

SINTEF confirms that

Protan 2X Roofing System

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

Protan AS
 P.O.Box 420
 NO-3002 Drammen
www.protan.com

2. Product description

Protan 2X Roofing System is a roofing system that meets the need for early installation of a construction period roofing and includes first actions for the finished roof. The roofing system includes also solutions for slope and gutter designs for the finished roof.

1.X = Construction period roofing (cpr)

The construction period roofing should be installed as early as possible to protect the building from intrusion of water during construction. This membrane can be used as working platform and material storage for other ongoing construction work. This is usually not permitted for finished insulated roofs.

The construction period roofing may consist of either a polymer-modified bituminous underlay membrane with a polyester core, or a polymeric or rubber roofing membrane with polyester reinforcement. The material needs to resist weather and mechanical loads. The used membrane should have documented vapour barrier properties to could satisfy the required properties for the finished roof.

The construction period roofing can be installed on a 50 mm insulation layer on a load-bearing structure of steel plates; as shown fig. 1. Alternatively, can the membrane be installed directly on the load-bearing underlay, as shown in fig. 2.

2.X = Final roofing

As soon as there is no longer need for the roof as working platform or storage, a proper control and reparation of the surface should be performed. Under suitable weather conditions can the thermal insulation and the final roofing membrane of Protan SE be installed. The construction period roofing will from that point be used as vapour barrier in this compact roof for the whole live time. In addition, the system includes solutions for preparing roofing slopes on flat roofs and gutter solutions.

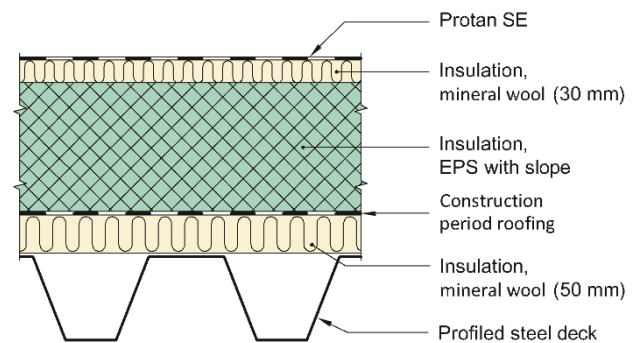


Fig. 1
 Protan 2X Roofing System / Construction period roofing
 laid on 50 mm mineral wool boards

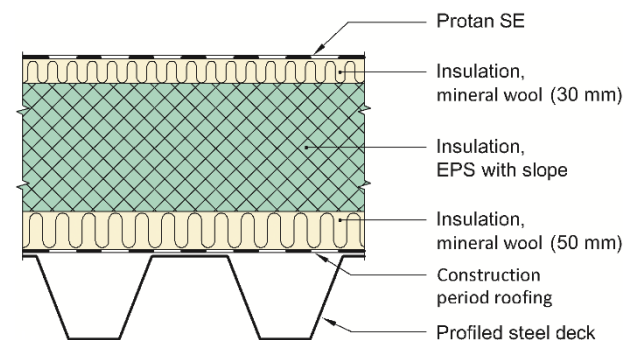


Fig. 2
 Protan 2X Roofing System / Construction period roofing
 laid directly on steel plates.

The final roofing membrane is Protan SE made of pliable PVC with a core of woven polyester. Protan SE is documented in SINTEF Technical Approval no. 2010.

3. Fields of application

Protan 2X Roofing System can be used as a new roof covering for both flat and sloping roofs. The roofing system is used primarily on roofs that are subjected to extraordinary loading during the construction period and for buildings with stringent vapour/moisture-proofing requirements.

The final roofing membrane, Protan SE, is installed as an exposed roof with mechanically or vacuum based fastening. For more information see SINTEF Technical Approval 2010 and 2281.

The roof must have a sufficient slope for rain and meltwater to run off. SINTEF recommends that all roofs have an inclination of minimum 1:40.

4. Properties

Material properties

The properties for Protan roofing membranes are given in SINTEF Technical Approval No. 2010, paragraph 4, table 2.

Safety in case of fire

Fire classifications for Protan roofing membranes are given in SINTEF Technical Approval No. 2010, paragraph 4, table 3.

5. Environmental aspects

Substances hazardous to health and environment

Protan 2X Roofing System 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.

