SINTEF Technical Approval

TG 20904

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Valid until 01.07.2029
Provided listed on
www.sintefcertification.no

SINTEF confirms that

DELTA-XX PLUS® HEAVY
combined roofing underlay and wind barrier

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

Dörken GmbH & Co. KG
Wetterstr. 58
58313 Herdecke
Germany
www.doerken.de

2. Product description

DELTA-XX PLUS® HEAVY combined roofing underlay and wind barrier is a triple layer membrane, made of a vapour open PU film sandwiched between two layers of nonwoven, spunbonded polypropylene. DELTA-XX PLUS® HEAVY is black on both sides with grey printing on the upper side. The product has self-adhesive strips. Measures and tolerances are shown in table 1.

Accessories which can be used during installation are described in table 3.

Table 1
Measures and tolerances for DELTA-XX PLUS® HEAVY measured according to EN 1848-2 and EN 1849-2.

Property	Value	Tolerance	Unit
Roll width	1.50	+1.5/-0.5 %	m
Roll length	50	- 0%	m
Mass per unit	200	±20 g	g/m²

3. Fields of application

DELTA-XX PLUS® HEAVY can be used as a wind barrier in thermal insulated walls and as a combined roofing underlay and wind barrier in thermal insulated pitched wooden roofs ventilated with battens under discontinuous roofing with outside drainage.

DELTA-XX PLUS® HEAVY is especially suitable for roofs with continuous thermal insulation from eaves to ridge, but can also be used above uninsulated attic spaces with the insulation in the ceiling. DELTA-XX PLUS® HEAVY can also be installed on roofs with wooden sheeting of rough panel boards that shall be insulated between the rafters.

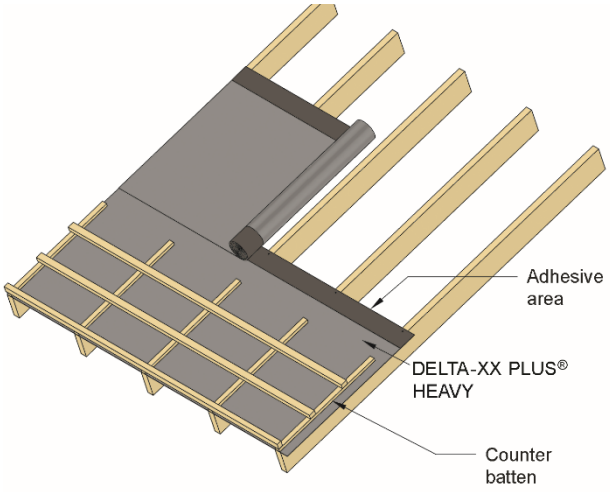


Fig. 1
DELTA-XX PLUS® HEAVY combined roofing underlay and wind barrier used perpendicular to rafters.

DELTA-XX PLUS® HEAVY can be used as combined roofing underlay and wind barrier on roofs in buildings in hazard class 1-6 and fire class 1, 2 and 3 except for in roofs in fire class 3 where pre-accepted performance requires all components to satisfy minimum class A2-s1,d0.

4. Properties

Material properties
Material characteristics for DELTA-XX PLUS® HEAVY are shown in table 2.

Properties related to fire
DELTA-XX PLUS® HEAVY has a reaction to fire class E-d2 according to EN 13501-1.

Resistance against tread through
Resistance against tread through is not evaluated for DELTA-XX PLUS® HEAVY.

