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Agrément Certificate
06/4354
Product Sheet 1

BAUDER SINGLE PLY PVC ROOF WATERPROOFING MEMBRANES

BAUDER THERMOFOL U ROOF WATERPROOFING MEMBRANES

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Bauder Thermofol U Roof Waterproofing Membranes, for use as a mechanically fastened waterproofing layer on flat or pitched roofs and as a loose-laid and ballasted waterproofing layer on flat roofs.

AGRÉMENT 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 5).

Properties in relation to fire — tests indicate that the membranes will enable a roof to be unrestricted under the Building Regulations (see section 6).

Resistance to wind uplift — the system will resist the effects of any likely wind suction acting on the roof (see section 7).

Resistance to foot traffic — the membranes will accept the limited foot traffic and loads associated with installation and maintenance (see section 8).

Durability — under normal service conditions the membranes will provide a durable roof waterproofing with a service life in excess of 30 years (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the products described herein. The 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 Second issue: 17 January 2011

Originally certificated on 11 July 2006

A handwritten signature in black ink, appearing to read 'Stuart Sadler'.

Stuart Sadler
Head of Approvals — Materials

A handwritten signature in black ink, appearing to read 'Greg Cooper'.

Greg Cooper
Chief Executive

The BBA is a UKAS accredited certification body — Number 1113. 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, Bauder Thermofol U Roof Waterproofing Membranes, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2010 (England and Wales)

Requirement:	B4(2)	External fire spread
Comment:		Tests to BS 476-3 : 2004 indicate that on a suitable substructure, the use of the membranes will enable a roof to be unrestricted under this Requirement. See sections 6.1 to 6.3 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		Tests for water resistance indicate that the membranes, including joints, meet this Requirement. See section 5.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The membranes are acceptable. See sections 10.1 and 10.2 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the membrane satisfies the requirements of this Regulation. See sections 9, 10.1, 10.2 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		Tests to BS 476-3 : 2004 indicate that the membranes when applied to a suitable substructure, are regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 6.1 to 6.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Tests for water resistance indicate that the use of the membranes, including joints, will enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See section 5.1 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for the membranes under Regulation 9, 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) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The membranes are acceptable. See sections 10.1 and 10.2 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The membranes are acceptable. See section 9 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		Tests for water resistance indicate that the membranes, including joints, meet the requirements of this Regulation. See section 5.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		Tests to BS 476-3 : 2004 indicate that on suitable substructures the use of the membranes will be unrestricted under the requirements of this Regulation. See sections 6.1 to 6.3 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 obligation under these Regulations.

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

Non-regulatory Information

NHBC Standards 2011

NHBC accepts the use of Bauder Thermofol U Roof Waterproofing Membranes, when installed and used in accordance with this Certificate, as meeting Technical Requirement R3 in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

General

This Certificate is a Confirmation of a Dutch Agrément CTG-474/2 issued by INTRON Certificatie BV to Bauder Nederland BV.

The products are marketed in the United Kingdom by the Certificate holder, and manufactured by Paul Bauder GmbH & Co KG, Werk Berndorf, Dresdener Straße 80, D-02994 Berndorf, Germany. Tel: 00 49 35 7232450, Fax: 00 49 35 72324510.

Technical Specification

1 Description

1.1 Bauder Thermofol U Roof Waterproofing Membranes are polyester reinforced plasticised PVC sheets manufactured by calendaring.

1.2 The membranes are manufactured to the nominal characteristics given in Table 1.

Dimensions (units)	Membrane			
	U12	U15	U18	U20
Thickness (mm)	1.2	1.5	1.8	2.0
Roll width ⁽¹⁾ (m)	1.5	1.5	1.5	1.5
Roll length (m)	20	20	20	20
Roll weight (kg)	46	57	67	75
Colours ⁽²⁾	light grey	light grey	light grey	light grey

(1) Other widths available on request.

(2) Also available in blue-grey and other colours on request.

1.3 Ancillary items for use with the membranes include:

- Thermofol Metal — PVC-coated steel sheets, for use in producing profiles for perimeter flashings
- Thermofol D15 — 1.5 mm PVC membrane, for use in detailing
- Bauder K35 Vapour Barrier — foam-backed vapour control layer for isolating rough deck surfaces
- Bauder VB25 and VB40 Vapour Barrier — polyethylene film vapour control layers
- Bauder Thermotech PIR — rigid foam insulation boards
- Bauder Tapes 03 and 20 — self-adhesive tapes for the jointing and sealing of polyethylene vapour barriers
- Thermofol preformed corners — for the creation of corner details
- Thermofol Contact Adhesive — for bonding PVC membrane
- Thermofol — details direct to metal, concrete or timber
- Thermofol Walkway Membrane — for the protection of the roofing membrane and providing an anti-slip 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.

