

SINTEF Building and Infrastructure confirms that

## Ektafol PV, PVG and PF+ roof coverings

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

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### 2. Manufacturer

Manufactured by Protan AS, Drammen, according to specifications from Ektakon AS, proprietors of the "Ektafol" trademark.

### 3. Product description

Ektafol PV, PVG and PF+ are roof coverings made from pliable PVC incorporating a woven polyester reinforcement. A stabiliser is applied to the coverings to render the products resistant to high and low temperatures, ultraviolet radiation and atmospheric pollution, as well as fire resistant. Installation and jointing is carried out by means of hot air.

Ektafol roof coverings are supplied in two thicknesses with specifications as given in Table 1. In addition, Ektafol PF+ and PVG respectively have polyester felt and glass-felt laminated to the underside.

Standard widths are 1 m and 2 m, and standard length is 20 m per. roll. The roof coverings can be supplied with the upper side in various standard colours. The underside is dark grey.

### 4. Fields of application

Ektafol roof coverings are used as exposed, mechanically fastened roofing on flat and sloping roofs (see fig. 1).

Ektafol PV can be used as roofing on all types of substructure, but a separate migration barrier/levelling layer is needed against polystyrene substructures or when re-roofing.

Ektafol PF+ has polyester felt laminated to its underside and can be laid directly on old roofing underlays, as well as used as roofing under turf. On liquid applied asphalt roofing, an additional loose felt should be laid.

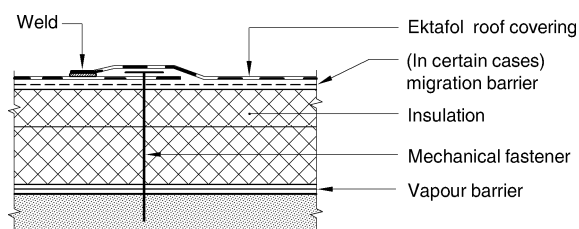


Fig. 1  
 Ektafol roof covering with mechanical fastening at overlap joint

Ektafol PVG is laminated with glass felt and can be laid directly on polystyrene.

Roofs must have sufficient gradient so that rain and meltwater can run off. SINTEF Building and Infrastructure recommend that all roofs should have an inclination of min. 1:40.

### 5. Properties

#### Material properties

The product properties for new material are given in Table 2.

#### Safety in case of fire

Ektafol PV fulfils the requirements of class B<sub>ROOF</sub> (t2) according to EN 13501-5 for all underlay except EPS/XPS-insulation. When using a migration barrier of at least 120 g/m<sup>2</sup> glass felt, Ektafol PV fulfils class B<sub>ROOF</sub> (t1) and (t2) also on EPS/XPS-insulation.

Ektafol PF+ satisfies fire-resistance class B<sub>ROOF</sub> (t2) in accordance with EN 13501-5 on re-roofing foundation.

Ektafol PVG satisfies fire-resistance Class B<sub>ROOF</sub> (t2) in accordance with EN 13501-5 on all substructures except re-roofing.

The testing is carried out in accordance with ENV 1187.

#### 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.

SINTEF Byggforsk is Norwegian member of European Organisation for Technical Approvals, EOTA, and European Union of Agrément, UEAtc

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Subject: Roof Covering

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**Table 1**  
Dimensions and tolerances for Ektafol PV, PVG and PF+ roof coverings

	Ektafol PV		Ektafol PVG	Ektafol PF+	
Thickness (mm)	1.2 +0.2/-0.1	1.6 +0.2/-0.15	1.2 + felt + 0.2/-0.10	1.2 + felt +0.2/-0.1	1.6 + felt +0.2/-0.15
Weight (kg/m <sup>2</sup> )	1.4 +0.2/-0.1	1.8 +0.2/-0.1	1.4 + felt + 0.2/-0.1	1.4 + felt +0.2/-0.1	1.8 + felt +0.2/-0.1
Width	1 m and 2 m ± 2 %	1 m and 2 m ± 2 %	1 m and 2 m ± 2 %	1 m and 2 m ± 2 %	1 m and 2 m ± 2 %
Roll length	20 m + 2 %/-0 %	20 m +2 %/-0 %	20 m +2 %/-0 %	20 m +2 %/-0 %	20 m +2 %/-0 %
Weight of polyester core (impr.)	80 g/m <sup>2</sup>	80 g/m <sup>2</sup>	80 g/m <sup>2</sup>	80 g/m <sup>2</sup>	80 g/m <sup>2</sup>
Weight of polyester felt				180 g/m <sup>2</sup>	180 g/m <sup>2</sup>
Weight of glass-fibre felt			55 g/m <sup>2</sup>		