Table 2
Product properties for DELTA-XX PLUS® HEAVY

Property	Test method	Product name		Unit
		Declaration of performance[1)]	Control limit[2)]	
Dimensional stability Longitudinal Transversal	EN 1107-2	- -	≤ 2 ≤ 2	%
Watertightness 200 mm water column for 2 hours	EN 1928 / EN 13859-1	W1	Tight	-
Rain tightness construction	NT Build 421	-	400 [3)]	Pa
Air permeability material	EN 12114	-	< 0.001	$m^3/(m^2h50Pa)$
Air permeability construction	EN 12114	-	< 0.1	$m^3/(m^2h50Pa)$
Water vapour resistance sd-value	EN 12572	0.08 ±0.02	≤ 0.1	m
Tearing resistance (nail shank) Longitudinal Transversal	EN 12310-1 / EN 13859-1	200 ±50 250 ±50	≥ 150 ≥ 200	N
Tensile strength Longitudinal Transversal	EN 12311-1 / EN 13859-1	370 ±40 270 ±30	≥ 330 ≥ 240	N/50 mm
Elongation at max. load Longitudinal Transversal	EN 12311-1 / EN 13859-12	80 ±40 % 80 ±40 %	≥ 48 ≥ 48	%
Adhesive strip, Peel resistance Max/Average	EN 12316-2	-	≥ 25/12 [3)]	N/50 mm
Adhesive strip, Shear resistance	EN 12317-2	-	≥ 151 [3)]	N/50 mm
Adhesive strip, Water tightness 200 mm water column for 2 hours	EN 1928 / EN 13859-1	-	Tight [3)]	-

[1)] Manufacturers Declaration of Performance, DoP
[2)] Control limit show values the product must satisfy during internal factory production control and audit testing
[3)] Determined during type testing

Table 3
Accessories for mounting of DELTA-XX PLUS® HEAVY

Accessory	Material / Description	Used for	Measures
DELTA®-MULTI-BAND	Acryl-tape with PE-backing and reinforcement with synthetic strings	Taping of penetrations, alternative joining in small areas and connection to windows	Width : 60 / 100 and 150 mm Roll length: 25 m
DELTA®-FLEXX-BAND	Butyl-rubber tape with backing of nonwoven, spunbonded PP	Taping of penetrations and small repairs	Width : 100 mm Roll length: 10 m
DELTA®-SCHAUM-BAND	VPE foam	Sealing nail penetrations under counter battens	Width : 60 mm Roll length: 30 m
DELTA®-THAN	Permanently elastic, special rubber compound adhesive in cartridge	Additional tightening material in areas inaccessible for tape	Cartridge : 310 ml

Durability
DELTA-XX PLUS® HEAVY combined roofing underlay and wind barrier is considered to have satisfactory durability based on laboratory testing before- and after accelerated artificial ageing.

The product must be protected against direct exposure to UV radiation in the completed construction. DELTA-XX PLUS® HEAVY needs to be covered as soon as possible after installation, without unnecessary delay.

Durability of DELTA®-MULTI-BAND tape is evaluated as satisfying, based on testing before and after artificial ageing. The tape has shown satisfying durability tested on DELTA-XX PLUS® HEAVY, painted and unpainted wood, galvanized steel, aluminium and PVC.

Airtightness
The airtightness of DELTA-XX PLUS® HEAVY makes it possible to fulfil any requirements regarding airtightness n_{50} given in the building regulations, and in the Norwegian passive house standards before the vapour barrier is installed.

5. Environmental aspects

Substances hazardous to health and environment
DELTA-XX PLUS® HEAVY 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.

Waste treatment/recycling
DELTA-XX PLUS® HEAVY shall be sorted as plastic. The product shall be delivered to an authorized waste treatment plant for energy recycling.

Environmental declaration
No environmental declaration (EPD) has been worked out for DELTA-XX PLUS® HEAVY.

6. Special conditions for use and installation

Design considerations
DELTA-XX PLUS® HEAVY combined roofing underlay and wind barrier should not be used at especially exposed places where experience shows that drifting snow often may be accumulated between the roofing and the roofing underlay.

The roofing should be laid as soon as possible after the product is installed to prevent that the underlay is exposed for weather or UV radiation for a longer period. Thermal insulation, vapour barrier and the ceiling should not be installed until roofing has been laid and the underlay is checked to be properly installed.

To avoid reduction of the clamping at the overlaps, due to shrinkage of the wood, the moisture content of the rafters and the battens should be less than 20 % when installing the roofing underlay.

DELTA-XX PLUS® HEAVY combined roofing underlay and wind barrier can be used on roofs with a minimum slope of 10°.

Installation
DELTA-XX PLUS® HEAVY shall be installed in a way that provides both an airtight and a watertight layer.

