

SINTEF Building and Infrastructure confirms that

Daltex FNS 92 and FNS 125 wind barrier and roofing underlay

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

Don & Low Ltd., Nonwovens
 Glamis Road, Forfar, Angus
 DD8 1EY Scotland
 Tel: +44 1307 45 2600 Fax: +44 1307 45 2610
www.donlow.co.uk

2. Product description

Daltex FNS 92 and FNS 125 wind barrier and roofing underlay are made of a micro porous breathable polypropylene film which is sandwiched between two layers of spun bonded polypropylene fibres. The products are UV-stabilized, and intended for use as a combined roofing underlay and an airtight breather membrane. Measures and weights are given in Table 1.

The products are available in several colours. The width is not standard and can be supplied up to 3.0 m.

Table 1. Measures and weights of Daltex FNS

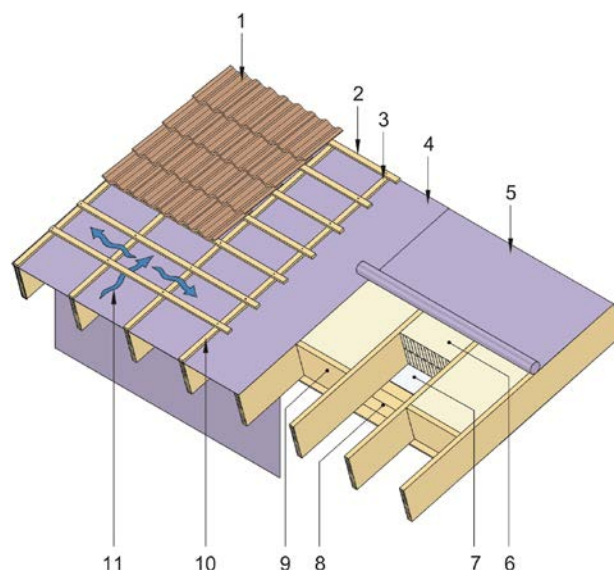
| Property | FNS 92 | FNS 125 | Tolerance | Unit |
|---------------|-----------|-----------|------------|------------------|
| Roll width | Up to 3,0 | Up to 3,0 | -0.5/+1.5% | m |
| Roll length | 25/30/50 | 25/30/50 | - 0 % | m |
| Straightness | <30 | <30 | - | mm/10m |
| Mass per unit | 92 | 125 | -10 / +10 | g/m ² |

Measured according NS-EN 1848-2 and 1849-2

3. Fields of application

Daltex FNS 92 and FNS 125 are intended for to be used as a wind barrier in thermal insulated wooden wall 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. Examples of the products used in roofs and walls are shown in Fig. 1 and Fig. 2.

The products are particularly suitable for roofs with continuous thermal insulation from eaves to ridge.



| No. | Description |
|-----|---|
| 1 | Roofing tiles or sheet |
| 2 | Roofing battens |
| 3 | Counter-battens, see clause 6 |
| 4 | Daltex FNS 92 and FNS 125 roofing underlay |
| 5 | Installation, laid continuously from the ridge to the eaves |
| 6 | Thermal insulation |
| 7 | Vapour barrier |
| 8 | Ceiling |
| 9 | Noggings |
| 10 | Continuously clamped overlap joints |
| 11 | Cross ventilation between roofing underlay and the roofing |

Fig. 1

Principle of to build up roof construction with Daltex FNS 92 or FNS 125 used as combined roofing underlay and wind barrier.

Daltex FNS 92 and FNS 125 may also be applied for rebuilding old roofs with thermal insulation placed in the plane of the roof.

The product can be used as combined roofing underlay and wind barrier on roofs in buildings in fire class 1, 2 and 3 and hazard class 1-6.

Table 2
Material and construction data for Daltex FNS 92 and FNS 125 wind barrier and roofing under

| Property | Test method NS-EN (conditions) | FNS 92 | | FNS 125 | | Unit | |
|---------------------------------|--------------------------------------|--------------------|---|--------------------|--|--|--------|
| | | DoP ¹⁾ | Control limit ²⁾ | DoP ¹⁾ | Control limit ²⁾ | | |
| Water tightness, | 1928 | W1 | W1 | W1 | W1 | Class / 2 kPa | |
| Rain tightness, construction | NT Build 421 | - | 18° slope / 600 ³⁾ | - | 18° slope / 600 ³⁾ | Roofslope / Pa pressure diff. | |
| Air tightness, material | 12114 | - | 0,5 | - | 0,5 | m ³ /(m ² h 50 Pa) | |
| Air tightness, construction | 12114 | - | 0,5 ³⁾ | - | 0,5 ³⁾ | m ³ /(m ² h 50 Pa) | |
| Condensation uptake | NT Build 304 | - | Not performed | - | 0,3 / 35° ³⁾ | l/m ² / roofslope | |
| Water vapour resistance | ISO 12752 (50/94 % RH, 20 °C) | - 0,026 ± 0,004 | 0,155 · 10 ⁹ ³⁾ 0,03 ³⁾ | - 0,026 ± 0,002 | 0,146 · 10 ⁹ ³⁾ 0,028 ³⁾ | (m ² sPa)/kg m air layer thick.(S _a) | |
| Tensile strength | L: T: | 12311-1 | 230 ± 50 125 ± 25 | 180 100 | 285 ± 55 165 ± 30 | 230 135 | N/50mm |
| Elongation at break | L: T: | 12311-1 | 65 ± 20 70 ± 20 | 45 50 | 70 ± 15 90 ± 18 | 55 72 | % |
| Tear resistance (nail shank) | L: T: | 12310-1 | 75 ± 40 80 ± 40 | 35 40 | 125 ± 25 120 ± 20 | 100 100 | N |
| Dimensional stability | L: T: | 1107-2 | - | - 1 - 0,5 | - | - 1 - 1 | % |

