Bord Agrément na hÉireann
Irish Agrément Board

CERTIFICATE NO. 06/0263
Protan AS,
P.O. Box 420,
NO-3002 Drammen , Norway.
Tel: 0047 32221600
Fax: 0047 32221700
Web: www.protan.com

Protan G, GG and GX Roofing Membranes

Revetement d'étanchéité
Dachabdichtungen

The **Irish Agrément Board** is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2006**.

The **Irish Agrément Board** operates in association with the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.

PRODUCT DESCRIPTION:
Protan G, GG and GX are roofing membranes manufactured from plasticised PVC with a core of glass felt. The system includes a range of accessories designed to deal with parapet, edge, rainwater and drainage details. Protan G, GG and GX roofing membranes have been certified by the NBI, Norway, Certificate No. 2008. This Certificate certifies compliance with the requirements of the Irish Building Regulations 1997 to 2006.

USE:
This Certificate relates to Protan G, GG and GX roofing membranes for use in loose-laid and ballasted applications or as an adhered waterproofing layer on pitched or flat roofs with limited access, as well as on flat roofs such as terraces and planted roofs.

MANUFACTURE AND MARKETING:
The product is manufactured by:
Protan AS
P.O. Box 420
NO-3002 Drammen
Norway
Tel: 0047 32221600
Fax: 0047 32221700
Web: www.protan.com

The product is marketed in Ireland by:
Colas Building Products Limited
Unit G1,
Maynooth Business Campus,
Maynooth,
Co Kildare.
Tel: 01 629 3630
Fax:01 629 3703
Web: www.colasbp.ie

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), Protan G, GG and GX roofing membranes, installed in Ireland by Protan trained and registered contractors, in accordance with specifications issued by Protan AS, and used in the context of this Certificate, can meet the requirements of the Building Regulations 1997 to 2006 as listed in section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2006 REQUIREMENT:

Part D – Materials and Workmanship

D3 – Protan G, GG and GX roofing membranes, as certified in this Irish Agrément Board Certificate, are manufactured from materials which are proper materials fit for their intended use. (See Part 4 of this Irish Agrément Board Certificate).

D1 – Protan G, GG and GX roofing membranes used in accordance with this Irish Agrément Board Certificate, can meet the requirements for workmanship.

Part A – Structure

A1 – Loading

Tests indicate that a roof incorporating Protan G, GG or GX roofing membranes can meet the loading requirements, provided the installation complies with the conditions set out in Section 2.6 and Part 3 of this Certificate.

Part B – Fire Safety

B4 – External Fire Spread

Protan G, GG and GX roofing membranes can meet the requirements for resistance to fire penetration and the distance of spread of flame for roofs, as indicated in Part 4.1 of this certificate.

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

Protan G, GG and GX roofing membranes can meet the weather resistant requirements when installed as indicated in Part 2.6 of this Certificate.

2.1 PRODUCT DESCRIPTION

Protan G, GG and GX roofing membranes consists of loose-laid and ballasted or adhered, glass-reinforced, plasticised PVC roof waterproofing membranes with hot-air welded lap joints. The System includes a range of accessories designed to deal with parapet, edge, rainwater outlet and drainage details. Installation must only be carried out by Protan trained and registered installers.

2.2 PRODUCT RANGE

Protan G, GG and GX roofing membranes are manufactured in a range of colours to the characteristics and tolerances given in Table 1. Field of application of the G, GG and GX membranes is as follows.

- Protan G, the standard membrane, is primarily used in loosely laid and ballasted applications such as terraces with pedestrian traffic.
- Protan GG is also loosely laid and ballasted and is intended for use in parking decks, on roofs with planting, and in culverts and in-ground structures.
- Protan GX, manufactured by laminating either a 180 or 300g/m^2 polyester fleece to the underside of the standard membrane, for use in fully-adhered specifications. Protan GX/180 is used for fully bonded applications on top of insulation boards. Protan GX/300 is used for bonding directly onto bitumen based substrates.