Used at roof slopes more than 10° the application shall follow the principles shown in the manufacturer's installation guidelines and in SINTEF Building Research Design Guide no. 525.101 *Skrå, luftede tretak med isolerte takflater*, 525.107 *Skrå tretak med oppholdsrom på deler av loftet* and 525.866 *Undertak*.

DELTA-XX PLUS® HEAVY can be installed perpendicular to the rafters as shown in Fig. 1.

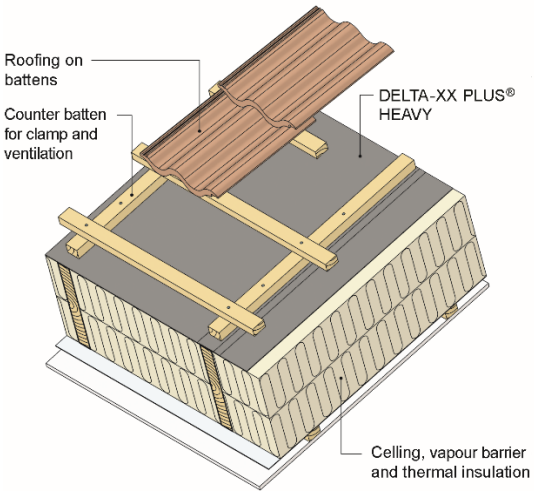


Fig. 2
Principle of a roof construction with DELTA-XX PLUS® HEAVY used as combined roofing underlay and wind barrier

In case of installation perpendicular to the rafters the mounting shall always start at the eave. The product must be mounted tight to avoid folds, and the adhesive strips must adhere to each other continuously. If there are vertical joints, the overlaps must be clamped to the rafters using counter battens, see Fig. 6.

Connections to other components and structures
DELTA-XX PLUS® HEAVY shall be installed with airtight connections to the wind barrier on exterior walls, and with airtight joints at the ridge and valley gutters. In addition, it is important that connections towards penetrations through the roof (chimney, roof windows, canals etc.) are water- and airtight. Connections towards roof windows, chimneys etc. must also be made both water- and airtight, see SINTEF Building Research Design Guides no. 525.101 *Skrå, luftede tretak med isolerte takflater* and 525.866 *Undertak* for details.

At eaves with protruding rafters the roofing underlay shall be installed around the rafters to get clamped, together with the wind barrier on the wall, to the top sill of the wall, see Fig.3.

At eaves without protruding rafters, the roofing underlay is folded and positioned over the filler timber, sealed, and clamped together with the wind barrier from the wall. The end of DELTA-XX PLUS® HEAVY also overlaps the board on top of the rafter dummies, see Fig. 4.

Counter battens and ventilation space
Discontinuous roofing shall be ventilated between roofing and the roofing underlay with counter battens and battens. Recommended dimensions depend on the average wind speed at the site, insulation thickness and the length of the ventilated gap, see SINTEF Building Research Design Guides no 525.101 *Skrå, luftede tretak med isolerte takflater* and 525.104 *Slake, luftede tretak med isolerte takflater og utvendig nedløp* for roof slopes below 10°.

The counter battens must be mounted in a way that provides tight joints. When using two counter battens to get the desired batten height the counter batten at the bottom shall not be thicker than 36 mm. The counter battens are screwed with a maximum distance of 300 mm. The minimum length for ribbed nails or screws shall be 2.5 times the battens thickness. The screws are recommended to have no threads on the part that goes through the counter batten.

DELTA®-SCHAUM-BAND can be used under the battens to reduce the risk of water leakage through the roofing underlay along screws or nails.

When DELTA-XX PLUS® HEAVY is installed perpendicular to the rafters, the counter battens must be cut in lengths reaching the lower edge of the adhesive strip and mounted gradually as the product is installed.

