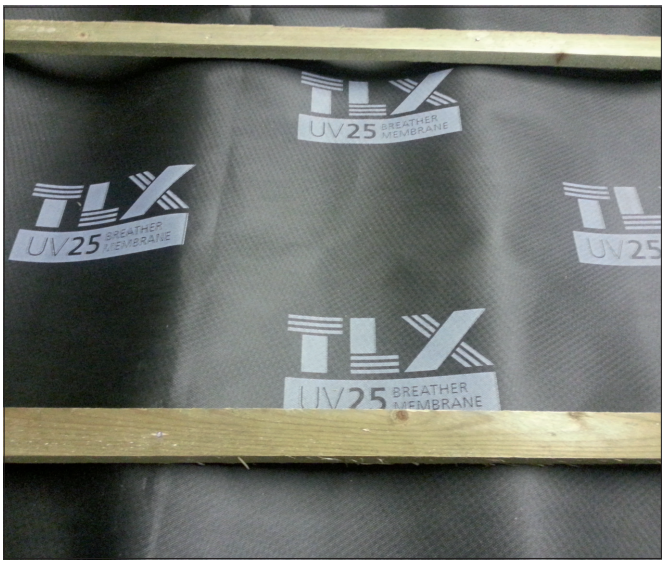
Agrément Certificate
14/5139
Product Sheet 3

TLX UV MEMBRANES

TLX UV10, UV15 AND UV25 BREATHER MEMBRANES

This Agrément Certificate Product Sheet(1) relates to TLX UV10, UV15 and UV25 Breather Membranes, for use in timber-frame walls with a cavity and a masonry outer leaf, weatherboarding, or tile or slate cladding.

(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

Weathertightness— the products will contribute to protecting a wall against water penetration (see section 6).

Risk of condensation— the products have a low resistance to water vapour transmission and will reduce the risk of interstitial condensation (see section 7).

Strength— the products have adequate strength to resist the loads associated with the installation of the roof (see section 8).

Durability —the products will have a service life comparable to similar elements in the construction, eg vapour control layers (see section 11).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 3 November 2014

Simon Wroe
Head of Approvals — Materials

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, TLX UV10, UV15 and UV25 Breather Membranes, 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(b)	Resistance to moisture
Comment:		The products will contribute to a wall meeting this Requirement. See section 6.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The products can contribute to a wall meeting this Requirement with respect to interstitial condensation. See section 7.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 11.2 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the products satisfies the requirements of this Regulation. See sections 10 and 11.2 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a wall satisfying clauses 3.10.1[1][2] and 3.10.5[1][2] of this Standard. See section 6.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The products can contribute to a wall satisfying clauses 3.15.1[1] and 3.15.5[1] of this Standard, with respect to interstitial condensation. See section 7.2 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The products can contribute to meeting 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.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these products under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 11.2 and the *Installation* part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The products will contribute to a wall satisfying this Regulation. See section 6.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The products can contribute to a wall satisfying this Regulation. See section 7.2 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See section: 1 *Description* of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of TLX UV10, UV15 and UV25 Breather Membranes, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.2 *External timber framed walls*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13859-2 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

TLX UV10, UV15 and UV25 Breather Membranes are thermally-bonded film laminate composites of polyolefins, for use in timber-frame wall construction with a cavity and conventional masonry, weatherboarding, or tile or slate cladding. They have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	TLX UV Roof Underlays		
	TLX UV10	TLX UV15	TLX UV25
Thickness (mm)	0.10	0.15	0.25
Mass per unit area ($g \cdot m^{-2}$)	112	130	165
Roll length (m)(1)	50	50	50
Roll width (m)(1)	1 and 1.5	1 and 1.5	1 and 1.5
Colour(2)			
upper face	black	black	black
lower face	white	white	black
Tensile strength* (N/50mm)			
longitudinal	285	305	420
aged	270	300	375
transverse	180	195	245
aged	165	180	215
Tear resistance* (N)			
longitudinal	148	148	193
transverse	198	198	151
Flexibility at low temperature* (°C)	–40	–40	–40
Watertightness*			
unaged	W1	W1	W1
aged	W1	W1	W1
Water vapour transmission* (S_d)	0.022	0.025	0.025

(1) Other sizes available to order

(2) Other colours available to order

2 Manufacture

2.1 The membranes are manufactured by thermally bonding two layers of spunbond polypropylene with a microporous film between them, to form a breathable waterproof membrane.

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 the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 68919).

3 Delivery and site handling

3.1 Rolls are delivered to site packaged with a label bearing the marketing company's name, the grade identification and the BBA logo incorporating the number of this Certificate.

3.2 The rolls should be stored on their sides, on a level, clean surface, under cover and protected from sunlight.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on TLX UV10, UV15 and UV25 Breather Membranes.

4 Use

4.1 TLX UV10, UV15 and UV25 Breather Membranes are satisfactory for use in timber-frame constructions, either factory or site applied.

4.2 In the absence of other guidance, suitable timber-frame constructions are defined as those designed and built in accordance with *NHBC Standards*, Section 6.2 *External timber framed walls*.

4.3 The products meet the requirements for a Class W1* material in accordance with BS EN 13859-2 : 2014, and meet the requirements for a high-performance breather membrane for use in very severe conditions[1] given in *NHBC Standards* 2014, Chapter 6.2, clause M5.

