CI/SfB

(47) In

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

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Agrément Certificate No 00/3755/C

PROTAN G PVC ROOFING MEMBRANE

Revêtement d'étanchéité
Dachabdichtungen

Product

Protan G fully adhered to cut to falls insulation scheme

- *THIS CERTIFICATE OF CONFIRMATION RELATES TO THE PROTAN G PVC ROOFING MEMBRANE, A GLASS REINFORCED PVC ROOF WATERPROOFING MEMBRANE.*
- *The system is for use as a loose-laid and ballasted waterproofing layer on flat roofs and fully adhered on pitched and flat roofs with limited access.*
- *Installation must be carried out only by trained and approved installers.*

Regulations

1 The Building Regulations 1991 (as amended) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of roof waterproofing membranes with the Building Regulations. In the opinion of the BBA, Protan G PVC Roofing Membrane, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	B4(2)	External fire spread
Comment:		Data obtained from tests to BS 476-3 : 1958 indicate that on suitable substructures the use of the system will enable a roof to be unrestricted under the requirements of these Regulations. See sections 11.1 to 11.3 of this Certificate.
Requirement:	C4	Resistance to weather and ground moisture
Comment:		Tests for water resistance on the membrane, including joints, indicate that the system meets this Requirement. See section 8.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The membrane is an acceptable material. See section 13 of this Certificate.

continued

continued

• *The membrane is marketed in the United Kingdom by Protan (UK) Limited, and manufactured by Protan A/S, P O Box 420, N-3002, Drammen, Norway. Tel: 00 47 32 221600 Fax: 00 47 32 221700.*

Confirmation of Norwegian Agrément issued by the Norges byggforskningsinstitutt (NBI) to Protan A/S, P O Box 420, N-3002 Drammen, Norway.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

In the opinion of the BBA, Protan G PVC Roofing Membrane, if used in accordance with the provision of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	**10**	Fitness of materials
Standard:	B2.1	Selection and use of materials and components
Comment:		The membrane complies with this Standard.
Regulation:	**12**	Structural fire precautions
Standard:	D6.7	Distance of sides of buildings from boundaries — Roofs and rooflights
Comment:		Data obtained from tests to BS 476-3 : 1958 indicate that on suitable substructures use of the system will enable a roof to be unrestricted under this Standard. See sections 11.1 to 11.3 of this Certificate.
Regulation:	**17**	Preparation of sites and resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		Tests for water resistance on the membrane indicate that use of the system, when correctly installed, can enable a roof to satisfy the requirements of this Standard. See section 8.1 of this Certificate.

3 The Building Regulations (Northern Ireland) 1994 (as amended)

In the opinion of the BBA, Protan G PVC Roofing Membrane, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	**B2**	Fitness of materials and workmanship
Comment:		The membrane is an acceptable material. See section 13 of this Certificate.
Regulation:	**C5**	Resistance to ground moisture and weather
Comment:		Tests for water resistance on the membrane, including joints, indicate that use of the system can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.
Regulation:	**E8**	External fire spread
Comment:		Data obtained from tests to BS 476-3 : 1958 indicate that on suitable substructures use of the system will enable a roof to be unrestricted under the requirements of these Regulations. See sections 11.1 to 11.3 of this Certificate.

4 Construction (Design and Management) Regulations 1994

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: *5 Description* (5.2) and 6 *Delivery and site handling* (6.3).

Technical Specification

5 Description

5.1 Protan G PVC Roofing Membrane is manufactured by coating a glass-fibre (50 gm^{-2}) carrier on both sides with a plastisol coating fused into one homogeneous sheet. The upper surface is designed to improve slip resistance.

5.2 The membrane is manufactured to the nominal parameters given in Table 1.

Table 1 Nominal parameters

Characteristic (units)	Values	
thickness (mm)	1.4	1.5
width (m)	2	2
length (m)	15	15
weight per unit area (kgm^{-2})	⩾1.6	⩾1.7
roll weight (kg)	48	51

5.3 The membrane is manufactured in standard colours of:

underside — dark grey
upper side — light grey, dark grey, red, blue and green.

