



Technical Approval

SINTEF Building and Infrastructure confirms that

Icopal Fonda Universal, Type V

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

Icopal AS
 P.O. Box 55
 1477 Fjellhamar
www.icopal.no

2. Product description

Icopal Fonda Universal is a combined waterproof membrane and protection sheet for use on outside walls against the ground, on concrete floors, and for the protection of bitumen roofing membranes on turf roofs.

The membrane is produced of polypropylene (PP) with a density of 900 – 920 kg/m³ and has a nominal thickness of 0.5 mm. Icopal Fonda Universal is made with studs and a pattern of intersecting channels forming a 7 mm air gap between the sheet and the underlying surface, see fig. 1. The membrane has flat jointing flanges on each side. Measures and tolerances are shown in table 1.

Additional accessories for fixing Icopal Fonda Universal are given in Table 3.

Table 1
 Measures and tolerances for Icopal Fonda Universal

Property	Measure ¹⁾	Tolerance
Thickness	0,5 mm	± 0,05 mm
Spec. Weight	0,5 kg/m ²	± 10 %
Total height	7 mm	± 5 %
Stand. Roll width	1,28 / 1,65 / 2,08 / 2,4 m	+ 1 % / - 0 %
Stand. Roll length	20 m	+ 1 % / - 0 %

¹⁾ Measured according to EN 1848-2 and EN 1849-2

3. Fields of application

Protection of external walls against moisture in the ground

Icopal Fonda Universal is used as a water repellent and capillary breaking layer on the outside of insulated or uninsulated walls against the ground, see fig. 2 and fig. 3.

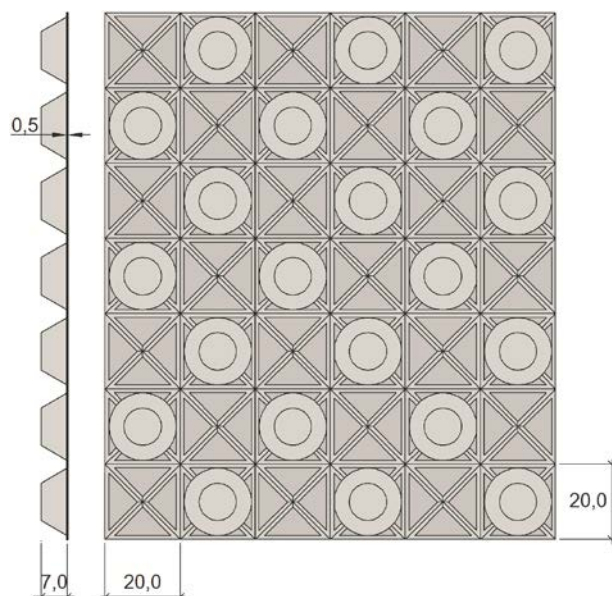


Fig 1
 Icopal Fonda Universal membrane, pattern of channels and studs. Plan and section drawing. Measurements in mm.

Damp-proof membrane on concrete floors

Icopal Fonda Universal can be used as a waterproof membrane on concrete floors or slabs under floating floors of sheet material, wood or laminate parquet, levelling compounds or screeds. Floor construction is shown in principle in fig. 3. The membrane can be used in new constructions or in refurbishment work.

The vapour barrier may be used in floor constructions for load category A and B according to NS-EN 1991-1-1:2002, with an imposed maximum uniformly distributed load of 3.0 kN/m² and 2.0 kN concentrated load.

Where there are problems with smell or gases from the ground special solutions should be used, for example mechanical ventilation of the air gap below the membrane. Icopal Fonda Universal cannot be used as a waterproof membrane in bathrooms etc.

Table 2
Product characteristics of fresh material for Icopal Fonda Universal

Property	Test method EN	DoP ¹⁾	Control limit ²⁾	Unit
Water tightness	1928:2000 (A)	Tight	Tight	-
Water vapour resistance	1931:2000	-	2×10^{11} 40	m ² sPa/kg m (equiv. air layer thickness, s _d)
Resistance to tearing (nail shank)	L: T: 12310 -1:1999	> 100 > 100	> 100	N
Tensile strength	L: T: 12311-2 (A):2010	> 300 > 300	> 300	N/50 mm
Elongation	L: T: 12311-2 (A):2010	> 30 > 30	> 30	%
Shear resistance in joint	12317-2:2000	-	5	N
Puncturing Impact at/+23 °C Static load	12691:2006 ³⁾ 12730:2001 ³⁾	> 250 -	> 250 >20	mm kg
Deformation under load measured after 60 h	EN 13967:2012, Annex B	-	1,4 50	X mm deformation at X kN/m ² Load

¹⁾ The manufacturers declaration of performance, DoP

²⁾ Control limit shows values the product has to satisfy during internal factory production control and audit testing.

