

Protan (UK) Limited

2 Alexandra Terrace
Alexandra Road
Aldershot
Hampshire GU11 3HU
Tel: 01252 338378 Fax: 01252 345300
e-mail: sales@protan.co.uk
website: www.protan.co.uk



Agrément Certificate
00/3755
Product Sheet 1

PROTAN G AND GX ROOFING MEMBRANES

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate of Confirmation relates to Protan G and GX, a range of glassfibre reinforced PVC roof waterproofing membranes.

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 and joints in the membranes, when completely sealed and consolidated, will resist the passage of moisture to the interior of 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 — when correctly specified, the membranes 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 the installation and maintenance of the membranes without damage (see section 8).

Durability — under normal service conditions, the membranes should provide a durable waterproof covering with a service life of at least 30 years (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the products described herein. These product has 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

Simon Wroe
Head of Approvals — Materials

Greg Cooper
Chief Executive

Date of First issue: 11 September 2008

Originally certificated on 29 September 2000

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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

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tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Regulations

In the opinion of the BBA, Protan G and GX Roofing 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 2000 (as amended) (England and Wales)

| | | |
|--------------|--------------|--|
| Requirement: | B4(2) | External fire spread |
| Comment: | | Test data to BS 476-3 : 1958 indicate that on suitable substructures 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 on the membranes, including joints, indicate that the membranes meet this Requirement. See section 5.1 of this Certificate. |
| Requirement: | Regulation 7 | Materials and workmanship |
| Comment: | | The membranes are acceptable. See section 10 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 membranes satisfy the requirements of this Regulation. See sections 9 and 10 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards – construction |
| Standard: | 2.8 | Spread from neighbouring buildings |
| Comment: | | Test data to BS 476-3 : 1958 indicate that the membranes when applied to a non-combustible substrate, can be 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 of the membranes indicate that the use of the membranes 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 section 10 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 of the membranes, including joints, indicate that the use of the membranes will enable a roof to satisfy the requirements of this Regulation. See section 5.1 of this Certificate. |
| Regulation: | E5(b) | External fire spread |
| Comment: | | Test data to BS 476-3 : 1958 indicate that on suitable substructures, the use of the membranes will enable a roof to 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 obligations under these Regulations.

See sections: 1 *Description* (1.3) and 2 *Delivery and site handling* (2.4).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Protan G and GX Roofing Membranes, when installed in accordance with this Certificate, as meeting Technical Requirements R3 in relation to *NHBC Standards*, Chapter 7.1, *Flat roofs and balconies*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Protan G and GX Roofing Membranes, when installed and used in accordance with this Certificate, satisfy the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4, *Superstructure*, Sub-section *Flat roofs*.

General

This Certificate of Confirmation relates to Protan G and GX, glassfibre reinforced PVC roof waterproofing membranes, for use as a loose-laid and ballasted waterproofing layer on flat roofs and fully-adhered on pitched or flat roofs with limited access.

The membranes are manufactured in Norway by Protan A/S and marketed in the UK by the Certificate holder.

Confirmation of Norwegian Technical Approval 2008 issued by the SINTEF Building and Infrastructure to Protan A/S.

Technical Specification

1 Description

1.1 Protan G and GX Roofing Membranes consist of a glassfibre reinforced PVC roofing sheet, with a slip-resistant upper surface and using hot-air welded lap joints. The membranes covered by this Certificate include:

- Protan G — standard membrane requiring a separation/protection layer when used over polystyrene insulation boards or re-roofing applications. This membrane is also manufactured with added fungicide, for use in gravel protected roof specifications
- Protan GX — standard membrane laminated with a 180 gm⁻² or 300 gm⁻² on the underside, for use in fully adhered specifications.

1.2 The membranes are manufactured by coating the glassfibre base on both sides with a plastisol coating fused into one homogeneous sheet. The coating can be applied in several layers to achieve the required membrane thickness and is then passed through a gelation oven.

1.3 The membranes are manufactured with the nominal characteristics shown in Table 1.

Table 1 Nominal characteristics

| Characteristic (units) | Membrane | |
|--|----------|------------|
| | Protan G | Protan GX |
| Thickness (mm) | 1.5 | 1.5 |
| Roll length (m) | 15 | 15 |
| Roll width (m) | 2 | 2 |
| Weight per unit area (kgm ⁻²) | ≥1.65 | ≥1.95 |
| Roll weight (kg) | ≥49.5 | ≥58.5 |
| Weight of glassfibre reinforcement (gm ⁻²) | 50 | 50 |
| Weight of polyester backing fleece (gm ⁻²) | – | 180 or 300 |

– Not applicable.