Other colours are available to special order.

5.4 Ancillary materials used with the system include:

Protan Contact Adhesive 95 — a solvent-based contact adhesive for use in fully adhered specifications.
Protan PVC laminated metal — a 0.6 mm thick galvanized steel sheet laminated with a 1.4 mm thick layer of Protan G membrane.
Preformed corners — internal and external corners.
Pipe cloaks — preformed cloaks for use at penetrations.
Rainwater outlets — stainless steel outlets with a Protan membrane flange.

Protan 2.4 mm GT Terrace Grade — a 2.4 mm thick PVC membrane for use on walkways.

Polypropylene geotextiles — a range of 140 gm^{-2} to 300 gm^{-2} non-woven mats, for use as protection or insulation layers over existing bitumen roofing, insulation or uneven substrates.

5.5 Quality control checks are carried out during production and on the finished products. Quality inspection seals are welded to the completed roof.

6 Delivery and site handling

6.1 The membrane is delivered to site in rolls with polyethylene wrappings bearing the product name, batch number and the BBA identification mark incorporating the number of this Certificate.

6.2 Rolls should be stored on a clean, level, dry surface and kept under cover.

6.3 Protan Contact Adhesive 95 is classified as 'Extremely flammable' and 'Irritant' under the chemical (Hazard and Packaging for Supply) Regulations 1994 (CHIP2) and carries the appropriate hazard warning.

Design Data

7 General

7.1 Protan G PVC Roofing Membrane is satisfactory for use as:

(1) a fully adhered waterproofing layer on flat and low pitched roofs with limited access

(2) a loose-laid and ballasted waterproofing layer, mechanically fixed at upstands and edges, for use on flat roofs of traditional or inverted design, with limited access.

7.2 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, a walkway must be provided using concrete slabs supported on bearing pads, or Protan 2.4 mm GT Terrace Grade.

7.3 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls in excess of 1:6. When designing flat roofs, twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including overall and local deflection, direction of fall, etc.

7.4 Decks to which the membrane is to be applied must comply with the relevant requirements of BS 6229 : 1982, BS 8217 : 1994 and, where appropriate, NHBC Standards, Chapter 7.1, or Zurich Building Guarantees Technical Standards, Section 5, clause 5.9.3.19.

7.5 Insulation materials used in conjunction with the product must be one of the following:

(a) as described in the relevant clauses of BS 8217 : 1994

(b) the subject of a current BBA Certificate and be used in accordance with and within the limitations of that Certificate.

7.6 Contact with certain bituminous coal tar and oil-based products must be avoided as the membrane is not compatible with lower grades of bitumen. If contact with such products is likely, a separating layer should be interposed before installing the waterproof sheet. Direct contact between the membrane and polystyrene insulation boards should be avoided. Where doubt arises, the advice of the marketing company should be sought.

7.7 Installation must be carried out only by installers trained and approved by the marketing company.

8 Weathertightness

8.1 Tests confirm that the membrane, and joints in the membrane, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building and so meet the requirements of the national Building Regulations.

England and Wales

Approved Document C, Requirement C4, Section 5.1

Scotland

Regulation 17, Standard G3.1.

Northern Ireland

Regulation C5.

8.2 The membrane is impervious to water and, when used in the system described, will give a weathertight roof covering capable of accepting minor structural movements without damage.

9 Resistance to wind uplift

9.1 When used in a fully adhered specification, the adhesion of the membrane will be limited by the cohesive strength of the substrate. On substances with high cohesive strength, the adhesion of the membrane is sufficient to resist the effect of wind suction, thermal cycling or minor structural movements occurring in practice.

9.2 The precise ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of CP 3 : Chapter V-2 : 1972 or BS 6399-2 : 1997, but should not be below a minimum thickness of 50 mm. In areas of high wind exposure the gravel may be bonded at the edges for a distance of 1 m. Alternatively, concrete slabs on suitable supports can be used.