**Table 2**  
Product properties for new materials of Ektafol PV, PVG and PF+ roof coverings

Property	Test method EN	Control limit <sup>1)</sup>					Units
		Ektafol PV		Ektafol PVG	Ektafol PF+		
		1.2 mm	1.6 mm	1.2 mm	1.2 mm w/felt	1.6 mm w/felt	
Foldability at low temperature	495-5:2001	≤ -30	≤ -25	≤ -30	≤ -30	≤ -25	°C
Dimensional stability	1107-2:2001	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	%
Water tightness (10 kPa)	1928:2000 (A)	Tight	Tight	Tight	Tight	Tight	-
Tear resistance	12310-2:2000	≥ 210	≥ 210	≥ 210	≥ 300	≥ 300	N
Tensile strength	12311-2:2000 (A)	≥ 1050	≥ 1050	≥ 1050	≥ 1100	≥ 1100	N/50 mm
Elongation	12311-2:2000 (A)	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	%
Average peel resistance of joints	12316-2	≥ 150	≥ 150	≥ 150	≥ 150	≥ 150	N/50 mm
Shear resistance of joints	12317-2	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	N/50 mm
Resistance to puncture							
- By impact at +23 °C	12691:2006 (A)	≥ 500	≥ 700	≥ 500	≥ 500	≥ 700	mm
- By impact at -10 °C	12691:2001	≤ 8	≤ 8	≤ 10	≤ 8	≤ 8	mm diam.
- By static load	12370:2001 (A)	≥ 20	≥ 20	≥ 20	≥ 20	≥ 20	kg
Water-vapour permeability	ISO 12572:2001	12 · 10 <sup>-12</sup>	9 · 10 <sup>-12</sup>	12 · 10 <sup>-12</sup>	12 · 10 <sup>-12</sup>	9 · 10 <sup>-12</sup>	kg/m <sup>2</sup> s Pa
Water vapor resistance as equivalent air-layer thickness	ISO 12572:2001	16	22	16	16	22	m
Adhesion of polyester felt	ASTM D 1876				≥ 20	≥ 20	N/50 mm

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

**Table 3**  
Product properties for aged materials of Ektafol PV, PVG and PF+ roof coverings

Property	Test method EN	Measured value				Units	
		Ektafol PV		Ektafol PVG	Ektafol PF+		
		1.2 mm	1.6 mm	1.2 mm	1.2 mm		1.6 mm
Foldability at low temperature after Artificial ageing <sup>1)</sup>	495-5:2001	≤ -25		≤ -25	≤ -25		°C

<sup>1)</sup> Aged according to method NS-EN 1297 where exposure comprises UV-radiation, heat, sprayed-on water and laboratory climate

### Calculation of fasteners

Load capacities for fastening the roofing membrane with various types of fasteners are shown in Table 4. The capacities relate to the fastening of the membrane itself. The strength of the hold to weak underlay 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 Sheet 544.206 and "TPF Informs No. 5".

Table 4

Design capacities at ultimate limit state for mechanical fastenings when fastening Ektafol roof coverings

Fastening system/Fastener	Capacity, N per fastener
<b>Placed at lane edge, Ektafol PV and PVG</b>	
Roofing nail 2,8–25	100
Staples (2 x 20 mm)	130
Eurofast TLK Ø45 fastener	620
SFS intec MW-40-F washer	650
SFS intec MW-40-R washer	650
Guardian SP 40-F washer	650
SFS IR-82x40 washer	650
Guardian SPA 8240-D washer	700
SFS Iso-Tak R45/RP45 fastener	700
Guardian R(P) 45 fastener	700
SFS Iso-Tak LB45 light weight concrete plug	700
Koelner GOK-Plus fastener with studs	720
Ecotek50 IH-P fastener with studs	720
Milletech Quatro-T fastener with studs	750
Guardian CBF/CP concrete plug	800
SFS IG8-C 82x40 washer	900
Guardian RB(P) 48 fastener with studs	900
Guardian SPBA 8240 washer	1000
SFS Iso-Tak R(P) 48–3N fastener with studs	1000
SFS Iso-Tak TPS/TPP fastener with studs	1100
<b>Placed at the edge, Ektafol PV</b>	
SFS Iso-Tak R45/RP45 fastener	725
SFS intec MW-40-F/ MW-40-R washer	900
Iso-Tak TPP fastener with studs	1100
<b>Pull through resistance, Ektafol PV, PVG and PF+</b>	
SFS Iso-Tak R45/RP45 fastener	1000
SFS intec MW-40-F/ MW-40-R washer	1100
Glued to old roofing felt with Soudal 26A, approx. 0.5 kg/m <sup>2</sup>	N/m <sup>2</sup>
Bitumen overlay	2500

<sup>1)</sup> Where no value for PF+ is given, the values for PV and PVG can be used.