2.3 ANCILLARY ITEMS

- Protan Contact Adhesive – a solvent-based contact adhesive for use in fully-adhered specifications.
- Protan PVC Laminated Metal – a 0.6mm thick galvanized steel sheet, factory laminated with 1.4mm thick Protan G membrane.
- Preformed corners- preformed internal and external corners.
- Pipe Cloaks/Collars - preformed cloaks/collars for use at penetrations.
- Rainwater Outlets – stainless steel outlets with a Protan membrane flange.
- Protan 2.4mm GT Terrace Grade – a 2.4mm thick PVC membrane for use on access walkways and lightly-trafficked terraces.
- Protan Proclip Decking – for use with walkways and terraces.
- Protan Pavepad – bearing pads for concrete slabs.
- Protan Omega and Triangular Profiles – for use to create architectural features on roofs.
- Polypropylene Geotextiles - a range of 140 g/m^2 to 800 g/m^2 non-woven mats, for use as protective 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 Barrier.

Table 1: Characteristics and Tolerances

	Protan G	Protan GG	Protan GX
Thickness (mm)	1.5 +0.2/-0.1	2.0 +0.2/-0.15	1.5+fleece +0.2/-0.1
Weight (kg/m^2)	≥ 1.5	≥ 1.15	≥ 1.15+fleece
Width (m)	2 +/- 2%	2 +/- 2%	2 +/- 2%
Roll Length (m)	15 +2%/-0%	10 +2%/-0%	15 +2%/-0%
Weight glass fibre core g/m^2)	50	80	50

2.4 MANUFACTURE

Protan G, GG and GX roofing membranes are manufactured by coating a glass-fibre (50 g/m^2) carrier on both sides with a plastisol coating, fused into a homogeneous sheet. The coating is applied in several layers and the upper surface is embossed to improve slip resistance. The membrane is then cut to width and reeled onto cardboard cores.

2.4.1 Quality control checks are carried out on the incoming raw materials, during production and on the finished product. The management systems of Protan have been assessed and registered as meeting the requirements of ISO 9001:2000 and ISO 14001:1996 by Det Norske Veritas, (Certificate No. 95-OSL-AQ-6543 and 97-OSL-SYMI-8015).

2.5 DELIVERY, STORAGE AND MARKING

Protan G, GG and GX membranes are delivered to site on palletised rolls with polyethylene wrappings. Each pallet and each membrane roll carries a label bearing the product's name, thickness, width, length, and production number, as well as the IAB Logo and Certificate number. A production number and recycling symbol to identify the product classification are embossed into the membrane. Rolls are to be stored on a clean level surface and kept under cover.

Protan Contact Adhesive 95 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.

2.6 DESIGN AND INSTALLATION

2.6.1 General

Installation of Protan G, GG and GX membranes must be in strict accordance with the manufacturer's fixing instructions and should be carried out only by Protan trained and registered installers, records of whom are kept on the Certificate holder's database.

When used in a adhered specification, the adhesion of the membrane will be limited by the cohesive strength of the substrate. On substrates with high cohesive strength, the adhesion to the membrane is sufficient to resist the effect of wind suction, thermal cycling or minor structural movements occurring in practice. The Certificate holder provides a list of suitable substrates and thermal insulation materials for bonding to.

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 50mm. In areas of high wind exposure the gravel may be bonded at the edges for a distance of one metre.

Older roofs to be retrofitted must be inspected to determine their suitability and any repairs that may be required.

It should be noted that overall structural design for the building, including designing for dead and superimposed loading on the roof, rests with the Architectural/engineering design team for the Developer. Installed Protan G, GG and GX membranes are subject to a final inspection by a Protan field Technician prior to the issue of a Protan Guarantee.

Roof decks to which the covering is applied, must comply with the relevant requirements of BS 8217: 2005: *Reinforced bitumen membranes for roofing - Code of practice*, and BS 6229: 2003: *Code of practice for flat roofs with continuously supported coverings.*

Substrates should be clean and free from sharp projections such as nail heads and concrete nibs. Where Protan G, GG and GX membranes are to be laid over rough finished decks, the appropriate protection/cushion layer must be used.

