SINTEF

SINTEF Certification

No. 20016

Technical Approval

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Provided listed on www.sintefcertification.no

SINTEF confirms that

Vempro R+ and RN combined roof underlayer 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

DuPont de Nemours (Luxembourg) S.àr.l.
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2. Product description

Vempro R+ and Vempro RN is made from spun bonded nonwoven polypropylene fabric and polypropylene film. The colour of polypropylene film can be both white and brownish. The product is UV-stabilized, and intended for use as a combined roofing underlay and an airtight breathable membrane The weight is 225 +35/-20 g/m² and the colour is blue on the top side and grey on the bottom side.

Vempro R+ and RN is supplied as rolls of standard length of 50 m and widths of respectively 1,50 m and 1,30 m. Vempro R + has a 50 mm wide adhesive strip at one edge on the top side, and at the opposite edge on the underside. The adhesive strips consist of a heat-melting glue.

Vempro RN has no adhesive strips, but a strip without felt intended for overlap.

3. Fields of application

Vempro R+ and RN is used as a wind barrier in thermal insulated wooden walls and roof constructions, and as a combined roofing underlay and wind barrier in thermal insulated, pitched wooden roofs with ventilated, discontinuous roofing and external drainage, see Fig. 2.

Vempro R + and RN can be used as combined roof underlayer and wind barrier on roofs in buildings in hazard class 1-6 in fire class 1,2 and 3.

Vempro R + and RN can be used as wind barrier on walls in hazard class 1-6 in and in homes until 3 floors where each unit has direct access to the terrain (not via staircase or staircases). For other uses must be fire safety analysis performed.

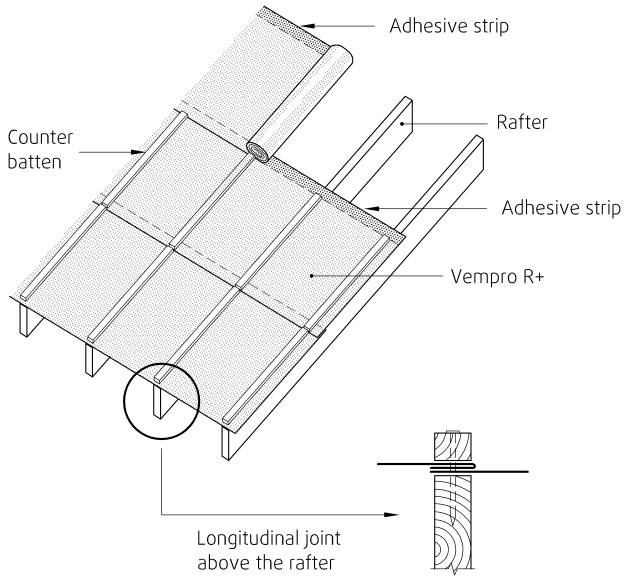

Fig. 1
Installing Vempro R+ with adhered joints mounted crosswise on the rafters or the roof trusses. End joints have to be clamped and folded above the rafters as shown in the figure segment above. Vempro RN has no adhesive strips and has therefore to be installed longitudinally to rafters and studs.

The product is particularly suitable for roofs with continuous thermal insulation from eaves to ridge. Vempro R+ and RN may also be applied in pitched wooden roofs with heated rooms in parts of the attic, and above uninsulated attic spaces.

The product may also be used in combination with wooden roof sheathing, e.g. for renovation of old roofs with thermal insulation in the plane of the roof. See clause. 6, *Special conditions for use and installation.*

4. Properties

Material and construction properties are shown in Table 1. Vempro R+ and RN complies with the requirements recommended by SINTEF Building and Infrastructure concerning water tightness, air tightness and water vapour permeability.