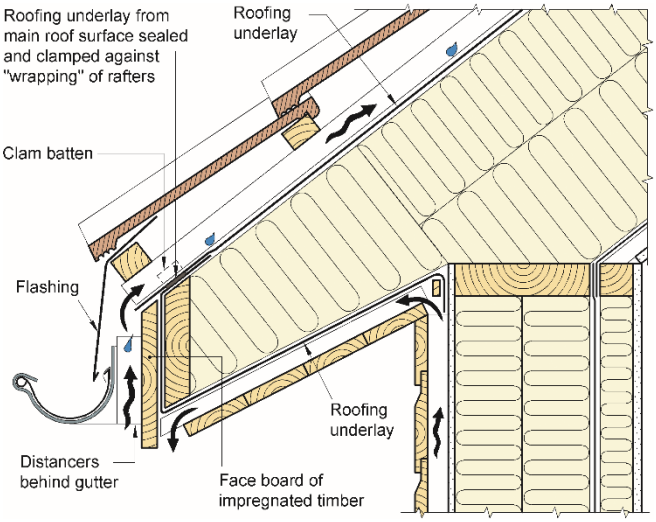


Fig. 3
Example of a connection detail between roof and wall with protruding rafters.

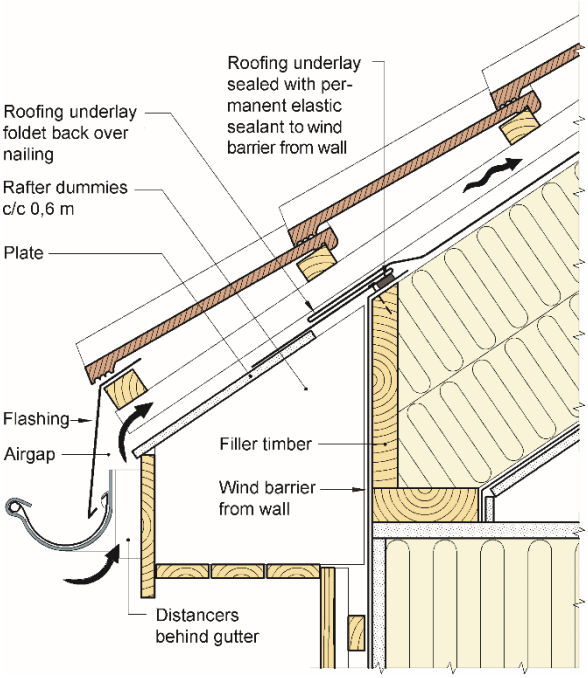
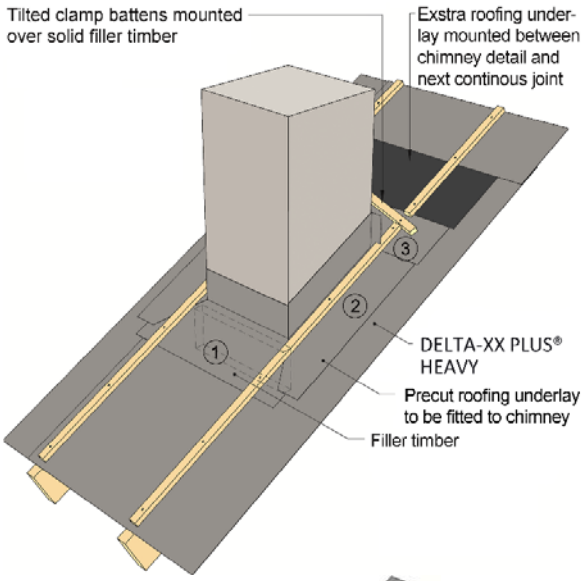


Fig. 4
Example of a connection detail between roof and wall without protruding rafters.



