

SINTEF Building and Infrastructure confirms that

## Protan G, GG og GT roofing and waterproofing membranes

meets the provisions regarding product documentation given in Norwegian building regulations, with properties, fields of application and conditions as stated in this document

### 1. Holder of the approval

Protan AS  
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### 2. Manufacturer

Protan AS, Drammen

### 3. Product description

Protan G, GG and GT are three types of roofing and waterproofing membranes, all made of plasticized PVC with a core of glass felt.

Stabilizer and plasticizer are added to the products in order to make them resistant to high temperatures, and to provide crack resistance at low temperatures. Protan G and GT are also made resistant to ultra violet radiation, and Protan GT also has a fire stabilizer to resist external fire.

Table 1 shows standard measures and tolerances. Other dimensions are available on request.

Protan G 1.5 and GT are manufactured with several surface colours. Protan GG has a yellow surface colour. The underside of the membranes is dark grey.

Table 1  
Measures and tolerances for Protan G, GG and GT roofing and waterproofing membranes

Property	Protan G 1.5	Protan GG 2.0	Protan GT 2.4	Unit
Thickness	1.5	2.0	2.4	mm
Tolerance	+0.2 -0.15	+0.2 -0.2	+0.2 -0.2	mm mm
Weight	≥ 1.65	≥ 2.2	≥ 2.7	kg/m <sup>2</sup>
Width	2.0	2.0	2.0	m
Tolerance	± 2	± 2	± 2	%
Roll length	15	10	10	m
Tolerance	+2/-0	+2/-0	+2/-0	%
Weight of glass fibre core	50	80	80	g/m <sup>2</sup>

### 4. Fields of application

#### General

Roofs must have adequate slope to drain water from rain and melting snow. SINTEF Building and Infrastructure recommends that all roofs have an inclination of minimum 1:40. On normal terraces as shown, see fig. 1 and 2, the membrane can be laid with a minimum slope 1:100.

#### Ballasted roof

Protan G 1.5 is used as roofing membrane on pitched and flat roofs. The membrane is loosely laid with gravel ballast, tiles on pads or concrete slab. On insulated roofs the roofing may be installed as a normal roof, inverted roof or duo-roof construction.

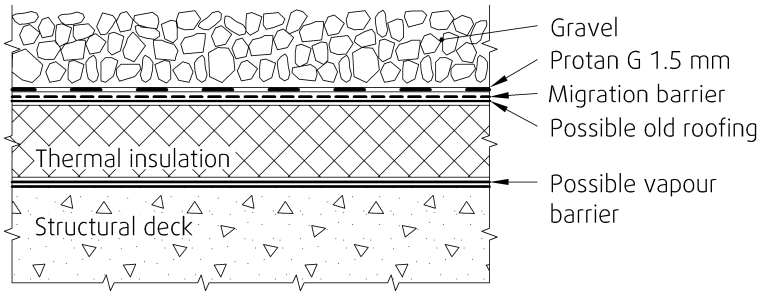
The membrane must not be used for mechanically fastened roofing. Examples of applications are shown in Fig. 1–4.

#### Roofs, terraces, parking decks

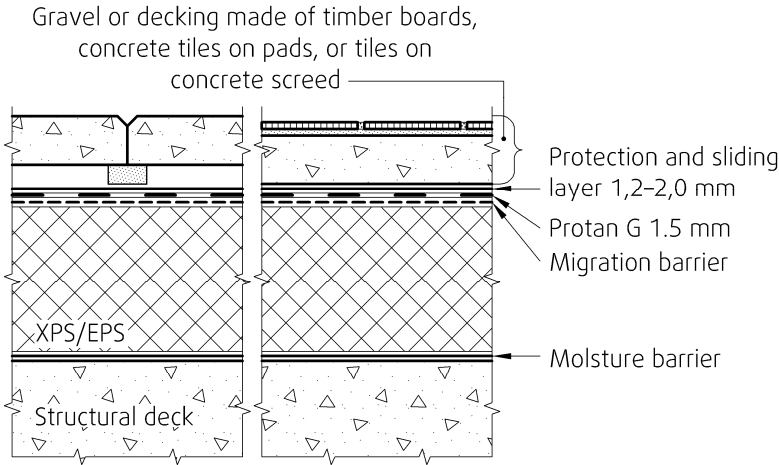
Protan G 1.5 is a waterproofing membrane primarily intended for use on ballasted roof and on terraces with pedestrian traffic. Fig. 2–4 show examples of the membrane used in terrace and roof structures. Protan G 1.5 is laid loosely, with ballast. Protan G is also used as covering in extensive green solutions, see Fig. 7.