³⁾ Tested on hard underlay

Table 3
Product specification for associated installation components for Icopal Fonda Universal

Component	Materialtype	Description	Measures
Joining tape	Butyl-rubber	Overlap jointing (when membrane is used on floors)	Width / thickness: 30 mm / 1,0 mm or 50 mm / 1,5 mm Length: 5 m, 10 m or 20 m
Multitape Butyl	Butyl-rubber on HDPE foil, single sided glueing	Overlap jointing (when membrane is used on floors)	Width / thickness: 80 mm / 1,0 mm Length: 20 m
Sealing Butyl	Butyl rubber sealing	Overlap sealing on green roofs	Cartridge: 310 ml
Fastening plugs with nails	Hardened, el. galvanised steel nails. PEL (Low density polythene) studs.	Fitting plugs and nails for fastening membrane to external walls or to roofing boards.	Diameter: 3.0 mm Length: 30 mm for concrete or roofing boards Length: 60 mm to light weight concrete
Fastening plug	Polypropylene PP or Polyethylene HDPE	Fastening plug (special designed for Universal)	Dimension: 7 mm Length: 50 mm
Retaining board bracket	Hot galvanised and plastic covered steel.	Fastening and support for turf retaining board	Width: 30 mm Height: 125 mm Length: 300 mm
Edge profile KL6	High Density Polyethylene, HDPE	Edge profile for closing top edge of membrane at ground level. Fastened with steel nails.	Length: 2 m

Protection of bitumen roofing membranes on turf roofs

Icopal Fonda Universal can be used in turf roof constructions to protect the membrane from the turf. The membrane's studs ensure ventilation and drainage above the bitumen roofing membranes and at the same time protect it from root growth.

4. Properties

Mechanical material properties

Icopal Fonda Universal product characteristics are given in Table 3.

Strength and stiffness

Strength and stiffness properties of 14 mm laminated parquet laid as a floating floor on Icopal Fonda Universal have been tested according to NT Build 384. The measurements shows that the sheet has sufficient stiffness for the construction to satisfy the resistance to deformation specified in all the load classes given in the test method.

Properties related to fire

Icopal Fonda Universal is not classified according to EN 13501-1. When it is used in a floor-system, the divisions must follow fire cell divisions.

Durability

Icopal Fonda Universal has been tested and assessed to have acceptable durability for its intended use.

Sound insulation

Weighted reduction in impact sound pressure $\Delta L_{n,w}$ according to ISO 717/2 is 17dB for floating floors of 14 mm parquet on Icopal Fonda Universal. Such floors laid on concrete decks with minimum thickness 180 mm satisfy Class C in NS 8175, except in residential housing.

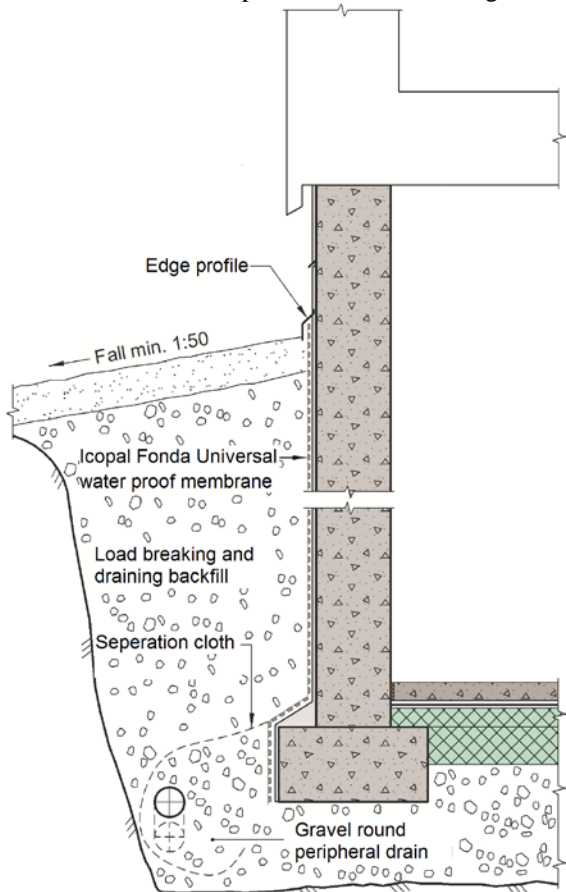


Fig.2 Example of the use of Icopal Fonda Universal on exterior wall of unheated cellar.

5. Environmental aspects

Substances hazardous to health and environment

The product 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 indoor environment

The product is 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.

