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Member of EOTA

## European Technical Approval

## ETA-13/0394

(English translation prepared by TZÚS - Original version in Czech language)

Obchodní název  
*Trade name*

**Stropní prvky VELOX**  
**VELOX Floor elements**

Držitel schválení  
*Holder of approval*

VELOX - WERK s.r.o.  
Bělotínská 288  
Hranice I - Město  
CZ-753 01 Hranice  
Czech Republic

Typ a použití výrobku  
*Generic type and use  
of construction product*

Systém nenosného ztraceného bednění pro stropní konstrukce ze štěpkocementových prvků  
*Non-bearing permanent shuttering system for floor construction based on cement-bonded wood chip elements*

Platnost od  
*Validity from*  
do  
*to*

16.05.2013  
15.05.2018

Výrobna  
*Manufacturing plant*

VELOX - WERK s.r.o.  
Bělotínská 288  
Hranice I - Město  
CZ-753 01 Hranice  
Czech Republic

Toto Evropské technické schválení obsahuje  
*This European Technical Approval contents*

17 stran včetně 2 příloh  
*17 pages including 2 annexes*



European Organisation for Technical Approvals  
Evropská organizace pro technické schvalování

## I. LEGAL BASES AND GENERAL CONDITIONS

- 1 This European Technical Approval is issued by the Technický a zkušební ústav stavební Praha, s.p. in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC of 22 July 1993<sup>2</sup> and Regulation (EC) No. 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - the Governmental Decree No. 190/2002 of the Collection of Law<sup>4</sup>;
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC<sup>5</sup>;
- 2 The Technický a zkušební ústav stavební Praha, s.p. is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
- 3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
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- 6 The European Technical Approval is issued by the approval body in its official language. This version corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.02.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p. 1

<sup>4</sup> Governmental Decree No. 190/2002 of the Collection of Law of the Czech Republic, 10.04.2002

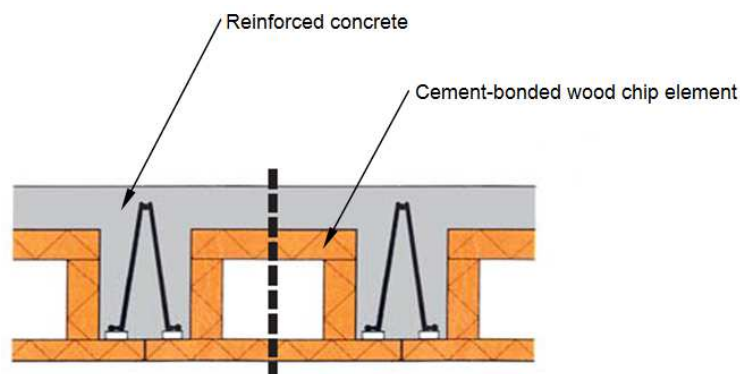
<sup>5</sup> Official Journal of the European Communities N° L 17, 20.01.1994, p. 34

## II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of product and intended use

#### 1.1 Definition of the construction product

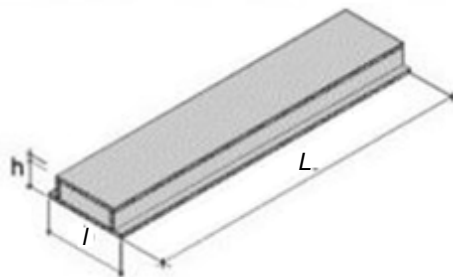
Non-load bearing permanent shuttering system for floor construction based on cement-bonded wood chip elements (called "element" in further text) are made from boards of cement-bonded wood chips, which are jointed by cement mortar to each other. On site the elements are arranged next to each other resulting in a permanent shuttering for floor constructions, see Figure 1.



**Figure 1:** Floor construction with cement-bonded wood-chip elements

#### Dimensions of the basic elements:

- length,  $L$ : 2 000 mm
- width,  $l$ : 500 mm (bottom) and 380 mm (top)
- height,  $h$ : 170 mm, 220 mm and 260 mm



**Figure 2:** Cement-bonded wood chip element

#### Dimensions of the additional elements:

- width: 300 mm (bottom) and 180 mm (top)
- maximal height: 570 mm

Thickness of the bottom, side, middle and the top board is 25 mm at least.

