SINTEF Technical Approval

TG 20953

Issued first time: 01.07.2026
Revised:
Amended:
Valid until 01.07.2031
Provided listed on
www.sintefcertification.no

SINTEF confirms that

Polar double-layer bituminous roofing membrane

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

General Membrane S.p.A.
Via Venezia 538
30022 Venezia
Italia
www.generalmembrane.it

2. Product description

Polar double-layer bituminous roofing membrane is made of SBS modified bitumen and reinforced with a non-woven polyester glass felt. The top layer is fully bonded to the underlay by welding. The roofing system consists of Polar 4000 as underlay and Polar 5000 as top layer. Measures and tolerances are given in table 1.

Table 1
Measures and tolerances for Polar 4000 and Polar 5000 according to EN 1848-1 and EN 1849-1

Property	Polar 4000	Polar 5000	Unit	Tolerance
Thickness	3.2	4.5	mm	
Area weight	4.0	5.0	kg/m²	± 10 %
Width	1.0	1.0	m	- 1 %
Length of roll	10	7.5	m	- 1 %
Weight of reinforcement	ca. 140	ca. 220	g/m²	-

Polar 4000 is made of SBS modified bitumen and reinforced with a non-woven polyester glass felt. The top surface can be covered with sand, thin plastic film or a non-woven polymeric fabric. The underside can be covered with thin plastic film or a non-woven polymeric fabric.

Polar 5000 is made of SBS modified bitumen and reinforced with a non-woven polyester glass felt. The top surface is covered with slate granules and thin plastic film or non-woven polymeric fabric on the overlap. The underside can be covered with thin plastic film or a non-woven polymeric fabric.

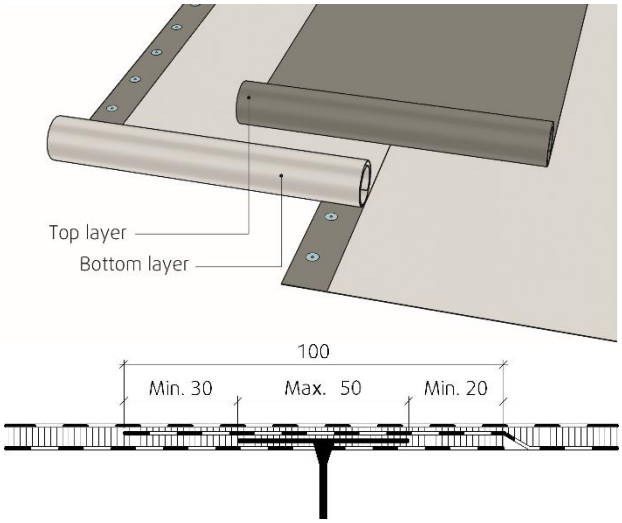

Fig. 1
Polar double-layer bituminous roofing membrane. The top layer is fully bonded by welding to the mechanically fixed underlay.

3. Fields of application

Polar double-layer bituminous roofing membrane can be used on sloping and flat roofs. It can be used both on new buildings and in rehabilitation projects. The system is designed especially for use as mechanically fixed double layer roofing membrane, see fig. 1.

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.

4. Product performance

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

Table 2 Product properties for fresh material of Polar double-layer roof waterproofing membrane

