SINTEF

SINTEF Certification

No. 2165

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Provided listed on www.sintefcertification.no

Technical Approval

SINTEF Building and Infrastructure 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 made of a resin composite containing a core of crushed mineral stone which is reinforced with two separate layers of cut fibreglass roving. The panels are produced by a continuous heat curing process.

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 stone 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

Steel or aluminium profiles and Steni screws 4,0 x 28 mm are delivered as supplementary products for installation. The screws are made of stainless steel A4 according to EN ISO 3506 with a coloured coating powder on the head. The screws are used for fastening panels to pressure impregnated wood.

Table1
Steni panels. Dimensions, tolerances and weight

Property	Value	
Width and length, stock panels	1195 x 2995 ± 2 mm	
With by orders	≤ 1195 ± 2 mm	
Length by orders	≤ 3500 ± 2 mm	
Edge straightness (against ruler)	± 1 mm	
Squareness (diagonal deviation)	≤ 3 mm	
Density	ca. 1880 - 2000 kg/m³	
	Thickness	Approx. weight
Steni Colour	6,0 ± 0,6 mm	12 kg/m²
Steni Vision	6,0 ± 0,6 mm	12 kg/m²
Steni Nature		
-Type FM	ca. 5,5 mm	11 kg/m²
-Type F	ca. 6,5 mm	12 kg/m²
-Type M	ca. 8 mm	15 kg/m²
-Type G	ca. 14 mm	18 kg/m²
-Type T	ca. 18 mm	25 kg/m²

3. Fields of application

Steni panels can be used as facade panels in ventilated exterior claddings, balcony railings etc.

Steni panels can be used as internal claddings in car washes, swimming baths, agricultural buildings and in food industry premises with special requirements for cleaning and hygiene.

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 is equal to q_{kast} = 2,9 kN/m^2.

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Table 2
Steni Panels. Strength and stiffness properties determined by type testing (mean values)

Property	Value	Test method
Steni Colour and Steni Vision:		
Bending strength	≥ 40 N/mm²	CSTB method
E-module in bending	≥ 5000 N/mm²	EN ISO 178
Impact strength	≥ 20 kJ/m²	ISO 179-82
Tensile strength	≥ 15 N/mm²	ISO/R 527-66
Impact resistance; - max. drop height of steel ball	3,5 m	NT Build 066
Surface hardness; - Ball impression at 250 N - Permanent impression	0,14 mm 0,03 mm	NT Build 059 NT Build 059
Steni Nature:		
Bending strength	≥ 40 N/mm²	CSTB method
E-module in bending	≥ 5000 N/mm²	EN ISO 178
Impact strength	≥ 17 kJ/m²	ISO 179-82
Tensile strength	≥ 13 N/mm²	ISO/R 527-66
Impact resistance; - max. drop height of steel ball	3,5 m	NT Build 066
Screw pull out resistance from panel	1,8 kN	NS-EN 320
Design screw pull out capacity from structural wood C 18	341 N/screw	NS-EN 1382

Reaction to fire

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

Table 3
Reaction to fire for Steni panels.

Product	Classification
Steni Colour, *Steni Vision* *Steni Nature* type FM, F, M, G, og T All installed on minimum 20 mm timber battens spaced c/c 600 mm and with 5 mm gap between panels	B-s1,d0

Properties related to moisture and temperature

Properties related to moisture and temperature, determined by type testing, are shown in Table 4.

Table 4
Properties related to moisture and temperature, determined by type testing

Property	Value	Test method
Water absorption	< 1,5 %	ISO/R 62-178
Water vapour resistance, s_d (eqv. air layer thickness)	Approx. 60 m	ASTM E 96-66
Temperature expansion	0,021 - 0,026 mm/(m K)	NBI [1)]
Thermal resistance R	Approx. 0,01 m²K/W for 6 mm panel	NBI-26:1983
Dimensional stability	Cumulative change max. 0,04 %	EN 438-2: 2005, Part 18

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

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 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.

Effect on indoor environment

The panels are not regarded as emitting any particles, gases or radiation that have a perceptible impact on the indoor climate, or to have any significant impact on health.

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

Effect on soil, surface water and ground water

The leaching properties of Steni panels are evaluated to have no negative effect on soil or ground water.