All new roof constructions must incorporate a moisture barrier to prevent condensation saturating the insulation layer. The advise of the certificate holder should be sought if additional information is required in this regard.

Contact with all bituminous, coal tar and certain oil-based products must be avoided, as the basic membrane is not compatible with bitumen. In addition, direct contact between the basic membrane and polystyrene insulation should also be avoided. This must be taken into consideration regarding the choice of Protan membrane to be used. The advise of the certificate holder should be sought if additional information is required in this regard.

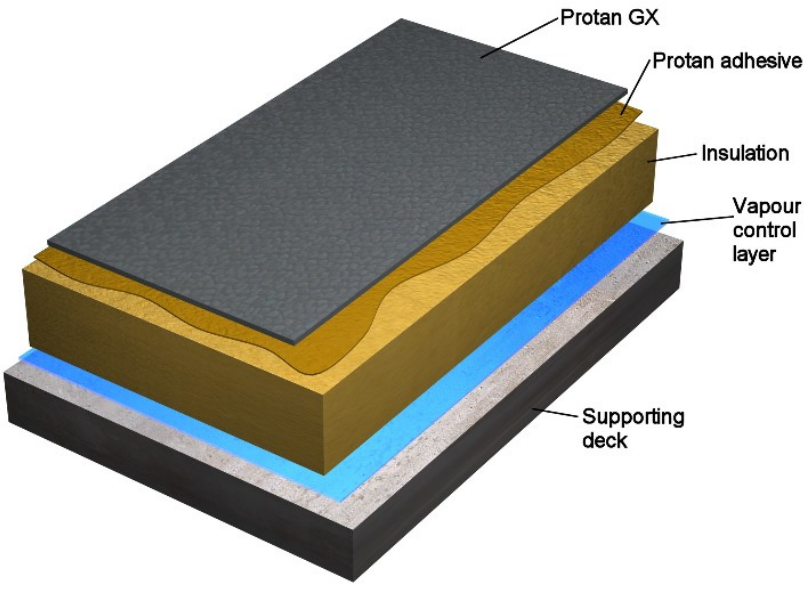


Figure 1 Fully Adhered Roofing System

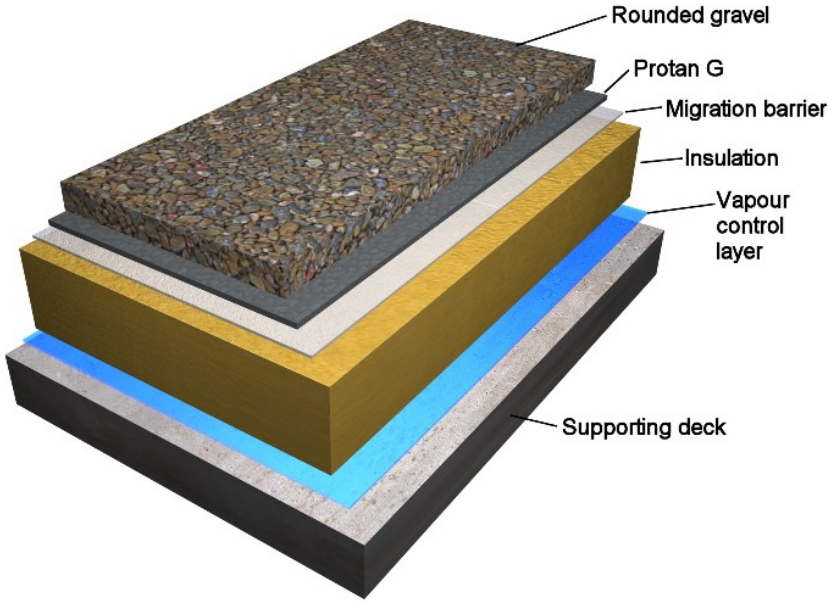


Figure 2 Gravel Ballasted Roof

Protan G, GG and GX roofing membranes may be laid in conditions normal to roofing work. Welding in damp weather or cold temperatures can be performed with Protan roofing membranes as the membranes are designed to remain flexible in low temperature conditions and have low water absorption. However, in damp or high humidity conditions, precautions should be taken to avoid trapped moisture in the roof construction. The advise of the certificate holder should be sought if additional information is required in this regard. In addition special installation precautions are necessary when using Protan adhesives.

