



Austrian Institute of Construction Engineering  
 Schenkenstrasse 4 | T+43 1 533 65 50  
 1010 Vienna | Austria | F+43 1 533 64 23  
 www.oib.or.at | mail@oib.or.at



## European Technical Assessment

**ETA-09/0081**  
 of 02.05.2019

General part

**Technical Assessment Body issuing the European Technical Assessment**

Österreichisches Institut für Bautechnik (OIB)  
 Austrian Institute of Construction Engineering

**Trade name of the construction product**

Ekovilla

**Product family to which the construction product belongs**

Insulation material made of loose, free cellulose fibres

**Manufacturer**

Ekovilla Oy  
 Katajajarjuntie 10  
 45720 Kuusankoski,  
 Finland

**Manufacturing plant**

Plant 1-3

**This European Technical Assessment contains**

12 pages

**This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of**

European Assessment Document (EAD) "In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres", EAD 040138-01-1201

**This European Technical Assessment replaces**

European Technical Approval ETA-09/0081 with validity form 25.06.2013 to 24.06.2018

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## Specific part

### 1 Technical description of the product

#### 1.1 Definition of the construction product

This European technical assessment applies to insulation materials with the designation:

“Ekovilla”

This product consists of cellulose fibres and serves for the production of insulation layers by means of machine processing.

The machine processing is carried out in wet and dry conditions.

“Ekovilla” is installed with different densities (density range **26 - 65 kg/m<sup>3</sup>**) depending on the area of application.

#### 1.2 Manufacturing

The cellulose fibres are made from selected waste paper by mechanical crushing.

The waste paper used in the manufacturing process has to fulfil the following quality criteria:

Glazed paper content  $\leq 5 \%$

During this manufacturing process the cellulose fibres are equipped with mineral salt for fire protection.

For the wet application, 7 % to 8 % binding agent depending on the thickness of the wall are dissolved in water, while 15l of the glue-water-solution are used to spray 1m<sup>3</sup> of cellulose.

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with the Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged.

Changes to the product or manufacturing process, which could result in this deposited data/information being incorrect, should be notified to the Österreichisches Institut für Bautechnik before the changes are introduced.

The Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

### 2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

#### 2.1 Intended use

“Ekovilla” made of cellulose fibres is used as dry applied non-loadable insulating material mainly for intended uses where vertical or horizontal cavities are completely filled or horizontal, arched or moderately pitched ( $\leq 10^\circ$ ) exposed areas are covered. Wet applied "Ekovilla" can be used as open space insulation horizontal, inclined and vertical.



It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals to guarantee a precise compression of the cellulose fibres.

The installation is carried out by appropriate personnel which have adequate experience in installing the material under the supervision of the person responsible for technical matters on site. Concerning this matter the manufacturer has to regularly train installers.

When calculating the thermal resistance, the nominal thickness (see table below) of the insulation layer shall be applied.

Area of application	Nominal thickness
<u>Vertical</u> : machine processed cavity insulation in exterior-, interior walls,	clear span of the filled cavity
<u>Pitched</u> : machine processed cavity insulation in roofs (pitch >10°)	clear span of the filled cavity
<u>Horizontal</u> : machine processed cavity insulation in flat roofs and floor constructions	clear span of the filled cavity
<u>Horizontal</u> : machine processed exposed insulation not subject to foot traffic on ceiling constructions (pitch ≤ 10°)	the percentage of insulation thickness to be added to the nominal thickness see clause 3.4.5 "Settling under cyclical temperature and cyclic humidity"
<u>Open Space</u> : machine processed insulation material applied in wet conditions with binding agent	minimum sprayed thickness

For horizontal machine processed dry installation of exposed insulation not subject to foot traffic and for open space machine wet installation the insulation layer shall have a constant installation thickness taking into account the nominal thickness. For that purpose suitable height marks shall be arranged in sufficient distances before the processing.

When blowing into closed cavities it shall be made sure by appropriate measures (e.g. control drillings) that the cavity is completely filled with the insulating material.

In case of installation on pitched or arched areas slipping of the thermal insulation product is to be prevented by suitable measures.

The construction shall be designed and installed in such a way that no harmful condensation occurs within the works.

### 3 Performance of the product and references to the methods used for its assessment

The performance of the product only applies if the insulation material is installed according to the manufacturer's installation instructions and if they are protected from precipitation, wetting or weathering in built-in state and during transport, storage and installation.

For sampling, conditioning and testing the provisions of the EAD No 040138-01-1201 "In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres" apply.

