SINTEF Technical Approval

TG 20630

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Provided listed on
www.sintefcertification.no

SINTEF confirms that

Rhenofol CV, mechanical fastened 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

FDT Flachdach Technologie GmbH
Eisenbahnstrasse 6-8
68199 Mannheim
Germany
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2. Product description

Rhenofol CV are roofing membranes, made of PVC-P, with a core of synthetic polyester fabric. Stabilizer and plasticizer have been added to make the PVC coating resistant to UV radiation as well as to high and low temperatures. The products can be applied in different colours with a dark grey bottom side.

Measures and tolerances are stated in table 1.

Table 1
Measures and tolerances for Rhenofol CV
according to EN 1848-2 and EN 1849-2

Property	CV 1.5	CV 1.8	CV 2.0	Unit	Tolerance
Thickness	1.5	1.8	2.0	mm	+10%/-5%
Area weight	1.75	2.20	2.44	kg/m²	+10%/-5%
Width	2.05 1.50 1.03 0.68 0.50	2.05 1.50 1.03	1.50	m	+1%/-0,5%
Length of roll	20/15	15	15	m	+5%/-0%
Weight of core	ca.100	ca.100	ca.100	g/m²	-

3. Fields of application

Rhenofol CV products are intended for use as exposed, mechanically fastened roofing membranes on flat and pitched roofs, see Fig. 1.

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

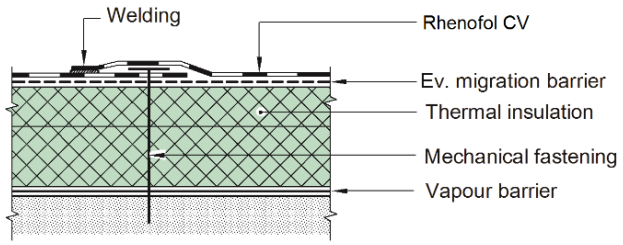

Fig. 1
Rhenofol CV, mechanically fastened in a straight roof construction.

4. Product performance

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

Properties related to fire
Rhenofol CV products fulfil 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.

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

Fastening capacity
The design capacity for the fastening of the membrane is given in table 4.

For weak substrates the connection between the substrate and the fastener might limit the capacity. This must be considered.

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Table 2
Product properties for fresh material of Rhenofol CV roofing membranes

Property		Test-method EN	CV 1.5		CV 1.8		CV 2.0		SINTEFs recommended minimum values [3]	Unit
			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	≤ -25 [4]	°C
Dimensional stability		1107-2	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2	± 0,5	%
Water tightness 10 kPa/42 h		1928 (B)	-	Passed [5]	-	Passed [5]	-	Passed [5]	Passed	
Water tightness 400 kPa/72 h		1928 (B)	Passed-	-	Passed	-	Passed	-	-	-
Tear resistance	L/T	12310-2	≥ 180	≥ 180	≥ 180	≥ 180	≥ 180	≥ 180	≥ 180	N
Tensile strength	L/T	12311-2 (A)	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 1000	≥ 600	N/50mm
Elongation at max. load	L/T	12311-2 (A)	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	≥ 10	%
Peel resistance	Average Maximum	12316-2	- ≥ 250	≥ 200 [6] ≥ 250 [7]	- ≥ 250	≥ 200 [6] ≥ 250 [7]	- ≥ 250	≥ 200 [6] ≥ 250 [7]	≥ 150 ≥ 200	N/50mm
Shear resistance joints		12317-2	≥ 900	≥ 900	≥ 900	≥ 900	≥ 900	≥ 900	≥ 600	N/50mm
Resistance to puncture by - Impact at +23 °C - Impact at -10 °C - Static load		12691 (A) 12691:2001 12730 (A)	≥ 900 - ≥ 20	≥ 900 ≤ 15 [5] ≥ 20	≥ 1200 - ≥ 20	≥ 1200 ≤ 15 [5] ≥ 20	≥ 1500 - ≥ 20	≥ 1500 ≤ 15 [5] ≥ 20	≥ 400 ≤ 15 ≥ 20	mm mm/diam kg

