SINTEF

**SINTEF Certification**

**No. 20602**

# Technical Approval

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Revised:
Amended:
Valid until: 01.03.2023
*Provided listed on www.sintefcertification.no*

SINTEF Building and Infrastructure confirms that

## Rhenofol CG, ballasted roofing- and water proofing 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 FlachdachTechnologie GmbH & Co. KG
Eisenbahnstrasse 6-8
68199 Mannheim
Germany
www.fdt.de

### 2. Product description

Rhenofol CG are roofing and waterproofing membranes of PVC-P with a core of glass fabric as reinforcement. Stabilizer and plasticizer have been added to make the PVC coating resiustant to high and low temperatures. The product is a dark grey at the bottom side and a light grey on top.

Measures and tolerances are shown in table 1.

Table 1
Measures and tolerances for Rhenofol membranes[1)]

| Property | CG 1,5 | CG 1,8 | CG 2,0 | Unit | Tolerance |
|---|---|---|---|---|---|
| Thickness | 1,5 | 1,8 | 2,0 | mm | +10%/-5% |
| Area weight | 1,88 | 2,28 | 2,53 | kg/m² | +10%/-5% |
| Width | 2,05 | 2,05 | 2,05 | m | +1%/-0,5% |
| Length of roll | 15 | 15 | 15 | m | +5%/-0% |
| Weight, core | ca. 35 | ca. 35 | ca. 35 | g/m² | - |

[1)] Measured according EN 1848-2 and EN 1849-2.

### 3. Fields of application

Rhenofol CG is intended for use for ballasted roof constructions on pitched or on flat roofs. The product can either be ballasted with gravel, concrete tiles on pads or tilework of concrete. Rhenofol CG can also be used in extensive or intensive green roofs.

The membrane is laid loosely with a ballast weight. The membrane cannot be used in mechanically fastened applications. Examples of use are shown in Fig. 1 – Fig. 4.

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.

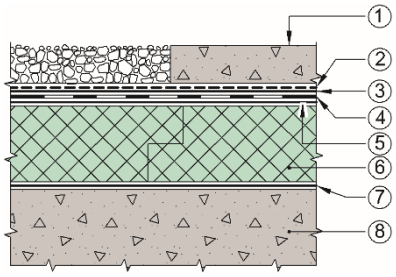


Fig. 1
Example of Rhenofol CG used as roofing with ballast on top.
1: Shingle, slabs of lightweight aggregate or concrete etc.
2: Optional separation layer
3: Protection layer of geotextile
4: Rhenofol CG
5: Migration barrier when insulation of EPS/XPS
6: Insulation
7: Vapour barrier
8: Supporting structure

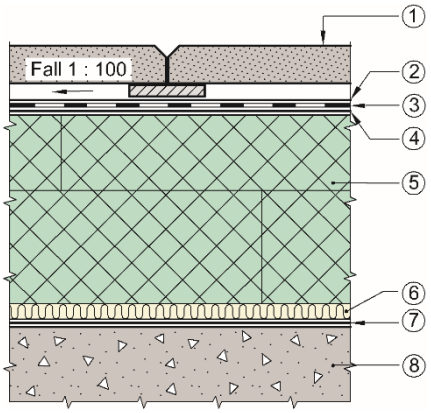


Fig. 2
Example of Rhenofol CG used as roofing with concrete slabs on top.
1: Concrete slabs on bricks
2: Optional protection layer geotextile
3: Rhenofol CG
4: Migration barrier if insulation of EPS/XPS
5: Insulation (EPS or mineral wool)
6: Optional acoustic underlay
7: Vapour barrier
8: Supporting structure