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Table 1: Vempro R+ and RN Material – and construction properties

Property	Method	DoP[1)]	Control limit[2)]	Unit
Dimensional stability. -Longitudinal -Transversal	EN 1107-2:2001	 < 2 < 2	 < 2 < 2	%
Water tightness	EN 1928:2000	W1	W1	Class
Air tightness material	EN 12114:2000	< 0.5	< 0.5	m³/(m²h50Pa)
Air tightness construction	EN 12114:2000	-	0.4 [3)]	m³/(m²h50Pa)
Tear resistance (nail shank) -Longitudinal -Transversal	EN 12310-1:1999	350 ± 100 350 ±150/-50	≥ 250 ≥ 300	N
Tensile strength -Longitudinal -Transversal	EN 12311-1:1999 EN 13859-2:2014	600 ± 150 550 +150/-100	≥ 450 ≥ 450	N / 50 mm
Elongation -Longitudinal -Transversal	EN 12311-1:1999 EN 13859-2:2014	50 +20/-10 60 +25/-10	≥ 40 ≥ 50	%
Water vapour resistance, s_d	EN-ISO 12572:2001	0.03 +0.02/-0.01	≤ 0.05	m
Rain and wind tightness construction	NT Build 421	-	400 [3)]	Pa
Thread through resistance	SP 0487	-	3.6 [3)]	kN

[1)] Declared value given in the manufacturers DoP (Declaration of performance)
[2)] Control limit shows values the product has to satisfy during internal factory production control and audit testing
[3)] Results from type testing

Durability

Vempro R+ (with adhesive strip), and Vempro RN, is considered to have satisfactory durability on the basis of laboratory testing before- and after accelerated artificial climate ageing. The products have to be protected against direct exposure to UV radiation in the complete construction. The products have to be covered as soon as possible after installation at roofs and walls, without unnecessary delay.

The durability for the material and the adhesive stip has been tested before and after exposure to artificial weathering/ ageing according to EN 13859-1 and NT Build 495.

Properties related to fire

Reaction to fire performance for the products has not been determined.

Concentrated load resistance

Based on performed tests and provided installation according to clause 6, Vempro R+ is considered to have sufficient resistance against “tread through” during the construction period.

Airtightness construction

When using Vempro R and RN as a wind barrier, the measured airtightness (construction) shows that it's 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.

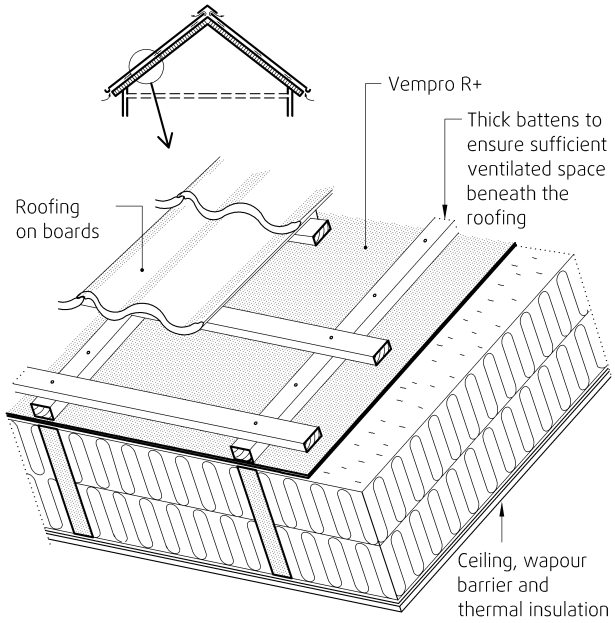

Fig. 2
Basic roof construction using Vempro R+ and RN as a combined roof underlayer and wind barrier

5. Environmental aspects

Substances hazardous to health and environment

Vempro R+ and RN 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

Vempro R+ and RN 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.

Environmental declaration

No environmental declaration (EPD) has been worked out for Vempro R+ and RN.

6. Special conditions for use and installation

General

Vempro R+ and RN shall be installed in a way that provides both an airtight and a watertight layer. The application shall follow the principles showed in Building Research Design Guide no. 525.102 and the instructions given by the manufacturer.

