

Ekovilla thermal insulation Ekovilla Oy



Ekovilla insulation is made from selected newsprint paper into which flame retardants are added. Insulation is suitable for new construction, renovation and additional insulation. Ekovilla is used for the upper and lower floors and walls. Produced in Finland since 1979, this insulation is also suitable for passive structures due to its good moisture transfer properties.

Dynamic structure

Dynamic or breathable structure refers to a structure in which water vapour transferred by diffusion binds to a hygroscopic insulator and is released from it, easily transferring back to the environment. In addition to water vapour, other gases such as carbon dioxide can diffuse into and through the breathable structure. This feature does not replace ventilation, but significantly reduces the disadvantages caused by a lack of ventilation. The breathing structure is important for room humidity.

Breathable Ekovilla insulation is a safe solution, especially when the structures are thick (cf. Nearly zero-energy buildings). The long heating season and the rapid cooling of the house during the summer season place special demands on the functionality of the structure. It is important for the functionality of the structure that, in addition to the air barrier, all other materials in the structure are also made of moisture-absorbing and releasing substances. The structure is capable of drying in both directions and has no surface where moisture can condense.

How a breathable structure works

Water vapour outdoors

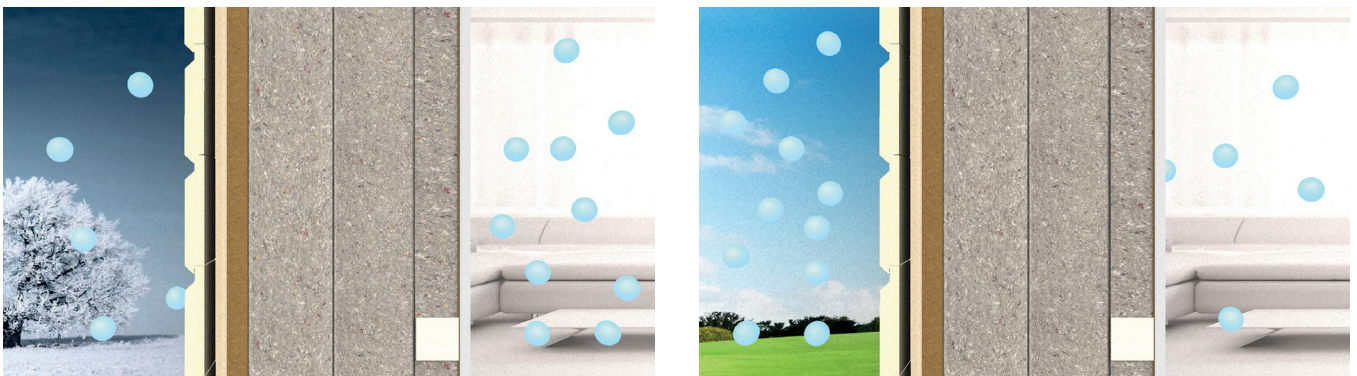
- Water vapour (g/m³) is usually lower outdoors than indoors (in winter).
- Temperature -20°C, 90% RH relative humidity, 0.78 g/m³ absolute humidity (water vapour in the air).

The natural movement of water vapor in the structure

- Water vapour concentrations between indoor and outdoor air tend to stabilise.
- Water vapour constantly moves in the direction of lower humidity.
- During the heating season, water vapour tends to move from the inside to the outside of the insulation structure.
- A breathable structure is a natural part of this natural moisture balance.
- Water vapour also comes back in from the insulation when the air in the room dries out.
- In summer, the movement of moisture is the opposite, from outside to inside.

Water vapor inside

- Water vapour (g/m³) is usually higher in indoor air than in outdoor air (in winter).
- Temperature +21 °C, relative humidity 30% RH, absolute humidity (water vapour in the air) 5.62 g/m³.



