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Agrément Certificate
90/2548
Product Sheet 3

TYVEK CONSTRUCTION MEMBRANES

TYVEK REFLEX INSULATING BREATHER MEMBRANE

This Agrément Certificate Product Sheet[1] relates to TYVEK[2] Reflex Insulating Breather Membrane, a low-emissivity, insulating breather membrane for use in external walls in timber-frame, steel-frame and masonry constructions.

(1) Hereinafter referred to as 'Certificate'.
(2) TYVEK is a registered trademark of E.I. du Pont de Nemours & Co. or its affiliates.

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 product will contribute to protecting a wall against water penetration (see section 6).

Thermal insulation — the product can contribute to limiting heat loss through a wall (see section 7 and BBA Information Bulletin No. 5 *Reflective breather membranes in timber frame walls — Thermal performance claims)*.

Risk of condensation — the product has a low resistance to water vapour transmission and will reduce the risk of interstitial condensation (see section 8).

Strength — the product has adequate strength to resist the loads associated with the construction of the wall (see section 9).

Properties in relation to fire — the product has not been classified in accordance with EN 13501-1 : 2018 and its use is restricted in some cases by the national Building Regulations (see section 10).

Durability — the product will have a lifetime equal to that of the building element in which it is installed (see section 12).

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

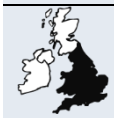
Date of Eighth issue: 2 March 2021

Originally certificated on 27 September 2004

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, TYVEK Reflex Insulating Breather Membrane, 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:	**B3(4)**	**External fire spread**
Comment:		The product can contribute to satisfying this Requirement. See section 10.1 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The product is restricted by this Requirement. See section 10 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The product will contribute to a wall satisfying this Requirement. See section 6.1 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The product can contribute to limiting the risk of interstitial condensation. See sections 8.4 and 8.8 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The product can contribute to satisfying this Requirement. See sections 7.1 and 7.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See section 12 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. See sections 7.1 and 7.2 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 a construction satisfying this Regulation. See section 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	2.4	Cavities
Comment:		The product can contribute to satisfying this Standard with respect to clause 2.4.2[(1)(2)]. See section 10.1 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The product 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 product can contribute to limiting the risk of interstitial condensation, with reference to clauses 3.15.1[(1)(2)] and 3.15.5[(1)(2)] of this Standard. See sections 8.4 and 8.9 of this Certificate.

Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying the requirements of these Standards, with reference to clauses 6.1.1[(1)], 6.1.2[(2)], 6.2.4[(1)], 6.2.6[(2)], 6.2.10[(1)], 6.2.11[(1)(2)], 6.2.12[(2)] and 6.2.13[(2)]. See sections 7.1 and 7.2 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product 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. In addition, the product can contribute to a construction meeting 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)(2)] [Aspects 1[(1)(2)] and 2[(1)(2)]], 7.1.7[(1)] [Aspect 1[(1)])], 7.1.9[(2)] [Aspects 1[(2)] and 2[(2)]] and 7.1.10[(2)] [Aspects 1[(2)]]. See sections 7.1 and 7.2 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the product 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 (as amended)

Regulation:	**23(a)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The product is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**28(a)**	**Resistance to moisture and weather**
Comment:		The product will contribute to a wall satisfying this Regulation. See section 6.1 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 8.4 of this Certificate.
Regulation:	**35(4)**	**Internal fire spread - structure**
Comment:		The product can contribute to satisfying this Regulation. See section 10.1 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 sections 7.1 and 7.2 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, TYVEK Reflex Insulating Breather Membrane, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*,

Chapters 6.1 *External masonry walls,* 6.2 *External timber framed walls,* 6.9 *Curtain walling and cladding* and 6.10 *Light steel framed walls and floors*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard EN 13859-2 : 2014.

Technical Specification

1 Description

1.1 TYVEK Reflex Insulating Breather Membrane is a low-emissivity, insulating breather membrane and is a spunbonded high-density polyethylene (HDPE) membrane, metallised and lacquered on one face.

