SINTEF Technical Approval

TG 2008

Issued first time: 05.12.2008
Revised: 26.08.2024
Amended: 09.12.2025
Valid until 01.02.2029
Provided listed on
www.sintefcertification.no

SINTEF confirms that

Protan G and GG roofing and waterproofing membranes

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

Protan AS
Postbox 420
NO 3002 DRAMMEN
www.protan.com

2. Product description

Protan G and GG are roofing and waterproofing membranes, all made of plasticized PVC with a core of glass felt. Stabilizers and plasticizer are added to the products to make them resistant to high temperatures, and to provide satisfactory foldability at low temperature.

Protan G
Protan G is made resistant to UV radiation. The upper side can be supplied in different colours. The underside is dark grey.

Protan G is produced in 2 variants:

- *Protan G 1,5* has no documented fire classification.
- *Protan G-FR 1,5* fulfils the requirements of class B_{ROOF} (t2).

Protan GG
Protan GG has a yellow upper surface and a dark grey underside. Protan GG has no documented fire classification.

Standard measures and tolerances are stated in table 1. Other thicknesses, lengths and widths can be supplied if required.

Table 1
Measures and tolerances for Protan G and GG according to EN 1848-2 and EN 1849

Property	Protan G	Protan GG	Unit	Tolerance
Thickness	1.5	2.0	mm	+10%/-5%
Area weight	1.65	2.2	kg/m²	+10%/-5%
Width	2.0	2.0	m	+1%/-0.5%
Length of roll	15	10	m	+5%/-0%
Weight of glass felt core	50	70	g/m²	-

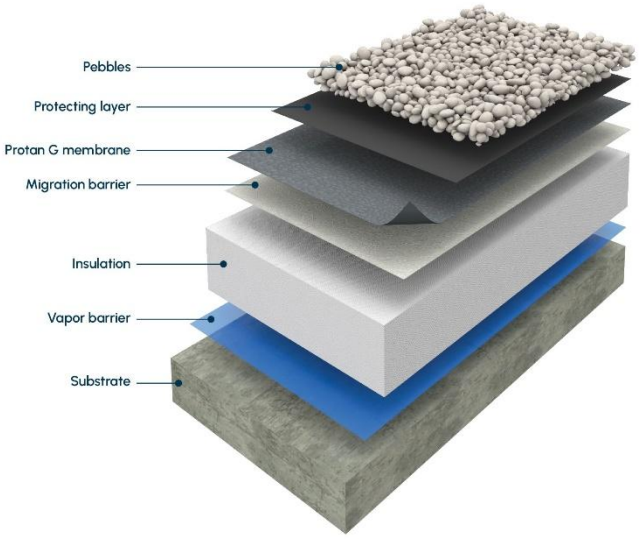


Fig. 1:
Protan G applied over the insulation and ballasted with gravel.
Figure: Protan AS

3. Fields of application

Protan G
Protan G can be used as roofing on pitched or flat roofs, with or without pedestrian traffic. The membrane shall be laid loosely, ballasted with gravel, concrete slabs, integral cast of concrete or used in intensive green roofs. In insulated constructions, the roofing can be installed over the insulation, below the insulation (inverted construction) or between two layers of insulation (duo construction).

Where fire technical class B_{ROOF} (t2) is required for the roofing membrane, Protan G-FR 1,5 must be applied.

Protan G shall not be mechanically fastened except to parapets where linear edge fastenings shall be used. Examples for roofing constructions with Protan G are shown in figure 1, 3 and 4.