¹⁾ The 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

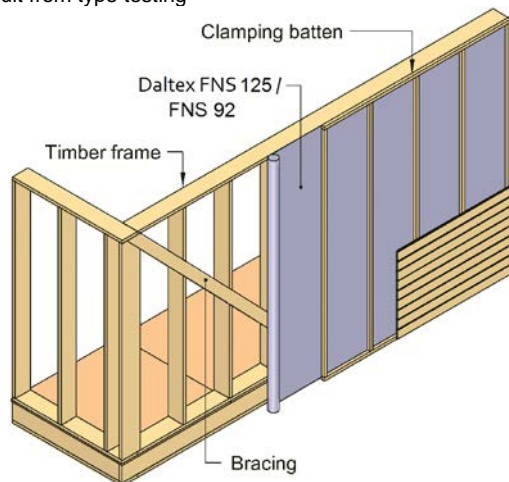


Fig. 2
Daltex FNS 92 and FNS 125 used as a wind barrier in timber frame wall.

The product can be used as wind barrier on walls in fire class 1 hazard class 1-6, and in houses up to 3 floors where each flat has straight access to the ground (not via stairs or staircases). For other use, fire technical analysis has to be carried out.

4. Properties

General

Material and construction properties are shown in Table 2. The product complies with the requirements recommended by SINTEF Building and Infrastructure concerning watertightness, airtightness and water vapour permeability.

Strength

Daltex FNS 92 and FNS 125 used as roofing underlay has not sufficient strength to be tread upon during the construction period.

Reaction to fire class

Daltex FNS 92 and Daltex FNS 125 have fire class D according to NS-EN 13501-1.

Durability

Daltex FNS 92 and FNS 125 are assessed to have satisfactory durability as long as the product is not exposed to direct sunlight over a long period of time.

The durability has been tested by artificial weathering/ ageing according to EN 13859-1 and NT Build 495, with testing of watertightness and tensile properties before and after the exposure.

5. Environmental aspects

Substances hazardous to health and environment

Daltex FNS 92 and FNS 125 are containing 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 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.

Environmental declaration

No environmental declaration (EPD) has been worked out for the product.

6. Special conditions for use and installation

General

Daltex FNS 92 and FNS 125 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 Sheet no.:

- 523.251 *Wooden framework in residential buildings, dimensioning and design*
- 523.255 *Wooden framework, thermal insulating and tighten*
- 525.101 *Insulated pitched wooden roofs with air ventilation between wind barrier and roof underlay*
- 525.102 *Insulated pitched wooden roofs with combined wind barrier and roof underlay.*

The wall cladding and the roofing should be laid as soon as possible after Daltex FNS92 and FNS 125 has been installed, in order to prevent that the underlay is freely exposed for a longer period of time. Thermal insulation, vapour barrier and the ceiling should not be installed until the roofing has been laid and the underlay is checked to be properly mounted.

Combined roofing underlays and wind barriers should not be used at especially exposed places where experience shows that drifting snow often may be packed between the roofing and the roofing underlay.

Installation as roofing underlay

Daltex FNS 92 and FNS 125 shall be installed in one length from the ridge to the eaves without transversal joints. Longitudinal overlap joints must be clamped continuously between counter battens and the rafters.

Span

Daltex FNS 92 and FNS 125 is not to be used on roofs where the spacing between the rafters is more than 600 mm.

Roof pitch

The roof pitch must be minimum 18°.

On small roofs, e.g. shed dormers on low rise houses, the roof pitch may be 15° provided that the overlap joints are particularly well clamped by the counter battens fastened with screws.

Dimensions of counter battens and ventilation space

The roofing shall have a ventilated space between the

roofing and the underlay. Recommended heights of counter battens are shown in table 3.

The counter battens shall be fixed with 3,1 mm galvanized, square nails spaced maximum 300 mm. The length of the nails should be approx. 2,5 x the thickness of the counterbattens. Alternatively may screws or nails of equivalent capacity and durability be used.

Table 3.

Recommended height of counter battens depending on roof pitch and roof length.

| Roof pitch | Roof length (m) ¹⁾ | | |
|------------|-------------------------------|---------|---------|
| | ≤ 7.5 | 10 | 15 |
| 18° – 30° | 36 | 36 + 36 | 48 + 48 |
| 31° – 40° | 30 | 36 | 36 + 23 |
| ≥ 41° | 23 | 36 | 36 + 23 |

¹⁾ Measured along the pitched roof from eave to ridge

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.

