

SINTEF confirms that

Ektafol PV and PF+ roofing 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

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2. Product description

Ektafol PV and PF+ are roofing membranes made of pliable PVC with a core of woven polyester. Stabilizers have been added to make the roofing resistant to high and low temperatures, ultraviolet radiation and atmospheric contaminations, and to limit spread of flames. Welding is carried out by using hot air.

Ektafol PF+ has a warm-concealed layer of polyester felt fixed to the bottom side.

The membranes are manufactured with several surface colours. The bottom side is dark grey.

3. Fields of application

Ektafol PV and PF+ are primary used as exposed, mechanically fastened roofing membranes on flat and sloping roofs, see fig. 1.

Ektafol PV can be used as roofing on all types of substrate but needs a separate migration barrier/levelling layer on polystyrene substrate and for re-roofing applications.

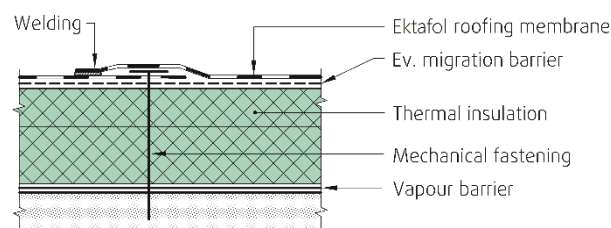


Fig. 1
Ektafol roofing membranes, mechanically fastened at the edge

Ektafol PF+ has warm concealed polyester felt and can be laid directly on old bituminous roofing underlays. The membrane can also be used under turf roofing. An additional loose felt should be laid on liquid applied bituminous roofing.

Roofs must have adequate slope to drain water from rain and melting snow. SINTEF Building and Infrastructure recommends in general a minimum slope of 1:40 for all roofs.

Table1

Measures and tolerances for Ektafol PV and PF+ roofing membranes, measured according EN 1848-2 and EN 1849-2.

Property	Ektafol PV		Ektafol PF+		Unit	Tolerance acc. EN 13956
Thickness	1,2	1,6	1,2 ¹⁾	1,6 ¹⁾	mm	+10 % / -5 %
Weight	1,4	1,8	1,4 ¹⁾	1,8 ¹⁾	kg/m ²	+10 % / -5 %
Width	1,0 / 2,0	1,0 / 2,0	1,0 / 2,0	1,0 / 2,0	m	+1 % / -0,5 %
Roll length	20	20	15	10	m	+5 % / -0 %
Weight polyester-core (impr.)	80	80	80	80	g/m ²	-
Weight polyester felt	-	-	180	180	g/m ²	-

¹⁾ Measured without polyester felt

Table 2

Product characteristics for fresh material of Ektafol PV and PF+ roofing membranes

Property	Ektafol	PV 1,2		PV 1,6		PF+ 1,2 ⁵⁾		PF+ 1,6 ⁵⁾		SINTEF's recom. minimum values ⁴⁾	Unit
	Test method EN	DoP ¹⁾	Control-limit ²⁾	DoP ¹⁾	Control-limit ²⁾	DoP ¹⁾	Control-limit ²⁾	DoP ¹⁾	Control-limit ²⁾		
Foldability at low temperature	495-5	≤ -30	≤ -30	≤ -30	≤ -30	≤ -30	≤ -30	≤ -30	≤ -30	≤ -30 ³⁾ ≤ -25 ³⁾	°C
Dimensional stability	1107-2	± 0,5	± 0,5	± 0,5	± 0,5	± 0,5	± 0,5	± 0,5	± 0,5	± 0,5	%
Water tightness (10 kPa)	1928 (A)	Tight	Tight	Tight	Tight	Tight	Tight	Tight	Tight	Tight	-
Tear resistance	L T 12310-2	≥ 210 ≥ 210	≥ 210 ≥ 210	≥ 210 ≥ 210	≥ 210 ≥ 210	≥ 300 ≥ 300	≥ 300 ≥ 300	≥ 300 ≥ 300	≥ 300 ≥ 300	≥ 180	N
Tensile strength	L T 12311-2 (A)	≥ 1100 ≥ 1050	≥ 1100 ≥ 1050	≥ 1100 ≥ 1100	≥ 1100 ≥ 1100	≥ 1100 ≥ 1100	≥ 1100 ≥ 1100	≥ 1100 ≥ 1100	≥ 1100 ≥ 1100	≥ 600	N/50mm
Elongation	L T 12311-2 (A)	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 15 ≥ 15	≥ 10	%
Peel resist.	Average Maximum 12316-2	- ≥ 200	- ⁶⁾ ≥ 200 ⁷⁾	- ≥ 200	- ⁶⁾ ≥ 200 ⁷⁾	- ≥ 200	- ⁶⁾ ≥ 200 ⁷⁾	- ≥ 200	- ⁶⁾ ≥ 200 ⁷⁾	≥ 150 ≥ 200	N/50mm
Shear resistance joints	12317-2	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 600	N/50mm
Puncturing	- Impact v/+23°C - Impact v/-10°C - Static load - Static load	12691 (A) 12691:2001 12730 (A) 12730 (C)	≥ 400 ≤ 10 ≥ 20 -	≥ 400 ≤ 10 - ≥ 20	≥ 500 ≤ 10 ≥ 20 -	≥ 400 ≤ 10 - ≥ 20	≥ 400 ≤ 10 - ≥ 20	≥ 600 ≤ 10 - ≥ 20	≥ 600 ≤ 10 ≥ 20 -	≥ 400 ≤ 15 ≥ 20 -	mm mm diam. kg kg
Water vapour resistance / equiv. air layer thickness	ISO 12572	-	16	-	22	-	16	-	22	-	m
Adhesion of polyester felt	ASTM D 1876	-	-	-	-	-	≥ 20	-	≥ 20	-	N/50mm

