SINTEF Technical Approval

TG 2056

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Provided listed on
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SINTEF confirms that

Derbigum Totaltekking Double-layer bituminous roof waterproofing 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

Derbigum Norge AS
Bernt Ankers gate 17
1534 Moss
Norway

2. Product description

Derbigum Totaltekking is a double-layer bituminous roof waterproofing membrane with APP polymer bitumen. The top layer is fully bonded to the underlay by welding or cold bonding. The roofing system consists of Derbicoat Artic as underlay and Derbigum SP FR as top layer. Measures and tolerances are stated in table 1.

Table 1
Measures and tolerances for Derbicoat Artic and Derbigum SP FR according to EN 1848-1 and EN 1849-1

Property	Derbicoat Artic	Derbigum SP FR	Unit	Tolerance
Thickness	2.5	4.0	mm	± 5 %
Area weight	2.75	4.5	kg/m²	± 10 %
Width	1.1	1.1	m	± 1 %
Length of roll	12.73	7.27 / 175	m	-0/+2 %
Total weight of reinforcement	173	205	g/m²	± 15 %
Weight of polyester reinforcement	165	150	g/m²	± 15 %
Weight of glass felt reinforcement	-	55	g/m²	± 15 %
Weight of glass scrim	8	-	g/m²	± 15 %

Derbicoat Artic has a reinforcement base of polyester felt, and both sides are impregnated with APP polymer bitumen. The top surface is coated with fine-grained sand while the underside is coated with an 8 µm plastic foil that is burnt off when the overlaps are welded. The colour is black.

Derbigum SP FR has a double reinforcement base positioned in the top layer of the membrane. The reinforcement consists of a polyester felt and a glass felt with longitudinal glass fibres.

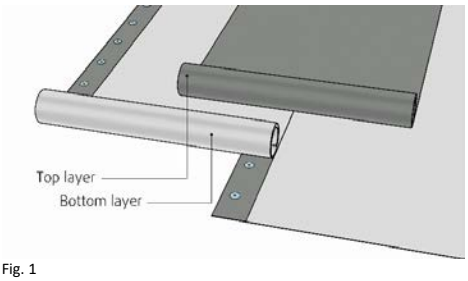

Fig. 1
Derbigum Totaltekking consists of a Derbicoat Artic underlay and a fully bonded Derbigum SP FR top layer.

Both felts are impregnated with APP polymer bitumen during the manufacturing process, at the same time as the membrane is given the specified thickness. Derbigum SP FR is manufactured in several surface colours. The underside is black and coated with talc.

3. Fields of application

Derbigum Totaltekking can be used on sloping and flat roofs. The system is specially designed for mechanically fastened roofing, see Figure 1.

Derbigum Totaltekking can also be used as ballasted roofing with gravel or concrete tiles.

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. Properties

Product properties
The properties of fresh material are shown in table 2.

Properties related to fire
Derbigum Totaltekking 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.

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Table 2
Product properties for fresh material of products in Derbigum Totaltekking

Property	Test method EN	Derbicoat Artic Underlay		SINTEF's recommended minimum performance [3]	Derbigum SP FR Top layer		SINTEF's recommended minimum performance [4]	Unit
		DoP [1]	Control limit [2]		DoP [1]	Control limit [2]		
Dimensional stability	1107-1	-	0.6	± 0.6	-	±0.2	± 0.6	%
Flexibility at low temperature - upper face - lower face	1109	≤ -20 ≤ -20	≤ -20 ≤ -20	≤ -15 ≤ -15	- ≤ - 15	- ≤ -15 [5]	≤ -15 -	°C
Flow resistance at elevated temperature	1110	-	≥ 140	≥ 90	-	≥ 140	≥ 90	°C
Watertightness 10 kPa/24 h	1928 (A)	Tight	Tight [6]	Tight	Tight	Tight [6]	Tight	-
Resistance to tearing (nail shank) L/T	12310-1	250 ± 25 %	≥ 187	≥ 150	200 ± 25 %	≥ 150 [5]	-	N
Tensile strength L T	12311-1	750 ± 20 % 650 ± 20 %	≥ 600 ≥ 520	≥ 400 ≥ 400	700 ± 20 % 650 ± 20 %	≥ 560 ≥ 520	≥ 400 ≥ 400	N/50 mm
Elongation at max load L/T	12311-1	40 ± 15	≥ 25	≥ 10	45 ± 15	≥ 30	≥ 10	%
Average peel resistance of joints Sidelap/Endlap	12316-1	≥ 50	≥ 50	≥ 50	65 ± 20 %	≥ 50 [5]	-	N/50 mm
Shear resistance of joints Sidelap/Endlap	12317-1	≥ 600	≥ 600	≥ 400	625 ± 20 %	≥ 500 [5]	-	N/50 mm
Resistance to - Impact +23 °C - Impact -10 °C - Static loading	12691 (A) 12691:2001 12730 (A)	≥ 500 - ≥ 15	≥ 500 - ≥ 15	≥ 500 - ≥ 15	≥ 1250 - ≥ 20	≥ 1250 ≤ 30 [5][6] ≥ 20	≥ 500 - ≥ 15	mm mm diam. kg

[1] Manufacturers Declaration of Performance, DoP
[2] Control limits show values that the product has to satisfy during internal factory production control and 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 top layer in double layer system
[5] Control limit concerns Derbigum SP FR as a one-layer system
[6] Result from type-testing

L = Longitudinal T = Transversal

Table 3
Derbigum Totaltekking has fire classification B_{ROOF} (t2)
on following substrates

Type of substrate	Derbigum Totaltekking
EPS *	Yes
Stone wool	Yes
Wood particle board	Yes
Concrete / silicate plate	Yes
Old roofing membrane on EPS *	Yes
Old roofing membrane on stone wool	Yes
Old roofing membrane on particle board	Yes
Old roofing membrane on concrete or silicate plate	Yes

* In case of roofing on lightweight 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.