Effect on soil, surface water and ground water

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

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

An environmental declaration (EPD) has been worked out according to EN 15804 for product. Environmental indicators are given in table 4.

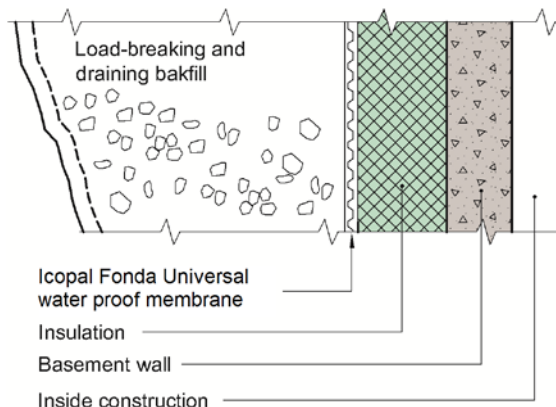


Fig. 3 Icopal Fonda Universal used on insulated basement wall. For quicker dry out of the basement wall it is recommended to place the membrane outside the vapour open insulation as e.g. EPS, see also SINTEF Building Research Design Guide 523.111.

For the complete documentation see EPD no. NEPD-205-260-NO, www.epd-norge.no.

Table 4 Environmental declaration according to EN 15804 for Product. Cradle to gate (France). The declared unit is 1 m² produced membrane.

Indicators	Value
Global warming, kg CO ₂ eq.	1,09
Total energy use, MJ	23,61

6. Special conditions for use and installation

Exterior walls below ground.

The membrane should be applied with the studs against the wall and rolled out along the length of the wall. Installation shall start at the bottom of the wall, and horizontal joints should have an overlap of 120 mm and vertical joints of 500 mm.

The membrane is fastened with nails and plugs every 250 mm along the top edge after which the finishing profile is applied. Fastening plugs shall be fixed with 6 mm pre-bored holes in concrete and 5,5 mm holes in expanded clay aggregate blocks.

The membrane should cover both the foundations and the wall, and installed 30 – 50 mm above ground level. The back fill on the outside must be of self draining and pressure breaking quality.

Approval is conditional upon Icopal Fonda Universal being applied according to the recommendations contained in the following SINTEF Building Research Design Guides: 514.221, 520.706, 523.111

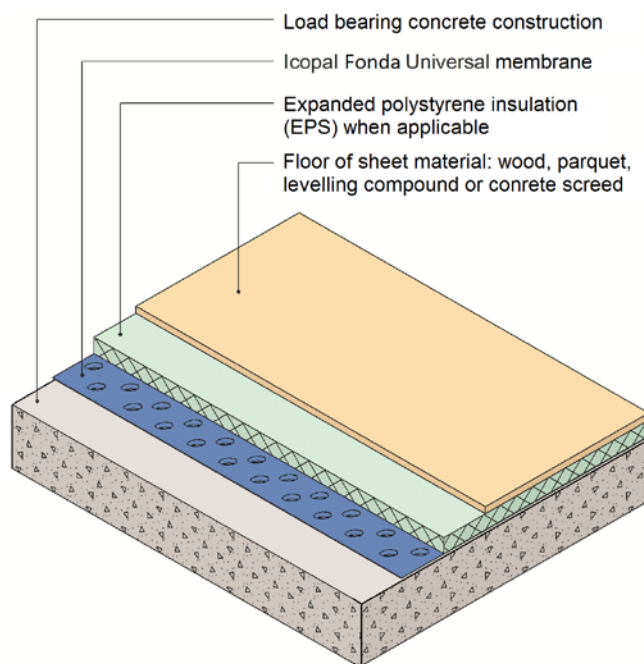


Fig.4.
Floating floor construction using Icopal Fonda Universal

Membrane on concrete floors.

Moisture conditions

The building is presumed to have a normal indoor climate. Icopal Fonda Universal can be laid independently of the moisture content of the underlying concrete construction. Icopal Fonda Universal cannot be used where free flowing water can occur.

Wall strips should be installed to avoid increased moisture content of the lower parts of existing walls standing on concrete floors. These should be fixed with the studs behind the skirting to form an air gap between the skirting and the wall. The membrane may also be installed with the edges raised against the wall. The skirting must allow passage between the air gap under the membrane and the air in the room. The wall strip is fastened to the membrane using jointing tape or jointing rope.

Thermal insulation and air tightness

Floors may be insulated with polystyrene sheets between the waterproof membrane and the floating floor. When parquet flooring or sheet materials are used over insulation it is required to use XPS (extruded polystyrene) or EPS (expanded polystyrene) sheets with a resistance to compression of at least 200 kN/m² (CS(10)200). A thin fibre cloth or equivalent should be laid between the insulation and flooring to avoid squeaking.

