

SINTEF confirms that

Steni panels

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

Steni AS
 Lågendalsveien 2633
 NO-3277 Steinsholt
www.steni.no

2. Product description

Steni panels are stone composite panels made up of a core of crushed mineral stone covered on each side with a layer of fibreglass reinforced polyester resin containing a fire-retarding filler of aluminium hydroxide. The panels are produced in three different versions; *Steni Colour*, *Steni Nature* and *Steni Vision*.

Steni Colour comes with electroncured acrylic colours in three different colour glosses; mat surface with a microstructure, semi gloss and high gloss with a smooth finish.

Steni Vision has a printed motive/design which is applied before the surface lacquering

Steni Nature has a surface of crushed natural materials set in a resin composite.

Steni panels are delivered in many colours. The panels have straight edges. The backside is smooth and unfinished.

Table 1 shows dimensions, tolerances and weight.

Supplementary products

Aluminium profiles with alloy 6060F22, EPDM foil for installations and Steni fasteners (screws). The fasteners are made of stainless steel A4 according to EN ISO 3506 with a polyester powder coating on the head. The screws are used for fastening panels to wood or metal profiles.

For Steni Color and Steni Vision: horizontal and vertical joints between the panels must be sealed with MONARFLEX DPC and wood beams. in order to satisfy fire class B-s1,d0 for the panels. Monarflex DPC is not covered by the approval and has not been considered by SINTEF. It is assumed that the product complies with Norwegian requirements for product documentation and environmental properties.

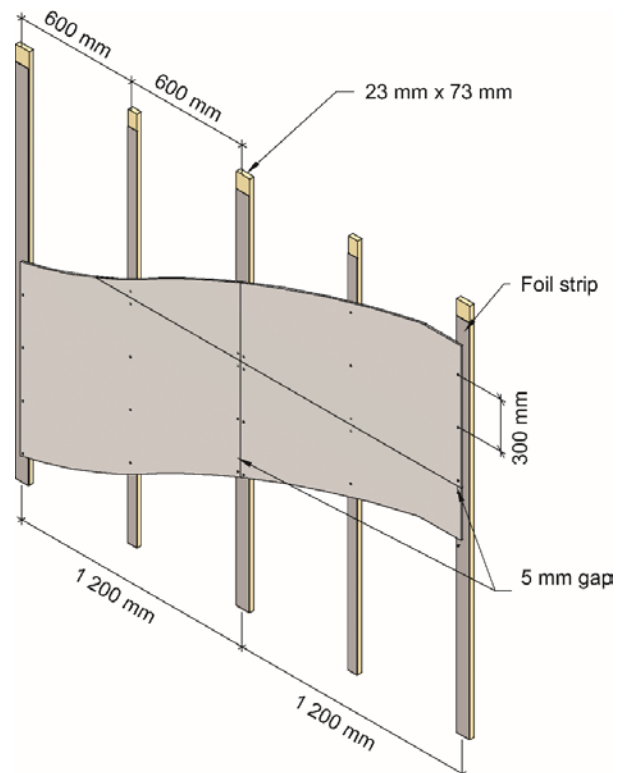


Fig. 1

Principle for vertical installation of Steni panels as facade cladding on wood battens.

3. Fields of application

Steni Colour, Steni Vision and Steni Nature panels can be used as facade panels in ventilated exterior claddings in buildings in Risk classes 1-6 in Fire classes 1-3.

4. Properties

Strength and stiffness

Strength and stiffness properties for the panels are shown in Table 2. When 6 mm thick panels are installed on facades according to cl. 6 the wind load resistance based on testing with EN 438-2:2005 is equal to $q_{k,ast} = 2,9 \text{ kN/m}^2$.

Reaction to fire

Steni panels have reaction to fire classification according to EN 13501-1 as shown in Table 3.

Table1 Steni panels. Dimensions, tolerances and weight

Property	Value
Width and length, stock panels	1195 x 2995 ± 2 mm
Width by orders	≤ 1195 ± 2 mm
Length by orders	≤ 3500 ± 2 mm
Edge straightness (against ruler)	± 1 mm
Squareness (diagonal deviation)	≤ 3 mm
Density	1960 ± 3 % kg/m ³
Thickness Steni Colour and Steni Vision	6,0 ± 0,6 mm
Thickness Steni Nature: Type FM Type F Type M and type M with glass Type C	ca. 5,5 mm ca. 6,5 mm ca. 8 mm ca. 14 mm
Weight Steni Colour and Steni Vision	ca.12 kg/m ²
Weight Steni Nature: Type FM Type F Type M and type M with glass Type C	11 ± 10 %kg/m ² 12 ± 10 % kg/m ² 15 ± 10 % kg/m ² 19 ± 10 % kg/m ²