## 6. Environmental aspects

### Environmental declaration

Specific environmental declaration according to ISO 21930 has been worked out for Ektafol PV. Environmental indicators are given in Table 4. For complete documentation see environmental declaration document NEPD No. 0032 on <http://www.epd-norge.no/> (see "EPD-register"). No environmental declarations have been worked out for the other membranes.

Table 4

Environmental declaration for Ektafol PV 1.2 mm

Environmental indicators	
Global warming	5.7 kg CO <sub>2</sub> ekv.
Energy use	28.6 kWh
Recycled materials	0 %
Indoor air classification (Classification according to EN 15251:2007)	Not relevant

### Substances hazardous to health and environment

The products contain no hazardous substances with priority in quantities that pose any 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 Ektafol PV, PVG and PF+ 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.

## 7. Special conditions for use and installation

### Storage

Ektafol roof coverings should be stored in a dry place with the rolls placed on pallets and protected at the building site with tarpaulins or similar.

### Installation

Joints in Ektafol roof coverings should be welded using hot air, and should be installed in accordance with the manufacturer's instructions. The roof coverings should furthermore be used in accordance with the principles in Byggforsk Building Design Sheet Nos. 544.202, 544.204 and 544.206, as well as "TPF informer nr. 5".

Rolled-out widths exceeding 1 m should only be used on the mid section of a roof surface and where design wind-gust speed pressures are less than 3.75 kN/m<sup>2</sup>. Spacing between fastening points should not exceed 1 m.

### Fasteners

Fastening with ordinary steel washer can be used in longitudinal overlap joints on firm substructures such as eg. woodbased roof sheathing or concrete.

On substructures of insulation material like EPS with compressive strength  $\geq 80$  kPa (class CS (10) 80 according to NS-EN 13162/13163) plastic fasteners with integrated sleeve should be 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.

On roofs with 2 m width, fasteners of  $\geq 900$  N/fastener capacities shall preferably be used.

#### *Ballast*

Ballast is calculated as indicated in SINTEF Design Sheet No. 544.202 and "TPF informer nr. 5".

#### *Underlay*

When a fire classification is required the underlay must be in accordance with the provisions stated in section 5 "Safety in case of fire".

Ektafol PVG or a separate migration barrier must be used when the roofing is installed directly on old, aged PVC, or on EPS or XPS insulation.

When the membrane is installed on old asphalt roofing without additional insulation, it is preferable to use Ektafol PF+, alternatively Ektafol PV with loose migration barrier layer.

E is recommended for installation on wood-based roof sheathing.

#### *Maintenance and repair*

In the case of repairs, the roofing must be cleaned locally before any welding work is undertaken.

#### *Roof traffic*

If abnormal movement/traffic is anticipated on the roof, over and above that which is required for inspection and maintenance, special precautions should be taken to protect the roof covering.

### **8. Factory production control**

Ektafol PV, PVG and PF+ are subject to continuous supervisory product and production control according to contract between SINTEF Building and Infrastructure and Ektafol AS concerning SINTEF Technical Approval with appurtenant product control description.

The manufacturer Ektafol AS has a quality system which is certified by Det Norske Veritas according to ISO 9001:2008, certificate no. 95-OSL-AQ-6343.

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

Material and design data is determined by means of type testing and audit testing carried out at SINTEF Building and Infrastructure in the period 1975–2012.

Resistance against spread of flames have been verified by type testing and audit testing performed by the Norwegian Fire Research Laboratory during the years 1975–2012.

The data in Table 4 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.

### **10. Marking**

All rolls/packages shall be marked with the manufacturer's product code, product name and date of production. The approval mark for SINTEF Technical Approval No. 2040 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.

### **11. Technical management**

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

for SINTEF Building and Infrastructure

Hans Boye Skogstad  
Approval Manager