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## Evaluation Report of

**ETA 16/0803  
of 05/01/2017**

### General Part

#### **Technical Assessment Body issuing the ETA:**

Centre of Building Construction Engineering, Joint Stock Company

#### **Trade name of the construction product**

Thermal and acoustic insulation based on natural fibers - KOBE ECO HEMP FLEX

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

Product area code: 04  
Thermal insulation products; Composite insulating kits/systems

#### **Manufacturer**

KOBE-cz s.r.o.  
Znojemská 1002  
691 23 Pohořelice  
Czech Republic  
www.kobe-cz.eu

#### **Manufacturing plant(s)**

KOBE-cz s.r.o.  
U Sladovny 430  
671 25 Hodonice  
Czech Republic

#### **This Evaluation Report contains**

7 pages

## 1 Generally

This evaluation report contains the results of tests used to assess thermal insulation based on natural fibers of the producer KOBE-cz s.r.o. marked HEMP FLEX according to the basic requirements that are stated by EAD 040005-00-1201 „Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres“, June 2015.

## 2 Definition of the construction product and intended use

### 2.1 Definition of the construction product

Thermal and acoustic insulation based on natural fibers - KOBE ECO HEMP FLEX with density of  $35 \pm 5 \text{ kg/m}^3$  is made of natural hemp fibers which are mixed with bicomponent connecting fibers. Products are manufactured in the form of boards or rolls in the given dimensions, possibly according to the customer's requirements.

#### **KOBE ECO HEMP FLEX**

Thickness	5 - 240 mm
Length	500 - 10000 mm
Width	350 - 2600 mm
Density	$35 \pm 5 \text{ kg/m}^3$
Standard dimensions of the product	
Board:	1200 x 580 mm 1200 x 600 mm 1200 x 625 mm or according to the customer's requirement
Roll:	2 - 20 m or according to the customer's requirement

### 2.2 Intended use

Product is designed for use in buildings for external and internal insulation of walls, insulation of built-in structures, under-rafter insulation, above-rafter insulation and insulation of the wooden beam ceilings.

Assessment of this insulation product applies only to product used in constructions that is not exposed to precipitation, moisture or weathering and structural members without contact with water or soil, or in buildings where there is a crossing of critical moisture content.

### 3 Summary of the test results and assessment

Test results and assessment are mentioned in the table 1.

Table 1 - Test results and assessment

No	Essential characteristics and method of verification/assessment	Expression of product performance	Protocol	
<b>Basic Works Requirement 1: Mechanical resistance and stability (BWR 1)</b>				
Not relevant				
<b>Basic Works Requirement 2: Safety in case of fire (BWR 2)</b>				
1	<b>Reaction to fire</b> (EN 13501-1+A1)	Class D-s1, d0	Classification Report No. PK-16-002	
<b>Basic Works Requirement 3: Hygiene, health and the environmental (BWR 3)</b>				
2	<b>Biological resistance (Growth of mould fungus)</b> (ÖNORM B 6010; EAD 040005-00-1201, Annex B; EN ISO 846, method A, B, B')	There is no intensity of fungal growth	Report No. 124009/2016	
<b>Basic Works Requirement 4: Safety and accessibility in use (BWR 4)</b>				
3	<b>Corrosion developing capacity</b>	No performance assessed	-	
<b>Basic Works Requirement 5: Protection against noise (BWR 5)</b>				
4	<b>Specific airflow resistivity</b> (EN 29053, method A) For speed of 5 mm/s the pressure drop of five layers (samples) For velocity of airflow of 0,5 mm/s the pressure loss is of one layer of the sample Standardized airflow resistance (art. 2.2 EN 29053) Specific airflow resistance (art. 2.3 EN 29053)	0,096 Pa 0,0192 Pa 38,4 Pa.s/m 320 Pa.s/m <sup>2</sup>	Test Report č. 15/1163/T063	
5	<b>Dynamic stiffness</b>	No performance assessed	-	
6	<b>Impact sound reduction</b>	No performance assessed	-	
7	<b>Compressibility</b>	No performance assessed	-	
8	<b>Sound absorption</b> (EN ISO 354, EN ISO 11654) - Sound absorption coefficient $\alpha_s$ - Practical sound absorption coefficient $\alpha_p$	product thickness 100 mm		
		frequency [Hz]	$\alpha_s$ [-]	$\alpha_p$ [-]
		125	0,40	0,35
		250	0,65	0,60
		500	0,82	0,80
		1000	0,81	0,85
		2000	0,89	0,90
	4000	1,03	1,00	
- Weighted sound absorption coefficient $\alpha_w$ [-] - Class sound absorption B		thickness [mm]	$\alpha_w$ [-]	
		100	0,85 (H)	
		Test Report č. 15/086/A036		