Breathable Windscreen

- porous but compact structure
- slows down the airflow
- water vapour permeable by diffusion
- five times more permeable to water vapour than air barrier
- windscreens, wood fibre or plaster-board

Breathable thermal insulation

- porous structure with high air content
- insulating air in fibres and between fibres
- water vapour permeable by diffusion
- water vapour moves safely in the fibres
- water vapour concentration does not affect the insulation performance
- Ekovilla insulation made from wood fibre

Breathable air barrier

- fibres packed in a dense layer
- compact structure is not permeable to air
- water vapour permeable by diffusion
- carbon dioxide permeable by diffusion
- breathable in both directions
- Ekovilla X5 air barrier
- breathable interior cladding

Ekovilla products

SLAB INSULATION

Ekovilla Slab

Ekovilla wood fibre slab is an uncoated, soft and elastic thermal insulation panel, which is well suited for wood construction due to its hygroscopic nature. The insulation is suitable for both new and renovation construction. The main applications are roofs, floors and walls.

Thermal conductivity (λ_D)	0.039 W/mK
Reaction to fire	E
CE mark identifier	WF-EN 13171-T2-DS(23,90)3-AF ₁ 9

Ekovilla Slab Standard dimensions

Slab size, mm			pcs/package	m ² /pckg	m ³ /pckg
thickness	width	height	quantity per package		
45	565	870	13	6.39	0.29
50	565	870	12	5.90	0.29
75	565	870	8	3.93	0.29
100	565	870	6	2.95	0.29
125	565	870	5	2.46	0.31
150	565	870	4	1.97	0.29

* For larger orders non-standard sizes can be made.

Installation and cutting

The Ekovilla board is then installed in the frame gap to completely fill the space reserved for it. The product can also be installed into a brick and concrete structure using fasteners. Cutting can be done with an Ekovilla saw or knife. Detailed instructions see on the packaging.

BLOWN-IN INSULATION

Open spaces (attics)

Recommended density	26 - 36 kg/m ³
Settlement s_v	10 %

Horizontal cavities

Recommended density	45-55 kg/m ³
Settlement s_d	0 %

Pitched cavities

Recommended density	45-55 kg/m ³
Settlement s_d	0 %

Vertical cavities

Recommended density	55-65 kg/m ³
Settlement s_d	0 %

Sprayed with glue

Recommended density	35-40 kg/m ³
Settlement s_d	0 %

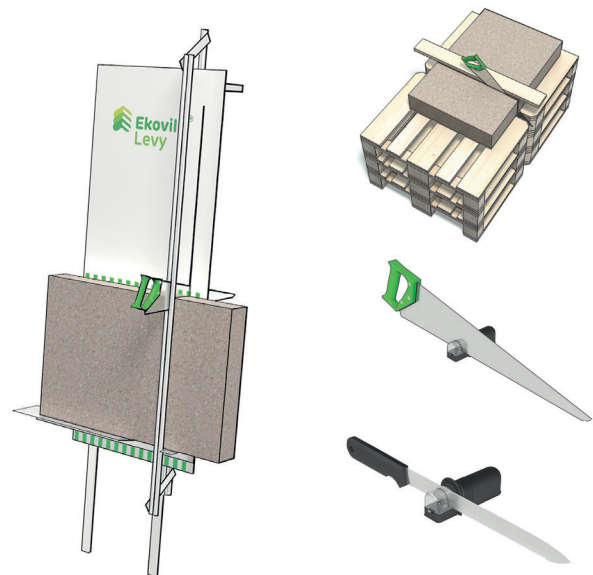
Technical characteristics

Thermal conductivity (λ_D)	0,038 W/mK
Reaction to fire	B-s2, d0
Air flow resistivity	AFr 8 - 44 kPa*s/m ²
Biological resistance	Class 0 (no mould growth)
Corrosion resistance	Class CR (no corrosion)
Sound absorption	$a_w=1,00$