Boards of cement-bonded wood chips are produced according to ETA-12/0320 elaborated according to CUAP 12.01/32. The WS type of board is used at production of the elements.

The concrete used for floor constructions must comply with requirements stated in EN 206-1. National annexes can be taken into account.

The reinforcement used for floor constructions must comply with requirements stated in EN 10080.

## 1.2 Intended use

The cement-bonded wood chip elements are intended to be used as non-bearing permanent shuttering for reinforced concrete floor construction under indoor air conditions.

The provisions made in this ETA are based on an assumed intended working life of the elements of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or by the Approval Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

## 2 Characteristics of the product and methods of verification

The evaluation of the fitness for use of the elements for the intended use was performed in conformity with the CUAP 05.02/13, version June 2011.

### 2.1 Mechanical resistance and stability (ER 1)

#### 2.1.1 Bending strength and deflection

The maximal bending strength (load bearing capacity), bending strength (load bearing capacity) at deflection of  $L/500$  and maximal deflection is stated in table 1. The test method described in EN 15037-1, Annex H was used.

Table 1: Declared values of bending strength and deflection (basic dimensions)

Property	Type of the element		
	$h = 170 \text{ mm}$	$h = 220 \text{ mm}$	$h \geq 260 \text{ mm}$
Maximal bending strength	16 kN	22 kN	30 kN
Bending strength at deflection of $L/500$	7.5 kN	12.5 kN	16.5 kN
Maximal deflection	14 mm	18 mm	18 mm

#### 2.1.2 Dimensions and shape

Nominal values of length,  $L$ , width,  $l$ , and height,  $h$ , and deviations of the elements are stated in table 2. Dimensions and shape of the elements were measured according to principles described EN 15037-2+A1.

Table 2: Declared values of dimensions and shape, deviations

Property	Type of the element		
	$h = 170 \text{ mm}$	$h = 220 \text{ mm}$	$h \geq 260 \text{ mm}$
Length, $L$	2000 mm $\pm$ 10 mm		
Width, $l$ (at bottom)	500 mm $\pm$ 10 mm or 300 mm $\pm$ 10 mm		
Width, $l$ (at top)	380 mm $\pm$ 10 mm or 180 mm $\pm$ 10 mm		
Height, $h$	170 mm	220 mm	$\geq 260 \text{ mm}$
	$\pm 10 \text{ mm}$		
Width of nose	$\pm 3 \text{ mm}$		
Deviation from the thickness of a single WS board	+ 3 mm; - 2 mm (class T1)		
Lateral deflection	max. $\pm 10 \text{ mm}$		
Flatness	max. $\pm 5 \text{ mm}$		

## **2.2 Safety in case of fire (ER 2)**

### **2.2.1 Reaction to fire**

The WS boards from which the elements are produced are classified to have class of reaction to fire B-s1, d0 classified in accordance with EN 13501-1+A1. The boundary conditions stated in test reports must be met.

### **2.2.1 Resistance to fire**

Not relevant.

The achievement characteristics according to EN 13501-2+A1 are ensured through the concrete floor.

## **2.3 Hygiene, health and environment (ER 3)**

### **2.3.1 Content and/or release of dangerous substances**

Based on the written declaration of the manufacturer, the elements do not contain harmful or dangerous substances as defined in the EU database.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

### **2.3.2 Water vapor transmission**

Water vapor transmission properties were determined in accordance with EN 12086, climatic conditions A.

Declared (maximal) value of the water vapor diffusion resistance factor  $\mu = 30$ .

### **2.3.3 Water absorption**

The short-term water absorption was determined in accordance with EN 1609, method A.

Declared (maximal) value is  $W_p = 8 \text{ kg/m}^2$ .

## **2.4 Safety in use (ER 4)**

### **2.4.1 Dimensional stability**

The dimensional stability was determined in accordance with the principles of method described in EN 1605 (test conditions 2).

During the test no relative change in thickness  $\Delta\varepsilon_d$  exceeded 3.0 % and no relative change in length  $\Delta\varepsilon_l$  and width  $\Delta\varepsilon_b$  exceeded 0.5 %.

### **2.4.2 Compressive stress or compressive strength**

The compressive stress at 10% deformation of the WS boards was determined in accordance with the principles of method described in EN 826.