¹⁾ The manufacturers Declaration of performance, DoP²⁾ Control limit shows values, product has to satisfy during internal factory production control and audit testing.³⁾ SINTEF's recommended minimum values are -30 °C for membranes of 1,2 mm thickness and -25 °C for membranes of 1,5 mm thickness and more⁴⁾ SINTEF's recommended minimum values for SINTEF Technical Approval for mechanically fastened membranes⁵⁾ Is tested with warm concealed polyester felt.⁶⁾ For failure mode A the average peel resistance has to be assessed towards SINTEF's recommended minimum value for average peel resistance⁷⁾ The control limit applies for failure mode B and C

4. Properties

Material properties

Product characteristics for fresh material are shown in Table 2.

Safety in case of fire

Ektafol PV fulfils the requirements of class B_{ROOF} (t2) according to EN 13501-5 regarding external fire performance on substrates shown in table 3.

PF+ fulfils the requirements of class B_{ROOF} (t2) according to EN 13501-5 regarding external fire performance on substrates shown in table 4.

Testing is performed according to CEN/TS 1187, test 2.

Calculation of fasteners

Load capacities for fastening the roofing membrane with various types of fasteners are shown in Table 5. The capacities relate to the fastening of the membrane itself. The strength of the hold to weak substrate may limit the overall capacity of the fixing points. The lowest value for membrane/foundation must always be used.

Calculation of fastener spacing is carried out according to SINTEF Building Research Design Guide 544.206 Mekanisk feste av asfalttakbelegg og takfolie på flate tak and "TPF Inform No. 5" published by Takprodusentenes Forskningsgruppe.

Table 3

Ektafol PV is classified for B_{ROOF} (t2) on following substrates

Type of substrate	Ektafol PV
EPS *	No
EPS + ≥120 g/m ² glass felt	Yes
PIR * / **	Yes
Stone wool	Yes
Wooden roof boards	Yes
Concrete / silicate board	Yes
Old roofing membrane on EPS	No
Old roofing membrane on EPS + ≥120 g/m ² glass felt	Yes
Old roofing membrane on PIR * / **	Yes
Old roofing membrane on stone wool	Yes
Old roofing membrane on wooden roof boards	Yes
Old roofing membrane on concrete / silicate board	Yes

* In case of roofing on lightweight combustible insulation (eg 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.

** Fire technical classification on PIR applies only to the tested PIR product "PIR Kingspan Therma TR26 LPC/FM".

Table 4

Ektafol PF+ is classified for B_{ROOF} (t2) on following substrates

Type of substrate	Ektafol PF+
EPS *	No
Stone wool	Yes
Wooden roof boards	Yes
Concrete / Silicate board	Yes
Old roofing membrane on EPS * / **	Yes
Old roofing membrane on stone wool	Yes
Old roofing membrane on wooden roof boards	Yes
Old roofing membrane on concrete / silicate board	Yes

* In case of roofing on lightweight combustible insulation (eg 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.

** See clause 6 *Special conditions for use and installation*, section *Substrate*, regarding requirements for the old roofing membrane.

Table 5

Design capacities at ultimate limit state for mechanical fasteners in Ektafol PV, PVG og PF+

Festesystem/festemiddel	Kapasitet ¹⁾ , N/stk.
Ektafol PV (overlapp)	
Pappspiker 2,8-25	100
Kramper (2 x 20 mm)	130
ECOTEK 40 skiver	650
SFS isotak R45/RH45/RP45 festebricke	700
SFS isotak RP48-3N festebricke med pigg	1000
Ektafol PF+ (overlapp)	
SFS isotak R45/RH45/RP45 festebricke	700
SFS intec IR 82 x 40 stålskive	1100
Pull through membrane (outside overlapp)	
SFS isotak R45/RH45/RP45 festebricke	1000
SFS isotak RP48-3N festebricke med pigg	1000
SFS intec MW-40-F/MW-40-R festeskive	1000
SFS intec MW-40-LBS lettbetongplugg	1000
SFS intec IR 82 x 40 stålskive	1200
Klebet til gammel asfalt teknikk med Soudal 26 A med ca. 0,5 kg/m ²	2500 N/m ²

¹⁾ The values given in table 5 are design capacities at ultimate limit state for use in Norway with safety factor $\gamma_m=1,3$.