Table 2
Product properties for fresh material of Protan G and GG roofing and waterproofing membranes

Property	Test method EN	Protan G		Protan GG		SINTEF's recommended minimum performance [3]	Unit
		DoP [1]	Control limit [2]	DoP [1]	Control limit [2]		
Foldability at low temperature	495-5	≤ -30	≤ -30	≤ -30	≤ -30	≤ -25	°C
Dimensional stability	1107-2	-	± 0.1	-	± 0.1	± 0.5	%
Water tightness, 10 kPa/24 h Water tightness, 150 kPa/1 h	1928 (A) 1928 (B)	Tight Tight	Tight [4] Tight [4] [10]	Tight Tight	Tight [4] Tight [4] [10]	Tight Tight [10]	-
Tear resistance L/T	12310-2	≥ 110	≥ 110	≥ 130	≥ 130	≥ 80	N
Tensile strength L/T	12311-2 (B)	≥ 7,5	≥ 7,5 [5]	≥ 7,5	≥ 7,5 [6]	≥ 380 N/50 mm [7]	N/mm²
Elongation at max. load L/T	12311-2 (B)	≥ 200	≥ 200	≥ 200	≥ 200	≥ 180	%
Shear resistance of joints	12317-2	≥ 450	≥ 450	≥ 600	≥ 600	≥ 380	N/50 mm
Resistance to puncture by							
- impact at +23°C	12691 (A)	≥ 600	≥ 600	≥ 900	≥ 900	≥ 400	mm
- impact at -10°C	12691:2001	-	≤ 20 [4]	-	≤ 20 [4]	≤ 20	mm diam.
- static loading	12730 (A)	-	-	-	-	≥ 20	kg
- static loading [8]	12730 (A)	-	≥ 20	-	≥ 20	≥ 20	kg
- static loading [9]	12730 (A)	-	≥ 20	-	≥ 20	≥ 20	kg
- static loading	12730 (B)	-	≥ 20	-	-	-	kg
- static loading	12730 (C)	≥ 20	-	≥ 20	-	-	
Root resistance	13948 /FLL	Tight	Passed [4] [10]	Tight	Passed [4] [10]	[10]	-

[1] The manufacturers Declaration of performance, DoP
[2] Control limit shows the value the product has to satisfy during internal factory production control and audit testing.
[3] SINTEFs recommended minimum values for SINTEF Technical Approval for ballasted membranes
[4] Result from type testing
[5] The value is given in N/mm². The specified value corresponds to 562.5 N/50 mm for Protan G 1.5 mm
[6] The value is given in N/mm². The specified value corresponds to 750 N/50 mm for Protan GG 2.0 mm
[7] Minimum performance for EN 12311-2, method A, given in N/50 mm
[8] with 180 g/m² polyester felt underlay
[9] with 50 g/m² glass felt underlay + 120 g/m² migration layer
[10] Additional requirement for water pressure membranes and /or parking decks

L = Longitudinal T = Transversal

Protan GG
Protan GG is a water pressure membrane primarily intended for use in parking decks, intensive green roofs, culverts and in-ground structures. Examples of applications are shown in figure 2 and 5. Protan GG is laid loosely, with ballast.

General
Roofs must have adequate slope to drain water from rain and melted snow. SINTEF recommends in general a minimum slope of 1:40 for all roofs. On terraces where the membrane is placed above the insulation the membrane can be laid with a minimum slope 1:100.

Other structures, such as parking decks and terraces, must have adequate slope to drain water from rain and melted snow. For inverted constructions or duo constructions the membrane can be laid horizontally when integrally casted wear layers have a slope towards gutter and drain of at least 1:100.

4. Properties

Product properties
Product properties for fresh material are shown in table 2.

Properties related to fire
Fire classification for Protan G 1,5 and Protan GG is not documented. To achieve satisfactory fire safety in buildings with requirements to class B_{ROOF} (t2) for the roofing the product must be covered. See more detailed description in chapter *6. Special conditions for use and installation*, section *Loosely laid with ballast*.

Protan G-FR 1,5 fulfils the requirements of fire class B_{ROOF} (t2) according to EN 13501-5 regarding external fire performance on substrates shown in table 3. Testing is performed according to CEN/TS 1187, test 2.