10 Resistance to foot traffic

10.1 Test data indicate that the system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Reasonable care should be taken, however, to avoid puncture by sharp objects or concentrated loads. Where regular traffic is envisaged, ie maintenance of lift equipment, etc, a walkway must be provided, either by using Protan 2.4 GT Terrace Grade, or concrete slabs on bearing pads. When paviours are used, a protective sheet must be laid over the waterproofing.

10.2 The membrane has a textured finish to aid slip resistance for foot traffic. However, care should be taken walking across the roof if surface water is present.

11 Properties in relation to fire

11.1 When tested in accordance with BS 476-3 : 1958, a system comprising 18 mm thick orientated strand board deck and a layer of Protan G fully adhered using a butanone adhesive achieved a rating of EXT.F.AA.

11.2 The membrane used in the loose-laid and ballasted specification, including a minimum depth of 50 mm of aggregate, shall be deemed to satisfy BS 476-3 : 1958.

11.3 The designation of other specifications should be confirmed by:

England and Wales

test or assessment in accordance with Clause A1, Appendix A of Approved Document B

Scotland

test to conform with Standard D6.7

Northern Ireland

test or assessment by a UKAS accredited laboratory, BRE or an independent consultant with appropriate experience.

12 Maintenance

In the event of damage, repair should be carried out in accordance with Protan (UK) Limited's instructions. Repair consists of applying a patch of the membrane, extending at least 50 mm beyond the defect. The damaged area should be cleaned back to unweathered material and the patch is then hot-air welded.

13 Durability

Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that Protan G PVC Roofing Membrane should have a life in excess of 25 years.

Installation

14 General

14.1 Installation of Protan G PVC Roofing Membrane must be in strict accordance with the manufacturer's fixing instructions and should be carried out only by trained and approved contractors.

14.2 Deck surfaces should be clean, dry, and free from sharp projections such as nail heads, concrete nibs, etc.

14.3 Where the membrane is to be laid over rough decks, a protective layer must first be installed. When used in remedial work, mineral surface protection should be removed. Where this is not possible, ie over a mineral-surfaced embedded bitumen felt, a protective layer will also be required.

14.4 The membrane may be laid in conditions normal to roofing work and should not be laid in wet or damp weather conditions, nor when the temperature falls below –10°C, and below 5°C precautions should be taken against the formation of condensation.

15 Procedures

Fully adhered system

15.1 The membrane is unrolled, without ripples, over the substrate, allowing for an 80 mm overlap between sheets. The sheet is folded back approximately half its length to expose the underside.

15.2 Protan Contact Adhesive 95 is applied evenly to the membrane and the substrate, ensuring that the adhesive is not too thickly applied.

15.3 When the adhesive has dried sufficiently to allow the surface to be touched with a finger without sticking or stringing, the two coated surfaces should be brought into contact, pressed firmly together and brushed to ensure bonding.

15.4 This is then repeated for the unbonded section of the sheet.

15.5 The membrane is mechanically fixed at the perimeter. The membrane should then be lap jointed.

Loose-laid and ballasted system

15.6 Where possible, loose-laid membrane should be factory prefabricated. Horizontal laps should be a minimum of 80 mm wide and the roofing must be raised at least 150 mm at all flashings.

15.7 The membrane is mechanically fixed at perimeters, and the laps welded together. Finally, the detail work is carried out.

15.8 The membrane should be covered with protective sheet prior to the application of at least

50 mm washed, well rounded gravel. In areas of high wind exposure, a heavier gravel may be used and/or the gravel may be bonded at the edges for a distance of 1 m, using Protan Contact Adhesive 95. Alternatively, concrete slabs on suitable supports can be used.

16 Jointing procedures

16.1 Hot-air welding is carried out by hand or machine, using equipment approved by Protan (UK) Limited. Lap widths should be in accordance with the manufacturer's instructions.