Basic requirements for construction works	Essential characteristics	Method of verification	Performance
<b>BWR 2</b>	Reaction to fire	EN 13501-1:2009	Clause 3.1.1 of the ETA
<b>BWR 3</b>	Biological resistance	EAD "In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres", Annex B	Clause 3.2.1 of the ETA
<b>BWR 5</b>	Sound absorption	EN 15101:2013	Clause 3.3.1 of the ETA
<b>BWR 6</b>	Thermal conductivity	EAD "In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres", Annex A	Clause 3.4.1 of the ETA
	Water vapour diffusion resistance	EN 12086	Clause 3.4.2 of the ETA
	Water absorption	No performance assessed	
	Corrosion developing capacity	EN 15101-1, Annex E	Clause 3.4.4 of the ETA
	Settlement / density	EN 15101-1, Annex B and EAD	Clause 3.4.5 of the ETA
	Critical moisture content	No performance assessed	
	Specific airflow resistance	EN 29053, Method A	Clause 3.4.7 of the ETA
	Hygroscopic sorption properties	EN 12571	Clause 3.4.8 of the ETA

**3.1 Safety in case of fire (BWR 2)**

3.1.1 Reaction to fire

The reaction to fire of “Ekovilla” is classified according to EN 13501-1.

End use application	Class according to EN 13501-1
<ul style="list-style-type: none"> <li>- dry installation</li> <li>- installation density of “Ekovilla” is 26 kg/m<sup>3</sup> to 65 kg/m<sup>3</sup></li> <li>- insulation layer thickness ≥ 100 mm,</li> <li>- end use application without air gap</li> <li>- end use application substrates defined in EN13238 for the following standard substrate:                      “wood based panel”: density of the board 680 ± 50 kg/m<sup>3</sup>, board thickness ≥ 12 ± 2 mm, reaction to fire of the board: class D;                      “calcium silicate board”: density of the board 870 ± 50 kg/m<sup>3</sup>, board thickness ≥ 11 ± 2 mm, reaction to fire of the board: class A2</li> </ul>	<b>D-s2,d0</b>
<ul style="list-style-type: none"> <li>- dry installation</li> <li>- installation density of “Ekovilla” is 26 kg/m<sup>3</sup> to 65 kg/m<sup>3</sup></li> <li>- insulation layer thickness ≥ 60 mm</li> </ul>	<b>E</b>
<ul style="list-style-type: none"> <li>- wet installation</li> <li>- installation density of “Ekovilla” is 36 kg/m<sup>3</sup> to 38 kg/m<sup>3</sup></li> <li>- insulation layer thickness ≥ 100 mm,</li> <li>- end use application without air gap</li> <li>- end use application substrates defined in EN13238 for the following standard substrate:                      “wood based panel”: density of the board 680 ± 50 kg/m<sup>3</sup>, board thickness ≥ 12 ± 2 mm, reaction to fire of the board: class D;                      “calcium silicate board”: density of the board 870 ± 50 kg/m<sup>3</sup>, board thickness ≥ 11 ± 2 mm, reaction to fire of the board: class A2</li> </ul>	<b>D-s2,d0</b>

**3.2 Hygiene, health and the environment (BWR 3)**

3.2.1 Biological resistance

The test and the assessment of the resistance to growth of mould fungus has been verified according to the EOTA testing procedure (Annex B of EAD “In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres”; issued May 2018.). The reached **class** of “Ekovilla” applied wet and dry is **0**.

**3.3 Protection against noise (BWR 5)**

3.3.1 Sound absorption

Both the practical sound absorption coefficient  $\alpha_p$  and the weighted sound absorption  $\alpha_w$  are calculated according to EN ISO 11654.

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	Ekovilla dry applied	Ekovilla wet applied
frequency (Hz)	$\alpha_p$	
125	<b>0,35</b>	No performance assessed
250	<b>0,85</b>	
500	<b>1,00</b>	
1000	<b>1,00</b>	
2000	<b>1,00</b>	
4000	<b>1,00</b>	

product	density (kg/m <sup>3</sup> )	thickness (mm)	$\alpha_w$
Ekovilla dry applied	28	100	<b>1,00</b>
Ekovilla wet applied	-	-	No performance assessed

### 3.4 Energy economy and heat retention (BWR 6)

#### 3.4.1 Thermal conductivity

The assessment of the thermal conductivity of “Ekovilla” is carried out according to Annex A of EAD “In-situ formed loose fill thermal and/or acoustic insulation products made of vegetable fibres”. The declared value of thermal conductivity is determined according to EN 10456.

The fractile value of thermal conductivity of the dry applied material for the density range of 28 kg/m<sup>3</sup> - 60 kg/m<sup>3</sup> is  $\lambda_{(10,dry,90/90)} = \mathbf{0,0374 \text{ W/(m}\cdot\text{K)}$  representing at least 90 % of the production with a confidence limit of 90%

The declared value of thermal conductivity for the density range of 28 kg/m<sup>3</sup> - 60 kg/m<sup>3</sup> is  $\lambda_{D(23,50)} = \mathbf{0,038 \text{ W/(m}\cdot\text{K)}$  determined by conversion of the  $\lambda_{(10,dry,90/90)}$  value.