For more information regarding fire property requirements for the roofing, see TPF Informerer no. 6 *Branntekniske løsninger for kompakte tak og terrasser* published by Takprodusentenes Forskningsgruppe (TPF), see www.tpf-info.org.

Durability
The products have shown satisfying properties after artificial ageing in connection with type-testing and audit testing performed by SINTEF.

Table 3
Protan G-FR 1,5 has fire classification B_{ROOF} (t2) on following substrates

Type of substrate	Protan G-FR 1,5
EPS [1) 2)]	No
EPS [1)] + min. 120 g/m² glass felt [2)]	Yes
Mineral wool [1)]	No
Wood particle board [1)]	No
Concrete / calcium silicate plate [1)]	Yes
Old roofing membrane on EPS [2)]	No
Old roofing membrane on EPS + min. 120 g/m² glass felt [2)]	Yes
Old roofing membrane on mineral wool	No
Old roofing membrane on wood particle board	No
Old roofing membrane on concrete / calcium silicate plate	Yes

[1)] Standard substrate according to CEN/TS 1187, test 2.
[2)] In case of roofing on combustible insulation (e.g. EPS or PIR): See clause 6 *Special conditions for use and installation*, section *Substrate*, regarding requirements for replacement of combustible insulation to non-combustible around passages and against adjacent structures.

5. Environmental aspects

Substances hazardous to health and environment
The products contain no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

Effect on soil, surface water and ground water
The leaching properties of the products are evaluated to have no negative effects on soil or water.

Waste treatment/recycling
The products shall be sorted as residual waste. The products shall be delivered to an authorized waste treatment plant for material recycling or be sent to depone/landfill.

Environmental declaration
An environmental declaration (EPD) has been worked out according to EN 15804 for Protan G 1,5. For complete documentation see EPD no. NEPD-6561-5817-EN, *www.epd-norge.no*.

6. Special conditions for use and installation

Installation in general
Joints of Protan G and GG are welded with hot air. TPF Informerer no. 6 *Branntekniske løsninger for kompakte tak og terrasser* describes which roofing methods can be used on various roof structures. When roofing with hot air or open flame, all combustible insulation must in principle be protected with non-combustible insulation. However, TPF Informerer no. 6 describes exceptions for hot air welding of roofing membranes with fire class B_{ROOF} (t2).

Hot air welding of membranes installed directly on top of combustible insulation can, in principle, only be used if the membrane has class B_{ROOF}(t2) on the relevant substrate. For membranes without B_{ROOF}(t2) classification, 30 mm of non-combustible insulation must be placed between the membrane and the combustible insulation. However, if a glass fleece ≥ 120 g/m² is placed between the insulation and the roofing membrane to protect against ignition, hot air welding can be used even for membranes without fire classification when installed directly on top of combustible insulation. The roofing membrane also has to be sufficiently covered in accordance with TPF Informerer no. 6. In such cases, a risk assessment/Safe Job Analysis must be carried out for the specific construction project to document that the fire safety during welding is ensured.

Protan G and GG should only be used together with one of the layers mentioned in table 2, footnote 5) and 6).

The roofing membranes shall be installed by an authorised contractor in accordance with the manufacturer's installation manual and the principles shown in SINTEF Building Research Design Guide no.:

- 525.207 *Kompakte tak*
- 525.304 *Terrasse på etasjeskiller av betong for lett eller moderat trafikk*
- 525.306 *Terrasser med beplantning på bærende betongdekker*
- 525.307 *Tak for biltrafikk og parkering*
- 544.202 *Takfolie. Egenskaper og tekking*
- 544.204 *Tekking med asfalttakbelegg eller takfolie. Detaljløsninger*

plus information sheets issued by Takprodusentenes Forskningsgruppe (TPF), see www.tpf-info.org:

- TPF informerer nr. 5 *Innfesting av fleksible takbelegg, dimensjonering og utførelse*
- TPF informerer nr. 6 *Branntekniske løsninger for kompakte tak og terrasser*
- TPF informerer nr. 13 *Tak under oppføring – forholdsregler og tiltak ved bruk*

Loosely laid with ballast
The membrane is laid loosely with a ballast weight. Necessary ballast must be calculated according to SINTEF Building Research Design Guide no. 544.202 *Takfolie. Egenskaper og tekking* and TPF informerer nr. 5 *Innfesting av fleksible takbelegg, dimensjonering og utførelse*, clause 6.1 *Ballast*.