Property	Test method EN	Polar 4000 Underlay		SINTEF's recommended minimum performance [3]	Polar 5000 Overlay		SINTEF's recommended minimum performance [4]	Unit
		DoP [1]	Control limits [2]		DoP [1]	Control limits [2]		
Dimensional stability	1107-1	± 0.6	± 0.6	± 0.6	± 0.6	± 0.6	± 0.6	%
Flexibility at low temperature Surface out Surface in	1109	≤ -30	≤ -30	≤ -15	≤ -30	≤-30	≤ -15	°C
Flow resistance, < 2 mm at tested temp.	1110	≥ 100	≥ 100	≥ 90	≥ 100	≥ 100	≥ 90	°C
Watertightness, 10 kPa/24 h	1928 (A)	60 kPa	Passed [6]	Tight	60 kPa	Passed [6]	Tight	-
Adhesion of granules [5]	12039	Max 30 %	≤ 2.5	≤ 2.5	Max 30 %	≤ 2.5	≤ 2.5	g [5]
Resistance to tearing (nail shank) L/T	12310-1	250 ± 75 250 ± 75	≥ 230 ≥ 280	≥ 150	250 ± 75 250 ± 75	≥ 230 ≥ 280	-	N
Tensile strength L T	12311-1	700 ± 140 500 ± 100	≥ 750 ≥ 550	≥ 400	800 ± 160 750 ± 150	≥ 850 ≥ 680	≥ 400	N/50 mm
Elongation at max load L/T	12311-1	30 ± 15 35 ± 15	≥ 25 ≥ 30	≥ 10	40 ± 15 45 ± 15	≥ 25 ≥ 30	≥ 10	%
Average peel resistance of joints Sidelap/Endlap	12316-1	50	≥ 50	≥ 50	50	≥ 150	-	N/50 mm
Shear resistance of joints Sidelap/Endlap	12317-1	500 ± 100	≥ 550	≥ 400	750 ± 150	≥ 700	-	N/50 mm
Resistance to - Impact +23 °C - Static loading	12691 (A) 12730 (A)	800 15	800 15	500 15	≥ 900 ≥ 20	900 20	≥ 500 ≥ 15	mm kg
Watertightness after 10% elongation at -10 °C	13897	-	Passed [6]	Tight	-	Passed [6]	Tight	-

[1] The manufacturers Declaration of performance, DoP
[2] Control limits show values that the product has to satisfy during audit testing.
[3] SINTEF's recommended minimum performance in SINTEF Technical Approval for the underlay in double layer system
[4] SINTEF's recommended minimum performance in SINTEF Technical Approval for the overlay in double layer system
[5] Modified to give the result of weight loss of granules in gram
[6] Results from type testing

L = Longitudinal T = Transversal

Table 3
Polar double-layer roofing membrane has fire classification B_{ROOF} (t2) on following substrates

Type of substrate	
EPS [1] [2]	Yes
PIR	No
Mineral wool [1]	Yes
Wood particle board [1]	Yes
Concrete / calcium silicate board [1]	Yes
Old roofing membrane on EPS [1] [5]	Yes
Old roofing membrane on PIR	No
Old roofing membrane on mineral wool [1]	Yes
Old roofing membrane on wood particle board [1]	Yes
Old roofing membrane on concrete / calcium silicate board [1]	Yes

[1] Fire class B_{ROOF}(t2) applies to substrates with density ≥ 19 kg/m³, except PIR.
[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.

Properties related to fire
Polar double-layer bituminous roofing membrane fulfils the requirements of 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.

Table 4 Design capacity at ultimate limit state for the fastening of Polar double-layer roofing membrane with different fastening systems

Fastener/Fastening system Fastening in 100 mm welded overlap/joint Tested on soft substrate, Fastened to 0.75 mm steel plate, , f_y = 320 N/mm² Distance between fasteners: C/C 320 mm Row distance: C/C 900 mm	Design capacity N/fastener
SFS RP50 plastic washer and SFS BS-4.8 screw	867 [1]
Guardian R50 plastic washer and Guardian BS-4.8 screw	867 [1]

[1] Measured according to method EN 16002, safety factor γ_m=1.5 according to EAD 030351-00-0402. During a transitional period until January 1, 2028, designers may choose to use wind load capacities recalculated with a partial factor of γ_m=1.3

Durability
The products have shown satisfying properties after artificial ageing in connection with type-testing.

Fastening capacity
The design capacity for the fastening of the membrane with different fasteners and premises is given in table 4.