1.4 Quality control checks are carried out during production and on the finished product. Checks on the final product include dimensions.

2 Delivery and site handling

2.1 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 identification mark incorporating the number of this Certificate.

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

Assessment and Technical Investigations

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

3 General

3.1 Bauder Thermofol U Roof Waterproofing Membranes are satisfactory for use as mechanically-fastened waterproofing layers on flat or pitched roofs with limited access and for use as a loose-laid and ballasted waterproofing layer for flat roofs.

3.2 Limited access roofs are defined for the purpose of this Certificate as those roofs subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided (see section 8).

3.3 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. 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 and direction of falls. Pitched roofs are defined for the purpose of this Certificate as those having falls greater than 1:6.

3.4 Decks to which the membranes are to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 2005 and, where appropriate, *NHBC Standards 2011*, Chapter 7.1 *Flat roofs and balconies*, and the Certificate holder's instructions.

3.5 Insulation materials to be used in conjunction with the membranes 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 scope of, that Certificate.

3.6 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 should be interposed before installing the waterproofing sheet. Where doubt arises, the advice of the manufacturer or the Certificate holder should be sought.

4 Practicability of installation

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

5 Weathertightness



5.1 Tests confirm that the membrane, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the building, and enable a roof to comply within the requirements of the national Building Regulations (see section 15, Table for *Physical properties — general*):

England and Wales — Approved Document C, Requirement C2(b), Section 6

Scotland — Mandatory Standard 3.10, clauses 3.10.1 and 3.10.7

Northern Ireland — Regulation C4(b).

5.2 The membranes are impervious to water and will achieve a weathertight roof capable of accepting minor structural movement (see section 15, Table for *Physical properties — directional*).

6 Properties in relation to fire



6.1 When tested in accordance with BS 476-3 : 2004, a system comprising a 19 mm orientated strand board substrate, a low-density polyethylene vapour control layer, a 50 mm layer of PIR insulation board, covered by 1.5 mm thick Bauder Thermofol U, achieved an EXT.F.AB rating.

6.2 A roof waterproofed with the product and ballasted with a minimum depth of 50 mm of aggregate is deemed to be of designation AA. The roof therefore meets:

England and Wales — Requirement B4(2)

Scotland — Mandatory Standard 2.8, clause 2.8.1

Northern Ireland — Regulation E5(b).

6.3 The designation of other specifications should be confirmed by:

England and Wales — Test or assessment in accordance with Approved Document B, Appendix A, Clause A1

Scotland — Test to conform to Mandatory Standard 2.8

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

7 Resistance to wind uplift

7.1 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.

7.2 The wind uplift forces are calculated in accordance with BS EN 1991-1-4 : 2005 and the 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.

7.3 The ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and the UK National Annex. The membrane should always be ballasted 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 Resistance to foot traffic

Tests indicate that the membranes can withstand, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Where traffic, in excess of this, is envisaged, such as maintenance of lift equipment, a walkway should be provided, for example, using concrete slabs supported on bearing pads (see section 1.5, Table for *Physical properties — general*).

9 Maintenance



Roofs covered with the membranes must be the subject of annual inspections, to ensure continued performance.

10 Durability



10.1 Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that the membranes will have a service life in excess of 30 years.

10.2 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.

Installation

11 General

11.1 Installation of Bauder Thermofol U Roof Waterproofing Membranes must be carried out in accordance with relevant Clauses of BS 8000-4 : 1989, the manufacturer's instructions and this Certificate.

11.2 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 placed over the substrate.

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

11.4 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.

11.5 The membranes should not come into contact with unfaced polyurethane or polystyrene insulation boards. A suitable separation layer must be used if either of these type of boards is used.

12 Procedure

Loose-laid and ballasted applications

12.1 The product is unrolled onto the substrate without folds or ripples, with a 50 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 1.3.

12.2 A suitable protection layer must be laid over the product prior to the application of the ballast.

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

12.4 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.

12.5 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 due to the weight of the aggregate and/or paving.

Mechanically fastened applications

12.6 The membranes should be secured by corrosion-resistant plates and mechanical fixings.

12.7 The membranes should be 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 1.3.

12.8 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.

12.9 The fastener 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.

12.10 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.

