SINTEF Technical Approval

TG 20415

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SINTEF confirms that

Ampatop Aero plus wind barrier for wall and roof

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

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2. Product description

Ampatop Aero plus is a triple layer membrane of polypropylene, produced for use as combined roofing underlay and wind barrier. The Material is stabilized against UV-light. Ampatop Aero plus is light grey on the upper side, printed with dark grey letters, and white on the underside. Ampatop Aero plus has an integrated tape along the longitudinal side of the upper side of the roll and along the opposite, longitudinal side on the underside of the roll. The product can also be delivered without integrated tape under the product name Ampatop Aero. Standard measures and tolerances are shown in table 1.

Ampatop Aero plus have several accessories, described in table 3.

Table 1
Geometric properties of Ampatop Aero plus

Property	Measure	Tolerance	Unit
Roll width	1.5/3.0	-0.5 % /+1.5 %	m
Roll length	30/50	- 0 %	m
Straightness	-	< 30	mm/10m
Area weight	145	± 10 %	g/m²

3. Fields of application

Ampatop Aero plus can be used as a combined roofing underlay and wind barrier in pitched, thermal insulated, wooden roof constructions with ventilated, discontinuous roofing and external drainage. Ampatop Aero plus can also be used as a wind barrier in thermal insulated roofs and walls.

Combined roofing underlay and wind barrier is particularly suitable for roofs with continuous thermal insulation from eaves to ridge. Ampatop Aero plus may also be installed in pitched wooden roofs with heated rooms in parts of the attic and uninsulated attic spaces. Ampatop Aero plus can also be used in insulated diffusion open wooden sheathing of rough panel.

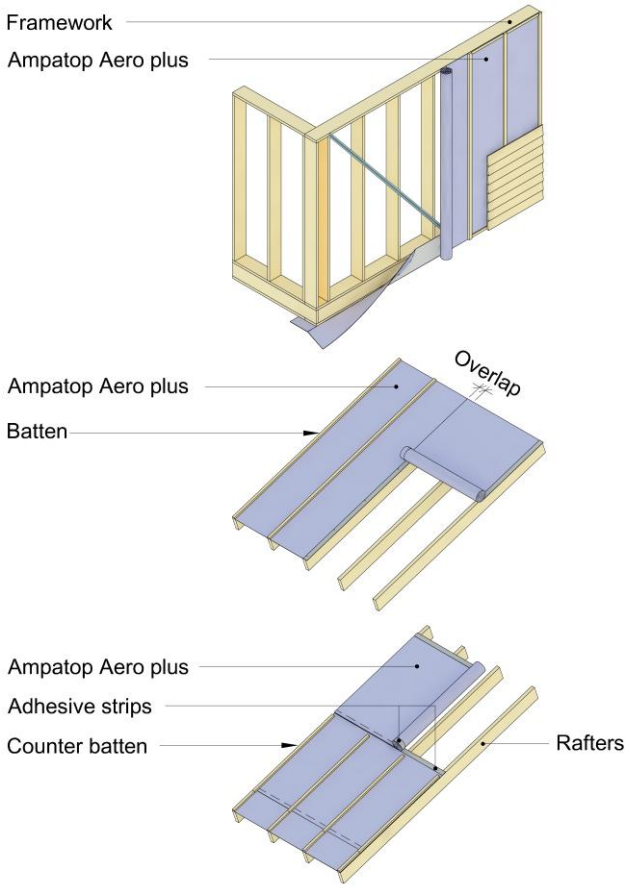

Fig. 1
Ampatop Aero plus mounting principles: At the top; horizontal mounted on a framework wall. Underneath; mounted along and across the rafters on a roof.

Ampatop Aero plus can be used in walls in hazard class 1-6 in fire class 1 in buildings up to three floors if each dwelling unit has direct access to the ground level (not via stairs or staircases). For other use, a fire safety analysis must be performed.

Ampatop Aero plus can be used as combined roof underlayer and wind barrier on roofs in buildings in hazard class 1-6 and fire class 1, 2 and 3 with exception for roofs in fire class 3 where pre-accepted performance states that all components must satisfy minimum class A2-s1,d0.