Declared level of compressive stress of the WS boards is stated in table 3.

Table 3: Declared level of compressive stress

Type of board	Declared level
WS	CS(10/Y) 1000 ( $\geq 1000$ kPa)

### 2.4.3 Bending strength

The bending strength of the WS boards was determined in accordance with EN 12089, method A.

Declared level of bending strength of the WS boards is stated in table 4.

Table 4: Declared level of bending strength

Type of board	Declared level
WS	BS 1300 ( $\geq 1300$ kPa)

### 2.4.4 Tensile strength parallel to faces

Tensile strength parallel to faces of the WS boards was determined in accordance with the principles of method given in EN 1608.

Declared value of the tensile strength is 1000 kPa.

### 2.4.5 Bond strength between adhesive and WS board (bond integrity)

The bond strength between adhesive and board was determined in accordance with the principles of method described in CUAP 05.02/13, Annex C.

The individual value: 0.4 N/mm<sup>2</sup> at least.

The average value: 0.6 N/mm<sup>2</sup> at least.

### 2.4.6 Bond strength between concrete and WS board

The bond strength between concrete and WS board was determined in accordance with CUAP 12.01/26, Annex C.

The minimum value of the bond strength is 0.15 N/mm<sup>2</sup>.

## 2.5 Protection against noise (ER 5)

### 2.5.1 Sound absorption

No performance determined.

## 2.6 Energy economy and heat retention (ER 6)

### 2.6.1 Thermal conductivity

The thermal conductivity of the WS boards was determined in accordance with the principles of method described in EN 12667 with simultaneous consideration of ETA-12/0320. The verification of declared value of the thermal conductivity was performed in accordance with the annex C.

Declared value of the thermal conductivity  $\lambda_D$  of the WS boards is maximal 0.15 W/m·K.

Calculation of thermal insulation characteristics of complete floor construction (thermal resistance/thermal transmission coefficient) may be conducted in accordance with EN ISO 6946.

## **2.6.2 Thermal inertia**

According to EN ISO 10456 the value of thermal capacity,  $c_p$ , of WS boards 1500 J/(kg·K) may be used.

## **2.7 Aspects relating to fitness for use**

### **2.7.1 Fixing of objects**

The installation guide of producer shall state which load range with common corresponding types of fixings the elements is able to withstand without damage and without need for anchoring in the concrete structure.

### **2.7.2 Density of WS boards**

The apparent density of WS boards was determined in accordance with the principles of method described in EN 1602.

Declared value of the apparent density is as follows:

- WS board:  $670 \text{ kg/m}^3 \pm 10 \%$

### **2.7.3 Mass per unit area of WS boards**

The mass per unit area of boards was determined in accordance with the principles of method described in EN 1602.

Declared value of the apparent density of the 25 mm and 35 mm thick boards is as follows:

- WS board:  $18 \text{ kg/m}^2 \pm 10 \%$  (25 mm thick)
- WS board:  $21 \text{ kg/m}^2 \pm 10 \%$  (35 mm thick)

### **2.7.4 Thickness**

The thickness of WS boards was determined in accordance with the principles of method described in EN 823.

The thickness is declared in the class T1.

### **2.7.2 Identification**

Upper board of element of each delivery package is labeled with relevant data, e.g. type of element, batch number and the CE marking.

### **3 Evaluation and attestation of conformity and CE marking**

#### **3.1 System of attestation of conformity**

According to the Decision 98/279/EC<sup>6</sup> of the European Commission the system 1 of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

a) Tasks for the manufacturer:

- (1) factory production control (FPC);
- (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.

b) Tasks for the notified body:

- (3) initial type testing (ITT);
- (4) initial inspection of factory and of factory production control;
- (5) continuous surveillance, assessment and approval of factory production control.

#### **3.2 Responsibilities**

##### **3.2.1 Tasks for the manufacturer**

###### **3.2.1.1 Factory production control**

At the manufacturing plant the manufacturer has implemented and continuously maintains a factory production control. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The factory production control ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use initial/raw/constituent materials (as relevant) supplied with the relevant inspection documents as laid down in the prescribed Control plan<sup>7</sup> and documentation. The incoming raw materials shall be subject to controls and/or tests by the manufacturer before acceptance. Checking of incoming materials shall include control and inspection documents presented by the manufacturer of the raw materials by determining the material properties.