13 Jointing procedure

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

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

Hot-air welding

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

13.4 The lap joint must be a minimum width of 40 mm for an automatic machine, and 50 mm for a hand-held machine.

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

Flashing procedure

13.6 Flashings should be formed in accordance with the Certificate holder's instructions.

14 Repair

In the event of accidental damage, repairs can be carried out by cleaning the area around the damage and applying a patch of the product in the manner described in section 13.

Technical Investigations

15 Tests

15.1 Details of tests on the Bauder Thermofol membranes assessed by the BBA which show typical results for the materials, are summarised in Tables 2 and 3.

Table 2 Physical properties — directional (Bauder Thermofol U15)

Test (units)	Mean results		Method
	Longitudinal	Transverse	
Tensile strength (N per 50 mm)	1300	1165	EN 12311-2
control	1230	1170	
heat aged ⁽¹⁾			
Elongation at break (%)	16.5	21.0	EN 12311-2
control	15.5	20.0	
heat aged ⁽¹⁾			
Nail test (N)	514	790	EN 12310-1
Dimensional stability (%)	-0.20	-0.11	EN 1107-1
Low temperature foldability (°C)	≤-40	≤-40	EN 495-5
control	≤-40	≤-40	
heat aged ⁽¹⁾			
Interlaminar adhesion (N per 50 mm)	154	139	EN 12316-2
Shear strength (N per 50 mm)	1234	1084	EN 12317-2
Peel strength (N per 50 mm)	282	330	EN 12316-2

(1) Heat aged 168 days at 70°C.

Table 3 Physical properties — General

Test (units)	Mean results	Method
Wind uplift (N) ⁽¹⁾ corrected load per fixing	570	MOAT 55 : 4.2.2
Static indentation		EN 12730 and BRL 1511/01
U12	S ₄ ⁽²⁾	
U15	S ₄ ⁽²⁾	
U18	S ₄ ⁽²⁾	
U20	S ₄ ⁽²⁾	
Dynamic impact		EN 12691 and BRL 1511/01
U12	D ₃ ⁽³⁾	
U15	D ₄ ⁽⁴⁾	
U18	D ₄ ⁽⁴⁾	
U20	D ₄ ⁽⁴⁾	

(1) Testing carried out U15 grade.

(2) Equivalent of MOAT 65 : 4.3.8, class L25.

(3) Equivalent of MOAT 27 : 5.1.10, class I₃.

(4) Equivalent of MOAT 27 : 5.1.10, class I₄.

15.2 Samples were obtained from site of an earlier Bauder PVC grade and of Bauder Thermofol U from the Certificate holder for testing. The results of the tests carried out by the BBA show typical results for the materials and are summarised in Table 4.

Table 4 Physical properties — comparison of site samples against new production

Tests (units)	Mean results		Method
	Unaged	Site ⁽¹⁾	
Dynamic impact			MOAT 65 : 4.3.9
EPS substrate	110	115	
Perlite substrate	110	110	
Low temperature foldability (°C)	-35	-10	BS EN 495-5

(1) Sample taken from a site installed in 1991.

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

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

16 Investigations

Existing data on fire performance to BS 476-3 : 2004 of the product were examined.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS 8000-1 : 1989 *Workmanship on building sites — Code of practice for excavation and filling*

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

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*

EN 495-5 : 2000 *Flexible sheets for waterproofing — Determination of foldability at low temperature — Plastic and rubber sheet for roof waterproofing*

EN 1107-1 : 2000 *Flexible sheets for waterproofing — Determination of dimension stability — Bitumen sheets for roof waterproofing*

EN 12310-1 : 1999 *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of resistance to tearing (nail shank)*

EN 12311-2 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Part 2 — Plastic and rubber sheets for roof waterproofing*

EN 12316-2 : 2000 *Flexible sheets for waterproofing — Determination of peel resistance of joints — Plastic and rubber sheets for roof waterproofing*

EN 12317-2 : 2000 *Flexible sheets for waterproofing — Determination of shear resistance of joints — Plastic and rubber sheets for roof waterproofing*

EN 12691 : 2001 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to impact*

EN 12730 : 2001 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to static loading*

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

MOAT No 55 : 1991 *UEAtc Supplementary guide for the assessment of mechanically fastened roof waterproofing*

MOAT No 65 : 2001 *UEAtc Technical Guide for the Assessment of Non-Reinforced, Reinforced and/or Backed Roof Waterproofing Systems made of PVC*

BRL 1511/01: 2004 *Baanvormige Dakbedekkingssystemen — Specificke bepalingen*

Conditions of Certification

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

17.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

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

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- remain covered by a valid Dutch Agrément; and
- are reviewed by the BBA as and when it considers appropriate.

17.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

17.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.