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Agrément Certificate
06/4354
Product Sheet 1

BAUDER SINGLE PLY PVC ROOF WATERPROOFING MEMBRANES

THERMOFOL U WATERPROOFING MEMBRANES

This Agrément Certificate Product Sheet(1) relates to Thermofol U Waterproofing Membranes, a range of flexible polyvinylchloride (PVC) polyester-reinforced membranes, for use as single-ply roof waterproofing membranes on flat or pitched roofs, including green roofs and roof gardens, with limited access.

(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 membranes will resist the passage of moisture into the building (see section 6).

Properties in relation to fire — the membranes can enable a roof to be unrestricted under the national Building Regulations (see section 7).

Resistance to wind uplift — the membranes will resist the effects of any likely wind suction acting on the roof (see section 8).

Resistance to mechanical damage — the membranes will accept the limited foot traffic and loads associated with installation and maintenance (see section 9).

Resistance to root penetration — membranes 1.5 mm and thicker will adequately resists plant root penetration (see section 11).

Durability — the membranes will have a service life in excess of 35 years (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 Fifth issue: 20 June 2019

Originally certificated on 11 July 2006

John Albon
Chief Scientific Officer

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.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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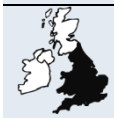
Regulations

In the opinion of the BBA, Thermofol U Waterproofing 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: **B4(2)** **External fire spread**
Comment: The membranes, when used with a suitable surface protection, can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.4 of this Certificate.

Requirement: **C2(b)** **Resistance to moisture**
Comment: The membranes, including joints, will enable a roof to satisfy this Requirement. See section 6.1 of this Certificate.

Regulation: **7** **Materials and workmanship (applicable to Wales only)**
Regulation: **7(1)** **Materials and workmanship (applicable to England only)**
Comment: The membranes are acceptable. See section 12.1 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 membranes satisfies the requirements of this Regulation. See sections 11.1 and 12.1 and the *Installation* part of this Certificate.

Regulation: **9** **Building standards applicable to construction**
Standard: 2.8 Spread from neighbouring buildings
Comment: The membranes, when used with a suitable surface protection, can be regarded as having low vulnerability under clause 2.8.1[(1)(2)] of this Standard. See sections 7.1 to 7.4 of this Certificate.

Standard: 3.10 Precipitation
Comment: The membranes, including joints, will enable a roof to satisfy the requirements of this Standard with references to clauses 3.10.1[(1)(2)] and 3.10.7[(1)(2)]. See section 6.1 of this Certificate.

Standard: 7.1(a) Statement of sustainability
Comment: The membranes 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: Comments in relation to the membranes 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)(iii)(b)(i)** **Fitness of materials and workmanship**
Comment: The membranes are acceptable. See section 12.1 and the *Installation* part of this Certificate.

Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		The membranes, including joints, can enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		The membranes, when used with a suitable surface protection, can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.4 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 sections: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, Thermofol U Waterproofing Membranes, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard EN 13956 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Thermofol U Waterproofing Membranes (single-ply membranes) are a range of flexible polyester-reinforced plasticised PVC membranes incorporating UV and flame retardant stabilisers. The 1.5 mm membrane is available in a fleece-backed version.

1.2 The membranes are light grey in colour(1) and manufactured to the nominal characteristics given in Table 1.

(1) Also available in blue-grey, anthracite and other colours on request.

Table 1 Nominal characteristics

Parameters (units)	Membranes				
	U12	U15	U18	U20	U15V
Thickness (mm)	1.2	1.5	1.8	2.0	1.5(1)
Roll width (m)(2)	1.5	1.5	1.5	1.5	1.5
Roll length (m)	20	20	20	20	20
Roll weight (kg)	46	57	67	75	63
Mass per unit area ($kg \cdot m^{-2}$)	1.4	1.8	2.1	2.4	2.0
Tensile force* (N per 50 mm)	1000	≥1000	≥1000	≥1000	≥1000
Elongation at break* (%)	19	≥19	≥19	≥20	≥20
Tear strength* (N)	>200	>200	>200	>250	>300
Dynamic indentation* (mm)					
hard substrate	>300	>400	>500	>600	>700
soft substrate	>600	>700	>800	>900	>1000
Static indentation* (kg)					
hard substrate	>20	>20	>20	>20	>20
soft substrate	>20	>20	>20	>20	>20
Watertightness* (kPa)	≥10	≥10	≥10	≥10	≥10
Dimensional stability (%)	<0.3	<0.3	<0.3	<0.3	<0.3
Low temperature foldability* (°C)	<–30	<–30	<–30	<–30	<–30

(1) Thickness excludes fleece backing.
(2) Other widths available on request.