Fastening to weaker substrates than given in Table 4 may limit capacity and must be specifically documented.

It is not possible to assume increased wind load capacity with shorter distance between the fasteners then what was tested; due to uncertainty in the type of failure, ref. EAD 030351-00-0402 Annex 1. The fastener capacity can be reduced if the distance between the fastener rows is increased and/or if the difference between the row distance and the fastener distance is increased. The lowest capacity for attachment in the membrane / substrate must always be used for the calculation.

Calculation of fasteners' spacing is carried out according to SINTEF Building Research Design Guide no. 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate tak* and TPF informerer nr. 5 *Innfesting av fleksible takbelegg, dimensjonering og utførelse* published by Takprodusentenes Forskningsgruppe (TPF), see www.tpf-info.org.

5. Environmental aspects

Substances hazardous to health and environment
Polar double-layer bituminous roofing membrane 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 or water

Waste treatment/recycling
The product shall be sorted as residual waste. The product shall be delivered to an authorized waste treatment plant for type energy recycling.

6. Conditions of use

General
The roofing membrane shall be installed in accordance with the manufacturer's installation manual and the principles shown in SINTEF Building Research Design Guide no.:

- 544.203 *Asfalttakbelegg. Egenskaper og tekking*
- 544.204 *Tekking med asfalttakbelegg eller takfolie. Detaljløsninger*
- 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate tak*
- 525.207 *Kompakte tak*

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*

Installation
The underlay Polar 4000 shall be mechanically fastened with overlaps of minimum 100 mm which are welded over the entire width. The fasteners must be positioned minimum 45 mm from the membrane edge. Minimum 20 mm bonding on the inside and minimum 30 mm bonding on the outside of the fastener is required, see fig. 1.

The top layer Polar 5000 shall be installed with 120 mm welded overlaps and the sheets shall be fully welded to the underlay Polar 4000. The longitudinal overlaps of Polar 5000 shall be positioned on the middle of the underlay, see fig. 1.

Transverse joints must have an overlap of minimum 150 mm. The underlying corner is fastened, and the overlying corner is cut at an angle. A good result is achieved by 'drowning' the granules of the surface in bitumen before the joint is fully welded.

Polar double-layer roofing membrane can be torched or hot air welded.

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).

Fasteners
Normal steel washers may be used in longitudinal overlapping joints on firm substrates such as wood-based roof sheathing or concrete.

On substrates of thermal insulation with compressive strength ≥ 80 kPa (level CS(10)80 according to EN 13162/13163) steel washers with deep collars or plastic washers should be used.

Washers with integrated sleeves and good telescopic function must be used for installation on thermal insulation with lower compression strength, and the tightening of the fasteners must particularly be checked.

Substrate
When a fire classification is required 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*.

Traffic on the roof
Special precautionary measures should be taken to protect the roofing membrane if the roof is expected to have more traffic than is necessary for inspection and maintenance purposes only.

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
Polar double-layer bituminous roofing membrane must be transported in a manner that does not damage the product and stored upright on pallets.

7. Product and factory production control
Polar double-layer bituminous roofing membrane is produced by General Membrane S.p.A., Via Venezia 538, 30022 Ceggia (VE), Italy

The holder of the approval is responsible for maintaining the factory production control to ensure that Polar double-layer bituminous roofing membrane is manufactured in compliance with the preconditions upon which this approval is based.

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

The manufacturer has a quality management system certified according to EN ISO 9001 an environmental management system certified according to EN ISO 14001.

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 13707, the guidelines for SINTEF Technical Approval, and recommendations as outlined in SINTEF Building Research Design Guides.

9. Marking
Each roll shall be marked with the manufacturer's name, product code, product name and date of production.

Polar 4000 and Polar 5000 membrane is CE-marked in accordance with EN 13707.

The approval mark for SINTEF Technical Approval TG 20953 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

Hans Boye Skogstad
Approval Manager