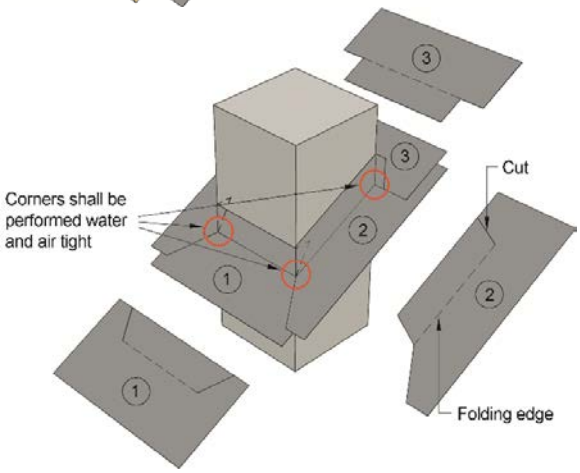


Fig. 5
Example of a chimney penetrating the roofing underlay.
Sleeves are cut on site from DELTA-XX PLUS® HEAVY. Counter battens, DELTA® MULTI-BAND and DELTA®-THAN are used for tightening the sleeves against each other and against the chimney.

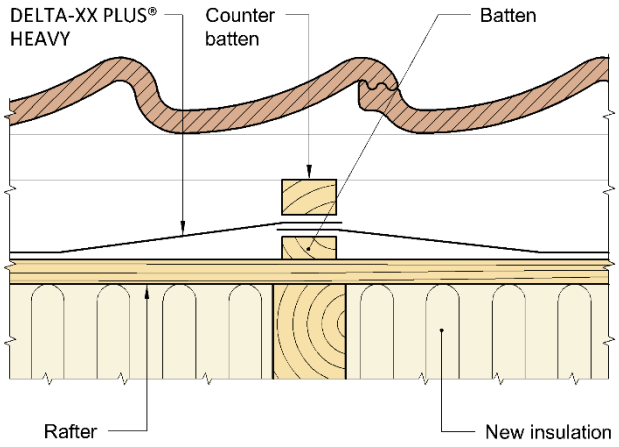


Fig. 6
Example of installation of DELTA-XX PLUS® HEAVY on wooden sheeting which is not smooth

Roofs with attics
DELTA-XX PLUS® HEAVY has sufficiently low vapour resistance to be used as roofing underlay in non-ventilated attic spaces as shown in SINTEF Building Research Design Guides no. 525.107 *Skrå tretak med oppholdsrom på deler av loftet*. DELTA-XX PLUS® HEAVY may also be used in cold unventilated attics, see SINTEF Building Research Design Guides no. 525.106 *Skrå tretak med kaldt loft.*

Combination to wooden sheeting
DELTA-XX PLUS® HEAVY can be applied as a roofing underlay and wind barrier on wooden sheeting provided that the total water vapour resistance does not exceed an s_d-value of 0.5 m. The insulation can then be installed directly underneath the wooden boards.

If DELTA-XX PLUS® HEAVY is installed on wooden sheeting which is not smooth, an extra batten shall be placed under the regular counter batten as shown in Fig. 6. In case of a smooth surface, DELTA®-SCHAUM-BAND can alternatively be used between the membrane and the counter batten.

When reconstructing old roofs, the old roofing must be removed before the new vapour open underlay, counter battens, and new roofing, are installed.

If plywood- or OSB-boards are used, the water vapour resistance must be documented. The total water vapour resistance for all layers shall not exceed an s_d-value of 0.5 m.

Transport and storage
DELTA-XX PLUS® HEAVY shall be stored under dry conditions on a clean and plane surface protected with wrapping and shielded from direct sunlight.

7. Factory production control

DELTA-XX PLUS® HEAVY is produced by Dörken GmbH & Co. KG, Wetterstr. 58, 58313 Herdecke, Germany.

The holder of the approval is responsible for the factory production control to ensure that DELTA-XX PLUS® HEAVY is produced in accordance with the preconditions applying to this approval.

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.

The manufacturer's quality management system is certified according to EN ISO 9001.

8. Basis for the approval

The evaluation of DELTA-XX PLUS® HEAVY is based on reports owned by the holder of the approval.

9. Marking

DELTA-XX PLUS® HEAVY shall be marked on the wrapping of each roll with the brand name, the manufacturer's name, and a bar code for product identification. Each roll has the product name and a batch number/production date printed on the upper side.

DELTA-XX PLUS® HEAVY is CE-marked in accordance with EN 13859-1 and ETA 22/0593.

The approval mark for SINTEF Technical Approval TG 20904 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

Hans Boye Skogstad
Approval Manager