1.4 The membrane is manufactured in standard colours⁽¹⁾ of:

under side — dark grey

upper side — light grey, dark grey and copper green.

(1) Other colours are available to special order and are subject to minimum quantities.

1.5 Ancillary materials used with the membranes include:

- Protan Bonding Adhesive — a solvent-based contact adhesive for use in detailing using Protan G membrane
- Protan Adhesive No 1 — a moisture curing adhesive for use in fully-adhered specifications using Protan GX membrane
- Protan PVC laminated metal — a 0.6 mm thick, galvanized steel sheet, factory laminated with 1.2 mm thick Protan G membrane
- Preformed 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 access walkways and lightly-trafficked terraces
- Protan Progrid Walkway
- Protan Pavepad — bearing pads for concrete slabs
- Polypropylene geotextiles — a range of 140 gm⁻² to 800 gm⁻² non-woven mats, for use as protection layers over existing bitumen roofing or uneven substrates
- Protan Constant Force Post — used as a part of a Mansafe System

- Protan Lightning Clips — protection cable anchor clips
- Protan Vapour Control Layers.

1.6 Quality control checks are carried out during production and on the finished products.

2 Delivery and site handling

2.1 The membranes are delivered to site in rolls. Pallets are covered with polyethylene wrappings bearing the product name, batch number and the BBA identification mark incorporating the number of this Certificate.

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

2.3 Protan Bonding Adhesive is classified as 'extremely flammable' and 'irritant' under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3)* and carries the appropriate hazard warning.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Protan G and GX Roofing Membranes.

Design Considerations

3 General

3.1 Protan G Roofing Membrane is satisfactory for use as a loose-laid and ballasted waterproofing layer on flat roofs. Protan GX Roofing Membrane is for use in fully-adhered systems on pitched or flat roofs with limited access.

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

3.3 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. 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.

3.4 Decks to which this system is to be applied must comply with the relevant requirements of BS 8217 : 2005 and BS 6229 : 2003, and, where appropriate, *NHBC Standards, Chapter 7.1* or the *Zurich Building Guarantee Technical Manual 2007, Section 4, Superstructure, Sub-section Flat roofs, pages 268-270.*

3.5 Insulation materials used in conjunction with the membranes must be approved by the Certificate holder 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.

3.6 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 also be avoided. Where doubt arises, the advice of the Certificate holder should be sought.

4 Practicability of installation

The membranes should only be installed by trained installers. Details of these are available from the Certificate holder.

5 Weathertightness

 5.1 Data confirm that the membranes, including joints, 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 thus:

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

Scotland — Mandatory Standard 3.10, clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.7⁽¹⁾⁽²⁾


(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Regulation C4(b).

5.2 The membranes are impervious to water and when used as described in this Certificate, will give a weathertight roof covering capable of accepting minor structural movement without damage.

6 Properties in relation to fire

 6.1 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 an EXT.F.AA rating.

6.2 When tested in accordance with BS 476-3 : 2004, a system comprising 18 mm plywood deck, 90 mm thick, Kingspan TR27 tissue-faced insulation and one layer of Protan GX fully-adhered to the insulation using Probond No 1 moisture curing adhesive, achieved an EXT.S.AB rating.

6.3 The designation of other specifications (eg when used on combustible substrates) 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 Resistance to wind uplift

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

7.2 The precise ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of 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 one metre. Alternatively, concrete slabs on suitable supports can be used.

8 Resistance to foot traffic

8.1 Data indicate that the membranes can withstand, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. However, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Where regular traffic is envisaged, ie maintenance of lift equipment, a walkway must be provided, either by using Protan 2.4 mm GT Terrace Grade, or concrete slabs on bearing pads. When pavements are used, a protective sheet must be laid over the waterproofing membrane.

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

9 Maintenance



Roofs covered with the products should be the subject of annual inspections, as is good practice with all waterproofing systems, to ensure continued security and performance.

10 Durability



Accelerated weathering tests and performance in service confirm that satisfactory retention of physical properties is achieved. All available evidence suggests that Protan G and GX Roofing Membranes should have a life in excess of 30 years.

Installation

11 General

11.1 Installation of Protan G and GX Roofing Membranes must be in strict accordance with the manufacturer's fixing instructions and should be carried out only by Protan Partner Contractors using trained labour, records for whom are kept on the Certificate holder's database.

11.2 In all cases, a vapour retarder should be used directly over the deck. When internal temperatures and humidity conditions exceed 22°C and 50% relative humidity, special precautions should be taken and the Certificate holder should be consulted.