No	Essential characteristics and method of verification/assessment	Expression of product performance	Protocol																																																																								
<b>Basic Works Requirement 6: Energy economy and heat retention (BWR 6)</b>																																																																											
9	<b>Thermal conductivity</b> (EN 12667, EN ISO 10456) $\lambda_{10,dry,90/90}$ Category 1 (comes from $\lambda_{10,dry,90/90}$ ) $\lambda_{D,(23,50)}$ Category 1 (comes from $\lambda_{10,dry,90/90}$ ) $\lambda_{10,dry,limit}$ Category 2 (comes from $\lambda_{10,dry,limit}$ ) $\lambda_{D,(23,50)}$ Category 2 (comes from $\lambda_{10,dry,limit}$ )  $\lambda_{10,dry,90/90}$  $\lambda_{10,dry,mean}$  $\lambda_{23,50}$ $\lambda_{23,80}$  <b>Moisture content</b> $u_{23,50}$ $u_{23,80}$  <b>Transitive coefficient</b> $f_{u,1}$ $f_{u,2}$	0,0432 W/m.K 0,0442 W/m.K 0,0427 W/m.K 0,0437 W/m.K  0,0432 W/m.K  0,0417 W/m.K  0,0427 W/m.K 0,0503 W/m.K  0,055 kg/kg 0,141 kg/kg  0,4238 1,8906	Test Report č. 15/1164/T064-A																																																																								
10	<b>Water vapour diffusion resistance <math>\mu</math></b> (EN 12086)	2,294	Test Report č. 15/1164/T064-A																																																																								
11	<b>Water absorption</b> (EN 1609, method A)	1,51 kg/m <sup>2</sup>	Test Report č. 15/1164/T064-A																																																																								
12	<b>Geometry <sup>1)</sup></b> - Length [mm] Nominal length of the tested sample 2000 mm  - Width (EN 822) [mm] Nominal width of the tested sample 600 mm  - Thickness (EN 823) [mm] Nominal thickness of the tested sample 50, 200, 200 a 100 mm	<table border="1"> <tr> <td>1198</td> <td>1210</td> <td>1190</td> <td>1214</td> </tr> <tr> <td>1200</td> <td>1204</td> <td>1213</td> <td>1204</td> </tr> <tr> <td>1187</td> <td>1213</td> <td>1190</td> <td>1185</td> </tr> <tr> <td>599</td> <td>598</td> <td>599</td> <td>596</td> </tr> <tr> <td>596</td> <td>601</td> <td>603</td> <td>597</td> </tr> <tr> <td>596</td> <td>603</td> <td>604</td> <td>604</td> </tr> <tr> <td>53</td> <td>198</td> <td>200</td> <td>104</td> </tr> <tr> <td>53</td> <td>198</td> <td>197</td> <td>102</td> </tr> <tr> <td>55</td> <td>202</td> <td>199</td> <td>103</td> </tr> <tr> <td>47</td> <td>200</td> <td>200</td> <td>106</td> </tr> <tr> <td>49</td> <td>200</td> <td>201</td> <td>100</td> </tr> <tr> <td>55</td> <td>203</td> <td>198</td> <td>103</td> </tr> <tr> <td>48</td> <td>198</td> <td>201</td> <td>102</td> </tr> <tr> <td>49</td> <td>203</td> <td>199</td> <td>105</td> </tr> <tr> <td>51</td> <td>201</td> <td>198</td> <td>104</td> </tr> <tr> <td>50</td> <td>201</td> <td>201</td> <td>100</td> </tr> <tr> <td>50</td> <td>201</td> <td>199</td> <td>102</td> </tr> <tr> <td>48</td> <td>202</td> <td>200</td> <td>105</td> </tr> </table>	1198	1210	1190	1214	1200	1204	1213	1204	1187	1213	1190	1185	599	598	599	596	596	601	603	597	596	603	604	604	53	198	200	104	53	198	197	102	55	202	199	103	47	200	200	106	49	200	201	100	55	203	198	103	48	198	201	102	49	203	199	105	51	201	198	104	50	201	201	100	50	201	199	102	48	202	200	105	Test Report č. 15/1164/T064-A
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13	<b>Density</b> (EN 1602)	(32,0 ± 0,4) kg/m <sup>3</sup>	Test Report č. 15/1164/T064-A																																																																								
14	<b>Flatness after one-sided wetting</b>	No performance assessed	-																																																																								
15	<b>Compressive stress or strength</b>	No performance assessed	-																																																																								
16	<b>Dimensional stability under specified temperature and humidity</b> (EN 1604) Exposure: 48 hours at temperature of (70 ± 2)°C and relative humidity (90 ± 5)% - Dimensional changes $\Delta\varepsilon_i$ - Dimensional changes $\Delta\varepsilon_b$ - Dimensional changes $\Delta\varepsilon_d$	0,66 % 0,65 % 2,84 %	Test Report č. 16/105/C005 A																																																																								