1.2 The product has the nominal characteristics of:

Thickness (mm)	0.22
Mass per unit area ($g \cdot m^{-2}$)	83
Roll length (m)	100
Roll width (m)	0.48 1.5, 2.4 or 2.7
Hydrostatic head (m of H_2O)	>2.0
Equivalent air layer thickness — s_d (m)	0.03
Water vapour resistance ($MN \cdot s \cdot g^{-1}$)	0.15
Watertightness	
unaged	Class W1
aged(1)	Class W1
Tensile strength (N per 50 mm)	
longitudinal	250
transverse	210
Elongation at maximum tensile force (%)	
longitudinal	10
transverse	13
Nail tear (N)	
longitudinal	90
transverse	85
Colour	white inner/grey outer with red logo.

(1) Aged in accordance with EN 13859-2 : 2014, Annex C.

1.3 Air and vapour control layers (AVCLs) or air leakage barriers can be used in conjunction with the product. See Product Sheets 4, 5 and 10 of this Certificate.

1.4 Ancillary items, within the scope of the Certificate, for use with the product include:

- TYVEK Metallised Tape (single-sided) — for sealing laps and making good around windows, doors and service penetrations
- TYVEK Acrylic Tape (double-sided) — for sealing laps and bonding the membrane to other materials, such as timber, masonry and steelwork
- TYVEK Butyl Tape (double-sided) — for sealing penetrations, eg behind metal brackets and timber battens (under compression.

2 Manufacture

2.1 The base product is manufactured by spinning strands of HDPE and bonding them together with heat and pressure to form a flexible sheet. The product is metallised with a thin layer of aluminium on one side, and the aluminium is lacquered with a protective layer.

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 systems of DuPont de Nemours (Luxembourg) S.à r.l. have been assessed and registered as meeting the requirements of EN ISO 9001 : 2015 by DQS GmbH (Certificate 000093 QM15).

3 Delivery and site handling

3.1 The product is delivered to site in rolls with paper wrappings bearing the marketing company's name, the grade identification, the technical specifications, installation instructions and the BBA logo incorporating the number of this Certificate.

3.2 The rolls should be stored flat on their sides, on a smooth, clean, dry 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 TYVEK Reflex Insulating Breather Membrane.

Design Considerations

4 Use

4.1 TYVEK Reflex Insulating Breather Membrane is satisfactory for use as a low-emissivity breather membrane in walls of timber-frame, either factory or site applied, steel-frame and masonry constructions behind lightweight cladding panels and masonry facades.

4.2 In the absence of other guidance, suitable wall constructions are defined as those designed and built in accordance with *NHBC Standards* 2021, Chapters 6.1, 6.2, 6.9 and 6.10 respectively.

4.3 The product satisfies the NHBC requirements given in *NHBC Standards* 2021, Chapter 6.2, as a high-performance breather membrane for use in very severe conditions(1).

(1) Very severe conditions are defined in *NHBC Standards* 2021, Chapter 6.1, section 6.1.6, Figure 1 Exposure zones map showing categories of exposure to wind-driven rain.

4.4 The product is effective in improving the thermal transmittance (U value) of walls (see section 7).

4.5 The product is breathable and will limit the risk of condensation within the wall structure.

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

5 Practicability of installation

The product can be readily installed by operatives experienced with this type of product.

6 Weathertightness

6.1 The product is Class W1 in accordance with BEN 13859-2 : 2014 and 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 the installation of brickwork should be kept to a minimum. The Certificate Holder's advice is that the product may be used as a temporary weatherproof covering for a period not exceeding four months. The membrane must be adequately secured during this time and suitable precautions taken during periods of high wind, advice should be sort from the Certificate Holder on this matter.

7 Thermal insulation

7.1 Calculations for thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006:

0.10 foil surface emissivity
0.57 $m^2 \cdot K \cdot W^{-1}$ resistance of a vented cavity >20 mm thick
0.33 $m^2 \cdot K \cdot W^{-1}$ external boundary layer resistance (R_{se}) where the cavity is well ventilated.

7.2 Calculations for an example wall(1) in Table 1 show that the product improves the U value when compared to the same wall with a standard (non-reflective) breather membrane.

Table 1 Example U values ($W \cdot m^{-2} \cdot K^{-1}$) for a timber-frame wall with brick outer leaf(1)

Breather membrane type	Insulation conductivity between studs ($W \cdot m^{-2} \cdot K^{-1}$)		
	0.032	0.033	0.037
Non-reflective	0.32	0.33	0.37
TYVEK Reflex	0.28	0.29	0.30

(1) Construction of wall: 12.5 mm plasterboard approximately 0.25 $W \cdot m^{-1} \cdot K^{-1}$, 110 mm studs (15% bridging), 12 mm OSB sheathing, 50 mm vented cavity, 102 mm brickwork.