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

| Property | Test-method EN | CG 1,5 | | CG 1,8 | | CG 2,0 | | SINTEFs recommended minimum values | 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 [3)] | °C |
| Dimensional stability | 1107-2 | ± 0,05 | ± 0,05 | ± 0,05 | ± 0,05 | ± 0,05 | ± 0,05 | ± 0,5 | % |
| Water tightness (10 kPa) | 1928 (A) | Tight | Tight | Tight | Tight | Tight | Tight | Tight | - |
| Tear resistance L<br>T | 12310-2 | ≥ 150<br>≥ 150 | ≥ 150<br>≥ 150 | ≥ 150<br>≥ 150 | ≥ 150<br>≥ 150 | ≥ 150<br>≥ 150 | ≥ 150<br>≥ 150 | ≥ 80 | N |
| Tensile strength [4)] L<br>T | 12311-2 (B) | ≥ 10 N/mm$^2$ | ≥ 750<br>≥ 750 | ≥ 10 N/mm$^2$ | ≥ 900<br>≥ 900 | ≥ 10 N/mm$^2$ | ≥ 1000<br>≥ 1000 | ≥ 380 | N/50mm |
| Elongation L<br>T | 12311-2 (B) | ≥ 200<br>≥ 200 | ≥ 200<br>≥ 200 | ≥ 200<br>≥ 200 | ≥ 200<br>≥ 200 | ≥ 200<br>≥ 200 | ≥ 200<br>≥ 200 | ≥ 180 | % |
| Average T-peel resistance | 12316-2 | ≥ 250 | ≥ 250 | ≥ 250 | ≥ 250 | ≥ 250 | ≥ 250 | - | N/50mm |
| Shear resistance / joints | 12317-2 | ≥ 600 | ≥ 600 | ≥ 600 | ≥ 600 | ≥ 600 | ≥ 600 | ≥ 380 | N/50mm |
| Puncturing<br>-Impact v/+23 °C<br>-Impact v/ -10 °C<br>-Static load | <br>12691 (A)<br>12691:2001<br>12730 (A) | <br>≥ 500<br>-<br>- | <br>≥ 500<br>≤ 15<br>≥ 20 | <br>≥ 500<br>-<br>- | <br>≥ 500<br>≤ 15<br>≥ 20 | <br>≥ 500<br>-<br>- | <br>≥ 500<br>≤ 15<br>≥ 20 | <br>≥ 400<br>≤ 20<br>≥ 20 | <br>mm<br>mm/diam<br>kg |
| Resistance to roots / FLL – test | 13948 | Conformed | | | | | | - | - |

[1)] Manufacturers Declaration of Performance, DoP.
[2)] Control limit shows the values the product has to satisfy during internal factory production control and audit testing
[3)] For thickness 1,2 mm: -30˚C, / For thickness ≥ 1,5 mm: -25˚C
[4)] Declared value in DoP is shown in N/mm$^2$. The shown value is equivalent to the values shown in control limits.

## 4. Properties

*Materialproperties*

Product properties for fresh material of Rhenofol CG are shown in table 2.

*Safety in case of fire*

Rhenofol CG products do not fulfil the requirements for class $B_{ROOF}$ (t2) according to EN 13501-5. To achieve satisfying fire resistance a suitable ballast, approved for fire resistance, should be used.

Rhenofol CG has a reaction to fire class E according to EN 13501-1

*Durability*

Rhenofol CG has shown satisfying properties after artificial ageing associated with type- and annual control testing.

## 5. 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 or ground water.

*Waste treatment/recycling*

The product shall be sorted as residual waste on the building/demolition site. The product shall be delivered to an authorized waste treatment plant for energy recovery.

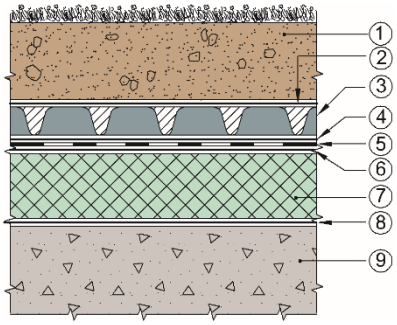


Fig. 3
Example of Rhenofol CG used in an intensive green roof
1: Soil
2: Filtering layer geotextile
3: Drainage layer
4: Optional protection layer geotextile
5: Rhenofol CG
6: Migration barrier if insulation of EPS/XPS
7: Insulation
8: Vapour barrier
9: Supporting structure

*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-20180020-IAA1-DE, https://ibu-epd.com/.

## 6. Special conditions for use and installation

*Design considerations*

Necessary ballast should be calculated according SINTEF Building Research Design Sheet *544.202 Takfolie. Egenskaper og tekking* and "TPF Informs no. 5", clause 6.1.