Effect on soil, surface water and ground water

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

Waste treatment/recycling

Protan 2X Roofing System shall be sorted residual waste. The product shall be delivered to an authorized waste treatment plant for energy recovery. The product can by ended service life be delivered to material recycling in recycling system.

Environmental declaration

An environmental declaration (EPD) has been worked out according to EN 15804 for Protan SE. For complete documentation see EPD no. NEPD-32-203-NO og NEPD-323-203-NO, <https://www.epd-norge.no/>.

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

6. Special conditions for use and installation

General design considerations

The roofing system must be installed by fitters who have been specially approved by Protan AS.

The roofing must otherwise be carried out in accordance with Protan's guidelines for engineering and execution and according SINTEF Building Research Design Guides:

- 525.207 Kompakte tak,
- 544.202 Takfolie. Egenskaper og tekking og
- 544.204 Tekking med asfalttakbelegg eller takfolie.

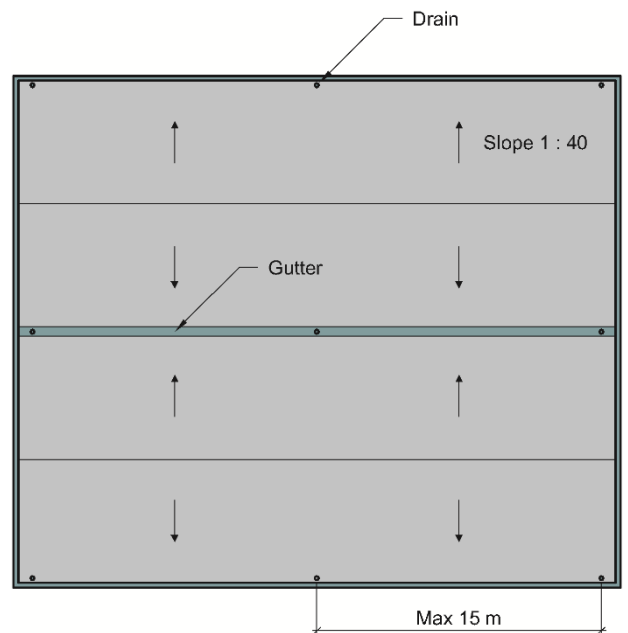


Fig. 3
Slope and drain location principles

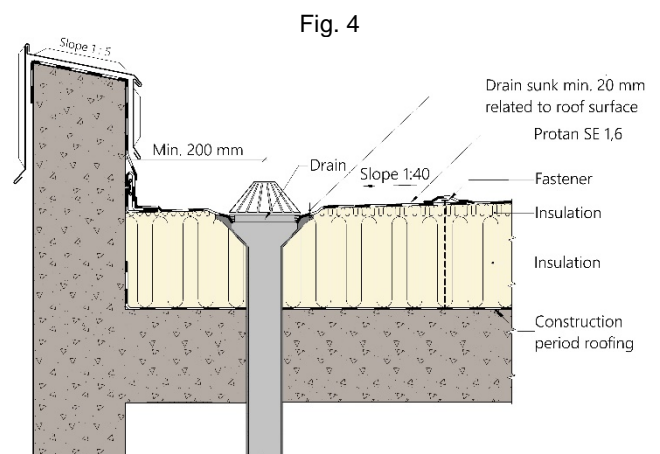


Fig. 4
Example of the structure and execution of parapets with Protan 2X Roofing System on concrete, with localised sinking of drains

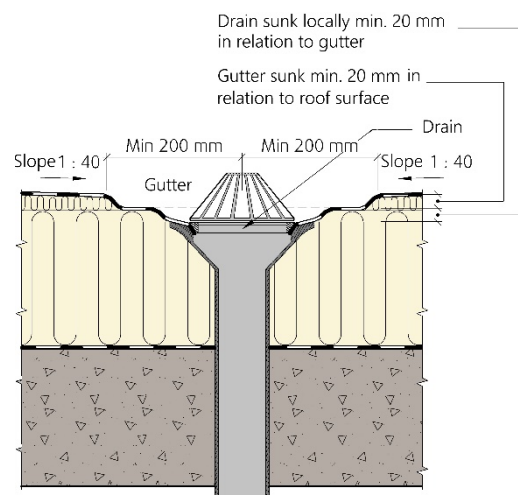


Fig. 5
Example of execution of a lowered gutter in the inner part of the roof surface with localised sinking of drains.