Protan GG is a waterproofing membrane primarily intended for use in parking decks, on intensive green roofs, and in culverts and in-ground structures. Examples of applications are shown in Fig. 5 and 6. Protan GG is laid loosely, with ballast.

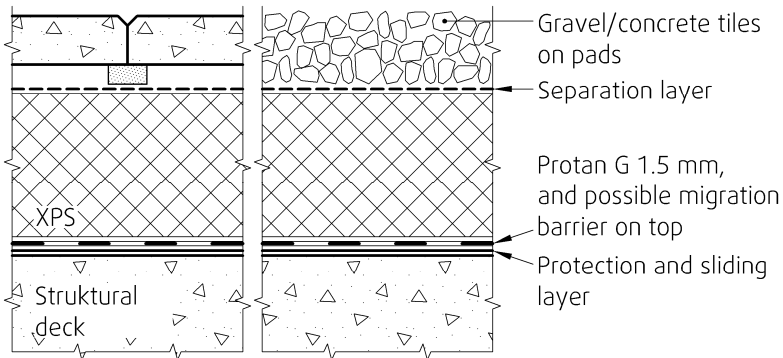
Protan GT is a waterproofing membrane primarily intended for use on terraces with pedestrian traffic. Protan GT is mechanically fastened as shown in Fig. 8.



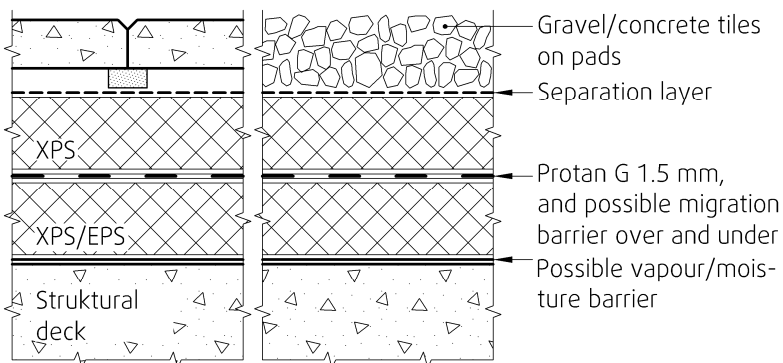
**Fig. 1**  
 Ballasted, insulated on straight roofs used for renovating old roof/new roofing