The use of XPS or EPS has to be performed according SINTEF Building Research Design Guide 520.339

Exterior walls must be checked for air leakages to prevent outside air to be drawn into the air gap beneath the membrane.

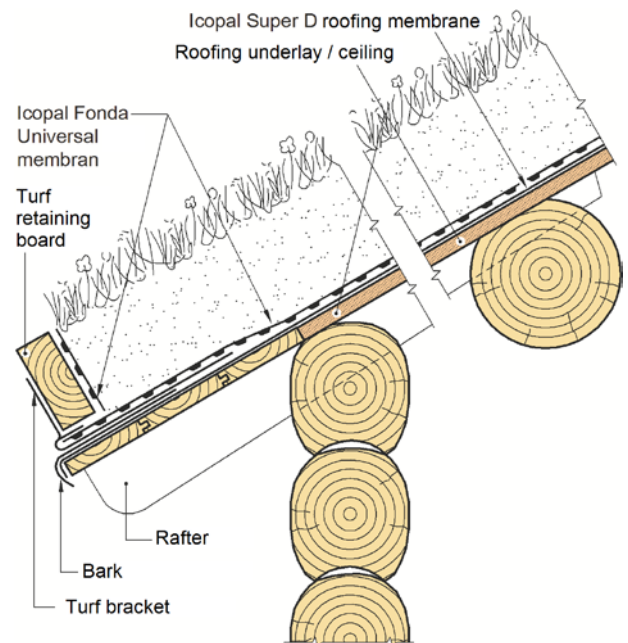


Fig. 5.
Example of the use of Icopal Fonda Universal as protection of bitumen roofing membranes on turf roof over unheated building

Installation

Icopal Fonda Universal shall be jointed by using self-adhesive jointing tape. Lengthwise joints are made with the tape between the overlapping flanges of the membrane. Transverse joints are made as butt joints with Multitape Butyl across the top of the joint.

Pipes or the equivalent passing through the membrane should be sealed with two rings of jointing rope against the concrete floor which must be primed beforehand to bind any dust.

Partition walls

Non load-bearing walls can be erected on the membrane. The material is combustible.

Turf roofs

Icopal Fonda Universal shall be rolled out across the direction of the roof slope, with the studs down. Installation should start at the foot of the roof. The membrane is fastened along the top edge with plugs and nails. Maximum distance between nails should be:

- approx. 200 mm for 1,28 m wide membranes
- approx. 150 mm for 1,65 m wide membranes
- approx. 100 mm for 2,08 m wide membranes
- approx. 100 mm for 2,40 m wide membranes

With a roof pitch $\geq 25^\circ$ joints along the length should have a minimum overlap of 250 mm, and 300 mm for roofs with less fall. Overlap at transverse joints should be 400 mm.

It is a condition that the use of Icopal Fonda Universal for the protection of asphalt roofing materials on turf roofs is in accordance with SINTEF Building Research Design Guide 544.803.

Transport and storage

The rolls shall be stored and transported standing vertically on pallets, protected from sunlight. Pallets may be stacked in two levels, providing the stacks are staggered. Caution must be shown when stacking pallets.

7. Factory production control

The product is produced by Siplast-Icopal in France for Icopal AS.

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.

Icopal AS; Fjellhamar has a quality management system certified of Det Norske Veritas according to EN ISO 9001. Certificate No. 95-OSL-AQ-6275

Siplast-Icopal has a quality management system certified of Bureau Veritas Certification France according to EN-ISO 9001. Certificate No. FR004371-1.

8. Basis for the approval

The approval is based primarily on the verification of properties documented in the following reports:

- Swedish Testing and Research Institute, report 97M22008, 12.08.97 (Type testing)
- Nemko Trondheim, report 974404532, april 1997 (sound insulation)

- Norwegian Building Research Institute. Report O 9403, 11.01.1999 (testing of floating laminated parquet flooring on Icopal Fonda Universal according to test method NT Build 384)
- Swedish Testing and Research Institute. Report F 602258, 22.02.2006 (Complementary tests for P-marking)
- SINTEF Building and Infrastructure, report 3D076201, 16.02.2010 (material properties)
- SINTEF Building and Infrastructure, report 102000866-2-2016, dated 30.03.2016 (material properties)

9. Marking

The rolls shall be marked with name of producer, name of product and date of production.

The product is CE marked in accordance with EN 13967

The approval mark for SINTEF Technical Approval No. 2136 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 Building and Infrastructure

Hans Boye Skogstad
Approval Manager