[1] The manufacturers Declaration of performance, DoP
[2] Control limits show values the product must satisfy during internal factory production control and audit testing
[3] SINTEFs recommended minimum values for SINTEF Technical Approval for mechanically fastened membranes
[4] SINTEFs recommended minimum value for membranes with thickness ≥ 1.5 mm is -25 °C
[5] Result from type testing
[6] For failure mode A the average peel resistance must be assessed against SINTEF's recommended minimum value for average peel resistance
[7] The control limit applies for failure mode B and C

L = Longitudinal T = Transversal

Table 3
Rhenofol CV has fire classification B_{ROOF} (t2) on following substrates

Type substrate	Rhenofol CV
EPS [1] [2]	No
EPS [1] [2] + min. 120g/m² glass fleece	Yes
Mineral wool [1]	Yes
Wood particle board [1]	No
Wood particle board [1] + min. 120g/m² glass fleece	Yes
Concrete / calcium silicate plate [1]	Yes
Old roofing membrane on EPS [2]	No
Old roofing membrane on EPS [2] + min. 120g/m[2] glass fleece	Yes
Old roofing membrane on mineral wool	Yes
Old roofing membrane on wood particle board	No
Old roofing membrane on wood particle board + min. 120g/m² glass fleece	Yes
Old roofing membrane on concrete / calcium silicate plates	Yes

[1] Standard substrate according to CEN/TS 1187, test 2.
[2] In case of roofing on combustible insulation (e.g. EPS): 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.

Table 4
Design capacity at ultimate limit state for the attachment of Rhenofol CV roofing membrane

Fastening system/Fastener Fastening in 100 mm welded joint	Design capacity [1] [2] N / fastener
EJOT HTK 2G 50 x L plastic washer and TKR 4.8x70 or TKE 4.8x70 screw Tested on soft substrate, attachment in 0.75 mm steel plate, f_y = Unknown Distance between fasteners: C/C 250 mm	680

[1] Measured according to method EN 16002, safety factor γ_m=1.5 according to EAD 030351-00-0402
[2] Wind load capacity is determined using a partial factor of γ_m=1.5. 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.

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. It is not possible to assume increased wind load capacity by decreasing the distance between the fasteners; due to uncertainty in the type of failure, ref. EAD 030351-00-0402 Annex 1. The lowest capacity for attachment in the membrane / substrate must always be used for the calculation. 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.

5. Environmental aspects

Chemicals hazardous to health and environment

Rhenofol CV 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 Rhenofol CV are evaluated to have no negative effects on soil or ground water.

Waste treatment/recycling

Rhenofol CV shall be sorted as residual waste. The product shall be delivered to an authorized waste treatment plant for energy recovery.

Environmental declaration

An environmental declaration (EPD) has been worked out according to EN 15804 for Rhenofol CV and Rhenofol CG. For complete documentation see EPD no. EPD-FDT-20240156-IBA1-EN, https://ibu-epd.com/.

6. Special conditions for use and installation

General

The membranes shall be installed in accordance with the vendor's installation manual and the principles shown in SINTEF building Research Design Guide no.:

- 544.202 *Takfolie. Egenskaper og tekking*
- 544.204 *Tekking med asfalttakbelegg eller takfolie. Detaljløsninger*
- 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate 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 joints of Rhenofol CV 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).

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 kN/m2 (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.

Substrates

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*.

When the membrane is installed on old bituminous roofing, on old and rigid PVC roofing or directly on polystyrene insulation a separate migration barrier must be used in accordance with the manufacturer's installation manual. See SINTEF Building Research Design Guide no. 544.202 *Takfolie. Egenskaper og tekking* for additional requirements for migration barriers and protective layers.

Traffic on the roofs

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

Rhenofol CV must be transported in a manner that does not damage the product and be stored in a dry location, placed horizontally on pallets, and protected at the building site.

7. Factory production control

Rhenofol CV is produced by FDT Flachdach Technologie GmbH, Eisenbahnstrasse 6-8, 68199 Mannheim, Germany.

The holder of the approval is responsible for maintaining the factory production control to ensure that Rhenofol CV is manufactured in compliance with the preconditions upon which this approval is based.

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.

FDT Flachdach Technologie GmbH has a quality system which is certified according to EN ISO 9001.

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 rolls shall be marked on their packaging with name of manufacturer, product name, batch number and/or manufacturing date.

Rhenofol CV is CE marked in accordance with EN 13956.

The approval mark for SINTEF Technical Approval No. 20602 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
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