**Fig. 2**  
 Terrace, normal roof construction



**Fig. 3**  
 Terrace, inverted roof construction



**Fig. 4**  
 Terrace, duo-roof construction

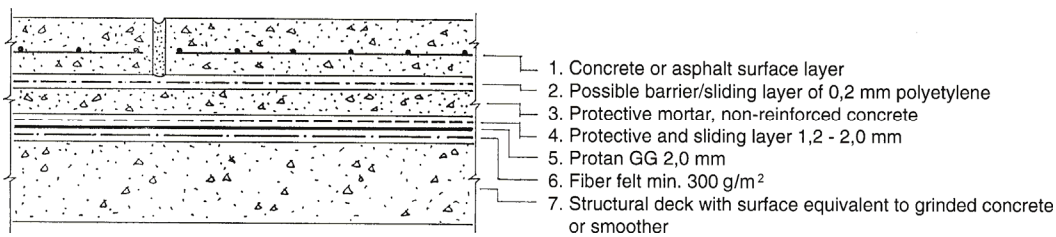


Fig. 5  
Parking deck with concrete surface

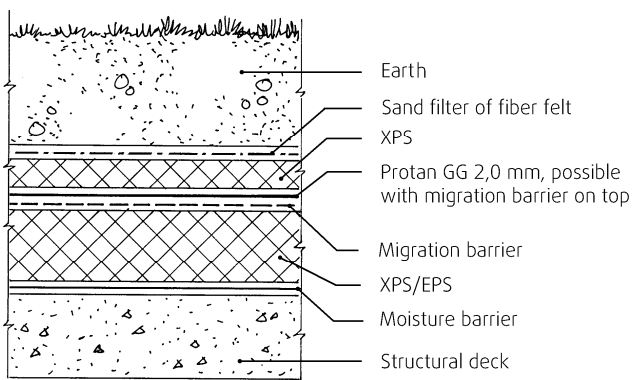


Fig. 6  
Intensive green roofs, culvert

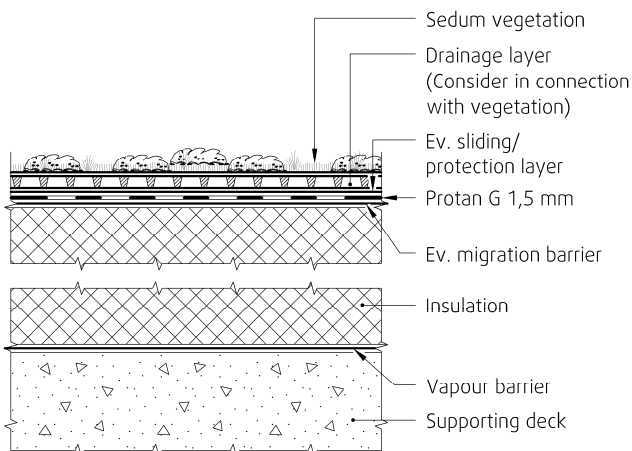


Fig. 7  
Protan G used in extensive green solutions

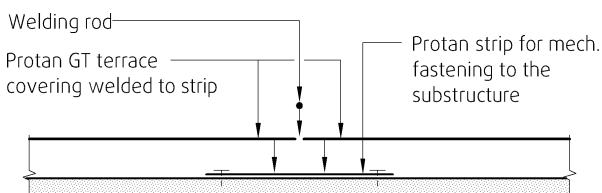


Fig. 8  
Fastening system for Protan GT

## 5. Properties

### Material properties

Product properties for fresh material are shown in Table 2.

### Safety in case of fire

Protan GT satisfies fire classification  $B_{ROOF}(t2)$  concerning spread of flames according to EN 13501-5 on non-combustible underlay with high density (i.e. min.  $680 \text{ kg/m}^3$ ) as e.g. in concrete or calcium silicate plates.

Protan G and GG and have no fire classification.

### Durability

Some properties after artificial ageing are given in Table 3. The products have shown satisfying properties after artificial ageing in connection with type-testing and audit testing performed by SINTEF Building and Infrastructure.

## 6. Environmental aspects

### Substances hazardous to health and environment

The product contains 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 product are evaluated to have no negative effects on soil, ground water or drinking water.

### Waste treatment/recycling

The products shall be sorted as mixed waste on the building/demolition site. The materials in Protan G, GG and GT can be recycled, and a system for recycling has been established. The products shall be delivered to an authorized waste treatment plant for energy recovery.

### Environmental declaration

No environmental declaration according to ISO 21930 has been worked out for Protan G, GG and GT.

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

Property	Test method EN	Control limit <sup>1)</sup>			Unit	
		Protan G 1.5	Protan GG 2.0	Protan GT 2.4		
Foldability at low temperature	495-5:2001	≤ -30	≤ -30	≤ -30	°C	
Dimensional stability	1107-2:2001	± 0.1	± 0.1	± 0.1	%	
Water tightness (10 kPa)	1928:2000 (A)	Tight	Tight	Tight	-	
Water tightness (150 kPa)	1928:2000 (B)	Tight	Tight	Tight		
Tear resistance	12310-2:2000	≥ 110	≥ 130	≥ 130	N	
Tensile strength	12311-2:2000 (A)	≥ 500	≥ 600	≥ 600	N/50 mm	
Elongation	12311-2:2000 (A)	≥ 200	≥ 200	≥ 200	%	
Average peel resistance of joints	12316-2:2000	-	-	≥ 250	N/50 mm	
Shear resistance of joints	12317-2:2000	≥ 450	≥ 600	≥ 550 <sup>2)</sup>	N/50 mm	
Resistance to puncture	- by impact at +23 °C	12691:2006 (A)	≥ 600	≥ 900	≥ 900	mm
	- by impact at -10 °C	12691:2001	≤ 20	≤ 20	≤ 20	mm diam.
	- by static loading	12730:2001 (A)	≥ 15	≥ 17.5	≥ 20	kg)
	- by static loading <sup>3)</sup>	12730:2001 (A)	≥ 20	-	-	kg)
	- by static loading <sup>4)</sup>	12730:2001 (A)	≥ 17.5	-	-	kg)
- by static loading <sup>5)</sup>	12730:2001 (A)	≥ 20	-	-	kg)	
Water vapour permeability	ISO 12572:2001	$9.5 \cdot 10^{-12}$	$7 \cdot 10^{-12}$	$6 \cdot 10^{-12}$	kg/m <sup>2</sup> sPa	
Water vapour resistance as equivalent air layer thickness	ISO 12572:2001	20	28	33	m	