The ETA holder makes sure that for the components that he does not manufacture by himself, the factory production control (FPC) carried out by other manufacturers guarantees compliance of the components with the European Technical Approval.

The test results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control plan.

The records shall be kept at least for five years time and shall be presented to the approved body (notified body) involved in continuous surveillance. On request they shall be presented to the approval body.

###### **3.2.1.2 Other tasks for the manufacturer**

The manufacturer shall, on the basis of a contract, involve a body (bodies) which is (are) approved for the tasks referred to in section 3.1 in the field of the elements in order to undertake the actions laid down in section 3.3. For this purpose, the Control

<sup>6</sup> Official Journal of the European Communities N° L 127/26 from 29/04/1998 amended by Commission Decision 2001/596/EC, Official Journal of the European Communities N° L 209/33 from 02/08/2011

<sup>7</sup> The prescribed control plan is a confidential part of the European Technical Approval and only handed over to the approved body or bodies involved in the procedure of attestation of conformity. See section 3.2.2.



plan referred to in section 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the notified body.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

### **3.2.2 Tasks for the notified body**

#### **3.2.2.1 Initial type testing of the product**

For initial type-testing, the results of the tests performed as part of the assessment for the European Technical Approval may be used unless there are changes in the manufacturing process or manufacturing plant. Otherwise, the necessary initial type-testing shall be agreed between the Technický a zkušební ústav stavební Praha, s.p. and the notified body.

#### **3.2.2.2 Initial inspection of factory and of factory production control**

The notified body shall ascertain that, in accordance with the prescribed Control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the boards (components) according to the specifications mentioned in section II of the European Technical Approval.

The notified body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European Technical Approval.

#### **3.2.2.3 Continuous surveillance, assessment and approval of the factory production control**

The notified body shall visit the factory at least once a year for surveillance. It shall be verified that the factory production control and the specified manufacturing process are maintained, taking account of the prescribed Control plan. On demand the results of continuous surveillance shall be made available by the notified body to the approval body.

In cases where the provisions of the European Technical Approval and its Control plan are no longer fulfilled the notified body shall withdraw the certificate of conformity and inform TZUS Prague without delay.

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.


### **3.3 CE marking**

The CE marking shall be affixed either to the product itself, a label attached to it, the packing or on the accompanying commercial documents. The letters „CE“ shall be followed by the identification number of the notified body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture)
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product (for AoC system 1),
- the number of the European Technical Approval,
- nominal length, width, thickness
- declared level of squareness
- declared thermal conductivity / declared thermal resistance or design thermal conductivity / thermal resistance
- level of compressive strength by 10% deformation or compressive stress

- reaction to fire (Euroclass)
- declared level of permeability
- declared level of water absorption
- declared level of bending strength
- declared level of sound absorption
- declared dangerous substances

Example of CE marking and accompanying information:

 1234	Letters "CE"  Identification number of notified body
Any Company Street 1, City, Country 13 1234-CPD-0321	Name and address of the producer (legal entity responsible for the manufacture)  Two last digits of year of affixing CE marking Number of EC certificate of conformity ( <i>for AoC system 1</i> )
ETA-13/0394 XX non-load bearing permanent shuttering system for floor construction based on cement-bonded wood chip elements - nominal length, width, thickness - declared thermal conductivity / declared thermal resistance or design thermal conductivity / thermal resistance - etc.	ETA number Type  Intended use  Declared values, level and/or classes in accordance with section 3.3 of this ETA

## **4 Assumptions under which the fitness of the product for the intended use was favorably assessed**

### **4.1 Manufacturing**

The ETA is issued for the product on the basis of agreed data/information, deposited with the approval body, which identifies the product that has been assessed and judged. Changes to the product/production process, which could result in this deposited data/information being incorrect, should be notified to the approval body before the changes are introduced. The approval body will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

### **4.2 Installation**

When installing the manufacturer's installation instructions shall be observed. The manufacturer's installation instructions shall be assessed by the approval body. The element shall only be installed in structures where it is protected from wetting, weathering and moisture.

As to the application of the elements, the respective national regulations shall in addition be observed.

The safety-at-work and health protection regulations have to be observed.