Design considerations for construction period roofing

Slope, drains and outlets are added as needed and as appropriate. Outlets from the construction period roofing should be temporary and must be sealed as they are replaced by permanent outlets. In places where temporary outlets from the construction period roofing are not used, there must be no parapets or it results in standing water.

The construction period roofing must be watertight, which means watertight execution at joints and adjacent walls with good turnups that are clamped with laths. Construction period roofing that are installed and finished in this way also ensure the necessary airtightness.

During the building period, the zones with most traffic, such as walkways and areas with scaffolding, must be covered so that the construction period roofing is not damaged. There should be a repair kit available at the building site, so that any minor damage to the construction period roofing can be repaired immediately.

Fastening of construction period roofing

Construction period roofing shall be fastened mechanically according valid guidelines for the material through joints into the bearing system. The fastening must be dimensioned with a view to possible vacuum-based fixing of the final roof.

Design considerations for the final roofing layer

When the weather is favourable, insulation and final roofing of Protan SE should be installed. Examples for slope and drain positioning is shown in fig. 3. Favourable weather is also recommended to avoid internal condensation, particularly in winter. Before the final insulation and roofing is installed, any standing water on the roof surface must be removed. Control of the construction period roofing needs to be done before the thermal insulation shall be installed.

Fastening

The final roofing can be anchored in two different ways: mechanical or vacuum-based.

Mechanical

When the roofing is anchored mechanically, the fasteners and design capacities for the attachment points used must be as described in SINTEF Technical Approval no. 2010.

Vacuum

As an alternative to mechanical anchoring, a vacuum-based system can be used for finishing the Protan 2X Roofing System. See SINTEF Technical Approval no. 2281.

Gutter design

The gutters can benefit from being horizontal. They must not be lower than the roof surface by the parapet; see fig. 4. Further in on the roof surface the gutters must be lowered by min. 20 mm in relation to the roof; see fig. 5. The gutters must have a width that allows plenty of room for installing drains, which must always be installed with centres minimum 200 mm from vertical surfaces or other vertical details.

Horizontal gutters must always be covered with Protan SE 1.6 with a minimum of welded joints. This can be done with longitudinally lying gutter membrane with underlying transverse or longitudinal strips. Against the parapet, the distance between underlying strips will depend on the design wind load, and will normally be in the range 0.6–1.0 m.

This gutter design provides a simpler and therefore safer mechanical anchoring of the roof covering. The covering can be stretched tighter, creating a surface that directs water away effectively.

Drains

Drains must be placed in gutters at a maximum distance of 15 m. All drains must have a local recession of minimum 20 mm in relation to the gutter. With horizontal gutters and recessed drains, the drains are linked in parallel to prevent standing water. This means that a blocked drain will direct water to the next drain along the horizontal gutter.

Leakage detector

Consideration must always be given to whether leakage detectors should be installed in the roof at suitable places between the vapour barrier and the roof membrane. These may be simple mechanical devices or electronic sensors.

Traffic on the roof

When it is expected that roof traffic may exceed what is required for normal inspection visits and maintenance, special precautions should be taken to protect the roofing membrane.

Inspection and maintenance

In the event of any repair work, the roofing must be cleaned locally before welding work starts.

7. Factory production control

The product is produced by Protan AS, P.O. Box 420, 3002 Drammen, Norway.

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 the product is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

The manufacturer Protan AS has a quality system which is certified by Det Norske Veritas according to ISO 9001, certificate no. 95-OSL-AQ-6343.

8. Basis for the approval

Protan 2X Roofing System has been subject to both type testing and field survey concerning execution and use.

- SINTEF Technical Approval No. 2010 Protan SE, T, SE-L, SE Titanium+, EX and EXG.
- SINTEF Technical Approval No. 2281 Protan vacuum roofing system.

The field survey is documented in the following report from the Norwegian Building Research Institute:

- Report O 14369, dated 20.12.2004.

9. Marking

All paletts/packages for roofing membranes and accessories need to be marked with name of manufacturer, name of product and time of manufacturing. All roofing membranes shall also be marked with production code and CE mark in accordance with EN 13956. The approval mark for SINTEF Technical Approval No. 2415 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

A handwritten signature in blue ink that reads 'Hans Boye Skogstad'.

Hans Boye Skogstad
Approval Manager