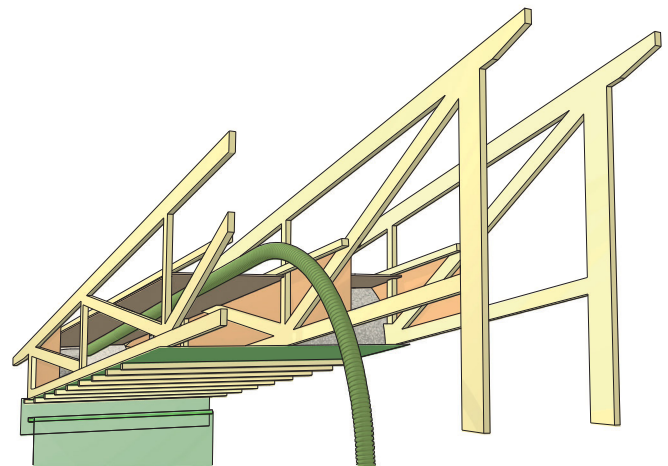
ETA-09/0081

Installation

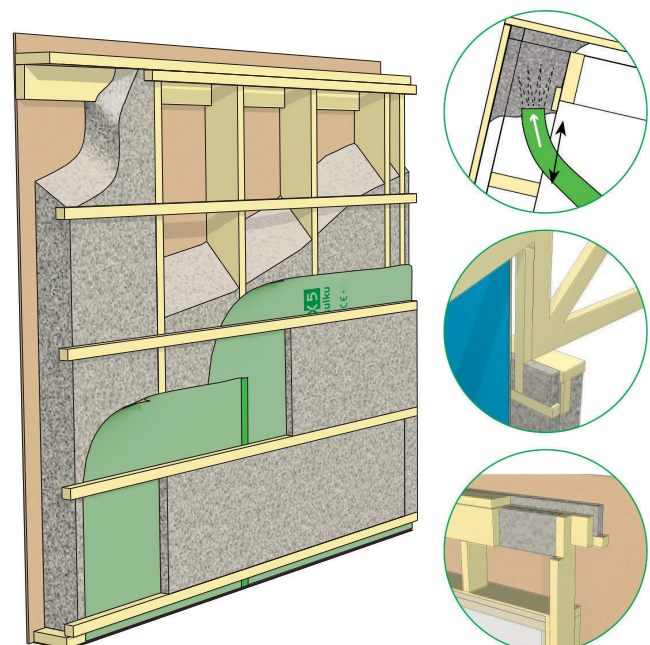
Sprayable and blowable Ekovilla insulation forms a seamless insulation layer that fills all cavities. The products can be installed via an authorized installation service. Blowable insulation can also be installed by yourself. The insulation can be purchased from DIY stores, where you can also rent a blowing machine.



The best way to cut an Ekovilla insulation slab is with an Ekovilla saw. A stable cutting surface should be used.



Installation of Ekovilla in roof with a desk grid.



Ekovilla installed by spraying on a vertical frame. An Ekovilla slab can be installed on top of the air barrier.

Thermal resistivity

Declared thermal conductivity $\lambda_{\text{Declared}}$ (λ_D) and design value λ_U of Ekovilla

The declared thermal value is the value declared by the manufacturer based on the CE marking (based on a product standard or European Technical Approval, ETA) or a certificate issued by a third party. Ekovilla λ_D and λ_U are calculated according to SFS-EN ISO 10456.

The declared thermal conductivity λ_D (23.50) is 0.038 W/ mK for blown and sprayed insulation at all densities and for slab insulation the value is 0.039 W/mK.

The declared thermal conductivity of Ekovilla can be used as such for design purposes. A separate correction to the design value is not required when the conditions for determining the declared thermal conductivity correspond to the design conditions (23.50).

Calculation of thermal transmittance (U-value)

U-values for structures adjacent to the outside air shall be calculated in accordance with standard SFS-EN ISO 6946 using the insulation design value λ_U .

Convection and airflow resistance AF_r

When calculating the U-value, it is also necessary to take into account possible air currents, i.e. convection, within the insulation.