16.2 When welding using a machine, test welds should be carried out to ensure the optimum setting for temperature, speed and pressure, prior to the start of work.

16.3 When hand welding, a continuous pre-weld should be made at the back edge of the overlap prior to full welding. The weld is then completed giving a finished seam width of 40 mm.

16.4 In all cases an uninterrupted extrusion of molten material should be visible along the seam.

16.5 On completion of the weld the seam should be tested for total consolidation.

17 Details

Protan (UK) Limited supply a range of components for the treatment of details such as flashings and penetrations.

Technical Investigations

The following is a summary of the technical investigations carried out on Protan G PVC Roofing Membrane.

18 Tests

Technical data from tests carried out by NBI leading to the issue of NBI Technical Approval 2008, and additional tests carried out by the BBA, were evaluated in the context of UK roofing practice and Building Regulations and are summarised in Tables 2 and 3.

Table 2 Physical properties — directional

Test (units)	Method*	Mean results	
		Long[1]	Trans[2]
Tensile strength (Nmm^{-2})	DIN 53-354		
unaged		7.1	6.6
water soak[3]		7.8	7.6
Elongation	DIN 53-354		
unaged		198	188
water soak[3]		192	186
Tear strength (N)	DIN 53-363		
unaged		146	150
water soak[3]		136	137

(1) Longitudinal direction.
(2) Transverse direction.
(3) Water soak 56 days at 60°C.

*The test document is detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the document.

Table 3 Service performance

Test (units)	Method*	Mean result
Water vapour permeability ($gm^{-2}day^{-1}$)	BS 3177 (25°C/75% RH)	2.68
Water vapour resistance ($MNsg^{-1}$)	BS 3177 (25°C/75% RH)	76.6
Low temperature flexibility (°C)	DIN 53-361	
unaged		–30
water soak[1]		–30
Static indentation	MOAT 27 : 5.1.9	
rigid		L_4
compressive		L_3
Dynamic indentation	MOAT 27 : 5.1.10	
perlite		I_3
EPS		I_3
Peel strength (N) plywood	MOAT 27 : 5.1.3	
unaged		51.7
heat aged[2]		54.1
Coefficient of friction	BBA T1/10[3]	
dry		0.64
wet		0.15

(1) Water soak 56 days at 60°C.
(2) Heat aged 28 days at 70°C.
(3) BBA Test method.

*The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

19 Other investigations

19.1 Existing data on the fire performance of the membrane were examined.

19.2 The manufacturing process was examined, including the methods adopted for quality control.

19.3 Test data on Protan SE3, which uses the same PVC compound, for heat ageing, natural exposure and effectiveness of welding, were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-3 : 1958 *External fire exposure roof test*
BS 3177 : 1959(1995) *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*
BS 6229 : 1982 *Code of practice for flat roofs with continuously supported coverings*
BS 6399 *Loading for buildings*
BS 6399-2 : 1997 *Code of practice for wind loads*
BS 8217 : 1994 *Code of practice for built-up felt roofing*
CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loading*
CP 3 : Chapter V-2 : 1972 *Wind loads*
MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*
DIN 53-354 *Testing of artificial leather; Tensile test*
DIN 53-361 : 1982 *Testing synthetic leather and similar surface structures; Determining the flexing behaviour under cold conditions*
DIN 53-363 : 1969 *Testing of Plastic Films; Tear Propagation Test on Trapezoidal Specimens with a Slit*

Conditions of Certification

20 Conditions

20.1 This Certificate:

(a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;

(b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;

(c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(d) is copyright of the BBA.

20.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

20.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) remain covered by a valid Norwegian Agrément; and

(c) are reviewed by the BBA as and when it considers appropriate.

20.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of any patent or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the nature of individual installations of the product, including methods and workmanship.

20.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Protan G PVC Roofing Membrane is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 00/3755/C is accordingly awarded to Protan (UK) Limited.

On behalf of the British Board of Agrément

Date of issue: 29th September 2000

Chief Executive

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