No	Essential characteristics and method of verification/assessment	Expression of product performance	Protocol
17	<b>Deformation under specified compressive load and temperature conditions</b> (EN 1605) Conditioning before test: 48 hours at the temperature of $(23 \pm 5)^{\circ}\text{C}$ - Relative deformation after degree $A\epsilon$ - Total relative deformation after degree $B\epsilon_2$	68,5 % 69,0 %	Test Report č. 16/105/C005 A
18	<b>Tensile strength parallel</b> (EN 1608) - Thickness 50 mm - Thickness 200 mm	10,1 kPa 10,2 kPa	Test Report č. 16/105/C005 A
19	<b>Tensile strength perpendicular to faces</b> (EN 1607)	2,3 kPa	Test Report č. 16/105/C005 A
20	<b>Tensile strength perpendicular to faces in wet conditions</b> (EN 1607) - Series 1 <sup>2)</sup> - Series 2 <sup>2)</sup>	1,8 kPa 1,5 kPa	Test Report č. 16/105/C005 A
21	<b>Compressive creep</b>	No performance assessed	-
22	<b>Behaviour under point load</b>	No performance assessed	-
23	<b>Shear strength and shear modulus of elasticity</b>	No performance assessed	-
<p>Note:</p> <p>1) Given values of measurement results are measured values of tested samples according to the date of the sample's production.</p> <p>2) Testing samples were placed in the climatic chamber at the temperature of <math>(70 \pm 2)^{\circ}\text{C}</math> and at relative humidity of <math>(95 \pm 5)\%</math>: Series 1: for 7 days followed by drying period at the temperature of <math>(23 \pm 2)^{\circ}\text{C}</math> and relative humidity of <math>(50 \pm 5)\%</math> until steady weight is reached. Series 2: for 28 days followed by drying period at the temperature of <math>(23 \pm 2)^{\circ}\text{C}</math> and relative humidity of <math>(50 \pm 5)\%</math> until steady weight is reached.</p>			

#### 4 Conclusion

For thermal and acoustic insulation based on natural fibers - KOBE ECO HEMP FLEX tests were performed that are determined in accordance with EAD 040005-00-1201 Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres, June 2015.