### **4.3 Design**

The European Technical Approval only applies to the manufacture and use of the elements.

## **5 Indications to the manufacturer**

### **5.1 General**

It is the responsibility of the ETA holder to ensure that all necessary information on design and installation is submitted to those responsible for design and execution of the works constructed with the elements.

### **5.2 Packaging, transport and storage**

Packaging of the product shall be such that the element is protected from humidity and mechanical damage during transport and storage unless there are other measures for this purpose provided for by the manufacturer.

The manufacturer has to provide details concerning packaging, transport and storage which shall be assessed by the approval body.

The manufacturer's instruction for packaging, transport and storage shall be observed.

### **5.3 Use, maintenance and repair**

Before use, the elements must be checked, whether they were not damaged during transport or storage. Damaged element must be replaced with the new one.

Necessary repairs should be done as soon as possible.

Maintenance includes at least:

- repairs of localised damaged areas due to accidents
- the aspect maintenance with products adapted and compatible (possibly after washing or ad hoc preparation).

It is important to carry out maintenance using readily available products and equipment, without causing any damage to the appearance.

During the assembly, the elements may not be exposed to the weather. Elements, which have become damp, must be dried and checked for damage before they are used and assembled. Only faultless elements may be used.

It is the responsibility of the manufacturer to ensure that these provisions are easily accessible to the employees concerned and that all necessary information on maintenance is handed over to the user.

*The original document is signed by:*

**Jozef Pôbiš**

Head of the Approval Body

## ANNEX A

### DETERMINATION OF THE DECLARED THERMAL CONDUCTIVITY AND THE CONVERSION FACTOR TO MOISTURE CONTENT

#### 1 Determination of the $\lambda$ fractile value at 10 °C, at dry conditions ( $\lambda_{10,dry, 90/90}$ )

Tests and calculation of the thermal conductivity should be done in accordance with EN 13168, clause 4.2.1 or EN ISO 10456.

##### 1.1 Measurement of the $\lambda_{dry}$ at 10 °C

1.1.1 Test specimens for the determination of the thermal conductivity  $\lambda$  at 10 °C shall be conditioned to dryness after storage for at least 72 hours at  $(70\pm 2)$  °C in an oven ventilated with air taken at  $(23\pm 2)$  °C and  $(50\pm 5)$  % relative humidity.

1.1.2 The thermal conductivity of the test specimens conditioned according to above shall be measured according to EN 12667 or EN 12939 for thick products at a mean temperature of  $(10\pm 0.3)$  °C.

During the measurement, precaution shall be taken to avoid moisture absorption by the specimen. It is acceptable, for instance, to put the test specimen into a thin plastic bag.

##### 1.2 Calculation of the $\lambda$ fractile value at 10 °C, at dry conditions ( $\lambda_{10,dry, 90/90}$ )

The  $\lambda$  fractile at 10 °C, at dry conditions ( $\lambda_{10,dry}$ ) as a limit value representing at least 90 % of the production with a confidence limit of 90 % shall be calculated using the procedures as detailed in EN 13162 Annex A. It shall be noted that the  $\lambda_D$  shall be calculated in accordance with clause 3.

#### 2 Determination of the moisture conversion factor ( $f_{u,1}$ )

For the determination of the moisture conversion factor  $f_{u,1}$ , two sets of measurements are needed.

##### 2.1 Set 1

At least three measurements on dry test specimens, to determine  $\lambda_{10,dry}$  and  $u_{dry}$  (moisture content mass by mass) are required.

###### Procedure Set 1

- Dry the three specimens following the procedure in 1.1.1.
- Determine for each test specimen the mass in dry condition. Average the three values to determine the  $m_{dry}$ .
- The  $u_{dry}$ , being the moisture content in dry condition, is by definition set to 0.
- Determine for each test specimen the  $\lambda$  value at 10 °C following the procedure in 1.1.2. Average the three values to determine the  $\lambda_{10,dry}$ .

##### 2.2 Set 2

At least three measurements on test specimens conditioned at  $(23\pm 2)$  °C and  $(50\pm 5)$  % relative humidity, to determine  $\lambda_{10,(23,50)}$  and  $u_{23,50}$  (moisture content mass by mass).