After welding the ballast must be applied immediately on the loose-laid roofing membrane to secure its position against wind uplift.

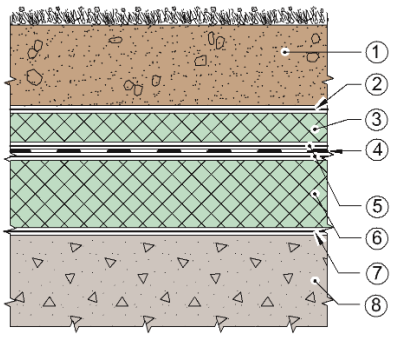
Adequate covering or ballast on roofing membranes that do not fulfil the requirements of class BROOF (t2) is described in TPF informerer nr. 6 *Branntekniske løsninger for kompakte tak og terrasser.*

There are special requirements and restrictions when using the product under "green roofs", see TPF informerer nr. 10 *Bygningsmessige aspekter ved prosjektering og bygging av grønne tak*.

In inverted roofs or duo-constructions, extruded polystyrene (XPS) should be used over the membrane. EPS should be avoided as EPS will absorb water and give reduced insulation.

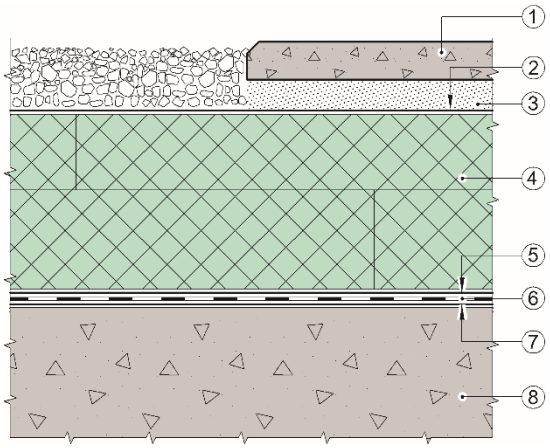
Substrate
Protan G-FR 1,5 must be applied where fire class B_{ROOF} (t2) is required, and the substrate must be in accordance with the provisions stated in clause 4 regarding *Properties related to fire*.

Substrates of combustible insulation, such as EPS, must be covered or divided into areas, and replaced with non-combustible insulation around bushings and adjacent constructions, such as parapets and walls, according to pre-accepted performances given in the guidance to *Forskrift om tekniske krav til byggverk § 11-9* and in TPF informerer nr. 6 *Branntekniske løsninger for kompakte tak og terrasser*.



1	Soil	5	Migration barrier *
2	Protection layer of geotextile	6	XPS / EPS
3	XPS	7	Vapour barrier
4	Protan GG	8	Structural deck

Fig. 2
Protan GG used in in ballasted and insulated, intensive, green roof.
* See special requirements for hot air welding of the roofing membrane on duo roofs in chapter *6. Special conditions for use and installation*, section *Installation*.