For conversion of humidity the following applies:

- the mass related moisture content at 23 °C/50 % relative humidity:  
 **$u_{23,50} = 0,0604 \text{ kg/kg}$**
- the mass related moisture content at 23 °C/80 % relative humidity:  
 **$u_{23,80} = 0,111 \text{ kg/kg}$**
- the mass related moisture conversion coefficient:  
 **$f_{u1(dry - 23/50)} = 0,123 \text{ kg/kg}$**   
 **$f_{u2(23/50 - 23/80)} = 0,428 \text{ kg/kg}^1$**
- the moisture conversion factor dry to 23 °C/50 % relative humidity  
 **$F_{m1} = 1,00746$**
- the moisture conversion factor 23 °C/50 % relative humidity to 23 °C/80 % relative humidity  
 **$F_{m2} = 1,0219$**

The thermal conductivity of the wet applied material was not assessed.

#### 3.4.2 Water vapour diffusion resistance

The water vapour diffusion resistance of “Ekovilla” is assessed according to EN 12086:2013, climate condition C.

The mean water vapour diffusion resistance factor of the dry applied material at a density of 60 kg/m<sup>3</sup> for “Ekovilla” did not exceed the value **1,3**.



For the wet applied material no performance was assessed.

3.4.3 Water absorption

No performance assessed.

3.4.4 Corrosion developing capacity

The test and the assessment of the corrosion developing capacity on metal products has been verified according to EN 15101, Annex E.

No corrosion developing potential of the dry applied material was determined. The reached **class is CR**.

For the wet applied material no performance was assessed. Suitable measures might be necessary to avoid corrosion of metal parts of the construction in contact.

3.4.5 Settlement / density

The assessment of the settlement of the dry applied material is carried out according to the test methods stated in EN 15101-1, Annex B.

Test method according to EN 15101-1, Annex B and EAD	Settlement (%)	Class	Max. thickness (mm)	Min density (kg/m <sup>3</sup> )
Settling in ceilings acc. Annex B3 and EAD clause 2.2.8.1b	$s_v = 9,8$	-	300	27,5
Settling in cavities of walls and between rafters acc. Annex B2	$s_d = 0$	<b>SC 0</b>	100	31,7
			240	37,8
Settling under impact excitation and constant temperature and humidity condition acc. Annex B3	<b>Not required</b>	-	-	-
Settling under cyclical temperature and cyclic humidity acc. Annex B1	$S_{cyc} = 23$	<b>SH 25</b>	-	-

The assessment of the settlement of the wet applied material is carried out according to the test methods stated in EN 15101-1, Annex B.

Test method according to EN 15101-1, Annex B and EAD	Settlement (%)	Class	Max. thickness (mm)	Min density (kg/m <sup>3</sup> )
Settling in ceilings acc. Annex B3 and EAD clause 2.2.8.1b	<b>No performance assessed</b>	-	-	-
Settling in cavities of walls and between rafters acc. Annex B2	$s_d = 0$	<b>SC 0</b>	100	34,6
			240	32,7
Settling under impact excitation and constant temperature and humidity condition acc. Annex B3	<b>Not required</b>	-	-	-

Settling under cyclical temperature and cyclic humidity acc. Annex B1	No performance assessed	-	-	-
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3.4.6 Critical moisture content

No performance assessed.