2.6.2 INSTALLATION PROCEDURE

2.6.2.1 Fully adhered system

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

Protan G

Protan Contact Adhesive 95 is applied evenly to the membrane and the substrate, ensuring that the adhesive is not too thickly applied. 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. This is then repeated for the un-bonded section of the sheet. The membrane is mechanically fixed at the perimeter. The membrane should then be lap jointed. See Figure 1.

Protan GX

Adhesive is applied evenly to the substrate, ensuring that the adhesive is not too thickly applied. The membrane should be rolled out onto the wet adhesive and pressed firmly using a suitable implement (e.g. a water filled roller). This process is then repeated for the un-bonded section of the sheet. The membrane should then be lap jointed.

2.6.2.2 Loose-laid and ballasted system

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

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

The membrane should be covered with at least 50mm 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 meter, using Protan Contact Adhesive 95. Alternatively, concrete slabs on suitable supports can be used.
See Figure 2 and 3.

2.6.2.4 Jointing Procedure

Welding must only be carried out by Protan trained personnel, using equipment approved by the Certificate holder.

To ensure a watertight weld, the membrane should be lapped by a minimum of 80 mm when hand or machine welding.

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 between 20 - 40mm.

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

On completion of the welding process Peel Tests should be carried out at 200 m intervals and covered by a Protan Quality Inspection Patch to identify where tests have been executed.

2.6.2.5 Details.

The Certificate holder supplies a range of preformed PVC rainwater outlets, PVC laminate metal and prefabricated PVC shapes to deal with parapet, edge corner, rainwater outlet and drainage details.

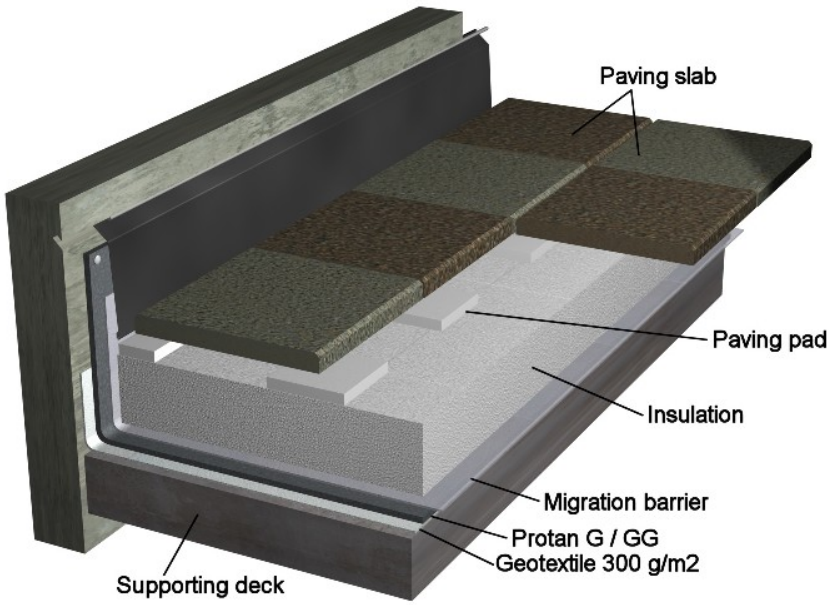


Figure 3 Pedestrian Deck – Insulation with Concrete Paving

3 GENERAL

3.1 Protan G, GG and GX roofing membranes, when installed in accordance with the manufacturer's instructions are suitable for use on timber, metal, concrete or suitable insulated decks as a fully adhered or loose laid and ballasted waterproofing layer on pitched or flat roofs with limited access.