Table 2
Ampatop Aero plus, product- and construction properties fresh material

Property	Test Method	DoP [1]	Control limit [2]	Unit
Dimensional stability Longitudinal/Transversal	EN 1107-2	≤ 2	≤ 2	%
Water tightness 2 kPa for 2 hours	EN 1928 / EN 13859-1	W1	W1	-
Air tightness material	EN 12114	≤ 0.04	≤ 0.04	m^3/m^2h50Pa
Air tightness construction	EN 12114	-	≤ 0.25 [3]	m^3/m^2h50Pa
Rain ~~and wind~~ tightness construction	NT Build 421	-	300 [3]	Pa
Water vapour resistance s_d-value	EN-ISO 12572	0.04 -0.02/+0.05	< 0.09	m
Tear resistance (nail shank) Longitudinal Transversal	EN 12310 / EN 13859-1	145 ± 30 185 ± 30	≥ 115 ≥ 155	N
Tensile strength Longitudinal Transversal	EN 12311-1 / EN 13859-1	240 ± 25 180 ± 25	≥ 215 ≥ 155	N/50mm
Elongation at max. load Longitudinal Transversal	EN 12311-1 / EN 13859-1	65 ± 15 ppt 40 ± 15 ppt	≥ 50 ≥ 25	%
Peel resistance of adhesive strips Max / Average	EN 12316-2	-	≥ 36 / 20 [3]	N/50 mm
Shear resistance of adhesive strips	EN 12217-2	-	≥ 120 [3]	N/50 mm
Water tightness of adhesive strips 2 kPa for 2 hours	EN 1928 / EN 13859-1	-	W1 [3]	-

[1] Manufacturers Declaration of performance, DoP
[2] Control limit shows values, product has to satisfy during internal factory production control and audit testing.
[3] Result from type testing

Table 3
Accessories for Ampatop Aero plus

Accessories	Used for	Material / Description	Measures
Ampacoll XT [1) 3)]	Taping of penetrations	Acrylic tape with paper backing	Width 60, 75, 100, 150, 200, 250 mm Length 25 m Thickness 0.3 mm
Ampacoll Flexx Pro [2) 3)]	Taping of penetrations and reparations	Acrylic tape with PE foil backing	Width 60 mm Length 40 m Width 100 mm Length 25 m Width 150 mm Length 25 m
Ampacoll BK 535 [1)]	Taping of penetrations	Butyl based tape with PE-foil backing	Width 50 mm Length 25 m / 5 m Width 80 mm Length 25 m Width 120 mm Length 30 m
Ampacoll Primax	Primer for increasing adhesive properties	Solvent-free primer	1 Litre
Ampacoll ND Band	Protection of nail penetrations under counter batten	Expanding foam material with an adhesive on one side	30 m x 60 mm x 3 mm

[1] Ampacoll XT and Ampacoll BK 535 has satisfactory adhesion to the surface of Ampatop Aero plus, painted and untreated wood, galvanized and stainless steel, painted and anodized aluminium, PVC, concrete and GUX gypsum plasterboard.
[2] Ampacoll Flexx Pro tape has satisfactory adhesion to the surface of Ampatop Aero plus, painted and untreated wood, galvanized and stainless steel, painted and anodized aluminium and PVC.
[3] The tapes can be used in areas where water accumulation is usually not possible, like on pitched roofs or vertical surfaces without obstacles transvers to the roof slope. On the outside of bushings, like chimneys etc., additional actions must be taken. See also fig. 2.

4. Product performance

Product properties
Product and construction properties for Ampatop Aero plus are shown in table 2.

Properties related to fire
Ampatop Aero plus has fire class E according to EN 13501-1.

Durability
Ampatop Aero plus is considered to have satisfactory durability based on laboratory testing before- and after accelerated artificial climate ageing.

The product must be protected against direct exposure to UV radiation in the completed construction. The product must be covered as soon as possible after installation at roofs and walls, without unnecessary delay.

The tapes Ampacoll XT, Ampacoll Flexx Pro and Ampacoll BK 535 also have satisfactory durability based on laboratory testing before- and after accelerated artificial climate ageing. The tapes have satisfactory adhesion to the substrates mentioned in the footnotes in table 3.