Design considerations

Vempro R+ and RN should not be used at very exposed places where experience show that drifting snow often may be accumulated between the roofing and the roofing underlay.

The roof pitch must be minimum 10°.

The wall cladding and the roofing should be laid as soon as possible after Vempro R+ and RN has been installed, in order to prevent that the underlay is freely exposed for a longer period of time (see also clause 4, *Properties*). Thermal insulation, vapour barrier and the ceiling shall not be installed until the roofing has been installed and the underlay is checked to be properly mounted.

Installation

Vempro R+ shall be installed crosswise the rafters as shown in Fig. 1. The roof underlayer shall be installed continuously from gable to gable and the installation shall always start at the eave. The adhesive strips must adhere continuously to each other along all horizontal joints. Any transversal overlap joints must be folded and clamped above the rafters as shown in Fig. 1.

Vempro RN has not adhesive strips and has therefor to be installed longitudinally to rafters and studs. Joints have to have minimum 50 mm overlap and have to be clamped continuously above rafters and studs.

In order to minimize the pressure at the overlaps due to shrinkage of the rafters, the moisture content of the rafters should be less than 20% when installed.

Overlapping joints, connections to other components and structures

Vempro R+ and RN shall be installed with airtight connections to the wind barrier of exterior walls, and with airtight joints at the ridge and connections between separate roof planes. Connections to the wind barrier are shown in Fig. 3 and 4.

Vempro R+ and RN has a felted underside. Therefore, the overlapping joints will not have satisfactory air- and rain tightness as given in Table 1. To ensure sufficient tightness of e.g. transversal joints above the rafters and for joints at the ridge, Vempro R+ and RN must be folded and clamped above the rafters as shown in figure segment in figure 1.

Vempro RN has a strip without felt intended for overlapping joints along the rafters.

Dimensions of counter battens and ventilation space

The roofing shall have a ventilated space between the roofing and the underlay. For roofs with a maximum length between eaves and ridge of approx. 7 m the following minimum thicknesses of counter battens should be used depending on the roof pitch:

≤ 30°	36 mm
31-40°	30 mm
≥ 41°	23 mm

For larger roofs the distance between the underlay and the roofing battens should be increased, see Building Research Design Guide no. 525.102.

The counter battens are cut just below the adhesive strip and are fixed gradually during the installation of the roof underlayer. Maximum thickness of the counter battens used for clamping shall be 36 mm.

The counter battens shall be fixed by screws or nails spaced at maximum 300 mm. It is recommended to use screws with plain shank on the part which penetrates the counter battens. For roof pitches below 18º, alternatively 3,1 mm hot galvanized square nails can be used or also grooved nails with a length of 2,5 times the thickness of the counter battens.

To avoid the risk of fluttering noise Vempro R+ and RN should not be installed at large eaves where the roof underlay can move freely.

Bushings

Connections towards installed bushings like chimneys, skylights, pipes etc. shall be performed in such way that they are air- and watertight. Fig 5 shows an example of a chimney bushing.

Roofs with attics

Vempro R+ and RN has sufficient low vapour resistance to be used as roofing underlay in non-ventilated attic spaces, see Building Research Design Guide no. 525.102.

Using wooden sheeting made of plywood or OSB-boards, the water vapour resistance has to be documented. Total water vapour resistance for all the layers in the under roof shall not exceed Sd-value = 0,5 m.

Combination with wooden board sheeting

Vempro R+ and RN may be applied as roofing underlay in combination with wooden board sheeting provided a total water vapour resistance of maximum s_d-value = 0,5 m.

Vempro R+ and RN can be assembled directly to wooden board sheetings made of spruce or pine in old roofs which are reconstructed and insulated. The insulation can then be placed as shown in Fig. 6 after the old roofing has been removed.

When reconstructing old roofs, the old, not breathable, roofing must be removed. Wooden battens have to be used beneath the overlapping joints to ensure adequate air tightness, se Fig. 6. This is even more important in cases where the substrate is irregular and when the joints are crosswise located on the wooden board sheetings. Wooden board sheetings beneath the counter battens, as shown in Fig. 6, decreases the risk of air leakage through screw- and nail holes.