3.2 Limited access roofs are defined for the purpose of this Certificate as those roofs that are subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. Where traffic in excess of this is envisaged, special precautions such as additional protection to the membrane, must be taken as recommended by the manufacturer.

3.3 Flat roofs are defined for the purpose of this Certificate as those roofs up to 10 ^{o} to the horizontal and having a minimum finished fall of 1:80. See section 4.1 (i) of this certificate for fire test ratings of flat roof systems per BS 476: Part 3: 2004: *Fire tests on building materials and structures*. The designation of other roof systems should be confirmed by test or assessment.

Section 4.1 (ii) of this certificate defined the fire rating of a Protan GX roofing system tested in the sloping position per BS 473: Part 3: 2004. The designation of other roof systems should be confirmed by test or assessment . Pitched roofs are defined as those which slope at an angle of greater than 10 ^{o} and up to 70 ^{o} to the horizontal.

3.4 To minimise ponding, and in accordance with BS 6229:2003, it is recommended that flat roofs should have a Design Fall of 1:40 to achieve a Minimum Finished fall of 1:80, unless a detailed analysis of the roof is available, including overall and local deflection and direction of falls.

3.5 Decks to which the product is to be applied must comply with the relevant requirements of BS 8217: 2005 and BS 6229: 2003.

3.6 Non-traditional insulation systems or materials used in conjunction with the product must only be used in accordance with the Certificate holders instructions.

3.7 Protan G, GG and GX roofing membranes can accept, without damage, limited foot traffic and light concentrated loads associated with installation and maintenance operations. Reasonable care is required however, to avoid puncture by sharp objects or concentrated loads. Anywhere regular traffic is envisaged, ie maintenance or lift equipment, a walkway must be provided either by Protan 2.4mm GT Terrace Grade walkway membrane or concrete slabs on Protan bearing pads. When ballast or paving is used, a protective layer should be laid over the waterproofing. See Figure 3.

4.1 BEHAVIOUR IN FIRE

When tested in accordance with BS 476-3: 2004, a system comprising of:

(i) A 18mm thick orientated strand board deck and a layer of Protan G fully adhered using a butanone adhesive achieved an EXT.F.AA rating.

The membranes used in the loose-laid and ballasted specification including a minimum depth of 50mm aggregate or paving should be deemed to satisfy BS 476-3: 2004.

(ii) A 18mm plywood deck, one 90mm thick layer of glass tissue faced PIR insulation fixed with Iso-TAK telescopic washers and one layer of Protan GX fully adhered to the insulation using Probond No.1 moisture curing adhesive achieved an EXT.S.AB rating.

The designation of other roof systems should be confirmed by test or assessment.

4.2 CONDENSATION RISK

When a correctly installed vapour barrier is used on the warm side of the insulation, interstitial condensation will not occur within the system.

4.3 MAINTENANCE

Protan G, GG and GX roofing membranes when installed in accordance with this Certificate and the Certificate holder's instructions will have little need for maintenance. Drainage outlets and gutters should be regularly maintained.

In the event of damage, repair should be carried out in accordance with Protans repair instructions. Repair consists of applying a Protan welding patch, diameter 110mm or 190mm, or a manually fitted Protan membrane patch to extend at least 50mm beyond the defect. The damaged area should be thoroughly cleaned and the patch then hot-air welded.

4.4 WEATHERTIGHTNESS

Test data examined by the IAB confirms that Protan G, GG and GX roofing membranes and joints in membranes, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building. They are capable of accepting minor structural movements without damage and so meet the requirements of Part C of the Building Regulations 1997 to 2006.

4.5 DURABILITY

When installed in accordance with this Certificate and adequately supported by the substrate, all available evidence indicates that Protan G, GG and GX roofing membranes should have a life in excess of 30 years.

Repairs carried out by Protan trained and registered contractors are effective in restoring weather tightness.

4.6 TOXICITY

The membranes are not toxic in normal service.