Also other fasteners than those given in table 5 can be used if they are documented with ETA or SINTEF Technical Approval.

Durability

The products have shown satisfying properties are related to type-testing and annual control testing performed by SINTEF Building and Infrastructure.

5. Environmental aspects

Substances hazardous to health and environment

Ektafol PV og PF+ 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 products are evaluated to have no negative effects on soil or water.

Waste treatment/recycling

Ektafol PV og PF+ shall be sorted residual waste. The product shall be delivered to an authorized waste treatment plant for energy recovery.

Ektafol PV og PF+ can by ended service life be delivered to material recycling in recycling system.

Environmental declaration

No environmental declaration (EPD) has been worked out for Ektafol PV og PF+.

6. Special conditions for use and installation

Fasteners

Fastening with normal steel washers can be used in longitudinal overlap joints on stiff underlay, i.e. on wood-based roof sheathing or on concrete.

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On underlay of insulation material with good compression strength like EPS with compression strength of ≥ 80 kPa (class CS (10) 80 according to EN 13162/13163), plastic fasteners with integrated sleeve are preferably used.

When roofing membranes are installed on insulation material with lower compression strength, the tightening of the fasteners must be controlled and fasteners with good telescopic action must be used.

Widths over 1 m should only be used at the field zone of the roof where the design peak velocity pressure is less than 3.75 kN/m² with exception of vacuum roofing where rolls of 2 m widths should be placed on the whole roof surface. When rolls with widths of above 1 m are used an accurate design consideration for distances and numbers of fasteners need to be done.

Installation

The joints are welded by the use of hot air, and the membranes shall be installed in accordance with the manufacturer's instructions. The products shall otherwise be used in accordance with the principles shown in "TPF Informs No. 5" and in the following SINTEF Building Research Design Guides:

- 544.202 Takfolie. Egenskaper og tekking
- 544.204 Tekking med asfalttakbelegg eller takfolie. Detaljløsninger
- 544.206 Mekanisk feste av asfalttakbelegg og takfolie på flate tak,

Substrate

When a fire classification is required the underlay must be in accordance with the provisions stated in section 4 *Safety in case of fire*.

Substrates of combustible insulation as EPS or PIR must be covered or divided, and also replaced with non-combustible insulation around bushings and adjacent constructions according to regulations in "Veiledning om tekniske krav til byggverk" § 11-9 and further descriptions in SINTEF Building Research Design Guides no. 525.207 *Kompakte tak* og 520.339 *Bruk av brennbar isolasjon i bygninger*, and "TPF informerer nr. 6 Branntekniske konstruksjoner for tak" published by Takprodusentenes Forskningsgruppe.

In connection with re-roofing, on old bituminous roofing membrane laid on insulation of EPS, the membrane in the old roofing must fulfil the requirements of class B_{ROOF} (t2) according to EN 13501-5 on EPS. When the membrane is installed on old asphalt roofing without additional insulation, Ektafol PV with a separate barrier or Ektafol PF+ shall be used.

A separate migration barrier of either a glass felt with in minimum 100 g/m² or a polyester felt of in minimum 180 g/m² must be used when the roofing is installed directly on old, aged PVC, or on EPS insulation.

Ektafol PF+ is recommended for installation on wood-based roof sheathing.

Inspections and maintenance

The roofing membranes must be cleaned locally before starting any welding of joints as a part of repair work.

Roof traffic

When it is expected that roof traffic may exceed what is required for normal inspection visits and maintenance, special measures should be taken to protect the roofing membrane.

Storage

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

7. Factory production control

The product is produced by Protan AS, P.O. Box 420, 3002 Drammen, Norway.

The holder of the approval is responsible for the factory production control in order to ensure that the product is

produced in accordance with the preconditions applying to this approval.

The manufacturing of the product is subject to continuous surveillance of the factory production control in accordance with the contract regarding 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.

8. Basis for the approval

Material- and design data have been verified by type testing and audit testing is performed by SINTEF Building and Infrastructure during the years 1975–2022.

Resistance against spread of flames have been verified by type testing and audit testing performed during the years 1975–2022.

The data in Table 5 is based on system tests in accordance with the test methods NT Build 307 and NBI 162/90, supplemented by comparable results from simplified tests in accordance with NBI 163/91, plus on tests according to ETAG 006 and EN 16002.

9. Marking

All rolls/packages shall be marked with the manufacturer's name, product name and date of production. Each roll need to be marked med manufacturers production code. The product is CE marked in accordance with EN 13956. The approval mark for SINTEF Technical Approval No. 2040 may also be used.



Approval mark

10. 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

for SINTEF

Hans Boye Skogstad
Approval Manager