Application on roofs and terraces shall be in accordance with the principles shown in SINTEF Building Research Design Sheets:

- *525.207 Kompakte tak*
- *525.304 Terrasse på etasjeskiller av betong for lett eller moderat trafikk*
- *525.306 Terrasser med beplantning på bærende betongdekker*

as well as information given in "TPF Informs No. 5".

*Installation*

All joints of Rhenofol CG should be hot air welded by specialized trained craftsmen. The overlap shall achieve a width of minimum 50 mm (minimum 80 mm when using EPS insulation on a warm-ballasted, roofing system). The membrane shall be installed in accordance with the manufacturer´s instructions and in accordance with the principles shown in SINTEF Building Research Design Sheets:

- *544.202 Takfolie. Egenskaper og tekking*
- *544.204 Tekking med asfalttakbelegg eller takfolie. Detaljløsninger*

as well as information given in "TPF Informs No. 5".

The substrate shall be thoroughly cleaned before installation, without sharp edges that may puncture the membrane. Particularly it should be checked that the membrane is not damaged by impacts from sharp objects, or objects being tramped into the membrane during installation.

*Underlay*

When the membranes are installed on old asphalt roofing without additional insulation, or directly on EPS or XPS insulation a separate glass fibre or geotextile barrier of minimum 300 g/m² shall be used.

When the membranes are applied directly on rough underlay, without additional insulation, a protection layer of polyester-, polypropylene felt, or similar, shall be used. SINTEF Building and Infrastructure recommends use of approx. 250 g/m² felt when applied directly on concrete underlay and minimum 300 g/m² felt on concrete underlay in constructions with heavy traffic.

*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 roof traffic is expected to exceed the traffic required for normal inspection visits and maintenance, special precaution should be taken to protect the roofing membrane.

*Transport and storage*

Rhenofol CG should be stored on dry places or protected by wrapping. The rolls can be placed horizontally or vertically on pallets at the building site.

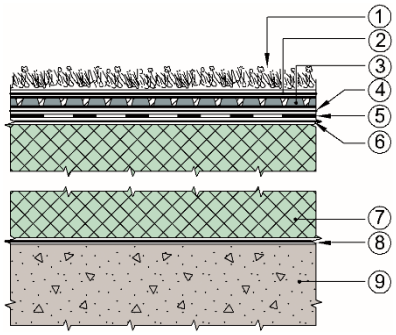


Fig. 4
Example of Rhenofol CG used in an extensive green roof
1: Sedum Vegetation
2: Optional filtering layer geotextile
3: Drainage layer
4: Optional protection layer geotextile
5: Rhenofol CG
6: Migration barrier if insulation of EPS/XPS
7: Insulation
8: Vapour barrier
9: Supporting structure

**7. Factory production control**

The product is produced by FDT FlachdachTechnologie GmbH & Co. KG, Eisenbahnstrasse 6-8, 68199 Mannheim, Germany

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 FDT GmbH & Co. KG has a quality system which is certified by TÜV SÜD Management System GmbH, according to EN ISO 9001, certificate no. 12 100 22279 TMS.

**8. Basis for the approval**

Material- and design data has been verified by type testing, and are documented in the following reports:

- SINTEF, report 2018:00162, dated 31.01.2018, Material properties
- MPA Darmstadt, report K 15 1541.5, dated 26.10.2015, Material properties
- MPA Darmstadt, report K 15 0262.9, dated 22.04.2015, Material properties
- MPA Darmstadt, report K 14 1271.11, dated 23.09.2014, Material properties
- MPA Darmstadt, report K 14 1271.10, dated 23.09.2014, Material properties
- Institut Bauen und Umwelt e.V., report EPD-FDT-20180020-IAA1-DE, dated 26.02.2018, EPD
- Hochschule Geisenheim, dated 09.2016, confirmation of validity for FLL-report from 18.07.2001.
- MPA Stuttgart, report 902 1441 000-2, dated 23.09.2014, Fire classification

**9. Marking**

All rolls shall be marked on their packaging with name of manufacturer, product name, batch number and/or manufacturing date.
The product is CE marked in accordance with EN 13956.
The approval mark for SINTEF Technical Approval No. 20602 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 Building and Infrastructure

Hans Boye Skogstad
Approval Manager