7.3 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.

8 Risk of condensation

8.1 Walls designed in accordance with BS 5250 : 2011, Annex G, and incorporating the product, will adequately minimise the risk of condensation.

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

8.3 Convective moisture transfer into the wall construction can be reduced by installing a vapour control layer/air barrier such as the DuPont AirGuard AVCLs or air leakage barrier behind the internal lining (see Product Sheets 4, 5 and 10 of this Certificate).

Interstitial condensation

8.4 The product, although metallised, has a microporous structure and therefore vapour open. The risk of interstitial condensation should be calculated in accordance with BS 5250 : 2011, Annex D, using a vapour resistance of 0.15 $MN \cdot s \cdot g^{-1}$ for the product.

8.5 The risk of condensation occurring within the wall of a 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 AVCL.

8.6 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 Report BR 262 : 2002.

8.7 The product has additional insulating properties (see section 7.1) and will maintain the frame sheathing at a higher temperature than for the same construction incorporating a conventional breather membrane. This will in turn assist in limiting the risk of interstitial condensation arising from breaches/imperfections in the AVCL in the wall's internal lining. However, it must not be relied upon as an alternative to conventional good practice for maintaining integrity of the AVCL.

Surface condensation

8.8 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 and openings are designed in accordance with the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002 or BRE Information Paper IP 1/06.

8.9 Walls incorporating the product will adequately limit the risk of surface condensation when designed in accordance with BS 5250 : 2011 and when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Additional guidance may be obtained from BRE Report BR 262 : 2002.

9 Strength

9.1 The product will resist the normal loads associated with construction and installation into a building.

9.2 The product is not adversely affected by water and will retain its properties when wet.

10 Properties in relation to fire

10.1 No performance has been determined for the product to EN 13501-1 : 2018. Where the product forms the face of a cavity the spacing of cavity barriers are restricted by the national Building Regulations.

10.2 In England and Wales, the product should not be used on buildings that have a storey at least 18 m above ground level and contain: one or more dwellings, an institution, a room for residential purposes (excluding any room in a hostel, hotel or boarding house), student accommodation, care homes, sheltered housing, hospitals or dormitories in boarding schools.

11 Maintenance

As the product is confined within a wall construction and has suitable durability (see section 12), maintenance is not required. However, any damaged areas should be repaired or replaced before completion in accordance with section 15.

12 Durability

The product will have a lifetime equal to that of the building element in which it is installed.

Installation

13 General

TYVEK Reflex Insulating Breather Membrane must be installed in accordance with the Certificate holder's instructions and the recommendations given in *NHBC Standards* 2021, Chapters 6.1 6.2, 6.9 and 6.10 where appropriate.

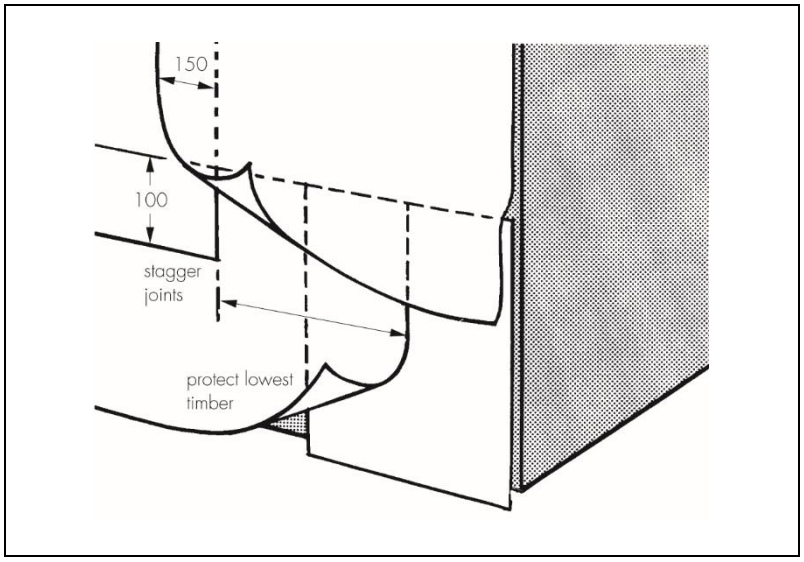
14 Procedure

Lapping and jointing

14.1 The product should be fixed in such a way as to shed water away from the sheathing, and below the lowest timber. Upper layers should 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)



14.3 To assist in achieving the design air permeability, the lap joints and penetrations through the membrane can be sealed with TYVEK Metallised Tape (single-sided), TYVEK Butyl Tape (double-sided) or TYVEK Acrylic Tape (double-sided) (see section 1.4).