Connections to other components and structures

Daltex FNS 92 and FNS 125 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 towards openings in the roof such as roof windows, chimneys etc. must also be made both water- and airtight. Construction details for combined roofing underlays and wind barriers are shown in Building Research Design Sheet no. 525.102.

Roofs with attics

Daltex FNS 92 and FNS 125 has sufficient low vapour resistance to be used as roofing underlay in non-ventilated attic spaces, e.g. as shown in fig. 3.

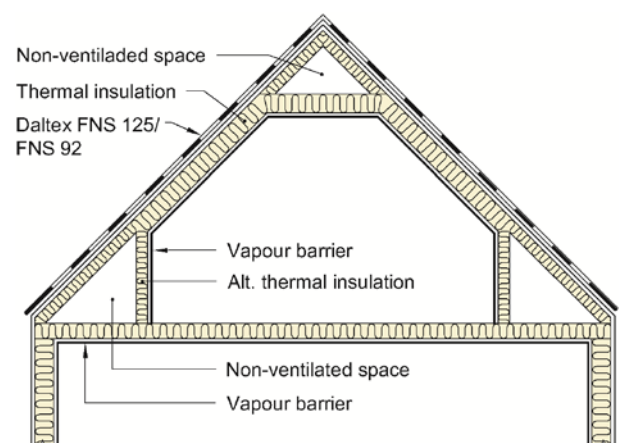


Fig. 3

Example of Daltex FNS 92 and FNS125 roofing underlay used in a roof construction with trussed rafters and partially non-ventilated spaces. The end walls in the non-ventilated spaces must also have thermal insulation and a wind barrier, and any openings to the rooms must have airtight doors/hatches.

Combination with sarking board

The products may be applied as roofing underlay in combination with wooden board sheathing, e.g. in constructions where thermal insulation is placed as shown in fig. 4. When reconstructing old roofs the old roofing must be removed before the new breathable underlay, counter battens and new roofing are installed.

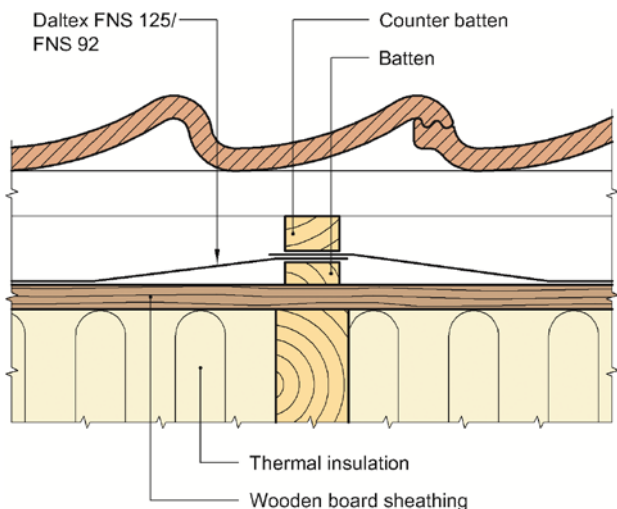


Fig. 4
Breathable roofing underlay placed on wooden board sheathing, with thermal insulation beneath. The overlap joints are continually clamped between battens and counter battens to insure air- and watertightness.

7. Factory production control

The product is produced by Don & Low Ltd., Scotland.

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 Daltex FNS 92 and FNS 125 is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

The manufacturer's quality management system is certified by British Standards Institution, BSI, towards ISO 9001:2008, certificate no.FM 45536.

8. Basis for the approval

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

for SINTEF Building and Infrastructure

Marius Kvalvik

Marius Kvalvik
Approval Manager

- Norwegian Building Research Institute. Report no. O 14109 dated 13.02.2003
- Danish Building and Urban Research. Report no. 452-11 dated 14.03.2003
- BTTG Testing and Certification Ltd. Report no. N007170 dated 05.05.2007
- BTTG Testing and Certification Ltd. Report no. N010410 dated 05.11.2009
- BTTG Testing and Certification Ltd. Report no. N009295 dated 19.11.2009
- BTTG Testing and Certification Ltd. Report no. N010044 dated 26.05.2010
- SINTEF Building and Infrastructure, Report no. B1422 dated 18.11.2010 (condensation)
- BTTG Testing and Certification Ltd. Report no. 11/20456/E/SEJ dated 27.08.2015 (testing of properties)
- BTTG Testing and Certification Ltd. Report no. 27/03800A/02/16 dated 23.02.2016 (fire classification)
- BTTG Testing and Certification Ltd. Report no. 17/03777A/01/16 dated 02.02.2016 (fire classification)

9. Marking

Daltex FNS 92 and FNS 125 roofing underlay shall be marked on the packaging with the name of the product, role dimensions, and production code or date. The product is CE marked in accordance with EN 13859-1 and EN 13859-2. The approval mark for SINTEF Technical Approval No. 2375 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