###### Procedure Set 2

- Condition the three test specimens at  $(23\pm 2)$  °C and  $(50\pm 5)$  % relative humidity following the procedures detailed in EN 13169 clause 5.2, step 2.
  - Determine for each test specimen the mass at  $(23\pm 2)$  °C and  $(50\pm 5)$  % relative humidity. Average the three values to determine the mass at 23 °C and 50 % relative humidity as  $m_{23,50}$ .
- Calculate  $u_{23,50}$  by the formula (A.1)

$$u_{23,50} = \frac{m_{23,50} - m_{dry}}{m_{dry}} \quad (\text{A.1})$$

where,

- $m_{23,50}$  is average value, the mass at 23 °C and 50 % relative humidity
- $m_{dry}$  - average value, the mass according to *clause 2, Procedure Set 1*

Determine for each test specimen the  $\lambda$  value in accordance with EN 12667 or EN 12939 for thick products at a mean temperature of  $(10 \pm 0,3)$  °C. Average the three values to determine  $\lambda_{10,(23,50)}$ .

Conditioning of the specimen should be done according to the procedures detailed in EN 13169 clause 5.2, step 2.

### 2.3 Calculation of the moisture conversion factor ( $f_{u,1}$ )

The moisture conversion factor  $f_{u,1}$  shall be calculated by the formula (A.2), derived from ISO 10456, formula 4:

$$f_{u,1} = \frac{\ln \frac{\lambda_{10,(23,50)}}{\lambda_{10,dry}}}{u_{23,50} - u_{dry}} \quad (\text{A.2})$$

where,

- $\lambda_{10,(23,50)}$  is average value
- $\lambda_{10,dry}$  - average value, according to clause 2.1, Procedure Set 1;
- $u_{23,50}$  - determined according to formula A.1;
- $u_{dry}$  - described in clause 2.1, Procedure Set 1 and is defined to be 0.

### 3 Calculation of the declared thermal conductivity $\lambda_D$

The declared thermal conductivity  $\lambda_D$  shall be calculated using the formula (A.3):

$$\lambda_{10(23,50)} = \lambda_{10,dry,90/90} * e^{f_{u,1}(u_{23,50} - u_{dry})} \quad (\text{A.3})$$

where,

- $\lambda_{10,dry,90/90}$  is determined according to clause 2.1;
- $f_{u,1}$  - determined according to formula A.2;
- $u_{23,50}$  - determined according to formula A.1;
- $u_{dry}$  - determined according to clause 2.1, Procedure Set 1 and is defined to be 0.

The calculated value  $\lambda_{10(23/50)}$  shall be rounded upwards to the nearest 0.001 W/(m·K) and declared as  $\lambda_{D(23,50)}$ .

### 4 Determination of the conversion factor ( $f_{u,2}$ ) to high moisture content

For the determination of the conversion factor to high moisture content  $f_{u,2}$ , two sets of measurements are needed.

#### 4.1 Set 1

At least three measurements on test specimens conditioned at  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity, to determine  $\lambda_{10,(23,50)}$  and  $u_{23,50}$  (moisture content mass by mass).

#### Procedure Set 1

- Determine the  $\lambda_{10,(23,50)}$  and  $u_{23,50}$  in accordance with above mentioned formulas A.3 and A.1.

## 4.2 Set 2

At least three measurements on test specimens conditioned at  $(23\pm 2)^{\circ}\text{C}$  and  $(80\pm 5)\%$  relative humidity, to determine  $\lambda_{10,(23,80)}$  and  $u_{23,80}$  (moisture content mass by mass).

### Procedure Set 2

- Condition the three test specimens at  $(23\pm 2)^{\circ}\text{C}$  and  $(80\pm 5)\%$  relative humidity following the procedures detailed in EN 13169 clause 5.2, step 2.
- Determine for each test specimen the mass at  $(23\pm 2)^{\circ}\text{C}$  and  $(80\pm 5)\%$  relative humidity. Average the three values to determine the mass at  $23^{\circ}\text{C}$  and  $80\%$  relative humidity as  $m_{23,80}$ .
- Calculate  $u_{23,80}$  by the formula A.4:

$$u_{23,80} = \frac{m_{23,80} - m_{dry}}{m_{dry}} \quad (\text{A.4})$$

where,

- $m_{23,80}$  is average value, the mass at  $23^{\circ}\text{C}$  and  $80\%$  relative humidity according to clause 4.2;
- $m_{dry}$  - the mass according to clause 2, Procedure Set 1

Determine for each test specimen conditioned according B.4.1.2.1 the  $\lambda$  value in accordance with EN 12667 or EN 12939 for thick products at a mean temperature of  $(10\pm 0.3)^{\circ}\text{C}$ . Average of the three values to determine  $\lambda_{10,(23,80)}$ .