Table 2 Material properties for Steni panels

Property	Value	Test method
Bending strength	≥ 30 N/mm ²	CSTB
E-module in bending	≥ 5000 N/mm ²	EN ISO 178
Water absorption	< 1,5 %	ISO/R 62-178
Water vapour resistance, S _d (eqv. Air layer thickness)	Ca. 60 m	ASTM E 96-66
Temperature expansion	0,021 - 0,026 mm/(mK)	NBI ¹⁾
Heat resistance R	R ca. 0,01 m ² K/W for ca. 6 mm plate	NBI-26:1983
Hard body impact resistance	Category I	EAD-090062 ²⁾
Surface hardness; - Ball impression at 250 N - Permanent impression	0,14mm 0,03 mm	NT Build 059 NT Build 059
Impact strength Steni Colour og Steni Vision:	≥ 20 kJ/m ²	ISO 179-82
Impact strength Steni Nature	≥ 17 kJ/m ²	ISO 179-82
Tensile strength Steni Colour og Steni Vision:	≥ 15 N/mm ²	ISO/R 527-66
Tensile strenght Steni Nature	≥ 13 N/mm ²	ISO/R 527-66
Humidity expansion	0,0015 mm/(m·%) ³⁾	EN 438-2:2005, Part 18
Screw pull out resistance from panel	1,8 kN	EN 320
Design screw pull out capacity from structural wood C18	341 N/skrue	EN 1382

¹⁾ Self-developed method, NBI Report O 3437, September 1989

²⁾ Tested with ETAG 034 which is now replaced by EAD-090062. No visible deterioration from hard body impacts at 10 J.

³⁾ Mean change in dimension at 32-90 % relative humidity.

Table 3 Reaction to fire for Steni panels.

Product	Classification
Steni Colour ¹⁾ Steni Vision ¹⁾ Steni Nature type FM ²⁾ , F ²⁾ og M ³⁾ Steni Nature type M with glass ³⁾	B-s1,d0
Steni Nature type C ^{3),4)}	A2-s1,d0

¹⁾ On all types of substrates with fire class A1 and A2-s1,d0

²⁾ On all substrates of fire class A1 or A2-s1,d0, having a density of at least 570 kg/m³

³⁾ On all substrates with fire class A1 or A2-s1,d0, having a density of at least 664 kg/m³

⁴⁾ Tested weight 21,2 kg/m²

Durability

Results from freeze/thaw testing and testing in accelerated aging apparatus show that Steni Colour has good frost resistance and durability when exposed to external climate.

5. Environmental aspects

Substances hazardous to health and environment

Steni panels 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.

Dust mask should be used when cutting panels, and vacuum dust extractor should be used when extensive cutting.

Effect on soil, surface water and ground water

The leaching properties of the product are evaluated to have no negative effects on soil or water.

Waste treatment/recycling

The product shall be sorted as metal and residual waste. The product shall be delivered to an authorized waste treatment plant for material recovery and disposal.

Environmental declaration

Environmental declarations (EPD) have been worked out according to EN 15804 for Steni Colour, Steni Nature and Steni Vision. For complete documentation see EPD nr. NEPD 2581-1309 NEPD 2580-1307, NEPD-2657-1361-EN. <http://epd-norge.no/>

6. Special conditions for use and installation

Installation

Steni Colour, *Steni Vision* and *Steni Nature* are installed vertically or horizontally on wooden or metal battens spaced maximum c/c 600 mm as shown in fig. 1. Battens are also used for panel edge support at horizontal joints and at edges along roof eaves, windows, foundations etc.

Wooden battens can be in white or impregnated wood (max RH 15–20 %). The recommended maximum batten thickness is 28 mm. The battens should have a width of at least 45 mm under the panels and at least 70 mm at the joints. Before mounting the panels, the batten must be covered with STENI EPDM foil, which is attached using a staple gun. The EPDM foil should be wider than the batten and fixed so that the entire batten is covered. A 10–20 mm overlap is recommended on each side of the beam.

The panels are installed with a 5 mm open gap both vertically and horizontally. Vertical joints must be continuously supported. Horizontal joints shall be made tight against driving rain in places with severe climate exposure, such as for tall buildings, and when gaps between panels are more than 5 mm. Horizontal joints may be made rain tight with surface treated joint steel or aluminium profiles spanning between the battens. The gap between panels is 8 – 10 mm when joint profiles are applied.