(1) Very severe conditions are defined in *NHBC Standards* 2014, Appendix 6.1A — map showing categories of exposure to wind-driven rain.

5 Practicability of installation

The products are designed to be installed by competent operatives experienced with this type of installation.

6 Weathertightness

6.1 The products are class W1 in accordance with BS EN 13859-2 : 2014. The products will resist liquid water penetration and wind-blown snow, and will protect the sheathing and frame from external moisture.

6.2 The period prior to installation of the external cladding should be kept to a minimum. The products should not be used as a temporary waterproof covering during this time.

7 Risk of condensation

7.1 Conventional timber-frame walls designed in accordance with BS 5250 : 2011 and incorporating the products will adequately minimise the risk of condensation.

7.2 The products have a design resistance to water vapour transmission of less than or equal to 0.6 $MNsg^{-1}$ and are defined as a 'breather membrane' in accordance with BS 5250 : 2011. Walls incorporating the products will therefore contribute towards minimising the risk of interstitial condensation in suitably-designed walls.

7.3 The risk of condensation occurring within the wall of a timber-frame building will depend upon the properties and vapour resistance of other materials used in the construction, the internal and external conditions and the effectiveness of the internal vapour control layer.

8 Strength

8.1 The products will resist the normal loads associated with construction and installation into timber-frame constructions.

8.2 The products are not adversely affected by water and retain their properties when wet.

9 Behaviour in relation to fire

9.1 The products are Class E in accordance with BS EN 13501 -1 : 2007.

9.2 The products will have similar behaviour to polyolefin membranes in relation to fire, tending to burn and shrink away from the heat source. The products are unclassifiable in terms of the Building Regulations, and this should be considered when assessing the overall risk.

9.3 To satisfy the requirements of the national Buildings Regulations, cavity barriers must be used.

10 Maintenance

As the products are confined within a wall construction and have suitable durability (see section 11), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 15).

11 Durability

11.1 The products may be damaged by high winds, careless handling or vandalism, and should not be left uncovered for longer than is absolutely necessary. Any damaged areas must be repaired or replaced before completion, in accordance with section 15.

11.2 The products will be virtually unaffected by the normal conditions found in a timber-frame wall and will have a life comparable with other similar elements of construction, eg vapour control layers.

12 Reuse and recyclability

The products comprise polypropylene, which can be recycled.

Installation

13 General

TLX UV10, UV15 and UV25 Breather Membranes must be installed in accordance with the Certificate holder's instructions and the recommendations given in *NHBC Standards* 2014, Section 6.2, where appropriate.

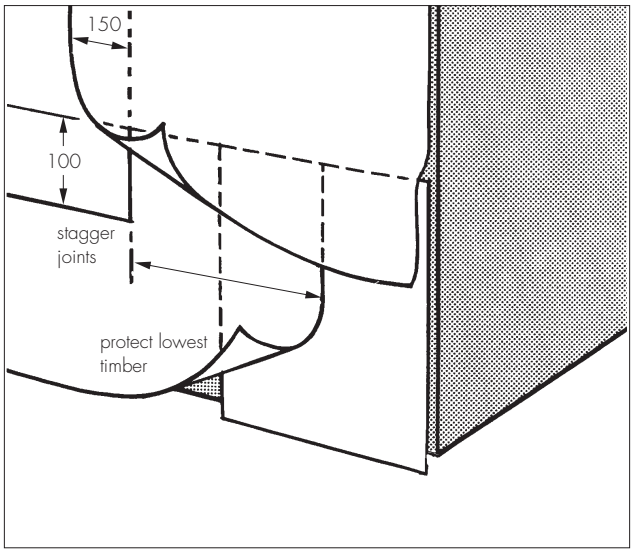
14 Procedure

Lapping and jointing

14.1 The membrane should be fixed in such a way as to shed water away from the sheathing, and below the lowest timber. Upper layers must be lapped over lower layers.

14.2 Horizontal laps should be at least 100 mm and vertical laps 150 mm. Vertical laps should be staggered wherever possible (see Figure 1).

Figure 1 Laps (dimensions in mm)



Fixing

14.3 The membrane must be secured at regular intervals with nails and staples to prevent damage by wind.

14.4 Nails should be of galvanized or sherardized mild steel, austenitic stainless steel, phosphor bronze or silicon bronze, and staples should be of austenitic stainless steel.

Marking stud positions

14.5 It is essential that the positions of studs are marked to enable wall tie fixing.

Lowest timbers

14.6 It is essential that the lowest timbers in the wall are protected by the breather membrane.

15 Repair

Damage to the products must be repaired prior to the installation of the external walls or cladding, by laying another sheet over the damaged area and sealing, ensuring water is shed away from the sheathing.

Technical Investigations

16 Tests

16.1 An assessment was made of data to BS EN 13859-1 : 2014 in relation to:

- dimensional stability
- tensile strength and elongation*
- resistance to tear*
- resistance to water penetration*
- resistance to artificial ageing*
- water vapour transmission*
- flexibility at low temperature*
- resistance to fire*.

16.2 Tests were carried out to determine:

- resistance to streaming water
- burst strength
- eosin test.

17 Investigations

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

17.2 Reaction to fire test data to BS EN ISO 11925-2 : 2010 were examined.

Bibliography

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

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

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

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

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- 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.

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