11.3 Insulation boards should be fixed to the substructure in such a way as not to impair the performance of the waterproofing membrane.

11.4 Deck surfaces should be clean, dry, and free from sharp projections, such as nail heads or concrete nibs. When necessary, a separating or levelling layer may be interposed between the substrate and the membrane.

11.5 The membrane should not be laid in damp weather nor when the temperature falls below -10°C, and below 5°C precautions should be taken against the formation of condensation.

12 Procedures

Fully-adhered system

12.1 The membrane is unrolled, without folds or 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.

Protan GX

12.2 Protan Adhesive No 1 is applied evenly to the substrate, ensuring that the adhesive is not too thickly applied.

12.3 The membrane should be rolled out into the wet adhesive and pressed firmly using a suitable implement (eg a heavy roller).

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

12.5 The membrane is mechanically fixed at the parameter. The membrane should then be lap jointed.

Protan G – for detailing only

12.6 Protan Bonding Adhesive is applied evenly to the membrane and the substrate, ensuring that the adhesive is not too thickly applied.

12.7 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 together and brushed to ensure bonding.

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

12.9 The membrane is mechanically fixed at the parameter. The membrane should then be lap jointed.

Loose-laid and ballasted system

Protan G

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

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

12.12 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 one metre, using Protan Bonding Adhesive. Alternatively, concrete slabs on suitable supports can be used.

13 Lap welding procedures

13.1 Hot-air welding is carried out by hand or machine using equipment approved by the Certificate holder. Lap widths should be in accordance with the manufacturer's instructions.

13.2 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.

13.3 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.

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

13.5 On completion of the weld, the seam should be tested for total consolidation using a seam probe.

14 Details

The Certificate holder supplies a range of components for the treatment of details such as flashings, penetrations.

15 Repair

In the event of accidental damage, repair should be carried out in accordance with the Certificate holder's instructions. Repair consists of applying a patch of Protan G, or where appropriate Protan GX, extending at least 50 mm beyond the defect. The joint should be cleaned back to unweathered material and hot-air welded.

Technical Investigations

16 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. The results are summarised in Tables 2 and 3.

17 Investigations

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

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

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

17.4 Test data on samples taken by NBI during 2003 from an exposed site installed during 1977/78 were assessed against the product as new.

Table 2 Physical properties — directional

| Test (units) | Mean result | | Method ⁽¹⁾ |
|---------------------------------------|---------------------|----------------------|-----------------------|
| | Long ⁽²⁾ | Trans ⁽³⁾ | |
| Tensile strength (Nmm ⁻²) | | | DIN 53354 |
| unaged | 7.1 | 6.6 | |
| water soak ⁽⁴⁾ | 7.8 | 7.6 | |
| Elongation at break (%) | | | DIN 53354 |
| unaged | 198 | 188 | |
| water soak ⁽⁴⁾ | 192 | 186 | |
| Tear strength (N) | | | DIN 53363 |
| unaged | 146 | 150 | |
| water soak ⁽⁴⁾ | 136 | 137 | |

(1) The test documents are detailed in the *Bibliography*.

(2) Longitudinal direction.

(3) Transverse direction.

(4) Water soak 56 days at 60°C.

Table 3 Service performance

| Test (units) | Result | Method ⁽¹⁾ |
|---|----------------|-----------------------|
| Water vapour permeability (gm ⁻² day ⁻¹) | 2.68 | BS 3177 |
| Water vapour resistance (MNsg ⁻¹) | 76.6 | BS 3177 |
| Low temperature flexibility (°C) | | DIN 53361 |
| unaged | -30 | |
| water soak ⁽²⁾ | -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) | | MOAT 27 : 5.1.3 |
| plywood | | |
| unaged | 51.7 | |
| heat aged ⁽³⁾ | 54.1 | |
| Coefficient of friction | | BBA T1/10 |
| dry | 0.64 | |
| wet | 0.15 | |

(1) Test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Water soak 56 days at 60°C.

(3) Heat aged 28 days at 70°C.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

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

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

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

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

DIN 53354 : 1981 *Testing of artificial leather; Tensile test*

DIN 53361 : 1982 *Testing of artificial leather and similar sheet materials; Determination of suppression at groove in coolness*

DIN 53363 : 1969 *Testing of Plastic Films; Tear propagation Test on Trapezoidal Specimens with a Slit*

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

18 Conditions

18.1 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.

18.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

18.3 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 Norwegian Agrément; and
- are reviewed by the BBA as and when it considers appropriate.

18.4 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.

18.5 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.