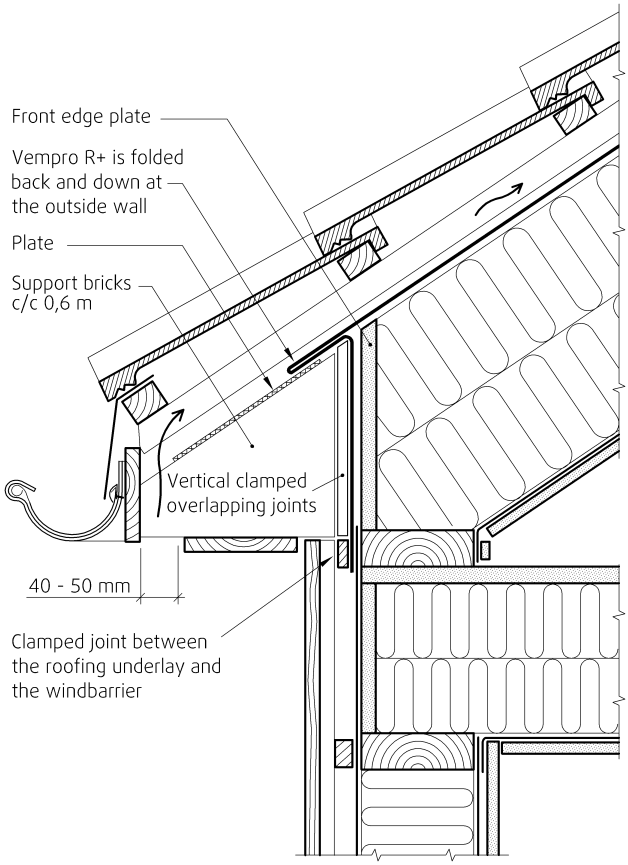

Fig 3
Example of connection between roof and external wall where the rafters do not extend outside the plane of the wall. Vempro R+ or RN is installed continuously over the front edge plate and is clamped to Vempro Wind barrier at the wall.

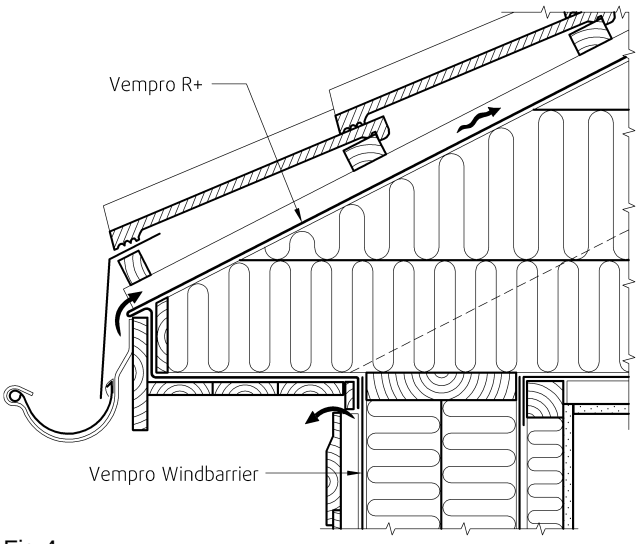

Fig 4
Example of connection between roof and external wall where the rafters extend outside the plane of the wall. Vempro R+ or RN is folded around the rafter edge and clamped to Vempro Wind barrier at the wall.