Durability
Derbigum SP FR and Derbicoat Artic have been assessed on the basis of field investigations and laboratory testing to have satisfying durability for their intended use.

Fastening capacity
The design capacity for the fastening of the membrane with different fasteners and premises is given in table 4. The capacity applies to the connection between the membrane and the fasteners and is determined in form of a system test according to EN 16002.

For weak substrates the connection between the substrate and the fastener might limit the capacity. This must be considered. The lowest value for the fastening in membrane/substrate must always be used.

Calculation of fasteners' spacing is carried out according to SINTEF Building Research Design Guide 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate tak* and "TPF informerer nr. 5" published by Takprodusentenes Forskningsgruppe (TPF), see www.tpf-info.org.

Kommentert [BWO1]: SINTEF must receive updated DoP with declared values in accordance with opdated control limits.

Kommentert [BWO2R1]: Mottatt.

Table 4
Design capacity at ultimate limit state for the attachment of Derbigum Totaltekking Double-layer bituminous roof waterproofing membrane with different fastening systems

Fastener/Fastening system Fastening in 130 mm welded joint	Design capacity N / fastener
Guardian RBS50 plastic washer and Guardian BS-4,8 screw Tested on soft substrate, attachment in steel plate Distance between fasteners: C/C 320 mm	733 [1)]
SFS RP50 plastic washer and SFS BS-4,8 screw Tested on soft substrate, attachment in steel plate Distance between fasteners: C/C 320 mm	667 [1)]
Guardian R48 plastic washer and Guardian BS-4,8 screw Tested on soft substrate, attachment in steel plate Distance between fasteners: C/C 320 mm	667 [1)]

[1)] Measured according to method EN 16002 and the safety factor γ_m=1.5.

5. Environmental aspects

Substances hazardous to health and environment
Derbigum Totaltekking contain 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 Derbigum Totaltekking are evaluated to have no negative effects on soil or ground water.

Waste treatment/recycling
Derbigum Totaltekking can be sorted as separate waste fraction by end-of life and be delivered to material recovery.

Environmental declaration
No environmental declarations (EPD) have been worked out for Derbigum Totaltekking.

6. Special conditions for use and installation

Installation
Derbicoat Artic underlay shall be mechanically fastened with 130 mm overlaps (150 mm for endlaps) which are entirely welded over the width, see Figure 2. There must be minimum 30 mm bonding on the inside and minimum 50 mm bonding on the outside of the fastener.

The Derbigum SP FR top layer shall be installed with 100 mm welded overlaps, and shall be fully welded or cold bonded to the underlay.

Transverse joints must have a 150 mm overlap, with the underlying corners cut at an angle. A good result is achieved by 'drowning' the granules of the surface in bitumen before the joint is fully welded.

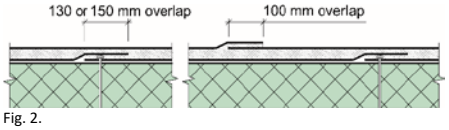

Fig. 2.
Fastening and overlap of Derbigum Totaltekking

The roofing membrane shall generally be installed in accordance with the vendor's installation manual and the principles shown in SINTEF Building Research Design Guide 544.203 *Asfalttakbelegg. Egenskaper og tekking*, 544.204 *Tekking med asfalttakbelegg eller takfolie. Detaljløsninger* and 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate tak*, plus "TPF informerer nr. 5" published by Takprodusentenes Forskningsgruppe (TPF), see www.tpf-info.org.

Welding the overlaps
At temperatures of below -15 °C, Derbicoat Artic must be heated before being unrolled. Derbigum SP FR must be heated before being unrolled at temperatures below -5 °C.

Contact welding to flashings and other places where the weld cannot be covered with a separate fitment must be carried out with a secure weld; i.e. the substrate must be clean and dry. The use of a primer may afford extra security.

If the membrane is to be laid directly on a combustible material, such as polystyrene, the overlaps must either be welded without the use of an open flame or a protective layer must be placed under the joints.

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.

Ballast
A 50 mm thick layer of gravel (16 – 32 mm) may be used for a design wind speed $q_d \leq 3.0$ kN/m² as ballast to secure resistance against wind up-lift. 50 mm thick concrete slabs may be used for a design wind speed $q_d \leq 5.0$ kN/m².

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, 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 description in SINTEF Building Research Design Guide no. 525.207 *Kompakte tak* and 520.339 *Bruk av brennbar isolasjon i bygninger, plus* "TPF informerer nr. 6" *Brannteknikske kostruksjoner for tak* published by Takprodusentenes Forskningsgruppe.

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 manufacturer's guidelines.

Storage
Derbicoat Artic and Derbigum SP FR must be stored upright on pallets.

7. Factory production control
Derbicoat Artic and Derbigum SP FR is produced by Imperbel SA, B-1360 Perwez, Belgium.

The holder of the approval is responsible for the factory production control in order to ensure that the products are produced in accordance with the preconditions applying to this approval.

The manufacturing of the products is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

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

8. Basis for the approval
The evaluation of Derbicoat Artic and Derbigum SP FR is based on reports owned by the holder of the approval.
The evaluation of design and technical solutions are based on recommendations given in SINTEF Building Research Design Guides.

9. Marking
All rolls are marked on their packaging with manufacturer, the manufacturer's product description and the manufacturing date.

Derbicoat Artic and Derbigum SP FR are CE-marked in accordance with EN 13707.

The approval mark for SINTEF Technical Approval TG 2056 may also be used.

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

Susanne Skjervø
Approval Manager