1.3 Other items or components which may be used with the products, but which are outside the scope of this Certificate, are:

- Bauder Membrane Adhesive — for bonding Thermofol U15V fleece-backed membrane to substrates
- Thermofol Metal — PVC-coated steel sheets, for use in producing profiles for perimeter flashings
- Thermofol D15 — 1.5 mm unreinforced PVC membrane, for use in non-regular detailing
- Bauder VB20 and Vapour Barrier — polyethylene film vapour control layers (vcl)
- BauderTEC KSD Foil — self-adhesive bituminous vcl
- BauderTEC KSD Mica — self-adhesive bituminous vcl with a mica finished upper surface
- BauderTEC DBR — self-adhesive bituminous vcl with an aluminium foil facing
- BauderROCK — mineral wool insulation boards
- Bauder FA, FA-TE — tapered PIR rigid insulation boards
- Bauder Profiled EPS Insulation
- Bauder Tapes 03 and 20 — self-adhesive tapes for the jointing and sealing of polyethylene vapour control layer
- Thermofol preformed corners — for the creation of corner details
- Thermofol Contact Adhesive — for bonding PVC membranes
- Thermofol — details direct to metal, concrete or timber
- Thermofol Walkway Membrane — for the protection of the roofing membrane and to provide an embossed surface in walkway areas
- Bauder PF 300 Protection Fleece — for providing protection to the membrane surface in ballasted and paved applications
- a range of outlet and pipe flashing accessories
- corrosion-resistant mechanical fixings for use in mechanically fixed specifications.

2 Manufacture

2.1 The membranes are manufactured from a plasticised PVC compound by calendering and lamination, with a synthetic reinforcement, and, in the case of the backed product, a polyester fleece.

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 Paul Bauder GmbH has been assessed and registered as meeting the requirements of EN ISO 9001 : 2015 by ESC GmbH (Certificate DE-002735 QM).

3 Delivery and site handling

3.1 The membranes are delivered to site in wrapped rolls packaged on pallets. The labels bear the marketing company's name, product identification, batch number and the BBA logo incorporating the number of this Certificate.

3.2 Rolls should be stored on their side, on a clean, level surface, and under cover.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the product under the *CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures.* Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Thermofol U Waterproofing Membrane.

Design Considerations

4 General

4.1 Thermofol U Waterproofing Membranes are satisfactory for use as a waterproofing layer as follows:

- mechanically fastened systems on flat and pitched roofs with limited access
- fully adhered on flat and pitched roofs with limited access
- loose-laid and ballasted waterproofing for flat roofs with limited access
- vertical detailing
- green roofs and roof gardens.

4.2 Decks to which the products are to be applied must comply with the relevant requirements of BS 6229 : 2018, BS 8217 : 2005 and, where appropriate, *NHBC Standards* 2019, Chapter 7.1.

4.3 The following terms are defined for the purpose of this Certificate as:

- roof garden (intensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, generally accessible to pedestrians
- green roof (extensive) — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wild flower species.

4.4 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters etc. Where traffic in excess of this is envisaged, such as pedestrian access roofs, additional protection to the membranes must be provided (see section 9).

4.5 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80(1). For design purposes, twice the minimum finished fall should be assumed unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc.

(1) *NHBC Standards* 2019 require a minimum fall of 1:60 for green roofs and roof gardens.

4.6 Pitched roofs are defined for the purpose of this Certificate as those having a fall in excess of 1:6.

4.7 Structural decks to which the products are to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.8 Imposed loads, dead loading and wind load specifications should be calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005, and their UK National Annexes.

4.9 Recommendations for the design of green roof specifications are available within the latest edition of *The GRO Green Roof Code — Green Roof Code of Best Practice for the UK, issued by The Green Roof Organisation (GRO).*

4.10 The drainage systems for green roofs or roof gardens must be correctly designed, and the following points should be addressed:

- provision made for access for maintenance purposes
- dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.11 Insulation materials to be used in conjunction with the membrane must be in accordance with the Certificate holder's instructions and be either:

- as described in the relevant clauses of BS 8217 : 2005, or
- the subject of a current BBA Certificate and be used in accordance with and within the limitations of, that Certificate.

4.12 Contact with bituminous, coal tar and oil-based products must be avoided as the membranes are not compatible with lower grades of bitumen. If contact with such products is likely, a separating layer must be interposed before installing the waterproofing sheet. Where doubt arises, the advice of Certificate holder must be sought.