Resistance against tread through
Resistance against tread through is not evaluated for Ampatop Aero plus.

Air tightness construction
The airtightness of the wind barrier 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
The products 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.

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

Environmental declaration
No environmental declaration (EPD) has been worked out for Ampatop Aero plus.

6. Conditions of use

Design considerations
Combined roofing underlays and wind barriers should generally not be used at very exposed places where experience shows that drifting snow often may accumulate between the roofing and the roofing underlay.

Exterior cladding and roofing should be finished as soon as possible after Ampatop Aero plus has been installed, to prevent that the product is freely exposed to weather and/or UV radiation for a longer time. Thermal insulation, vapour barrier and the interior lining shall not be installed before the exterior cladding or roofing has been finished and the roofing underlay has been checked.

To avoid reduction of the clamping at the overlaps, due to shrinkage of the wood, the moisture content of wall studs, rafters and battens should be less than 20 % when installing Ampatop Aero plus.

Ampatop Aero plus can be used in a minimum roof slope of 10 ° when the general conditions described in this chapter are followed.

Ampatop Aero plus can also be used at roof slopes less than 10 ° provided that the recommendations in SINTEF Building Research Design Guide no. 525.104 *Slake, luftede tretak med isolerte takflater og utvendig nedløp* are followed. A requirement is that a watertight roofing is used on top of a wooden sheathing. There are also specific requirements for the ventilated gap (height of battens). This solution is not suitable for places that have very little wind or is exposed to snow and rain drift into the ventilated gap. Roofs with low roof slope are vulnerable for leakages if snow or rain drifts into the ventilated gap since water may penetrate the roofing underlay along screws or nails through the battens. The minimum roof slope is between 1:40 and 3°. The ventilated gap must be constructed with a precipitation chamber to prevent rain and snow drift into the ventilated gap.

Installation
Ampatop Aero plus must be installed so it forms both an airtight and waterproof layer outside insulated wooden constructions in walls and roofs.

Used in walls the application shall follow the principles shown in the manufacturer's installation manual for the product and in SINTEF Building Research Design Guide no. 523.255 *Yttervegger av bindingsverk, Varmeisolering og tetting*, 525.101 *Skrå, luftede tretak med isolerte takflater,* 520.308 *Yttervegger og tak i trehus med 30 minutters brannmotstand* og 520.322 *Brannmotstand for vegger av tre, mur og betong*.

Used at roof slopes above 10° the application shall follow the principles shown in the manufacturer's installation manual for the product and in SINTEF Building Research Design Guide no. 525.101 *Skrå, luftede tretak med isolerte takflater*, 525.106 *Skrå tretak med kaldt loft,* 525.107 *Skrå tretak med oppholdsrom på deler av loftet* and 525.866 *Undertak*.

Used at roof slopes below 10° the application shall follow the principles shown in SINTEF Building Research Design Guide no. 525.104 *Slake, luftede tretak med isolerte takflater og utvendig nedløp*.

Ampatop Aero plus can be installed parallel to or across the studs of a wall or the rafters of a roof, see figure 1.

When installed parallel to rafters, the product must be installed continuously from eave to ridge without transverse joints and without battens across the roof pitch. Longitudinal overlaps must be minimum 100 mm and the overlapping joints must be clamped continuously with counter battens on rafters. Used in roof slopes below 10° the joints must be sealed with tape.

In case of installation across rafters, Ampatop Aero plus should be installed continuously from gable to gable. Mounting shall always start at the eave. Ampatop Aero plus must be mounted tightly to avoid folds, and the adhesive strips must adhere to each other continuously. If there are transversal joints, the overlaps must be clamped to the rafters using counter battens. Installation across the rafters is not recommended for roof slopes below 10°.

Overlapping joints on studs or rafters must have minimum 100 mm overlap and continuous clamp of battens.

Ampacoll XT tape, Ampacoll Flexx pro tape or Ampacoll BK 535 can be used on overlapping joints for additional safety against air and rain penetration.

Connections to other building components and penetrations
Ampatop Aero plus shall be installed with airtight connections to the wind barrier of exterior walls, and with airtight joints at the ridge and valley gutters. In addition, it is important that connections towards roof windows, chimneys etc. are made both water- and airtight, see SINTEF Building Research Design Guide no. 525.101 *Skrå, luftede tretak med isolerte takflater* and 525.866 *Undertak* for details. On the outside of bushings, like chimneys etc., additional actions must be taken, see figure 2.