4.7 SECURITY OF FIXING

4.7.1 When used in a adhered specification, the adhesion of the membrane will be limited by the cohesive strength of the substrate. On substrates with high cohesive strength, the adhesion to the membrane is sufficient to resist the effect of wind suction, thermal cycling or minor structural movements occurring in practice. The Certificate holder provides a list of suitable substrates and thermal insulation materials for bonding to.

4.7.2 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 50mm. In areas of high wind exposure the gravel may be bonded at the edges for a distance of one metre, using Protan Contact Adhesive 95.

4.7.3 The Certificate holder offers a design service, which takes all the relevant supplied information into account, and provides a detailed written specification for the roof system.

4.8 EFFECTS OF TEMPERATURE

Membranes will resist normal temperatures in the range -30°C to 80°C.

4.8 OTHER INVESTIGATIONS

(i) The manufacturing process was examined including methods adopted for quality control and details were obtained of the quality and composition of the materials used. In addition testing of the product was witnessed.

(ii) The IAB carried out visits to assess the history of use and practicability of installation of the product. The Protan and Colas training facilities were also visited.

(iii) A visit was made to a site in progress to assess the method of application.

(iv) Test data on the following properties was also examined: See Table 2 for details.

- Shear resistance at joints
- Tensile, elongation and tear tests
- Water vapour permeability and resistance Flexibility at low temperatures

Table 2: Physical Properties

Property	Test Method	Control limit / product			Unit
		Protan G	Protan GG	Protan GX	
		1.5 mm	2.0 mm	1.5 mm + fleece	
Water tightness (10 kPa) **Water pressure tightness (150 kPa)**	EN 1928 EN 1928	Tight Tight	Tight Tight	Tight Tight	-
Shear resistance of joints – side lap	EN 12317-2	≥ 480	≥ 650	≥ 480	N/50mm
Tensile strength L/T	EN 12311-2	≥ 450	≥ 650	≥ 650	N/50mm
Elongation L/T	EN 12311-2	≥ 180	≥ 200	≥ 180	%
Tear resistance L/T	EN 12310-2	≥ 110	≥ 130	≥ 250	N
Resistance to puncture - By static load - By impact at +23°C - By impact at -10 °C	 EN 12730 EN 12691 EN 12691	 ≥ 150 ≤ 12 ≤ 20	 ≥ 200 ≤ 12 ≤ 20	 ≥ 400 ≤ 10 ≤ 15	 N mm dia. Mm dia.
Dimensional stability L/T	EN 1107-2	± 0.1	± 0.1	± 0.1	%
Foldability at low temperatures L/T	EN 495-5	≤ -30	≤ -30	≤ -30	°C
Water vapour permeability	EN ISO 12572	$9.5 \cdot 10^{-12}$	$7 \cdot 10^{-12}$	$9.5 \cdot 10^{-12}$	$Kg/m^2s\ Pa$
Water vapour resistance	EN ISO 12572	20	28	20	m

5.1 National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for 5 years so long as:

(a) the specification of the product is unchanged.
(b) the Building Regulations 1997 to 2006 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
(d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
(e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
(f) the registration and/or surveillance fees due to IAB are paid.

5.2 The IAB mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the IAB mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

(a) the absence or presence of patent rights subsisting in the product/process; or
(b) the legal right of the Certificate holder to market, install or maintain the product/process; or
(c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation, which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act. 1989, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

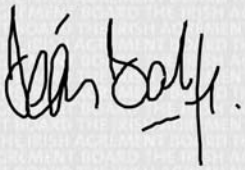
5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made there under, Statutory Instrument, Code of Practice, National Standards. Manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

The Irish Agrément Board

This Certificate No. **06/0263** is accordingly granted by the NSAI to **Protan AS,** on behalf of The Irish Agrément Board.

Date of Issue: **November 2006**

Signed



Seán Balfe
Director of the Irish Agrément Board

Readers may check that the status of this Certificate has not changed by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nsai.ie

Revisions: February 2007
To add fire test data for the product tested in the sloping position.