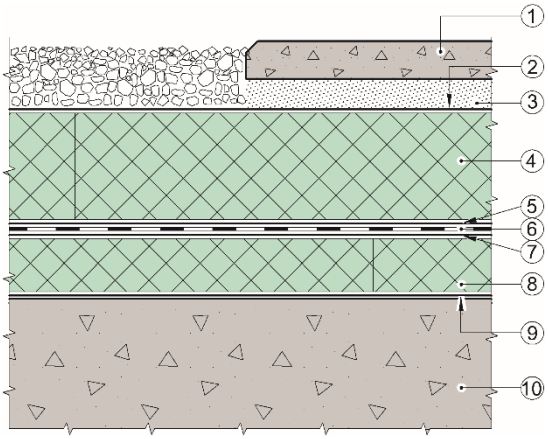


1	Gravel, concrete slabs etc.	5	Migration barrier
2	Optional separation layer	6	Protan G
3	Sand beneath concrete slabs	7	Sliding- / protection layer
4	XPS	8	Structural deck

Fig. 3
Protan G used in ballasted, insulated, inverted roof construction. Ballast of e.g. gravel or concrete slabs.

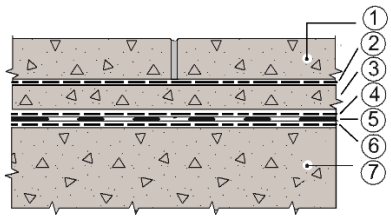
When the membranes are installed on old asphalt roofing without additional insulation or directly on EPS or XPS insulation, a separate migration barrier/separation layer shall be used in accordance with the manufacturer's installation manual. Re-roofing on top of old and rigid PVC roofing also requires a migration barrier.

When the membranes are applied directly on rough concrete underlay without additional insulation, a sliding- and protection layer shall be used. See SINTEF Building Research Design Guide no. 544.202 *Takfolie. Egenskaper og tekking. for additional requirements for migration barriers and protective layers*.



1	Gravel, concrete slabs etc.	6	Protan G
2	Optional separation layer	7	Optional migration barrier *
3	Sand beneath concretre slabs	8	Insulation
4	XPS	9	Vapour barrier
5	Migration barrier	10	Structural deck

Fig. 4
Protan G used in ballasted and insulated duo roof. Ballast of gravel or concrete slabs
* See special requirements for hot air welding of the roofing membrane on duo roofs in chapter *6. Special conditions for use and installation*, section *Installation*.



1	Wearing course of reinforced concrete	5	Protan GG
2	Optional barrier / sliding layer of 0,2 mm PE	6	Fibre felt of min. 300 g/m^2
3	Protective mortar of non-reinforced concrete	7	Structural deck
4	Sliding- / protection layer 1,2 – 2.0 mm		

Fig. 5
Protan GG used in parking deck with concrete surface.

Cleaning and maintenance
Before starting any welding, as a part of repair work, the roofing membrane must be cleaned locally, in accordance with the vendor's installation manual.

Transport and storage
The roofing membranes must be transported in a manner that does not damage the product and be stored in a dry location, placed on pallets and protected at the building site.

7. Factory production control

The products are produced by Protan AS, Baches vei 1, 3413 Lier, Norge.

The holder of the approval is responsible for maintaining the factory production control in order to ensure that Prota G and Protan GG are produced in accordance with the preconditions applying to this approval.

The manufacturing of the product(s) and the manufacturer's system for factory production control (FPC) is subject to continuous surveillance in accordance with the contract regarding SINTEF Technical Approval.

Protan AS has a quality management system certified according to EN ISO 9001 and an environmental management system certified according to EN ISO14001.

8. Basis for the approval

The product's characteristics are documented in reports issued by independent bodies. The technical documentation serves as the basis for SINTEF's product assessment with respect to the product standard EN 13956, the guidelines for SINTEF Technical Approval, and recommendations as outlined in SINTEF Building Research Design Guides.

9. Marking

All pallets/ packages/rolls shall be marked with the manufacturers name, product name and production number. All rolls are also marked with week number and year.

Protan G and GG are CE marked in accordance with EN 13956.

The approval mark for SINTEF Technical Approval TG 2008 may also be used.

10. Liability

The holder/manufacturer has sole product liability according to current law. Claims can only be made against SINTEF under general law or other special grounds.

for SINTEF

Ola Asphaug
Approval Manager