<sup>1)</sup> The stated values are existing control limits for internal control at the producer and supervising control

<sup>2)</sup> Welded joint according to Figure 8

<sup>3)</sup> Result with 180 g/m<sup>2</sup> polyester felt underlay, according to fig. 1-4

<sup>4)</sup> Result with 120 g/m<sup>2</sup> glass felt underlay, according to fig. 1-4

<sup>5)</sup> Result with 50 g/m<sup>2</sup> glass felt underlay +1.0 mm migration barrier, according to fig. 2 and fig. 4.

Table 3  
Product properties for aged material of Protan G, GG and GT roofing and waterproofing membranes

Property	Test method EN	Measured value			Unit
		Protan G 1.5	Protan GG 2.0	Protan GT 2.4	
Foldability at low temperature - aged in hot water <sup>1)</sup>	495-5:2001	≤ -25	≤ -25	≤ -25	°C
		- artificial ageing <sup>2)</sup>	≤ -25	-	-
Dimensional stability - aged in hot water <sup>1)</sup>	1107-2:2001	± 0.2	± 0.2	± 0.2	%
		- artificial ageing <sup>2)</sup>	-	-	-

<sup>1)</sup> Aged according to method NS-EN 1847 (NS 3531) for 8 weeks at 60 °C

<sup>2)</sup> Aged according to method NS-EN 1297 with specimen are exposed to UV light, heat radiation, water, and laboratory climate

## 7. Special conditions for use and installation

### Storage

The membranes should be stored dry, with the rolls placed on pallets at the building site and protected by a covering.

### Installation in general

Joints of Protan G, GG and GT are welded with hot air. The membranes shall be installed by an authorised contractor in accordance with the manufacturer's instructions.

### Roofs and terraces

Protan G shall be used and installed in accordance with the principles shown in SINTEF Building Research Design Sheet 544.202 and 544.204, plus "TPF Informs No. 5".

Protan G, GG and GT shall be used and installed on roofs, terraces and parking decks according to the principles shown in SINTEF Building Research Design Sheet 525.207, 525.304, 525.306, 525.307, 544.202 and 544.204.

### *Fastening/ballast*

Necessary ballast is calculated according to Byggforsk Building Research Design Sheet 544.202 and "TPF Informs No. 5". Protan GT shall be mechanically fastened as shown in Fig. 8, or may, under certain conditions, be glued to the underlay.

### *Underlay*

Where fire classification of the underlay is required, the products can be placed on the underlay as defined in item 5 concerning security by fire.

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 as instructed by the producer shall be used.

When the membranes are applied directly on rough underlay without additional insulation, a protection layer of polyester felt or similar shall be used. SINTEF Building and Infrastructure recommends use of ca. 250 g/m<sup>2</sup> felt when applied directly on concrete underlay and minimum 300 g/m<sup>2</sup> felt on concrete underlay in constructions with heavy traffic.

## **8. Factory production control**

Protan G, GG and GT are subject to supervisory factory production control according to contract between SINTEF Building and Infrastructure and Protan AS concerning SINTEF Technical Approval.

The manufacturer Protan AS has a quality system which is certified by Det Norske Veritas according to ISO 9001, certificate no. 95-OSL-AQ-6343.

## **9. Basis for the approval**

Material- and design data have been verified by type-testing and audit testing performed by SINTEF Building and Infrastructure during the years 1975–2012.

Performance testing of Protan G 1.5 mm used as membrane in wet rooms is documented in report no. O3994-26A, dated 01.04.1997, from Norwegian Building Research Institute.

## **10. Marking**

All rolls/packages shall be marked with the manufacturers name, product name and date of production. All rolls are marked with the manufacturer's production code. The approval mark for SINTEF Technical Approval No. 2008 may also be used.



Approval mark

## **11. Liability**

The holder/manufacturer has sole product responsibility according to existing law. Claims resulting from the use of the product cannot be brought against SINTEF beyond the provisions of Norwegian Standard NS 8402.

## **12. Technical management**

Project manager for this approval is Knut Noreng, SINTEF Building and Infrastructure, Trondheim.

for SINTEF Building and Infrastructure

Tore Henrik Erichsen  
Approval Manager