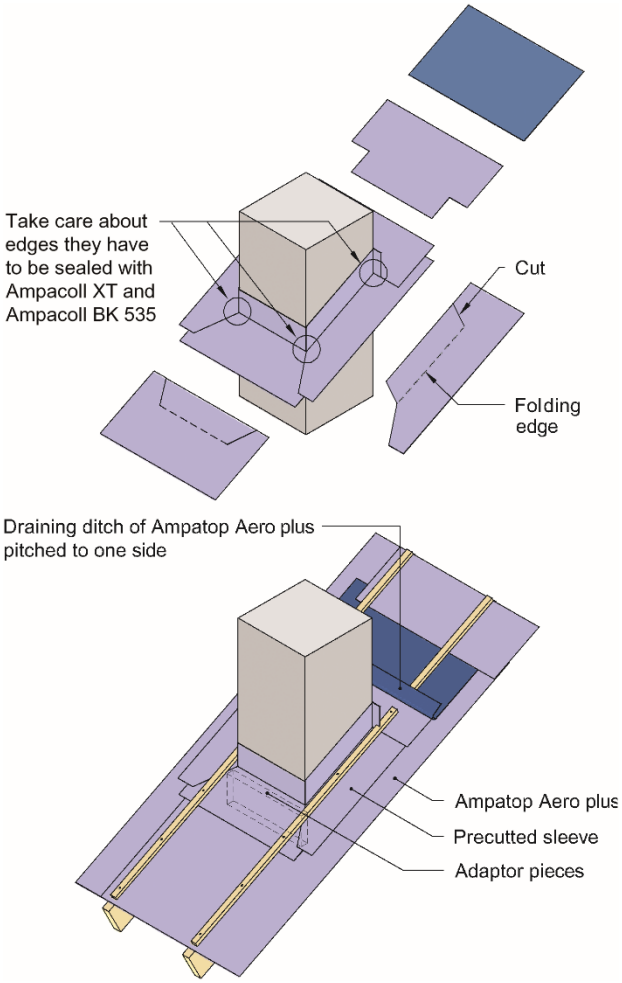

Fig. 2
Sealing around a chimney with Ampatop Aero plus.

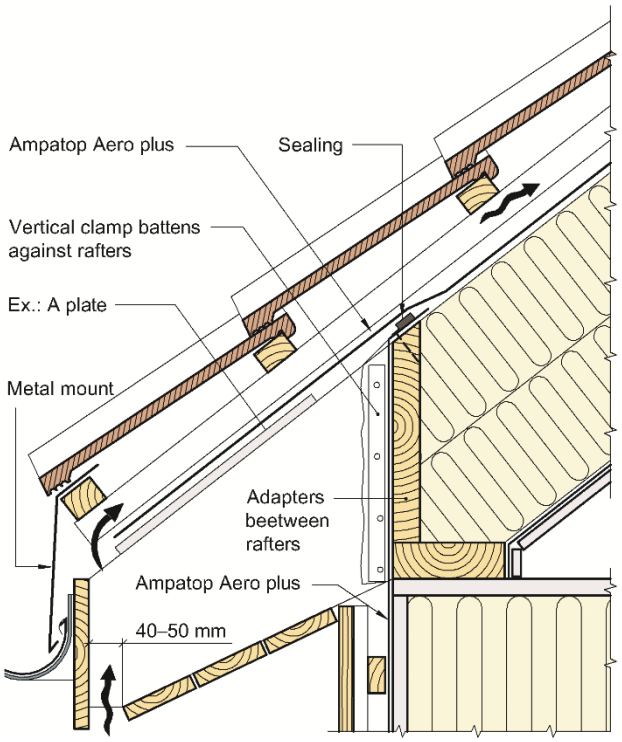

Fig. 3
Example of an eave between roof and wall with Ampatop Aero plus.

At eaves with protruding rafters the roofing underlay shall be installed around the rafters to get clamped to the wind barrier on the wall.