## 5 Use of documents

- [1] EN 12086 Thermal insulating products for building applications - Determination of water vapour transmission properties (2013).
- [2] EN 12430 Thermal insulating products for building applications - Determination of behaviour under point load (2013).
- [3] EN 12431 Thermal insulating products for building applications - Determination of thickness for floating floor insulating products (2013).
- [4] EN 12667 Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance (2001).
- [5] EN 13501-1+A1 Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests (2010).
- [6] EN 1602 Thermal insulating products for building applications - Determination of the apparent density (2013).
- [7] EN 1604 Thermal insulating products for building applications - Determination of dimensional stability under specified temperature and humidity conditions (2013).
- [8] EN 1605 Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions (2013).
- [9] EN 1607 Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces (2013).
- [10] EN 1608 Thermal insulating products for building applications - Determination of tensile strength parallel to faces (2013).
- [11] EN 1609 Thermal insulating products for building applications - Determination of short term water absorption by partial immersion (2013).
- [12] EN 29053 Acoustics - Materials for acoustical applications - Determination of airflow resistance (1994).
- [13] EN 822 Thermal insulating products for building applications - Determination of length and width (2013).
- [14] EN 823 Thermal insulating products for building applications - Determination of thickness (2013).
- [15] EN 826 Thermal insulating products for building applications - Determination of compression behaviour (2013).
- [16] EN ISO 10456 Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (2009).
- [17] EN ISO 11654 Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (1998).
- [18] EN ISO 354 Acoustics - Measurement of sound absorption in a reverberation room (2003).
- [19] EN ISO 846 Plastics - Evaluation of the action of microorganism (1998).
- [20] EAD 040005-00-1201 Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres (June 2015).
- [21] ÖNORM B 6010 Materials for thermal and/or acoustic insulation in building construction - Test methods (1998).

- [22] Test Report No. 124009/2016, on test on biological resistance to thermal and sound insulation boards on the base of hemp - KOBE ECO HEMP FLEX with assessment, in accordance with EN ISO 846: 1997, Czech Technical University in Prague, Faculty of Civil Engineering, 23/02/2016.
- [23] Classification report No. PK-16-002, Classification of reaction to fire in accordance with EN 13501-1+A1:2010, Product: KOBE EKO HANF FLEX, Inc. CSI Prague, 15/01/2016.
- [24] Test Report No. 15/086/A036, Measurement of sound absorption coefficient in accordance with EN ISO 354 and EN ISO 11654, Product: Insulation boards from hemp ropes 30 kg/m<sup>3</sup> - th. 100 mm, Inc. CSI Prague, 16/10/2015.
- [25] Test Report No. 15/1163/T063, Determination of values of airflow resistance of a porous material intended for use in acoustics in accordance with EN 29053 *Materials for use in acoustics – determination of airflow resistance*, Product: KOBE EKO HANF FLEX 30 kg/m<sup>3</sup>, Inc. CSI Prague, 30/11/2015.
- [26] Test Report No. 15/1164/T064-A, Determination of dimensions in accordance with EN 822; short-term absorbability in accordance with EN 1609; ventilating power in accordance with EN 12086; density in accordance with EN 1602; thermal resistance with method in accordance with EN 12667 (thermal conductivity coefficient), Product: KOBE EKO HANF FLEX 30 kg/m<sup>3</sup>, Inc. CSI Prague, 07/01/2016.
- [27] Test Report No. 16/105/C005 A, Determination of thickness (compressibility); Pressure test; Determination of stability of dimensions; Determination of deformation after loading with pressure and temperature; Determination of tensile strength in the plane of the board; Determination of tensile strength perpendicular to the surface of the board (also at humidity); Determination of resistance and point load, Product: Insulation boards based on hemp KOBE ECO HEMP FLEX, Inc. CSI Prague, 12/04/2016.