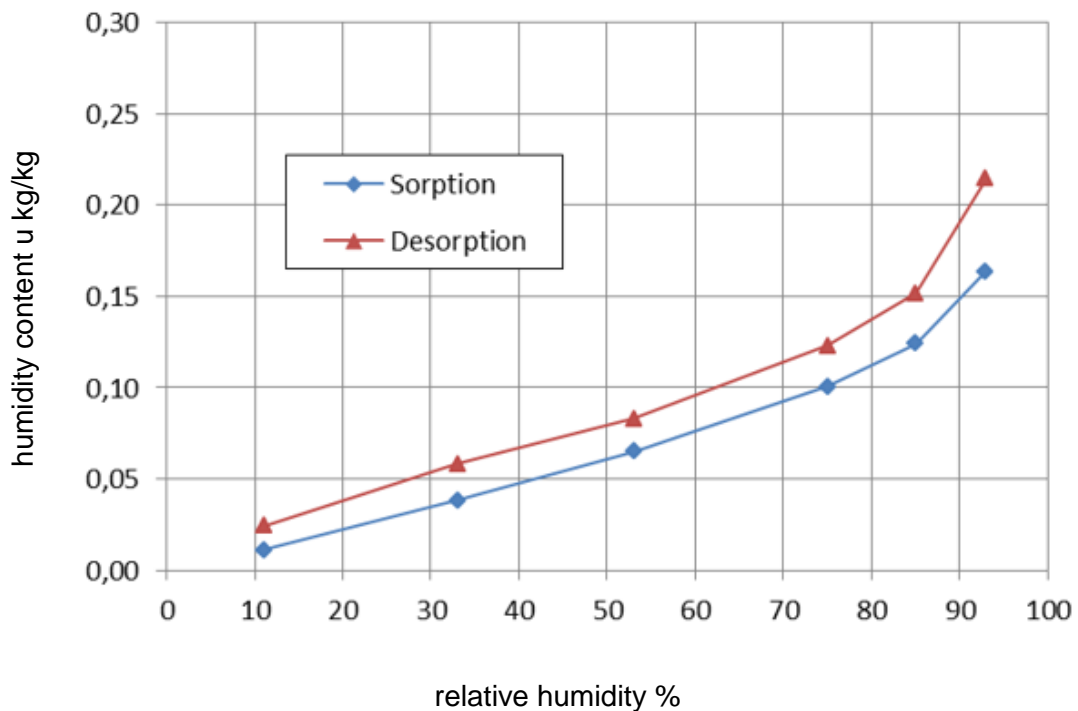
3.4.7 Specific airflow resistance

The airflow resistance of “Ekovilla” is assessed according to EN 29053, method A. The mean longitudinal airflow resistance of the dry applied material at a density of 29/44 kg/m<sup>3</sup> is at least **8/55 kPa s/m<sup>2</sup>**.

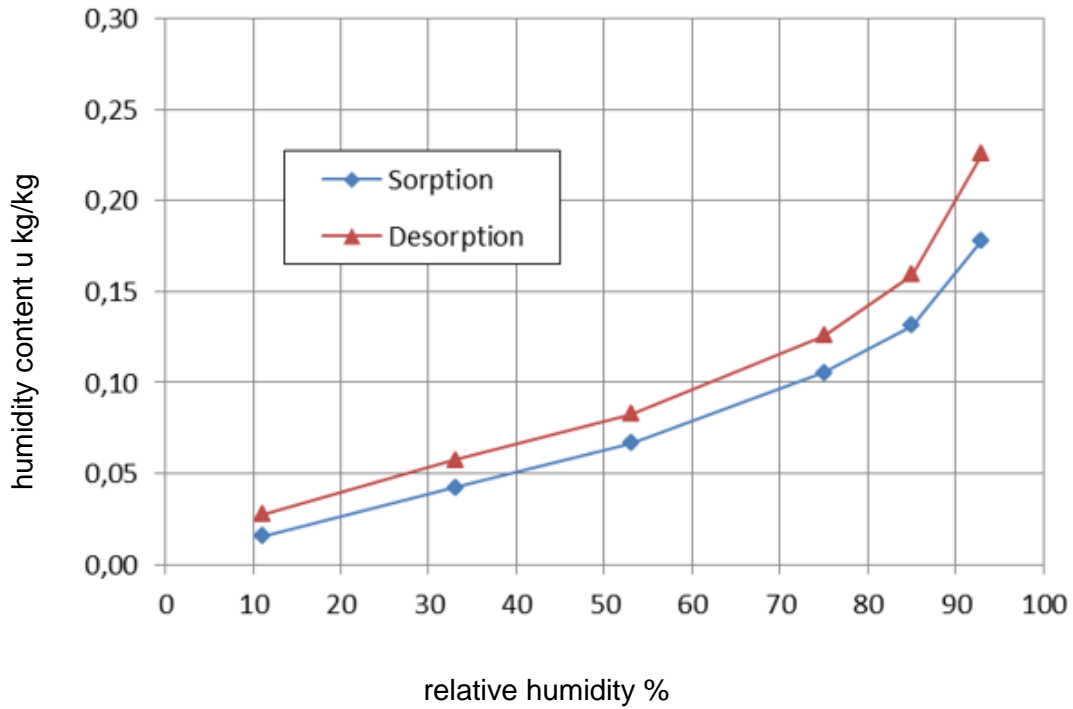
The airflow resistance of “Ekovilla” is assessed according to EN 29053, method A. The mean longitudinal airflow resistance of the wet applied material at a density of 43 kg/m<sup>3</sup> is at least **10 kPa s/m<sup>2</sup>**.

3.4.8 Hygroscopic sorption properties

The sorption and desorption line of “Ekovilla” dry applied is assessed according to EN ISO 12571.



The sorption and desorption line of “Ekovilla” wet applied is assessed according to EN ISO 12571.



**4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base**

According to the Decision 1999/91/EC<sup>1</sup>, as amended, the system of assessment and verification of constancy of performance (according to Annex V of Regulation (EU) No 305/2011) is 3.

<sup>1</sup> Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