## 4.3 Calculation of the conversion factor to high moisture content ( $f_{u,2}$ )

The conversion factor to high moisture content  $f_{u,2}$  shall be calculated by the formula A.5, derived from ISO 10456, formula 4:

$$f_{u,2} = \frac{\ln \frac{\lambda_{10,(23,80)}}{\lambda_{10,(23,50)}}}{u_{23,80} - u_{23,50}} \quad (\text{A.5})$$

where,

- $\lambda_{10,(23,80)}$  is average value;
- $\lambda_{10,(23,50)}$  - determined according to formula A.3
- $u_{23,80}$  - determined according to formula A.4
- $u_{23,50}$  - determined according to formula A.1

NOTE 1: For the determination of the moisture conversion factor  $f_{u,1}$  and the conversion factor to high moisture content  $f_{u,2}$ , the test specimens shall be taken from the same production run.

NOTE 2: Thermal conductivity may also be measured at mean temperatures other than  $10^{\circ}\text{C}$ , providing that the accuracy of the relationship between the temperature and thermal properties is well documented.

## ANNEX B

### REFERENCE DOCUMENTS

Common Understanding of Assessment Procedure (CUAP) No. 05.02/13, version June 2011  
“Non load-bearing permanent shuttering system for floor construction based on cement-bonded wood chip elements”

Common Understanding of Assessment Procedure (CUAP) No. 12.01/26, version August 2008  
“Floor insulation based on polystyrene light weight concrete”

European Technical Approval ETA-12/0320 from 12.09.2012 “Cement-bonded boards made of wood chips”

EN 822:1994 Thermal insulating products for building applications - Determination of length and width

EN 823:1994 Thermal insulating products for building applications - Determination of thickness

EN 824:1994 Thermal insulating products for building applications - Determination of squareness

EN 825:1994 Thermal insulating products for building applications - Determination of flatness

EN 826:1996 Thermal insulating products for building applications - Determination of compression behavior

EN 1602:1996 Thermal insulating products for building applications - Determination of the apparent density

EN 1605:1996 Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions

EN 1605:1996/A1:2006 Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions

EN 1609:1996 Thermal insulating products for building applications - Determination of short term water absorption by partial immersion

EN 1609:1996/A1:2006 Thermal insulating products for building applications - Determination of short term water absorption by partial immersion

EN 12086:1997 Thermal insulating products for building applications - Determination of water vapor transmission properties

EN 12667:2001 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

EN 13163:2008 Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) - Specification

EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

EN 15037-1:2008 Precast concrete products - Beam-and-block floor systems - Part 1: Beams

EN 15037-2:2009+A1:2011 Precast concrete products - Beam-and-block floor systems - Part 2: Concrete blocks

EN ISO 10456:2007 Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)

EN ISO 10456:2007/AC:2009-12 Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)



Test report No. 070-045155 on VELOX floor elements, issued by the Technický a zkušební ústav stavební Praha, s.p., branch Ostrava, Czech Republic, 25 March 2013

Test report No. 070-043209 regarding the tests of cement-bonded boards made of wood chips, issued by the Technický a zkušební ústav stavební Praha, s.p., branch office in Ostrava, Czech Republic, 22 February 2012

Report No. Pr-11-1.172 regarding the reaction to fire tests of cement-bonded boards made of wood chips, issued by PAVÚS, a.s., Czech Republic, 14 November 2011

Report No. Pr-11-1.174 regarding the reaction to fire tests of cement-bonded boards made of wood chips, issued by PAVÚS, a.s., Czech Republic, 14 November 2011

Report No. PK1-01-11-046-C-0 regarding the classification of reaction to fire of cement-bonded boards made of wood chips, issued by PAVÚS, a.s., Czech Republic, 15 November 2011

Declaration of the manufacturer regarding the dangerous substances, 15 January 2012