5 Practicability of installation

The products should only be installed by roofers who have been trained and approved by the Certificate holder.

6 Weathertightness

6.1 The membranes, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the building, and enable a roof to comply with the requirements of the national Building Regulations.

6.2 The membranes are impervious to water and will achieve a weathertight roof capable of accepting minor structural movement without damage.

7 Properties in relation to fire

7.1 When tested to DD CEN/TS 1187 : 2012, Test 4, and classified to BS EN 13501-5 : 2016, the following systems achieved Class $B_{ROOF}(t4)$:

- a system comprising an 18 mm orientated strand board substrate and a 150 mm layer of EPS insulation board, covered by Thermofol U 1.5 mm fleece-backed membrane fully bonded with polyurethane adhesive[(1)(2)]
- a system comprising an 18 mm OSB substrate, a 2.5 mm thick self-adhesive elastomeric bitumen vapour control layer and PIR insulation (60 - 240 mm) adhered with a polyurethane adhesive covered by Bauder Thermofol U 1.5 mm fleece-backed membrane fully adhered[(3)(4)(5)(6)]
- a system comprising an 18 mm OSB substrate, a 1.5 mm thick aluminium lined self-adhesive vapour control layer and 120 mm PIR insulation adhered with a polyurethane adhesive covered by Bauder Thermofol U 1.5 mm fleece-backed membrane fully adhered tested as a sloping roof at 45°[(7)(8)]

- a system comprising an 18 mm OSB substrate, a 2.5 mm thick self-adhesive elastomeric bitumen vapour control layer and 255 mm thick mineral wool insulation adhered with a polyurethane adhesive covered by Bauder Thermofol U 1.5 mm fleece-backed membrane fully adhered[9][10]
- a system comprising an 18 mm OSB substrate, a 1.5 mm self-adhesive elastomeric bitumen vapour control layer, 120 mm PIR insulation and 30 mineral wool insulation adhered with a polyurethane adhesive covered by Bauder Thermofol U 1.5 mm fleece-backed membrane fully adhered[11][12]
- a system comprising an 18 mm OBS substrate, 0.16 mm polyethylene vcl and mechanically fastened PIR insulation (60-260 mm) covered by Bauder Thermofol U 1.5 mm membrane mechanically fastened[13][14][15][16].

(1) Building Research Establishment, Test Report 279509, 24/05/2012. Report available from the Certificate holder on request.
(2) Building Research Establishment, Classification Report 279510, 24/05/2012. Report available from the Certificate holder on request.
(3) Warrington Fire, Test Report 19122A, 12/03/2019. Report available from the Certificate holder on request.
(4) Warrington Fire, Test Report 19122B, 12/03/2019. Report available from the Certificate holder on request.
(5) Warrington Fire, Classification Report 19122C, 12/03/2019. Report available from the Certificate holder on request.
(6) Warrington Fire, Classification Report 19122D, 12/03/2019. Report available from the Certificate holder on request.
(7) Building Research Establishment, Test Report Q100337-1010, 15/05/2019. Report available from the Certificate holder on request
(8) Building Research Establishment, Classification Report Q100337-1009, 15/05/2019. Report available from the Certificate holder on request
(9) Warrington Fire, Test Report 19122F, 12/03/2019. Report available from the Certificate holder on request.
(10) Warrington Fire, Test Report 19122G,12/03/2019. Report available from the Certificate holder on request.
(11) Building Research Establishment, Test Report Q100337-1004, 24/04/2019. Report available from the Certificate holder on request.
(12) Building Research Establishment, Classification Report Q100337-1005, 24/04/2019. Report available from the Certificate holder on request.
(13) Building Research Establishment, Test Report Q100337-1001, 24/04/2019. Report available from the Certificate holder on request.
(14) Building Research Establishment, Test Report Q100337-1007, 24/04/2019. Report available from the Certificate holder on request.
(15) Building Research Establishment, Classification Report Q100337-1002, 24/04/2019. Report available from the Certificate holder on request.
(16) Building Research Establishment, Classification Report Q100337-1008, 24/04/2019. Report available from the Certificate holder on request.

7.2 in the opinion of the BBA, a roof incorporating the membranes will be unrestricted under the national Building Regulations in the following circumstances:

- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- when protected by an inorganic covering (eg gravel or paving slabs) listed in the Annex of Commission Decision 2000/553/EC.

7.3 In the opinion of the BBA, irrigated green roofs and roof gardens will also be unrestricted.

7.4 The designation of other specifications should be confirmed by:

England and Wales — test or assessment in accordance with Approved Document B, Appendix A, clause 1
Scotland — test to conform to Mandatory Standard 2.8, clause 2.8.1[1][2]

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

Northern Ireland — test or assessment by a UKAS-accredited laboratory, or an independent consultant with appropriate experience.