At eaves without protruding rafters, the roofing underlay can be sealed to the wind barrier on top of the adapter, see example in figure 3. See also SINTEF Building Research Design Guide no. 525.101 *Skrå, luftede tretak med isolerte takflater* and 525.107 *Skrå tretak med oppholdsrom på deler av loftet.*

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

The counter battens must be mounted in a way that provides tight overlap joints. Using different dimensions to get the desired counter batten height, the lowermost counter batten must not be thicker than 36 mm. The counter battens are fastened with nails or screws with a maximum distance of 300 mm. The minimum length for 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.

To reduce the possibility for a leakage through the nail holes it is recommended to use Ampacoll ND Band between Ampatop Aero plus and the counter battens. Ampacoll ND Band must be used at roof slopes less than 10°.

When Ampatop Aero plus is installed across 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.

Roofs with attics
Even though a combined roofing underlay and wind barrier are best suited for roofs where the vapour barrier can continuously follow the roof plane on the inside, Ampatop Aero plus can be used in roofs with heated rooms in parts of the attic, see SINTEF Building Research Design Guide no. 525.107 *Skrå tretak med oppholdsrom på deler av loftet.* Ampatop Aero plus can also be used in cold, ventilated and non-ventilated attics, see SINTEF Building Research Design Guide no 525.106 *Skrå tretak med kaldt loft*.

Combination with wooden board sheating
Ampatop Aero plus can be installed directly to wooden board sheathing made of spruce or pine, e.g. in refurbished roofs which are reconstructed and insulated.

The insulation can be placed directly below the wooden board sheathing provided that the total water vapour resistance for the layers does not exceed an s_d-value of 0.5 m. If plywood- or OSB-boards are used, the water vapour resistance must be documented. When rebuilding old roofs, roofing with asphalt roofing must be removed.

If the wooden sheathing is not smooth, and when the joints run across the rafters, an extra batten shall be placed under the regular counter batten to reduce the possibility of leakage, see fig. 4. This is to create tight overlap joints, and to reduce the possibility of leakage through nail and screw holes.

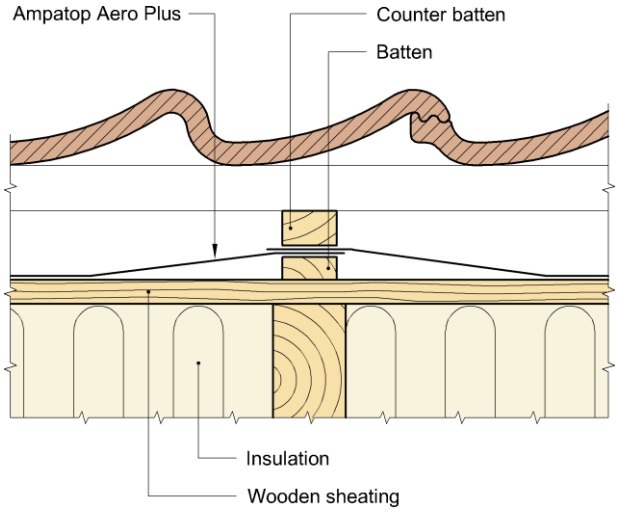

Fig. 4
Example of a transversal joint of Ampatop Aero plus on rough wooden sheathing.

Transport and storage
Ampatop Aero plus shall be stored under dry conditions on a clean and plane surface protected by wrapping and shielded from direct sunlight.

7. Product and factory production control

Ampatop Aero plus, Ampacoll XT, Ampacoll Flexx Pro, Ampacoll BK 535, Ampacoll Primax and Ampacoll ND Band is produced in Germany and UK for Ampack AG.

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

The manufacturing of the products and the manufacturer's system for factory production control (FPC) is subject to continuous surveillance in accordance with the contract regarding SINTEF Technical Approval.

Ampack AG's quality management system is certified according to EN ISO 9001.

8. Basis for the approval

The evaluation of Ampatop Aero plus and the accessories is based on reports owned by the holder of the approval.

9. Marking

Ampatop Aero plus is marked with product name, producer, and the date of manufacturing.

Ampatop Aero plus is CE-marked in accordance with EN 13859-1.

The approval mark for SINTEF Technical Approval TG 20415 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