The airflow resistance of the insulation material, i.e. the ability to resist convection, is described by the AF_r value. Due to the dense fibre structure, this feature is among the best on the market and therefore the insulation does not exhibit convective currents even at high insulation thicknesses. The Ekovilla AF_r ranges from 8 to 44 (kPas/m²) depending on the installation density.

Environmental profile

The environmental impact of a product throughout its lifecycle can be seen in the Environmental Product Declaration (EPD) prepared in accordance with EN 15804. The report examines, among other things, the use of natural resources, energy consumption during production and carbon dioxide emissions.

Ekovilla is made from renewable wood fibres, which do not require large amounts of energy to process and therefore have low carbon dioxide emissions. The energy used for production is generated by wind power.

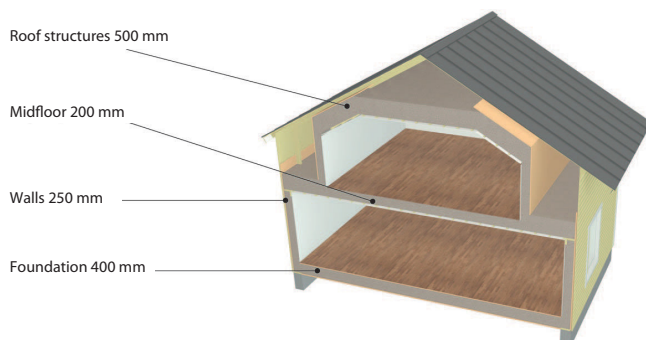
The carbon stored in the insulation, or carbon footprint, is many times greater than the emissions.

The environmental declarations for Ekovilla have been verified by a third party. Ekovilla has also been approved as a source of carbon removal rights (CORC) on the puro.earth marketplace.

Example

A house like the one in the picture has a living area of 180 m². 6,500 kg of Ekovilla has been blown into the outer shell of the house.

- The carbon dioxide emissions from the production of the insulation are 570 kg CO₂e.
- The carbon content of the wood fibre Ekovilla insulation is 8700 kg CO₂.



Humidity Capacity

Wood fibre made Ekovilla insulation's ability to store and release moisture almost the same as that of wood. The insulation is able to bind and release moisture many times its weight in a water damage situation. The ability to bind and release moisture is due to the hygroscopic wood fibre used as the raw material for the insulation. The insulation structure evens out moisture and even thick insulation structures can be made safely. No plastic film is required as a vapour barrier, but an adequate and compliant air barrier can be achieved by using Ekovilla X5 air barrier paper.

Fire resistance

Ekovilla does not melt even at high temperatures, but chars like solid wood. This property effectively protects the structures within the insulation. The carbonisation rate of Ekovilla is 50...150 mm per hour. Solid wood chars at a rate of 48 mm/hour and laminated wood chars at a rate of 42 mm/hour. In the event of a fire, the moisture binding capacity of Ekovilla is a factor that slows down the ignition and spread of the fire. Flame retardants are also added to the product during the manufacturing process.

Ekovilla releases moisture and slows down fire stresses, protecting the structures separated by the insulation layer from fire.

The structural fire characteristics of the insulation are good. The structures used in ordinary terraced houses and detached houses achieve a one-hour fire resistance rating of REI 60 (EN 13501-2).

Sound insulation

Thanks to its dense and soft fibre structure, Ekovilla is able to effectively absorb sound, acting as an excellent sound-absorbing layer in the structure. This has been proven by various measurements (ISO 10140-2; ISO 717-1).