7.5 If allowed to dry, the plants used may allow the spread of flame across the roof. This must be taken into consideration when selecting suitable plants. Appropriate planting, irrigation and/or protection must be applied to ensure the overall fire-rating of the roof is not compromised. Further guidance is available in the Department for Communities and Local Government publications, *Fire Performance of Green Roof and Walls – August 2013.*

8 Resistance to wind uplift

8.1 The resistance to wind uplift of a mechanically fastened waterproofing layer is provided by the fasteners passing through the membrane into the substrate. The number and position of fixings will depend on a number of factors including:

- wind uplift forces to be restrained
- pull-out strength of the fasteners
- tensile properties of the membrane
- appropriate calculation of safety factors.

8.2 The wind uplift forces are calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. On this basis, the number of fixings required should be established using a maximum permissible load of 0.5 kN per fixing, fixed using Etanco LR Anti-corrosion Aluminium -Zinc plate (82 mm x 40 xmm x 1 mm) and Etanco EHB DF 2C fixings (4.8 mm x 120 mm).

8.3 If other fixings are used in conjunction with the system, the load per fixing must be assessed and determined by a competent and suitably experienced individual.

8.4 Where the membranes are bonded to insulation boards, the resistance to wind uplift will be dependent on the cohesive strength of the insulation and the method by which they are secured to the roof deck. This must be taken into account when selecting a suitable insulation material.

8.5 The ballast requirements for loose-laid roof systems must be calculated by a suitably experienced and competent individual in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. When using gravel ballast, the system must always be loaded with a minimum depth of 50 mm of aggregate. In areas of high wind exposure, the Certificate holder's advice should be sought. Alternatively, concrete slabs on suitable supports can be used.

8.6 The ballast on protected roofs must not be of a type that will be removed or become delocalised owing to wind scour experienced on the roof.

8.7 The growing medium used in intensive plantings must not be of the type that will be removed, or become delocalised, owing to wind scour experienced on site.

8.8 It should be recognised that the type of plants used in roof gardens could significantly affect the expected wind loads experienced in service.

9 Resistance to mechanical damage

9.1 The membranes can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads.

9.2 Where regular traffic is envisaged, such as for maintenance of lift equipment, a walkway should be provided using concrete slabs supported on bearing pads or an anti-slip walkway with or without a protection sheet. The advice of the Certificate holder should be sought on the most appropriate method to be used with the amount of traffic involved.

10 Resistance to root penetration

Membranes that are at least 1.5 mm in thickness are resistance to root penetration. These membranes can be used in a roof waterproofing system for roof gardens and green roofs.

11 Maintenance

11.1 The roof systems must be the subject of six monthly inspections and maintenance in accordance with BS 6229 : 2018, Chapter 7.

11.2 Guidance is available within the latest edition of *The GRO Green Roof Code – Green Roof Code of Best Practice for the UK.*

11.3 Where damage has occurred it should be repaired in accordance with section 17 and the Certificate holder's instructions.

12 Durability

12.1 Under normal service conditions membranes will have a service life in excess of 35 years.

12.2 In environments where the membranes are in contact with organic solvents, the life expectancy of the membranes may be reduced. In cases of doubt the advice of the Certificate holder should be sought.

13 Reuse and recyclability

The membranes comprise PVC and polyester, which can be recycled.

Installation

14 General

14.1 Installation of Thermofol U must be carried out in accordance with the Certificate holder's instructions and the relevant clauses of BS 8000-0 : 2014, BS 8000-4 : 1989 and BS 8217 : 2005.

14.2 Substrates to which the membranes are applied must be sound, dry, clean and free from sharp projections such as nail heads and concrete nibs. When used over a rough substrate, a suitable protection layer must be laid first.

14.3 Installation must not be carried out during inclement weather (eg rain, fog or snow). When the temperature is below 5°C, suitable precautions against surface condensation must be taken.

14.4 Where contact with coal tar or oil-based products is likely, an isolating layer must be interposed between the product and the substrate. Where contact with bituminous materials is likely, consideration should be given to the use of an isolating layer, and the advice of the manufacturer should be sought.

14.5 The membranes must not come into contact with unfaced polystyrene insulation boards. A suitable separation layer must be used if this type of board is used.

15 Procedure

Loose-laid and ballasted applications

15.1 The product is unrolled onto the substrate without folds or ripples, with a 100 mm overlap, and is mechanically fixed and fully adhered at details and perimeters. Flashing and lap jointing must be carried out as described in section 16.