Fixing

14.4 The membrane must be secured at regular intervals with nails and staples to prevent damage by wind (see Figures 2 to 4). The fixing intervals are horizontally at 600 mm centres or at stud positions and vertically at 300 mm centres or at 150 mm centres at openings, at vertical membrane joints and at the end of panels.

Figure 2 Factory method of installation on timber-frame panel

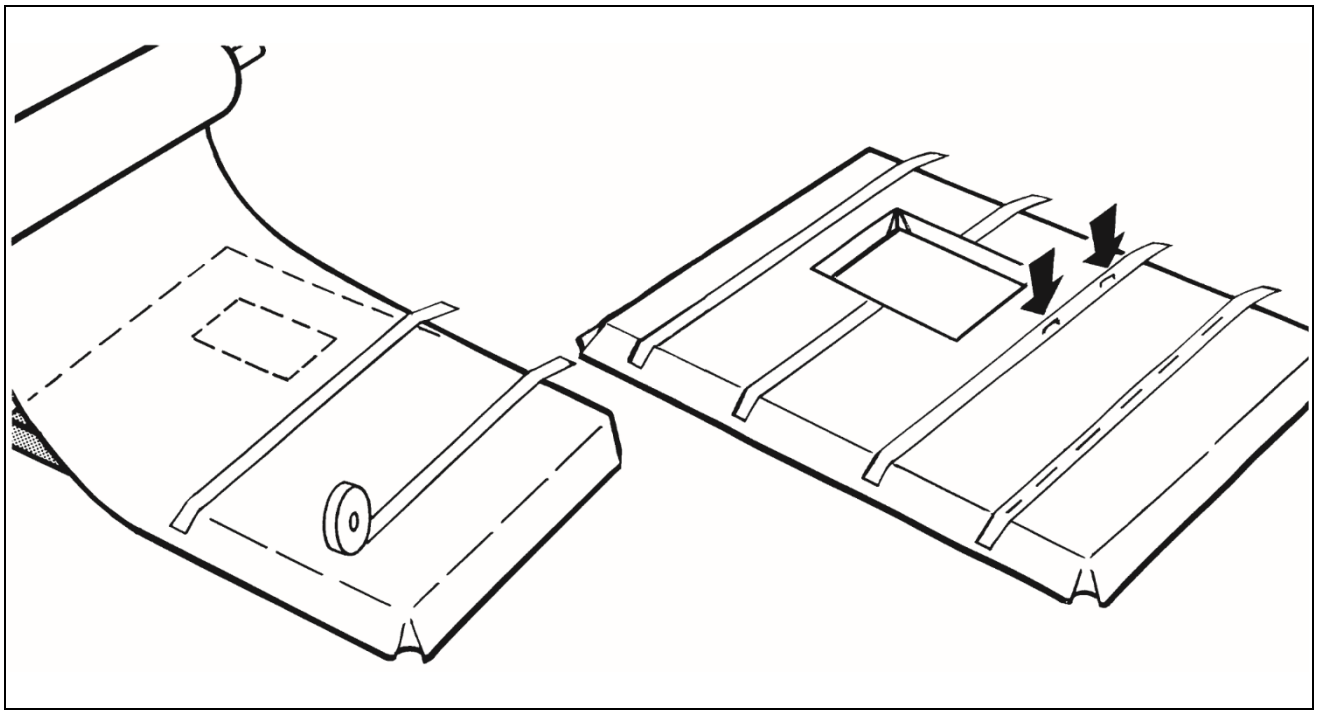


Figure 3 Site installation — external corner

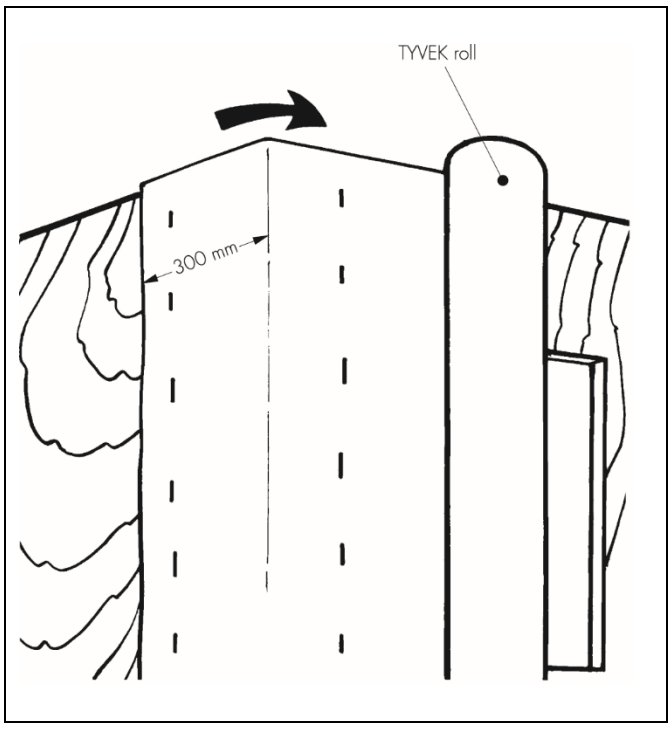
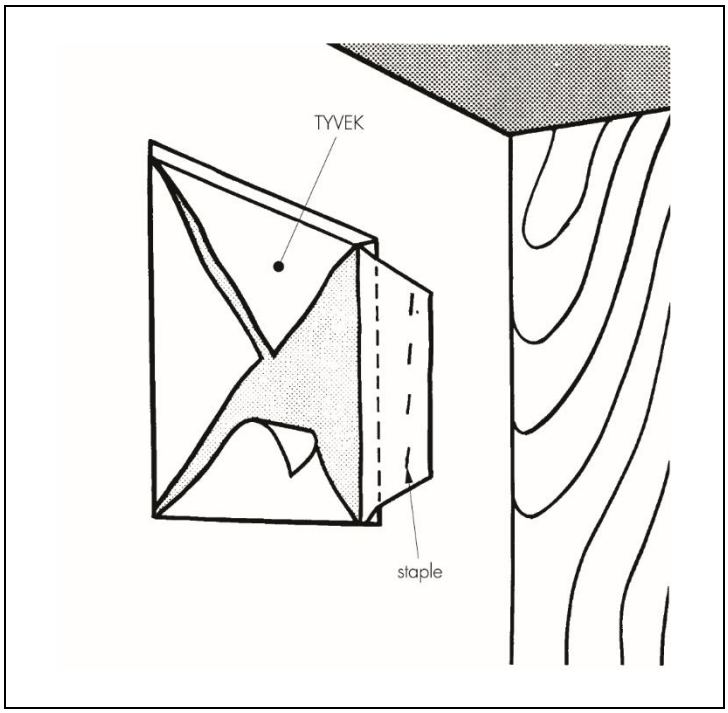


Figure 4 Site installation — opening (internal view of window)



14.5 Nails must be corrosion resistant and staples should be stainless steel.

Marking stud positions

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

Lowest timbers

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

15 Repair

Damage to the product can be repaired prior to the installation of the external walls or cladding by laying another sheet over the damaged area and sealing it using TYVEK Metallised Tape (single-sided), ensuring that water is shed away from the sheathing.

Technical Investigations

16 Tests

16.1 An assessment was made of data to EN 13859-2 : 2014 in relation to:

- tensile strength and elongation
- resistance to tear
- resistance to water penetration
- water vapour transmission.

16.2 The following tests were carried out:

- Mullen burst strength
- water immersion
- emissivity (control)
- emissivity (combined UV and heat ageing)
- emissivity (combined UV, heat and humidity ageing)

in order to assess:

- robustness during installation
- durability
- thermal performance.

16.3 Data from tests on other grades of TYVEK membrane were used to assess the properties of:

- wet strength
- low temperature flexibility
- heat ageing
- UV ageing.

17 Investigations

17.1 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.

17.2 An assessment was carried out of U values and risk of interstitial condensation of completed wall constructions.

Bibliography

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

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

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation methods*

EN 13501-1 : 2018 *Fire classification of construction products and building elements — Classification using data from reaction to fire tests*

EN 13859-2 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for walls*

EN ISO 9001 : 2015 *Quality management systems — Requirements*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.