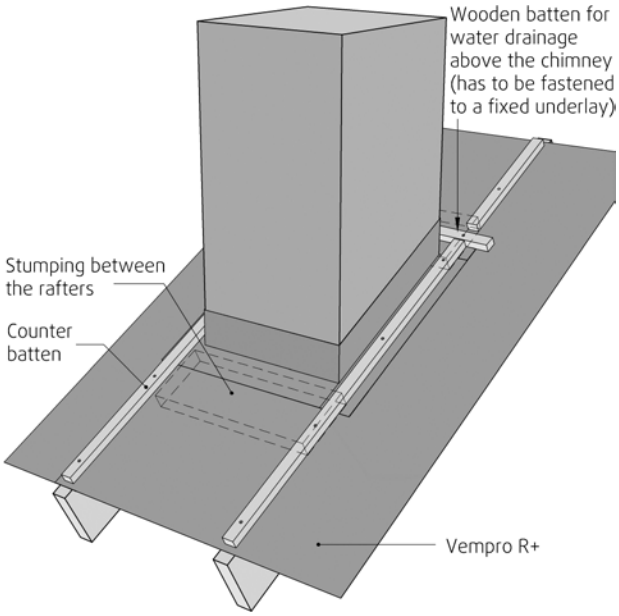

Fig. 5
Example of assembling a chimney bushing using a prefabricated bushing sleeve

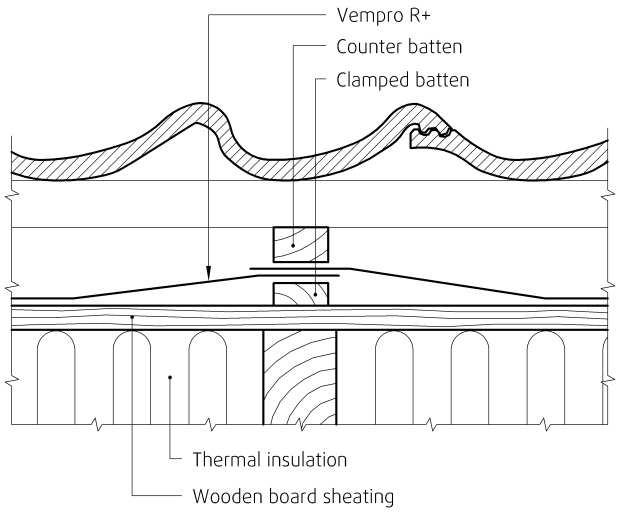

Fig. 6
Vempro R+ or RN nstalled on a rough surface and wooden board sheeting, which is insulated on the beneath side.

7. Factory production control

The products are produced in UK for DuPont de Nemours S. à r.l.

The holder of the approval is responible 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 subjected to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

The manufacturer has a quality management system which is certified by Lloyd's Register LRQA according to ISO 9001:2015, ISO 14001:2004 and OHSAS 18001:2007; certificate number 10137412.

8. Basis for the approval

The approval is mainly based on verification of product properties from type testing documented in the following reports:

- SINTEF Building and Infrastructure, report 3D0226.01-A dated 13.07.2009 (material and construction properties)
- SINTEF, report 102000554-4 Step through resistance dated 14.08.2015
- tBU, report 1.1 / 11400 / 589. 0.1.2006, dated 06.02.2007 (material properties)
- tBU, report 1.1 / 11400 / 0203. 1.1.2009, dated 21.06.2009 (material properties)
- tBU, report 1.3/11400/0743.0.1-2009, dated 01.09.2009 (material properties)
- SINTEF, report 102000554-4 Laboratory testing of Vempro R+ (Combined Roof Underlayer and Wind Barrier) and Vempro (Wind Barrier), produced in UK dated 22.10.2015 (material properties, durability)
- SINTEF, report 102000554-4 DOW Europe Artificial ageing Vempro R+ produced in UK and Poland, dated 21.02.2017 (artificial ageing/water vapour resistance/water tightness)

9. Marking

Vempro R+ and RN combined roofing underlay and wind barrier shall be marked on the packaging with the brand image of Glava and the manufacturer's product name, Vempro R+ or RN, printed on the product. The product is also labeled with product type and production number.

The approval mark for Technical Approval No. 20016 may also be used. The product is CE marked according to EN 13859-1.

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

Hans Boye Skogstad
Approval Manager