15.2 A suitable protection layer must be laid over the products prior to the application of the ballast.

15.3 When used in an inverted roof specification a suitable filter layer must be installed on top of the insulation.

15.4 Loose-laid applications should be covered by at least a 50 mm depth of well-rounded gravel. In areas of high-wind exposure, paving slabs set on a suitable support may be considered (eg pads). A minimum upstand height of 150 mm above the top of the ballast or paving should be allowed for detailing.

15.5 When used in a loose-laid application, normal account should be taken in the design of the deck with regard to the extra dead loading owing to the weight of the aggregate and/or paving.

Mechanically fastened applications

15.6 The membranes are secured by corrosion-resistant plates and mechanical fixings or thermally broken tubes and fixings manufactured by an SPRA Associate Fastener Member.

15.7 The membranes are unrolled onto the substrate, without folds or ripples, with a minimum 100 mm side lap and 150 mm head lap. Flashing and lap jointing must be carried out as described in section 16.

15.8 The membranes are fixed to the deck (through insulation boards, where appropriate) in the joint overlaps, prior to welding of the joint, in accordance with the Certificate holder's instructions.

15.9 The fastener tubes or washers should be positioned a minimum of 10 mm from the edge of the lower membrane. The fixings should be installed at centres calculated from the average wind force in that location.

15.10 A minimum distance of 150 mm between fasteners should be observed at all times. This may require the use of narrower membranes to obtain the correct number of fasteners per square metre.

Fully adhered application using Thermofol U15V membrane only

15.11 When using Bauder Membrane Adhesive the advice of the Certificate holder should be sought on the suitability of substrates.

15.12 The membrane is unrolled onto the substrate without ripples and rolled back to expose the underside.

15.13 A coat of Spray Contact adhesive is applied to the substrate and to the back of the fleece-backed membrane in a full and continuous coat. Alternative adhesive for the fleece-backed membrane is also available.

15.14 The membrane is rolled back onto the adhesive approximately 5 to 10 minutes after application. After initial contact, the surface of the membrane is rolled and pressed to ensure full contact.

16 Jointing procedure

16.1 Joints must be made using hot-air or welding techniques in accordance with the manufacturer's instructions.

16.2 If the lap area is contaminated, both sheets must be cleaned using a cleaner recommended by the Certificate holder.

Hot-air welding

16.3 Hot-air welding is conducted by using either an automatic or a hand-operated machine, with a temperature set in accordance with the Certificate holder's instructions.

16.4 The lap joint must be a minimum width of 30 mm for an automatic machine, and 40 mm for a hand-held machine.

16.5 The seams must be tested with a metal probe at least 15 minutes after welding, to identify poorly welded areas. Any such areas should be made good.

Flashing procedure

16.6 Flashings must be formed in accordance with the Certificate holder's instructions.

17 Repair

In the event of damage, repairs can be carried out by cleaning the area around the damage and applying a patch of the product, at least 50 mm beyond the defect, in the manner described in section 16.

Technical Investigations

18 Tests

18.1 Test results were evaluated in relation to Thermofol U relating to:

- tensile strength
- elongation at break
- nail test
- dimensional stability

- low temperature foldability
- interlaminar adhesion
- shear strength
- peel strength
- effects of heat ageing
- wind uplift
- static indentation
- dynamic impact.

18.2 Testing was also carried out on the Thermofol U fleece-backed membrane to determine peel strength.

18.3 Samples were obtained from a site of an earlier Bauder PVC grade membrane and Thermofol U membrane from the Certificate holder for the following testing:

- dynamic impact
- low temperature foldability.

18.4 Testing was also carried out on the membrane to determine:

- thickness
- width
- mass per unit area
- straightness
- flatness
- ash content
- plasticiser content.

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 Existing data on fire performance were evaluated.

Bibliography

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*
BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS EN 1991-1-1 : 2002 *Eurocode 1 — Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*
NA to BS EN 1991-1-1 : 2002 UK National Annex to *Eurocode 1 — Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*
BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 — Actions on structures — General actions — Snow loads*
NA + A2 : 18 to BS EN 1991-1-3 : 2003 BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 — Actions on structures — General actions — Snow loads*
BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 + A1 : 2010 UK National Annex *to Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 13501-5 : 2016 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roof tests*

DD CEN/TS 1187 : 2012 *Test methods for external fire exposure to roofs*

EN 13956 : 2012 *Flexible sheet for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

EN ISO 9001 : 2015 *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.