The panels shall be fixed with Steni screws in predrilled holes with diameter up to 6 mm as shown in figure 1.

Fire safety

Panels used in accordance with fire classification in table 3, installed on wooden beams, must use width-adapted Steni EPDM foil between panel and beam.

Design considerations

Most Steni panels are designed and delivered with special dimensions, custom made for each individual building project. This reduce cutting at the building site. In other projects panels standard dimensions are delivered and cut on site by the purchaser.

Steni Nature type M with glass has a rough surface of crushed, trembled glass. Small parts may break off and give sharp edges. Steni Nature type M with glass should not be used in areas where the public is close to the surface, such as ground floor in schools, kindergartens, entrance-areas, stairs etc. This is due to the risk of injuries to skin and clothes.

Maintenance/cleaning

Depending on the climate exposure and surface pollution it is recommended to clean facade panels with a facade cleaning agent and rinse with a high-pressure cleaner. Graffiti may be removed with solvents and chemicals without damaging the panel surface of Steni Colour or Steni Nature. Best effect is obtained by using warm water. It is recommended to use professional cleaning agencies who follow the panel manufacturer's instruction.

Transport and storage

The panels shall be transported and stored dry, protected by a cover, and placed on a level support.

The panels are lifted vertically from the pallet to avoid surface scratching and is carried on edge. The panels shall always be strapped when transported on the building site.

7. Factory production control

Steni panels are produced by:
Steni AS, 3277 Steinsholt, Norway.

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

The manufacturing of the panels is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval and the fire properties is controlled by RISE.

Steni AS has a management quality system certified by Lloyd's Register Quality Assurance Limited (LRQA) according to ISO 9001:2015; certificate number ISO 9001 – 00010800.

8. Basis for the approval

The approval is mainly based on type testing of Steni Colour and Steni Nature plus performance testing of internal cladding, documented in the following reports from the Norwegian Building Research Institute:

- Report O 7909, February 1983. Function and material testing of Stenex panels.
- Report O 6874, November 1983. Heat resistance of Steni panels.
- Report O 3073, December 1986. Laboratory testing of Steni and Stenex panels.
- Report O 3437, September 1989. Laboratory testing of Stenex (Steni Colour) and Steni Nature panels.
- Report O 3976, February 1995. Durability testing of Steni panels (Steni lakkplate).
- Report KO 19994, March 1998. Testing of strength properties of Steni Panels.
- Report O 8405-7, June 1999. Function testing of Steni Colour and water resistance based on NT Build 058.
- Report O 20670, October 2005 screw pullout resistance.
- Report O 21152 and O 21458, November 2006. testing of wind resistance for Steni Colour type 6.
- Report O 21658, March 2007. Testing of expansion in humid air for Steni Colour.
- Test report T164002 from British Board of Agrément, 22. February 2019. Soft and hard body resistance for Steni Colour and Steni Vision.
- Reports 8F020577, 9F001458 og 9F001442 from RISE, 30. oktober 2018 og 22. mars 2019. Emissions from Steni Colour og Steni Nature.
- Report 2019:00899 Leaching of chemical substances from Steni Colour boards, september 2019.
- Strength and stiffness is controlled based on Avis Technique 2/01-848 (2001) from CSTB, France.
- Report 102010/12.068 from SINTEF NBL AS, dated 05.11.2012, Reaction to fire classification report of Steni Colour
- Report 102010.02/12.093 from SINTEF NBL AS, dated 02.01.2013. Reaction to fire classification report of Steni Nature type F and FM
- Report SC131-3 (Rev.02) from Thomas Bell Writght International Consultants, dated 08.12.2018, Reaction to fire classification report of Steni Nature type M
- Report SJ074-3 (Rev. 01) from Thomas Bell-Wright International Consultants, dated 08.12.2019, Reaction to fire classification report of Steni Nature type C

- Report 7P09553-09-1 from RISE, 24.08.2020, Fire properties for Steni Nature
- Report 2P07442rev1 from RISE, 27.10.2020. Fire properties for Steni Vision and Steni Colour tested in accordance with NS-EN 13823.

The approval is also based on the following Building Research Design Guides from SINTEF:

- Byggedetaljer 542.502 *Utvendig kledning med plane plater*
- Byggedetaljer 543.505 *Våtromsvegger med overflate av vinyl, baderomspanel eller maling*

Fire classification is based on SINTEF Product Certificate no. 0011.

9. Marking

Each panel is marked with product name and date of production. A pallet label shows the relevant certificates. The approval mark for SINTEF Technical Approval No. 2165 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.

for SINTEF

Hans Boye Skogstad
Approval manager