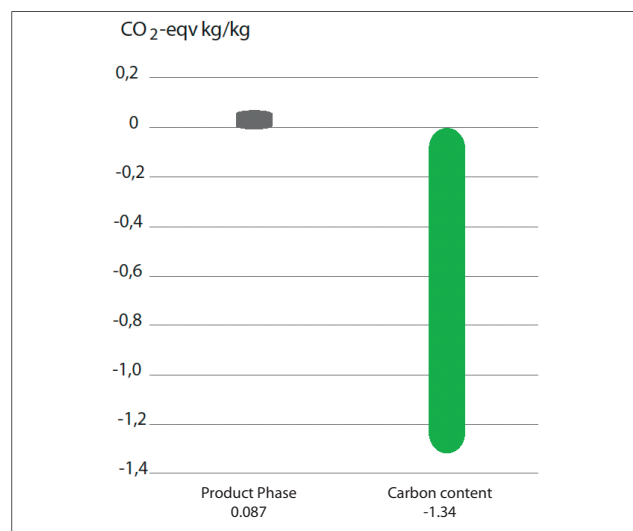


Ecological Insulation Measurement Calculator

The Ecological Insulation Measurement Calculator allows you to calculate the carbon footprint and handprint of the building insulation. In the case of Ekovilla, the values are given and they are based on the EPDs of the products. In addition, alternative insulation information can be entered into the calculator, making it easy to compare the environmental impact of different insulation materials.

Impartial information on the carbon footprints and handprints of insulation can be found in the database of the Ministry of the Environment: www.co2data.fi

The calculator can be found at: www.ekovilla.com/hiililaskuri



Certificates

- European Technical Approval (ETA-09/0081) CE marking for blowable insulation.
- CE marking for Ekovilla slab in accordance with EN 13171.

Ekovilla Oy has the right to use the CE mark on its products. As a product, Ekovilla meets the safety, health, environmental and consumer protection requirements set by the European Union.

Emission class of building materials M1



Research results

Fire resistance

- exterior wall REI 60
 - VTT-S-03 261-11
 - Magistrat der Stadt Wien / MA39-20-03481
 - Magistrat der Stadt Wien / MA39-20-03483
- exterior wall REI 30
 - VTT-S-03 893-13
 - Magistrat der Stadt Wien / MA39-20-05533
 - Magistrat der Stadt Wien / MA39-20-05534
- roof EI 30
 - Magistrat der Stadt Wien / MA39-20-03482

Humidity

- VTT-CR-00672-16, VTT 791

Sound insulation

- Walls R_w (C; C_{tr}) dB
 - outer wall: 46 (44; 41)
 - light dividing wall: 37 (35; 31)
 - partition wall between apartments: 61 (58; 51)
- Grid roof R_w (C; C_{tr}) dB
 - sheet metal cover: 46 (44; 37)
 - felt covering: 48 (47; 44)
 - brick coating: 50 (49; 47)
- Beam roof R_w (C; C_{tr}) dB
 - sheet metal cover: 52 (49; 43)
 - felt covering: 56 (54; 50)
 - brick coating: 59 (57; 52)
- Concrete roof R_w (C; C_{tr}) dB
 - sheet metal cover: 60 (60; 60)
 - felt covering: 60 (60; 56)
 - brick coating: 60 (60; 59)

EKOVILLA X AIRTIGHT PRODUCTS

An airtight house is safe to live in, energy efficient and durable. Ekovilla teaches builders how to build airtight and has also developed products for this purpose. Ekovilla's X tight insulation products help to build an airtight home.

Ekovilla X5

Ekovilla X5 is a fabric-reinforced air seal paper suitable only for internal air sealing of hygroscopic insulators in breathable structures.

Width	1300 mm
Length	46.2 m
Thickness	0.3 mm
Weight	161 g/m ²
Water vapour permeability	0.7 S _d (EN 13984-2005)

Ekovilla X RENO

The Ekovilla X RENO air barrier is intended for traditional construction and summer cottages. The product is only suitable for air sealing of hygroscopic insulators.

Note: Ekovilla X RENO is diffusion-open and is only recommended for the airtight sealing of thin insulation structures.

Width	1300 mm
Length	46,2 m
Thickness	0,2 mm
Weight	170 g/m ²
Water vapour permeability	0,05 S _d (EN 13984-2005)

Other sealing products

Ekovilla X sealing tape
Ekovilla X pass-throughs

More information www.ekovilla.com/tuotteet/



PRODUCTION

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Kiiminki



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