Waste treatment/recycling

The panels shall be sorted as residual waste, and delivered to an authorized waste treatment plant for disposal.

Environmental product declaration

An environmental declaration (EPD) has been worked out according to EN 15804 for Steni Colour and Steni Nature. For complete documentation see EPD no. NEPD00096E and NEPD00097E, 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 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.

Minimum 23 mm x 73 mm battens are used at panel joints. Otherwise may 23 mm x 48 mm battens be used. EPDM foil strips are placed between battens and panels. The strips shall cover the whole batten.

Steni Nature panels are installed with an extra batten as mid-support at all horizontal joints. Panels with half size (width 595 mm) are installed with battens in full length as mid-support.

The panels shall be fixed with Steni screws i prebored holes with diameter 5 mm and hole distances as shown in fig. 1.

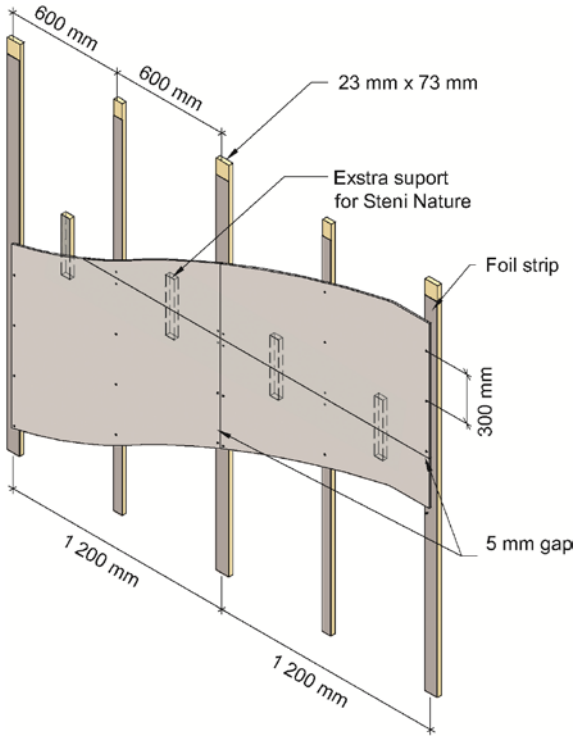

Fig.1
Principle for vertical installation of Steni Nature as facade cladding

The panels are installed with a 5 mm open gap both vertically and horizontally. Battens behind vertical joints shall be continuous. 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.

Internal cladding

Steni Colour and *Steni Vision* may be installed on battens spaced maximum c/c 600 mm.

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.

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, Steni Vision 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

The 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.

Steni AS has a management quality system certified by Bureau Veritas Quality International according to ISO 9001:2008, certificate no. 00022.

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:

- Rapport O 7909, februar 1983. Funksjons- og materialprøving av Stenexplater
- Rapport O 6874, november 1983. Varmemotstand til Steni plater
- Rapport O 1060, mai 1984. Undersøkelse av Steni fasadeplater under vindbelastning
- Rapport O 3073, desember 1986. Laboratorieprøving av fasadeplater type Steni og Stenex
- Rapport O 3437, september 1989. Div. laboratorie-testing av Stenex (Steni Colour) og Steni Nature plater
- Rapport O 3976, februar 1995. Bestandighetsprøving av fasadeplate, type Steni lakkplate
- Rapport O 7474-2, januar 1997. Avgassing fra fasade-plater. Sensorisk og kjemisk analyse
- Rapport KO 19994, mars 1998. Prøving av enkelte styrkeegenskaper til Steni fasadeplater
- Rapport O 8405-7, juni 1999. Funksjonsprøving av Steni Colour interiørplate. Prøving av vanntetthet etter NT Build 058
- Rapport O 20670 av 20.10.2005. Uttrekkskapasitet av skrue
- Rapport O 21152 av 06.11.2006. Vindlastprøving av Steni Colour type 6
- Rapport O 21658 av 22.03.07. Prøving av materialegenskapen dimensjonsstabilitet på produktet Steni Colour fasadeplate

The approval is also based on Avis Technique 2/01-848 (2001) from CSTB, France, and the following Building Research Design Guides from SINTEF Building and Infrastructure:

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

Fire classification is based on SINTEF Product Certificate no. 011.

Approval mark

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.

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 Byggforsk

Hans Boye Skogstad
Approval Manager