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le futur en construction

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European Technical Assessment

ETA-16/0178
of 22/06/2016

GENERAL PART

Technical Assessment Body issuing the European Technical Assessment:

Centre Scientifique et Technique du Bâtiment (CSTB)

Trade name of the construction product:

KEPS

Product family to which the construction product belongs:

Product Area Code:4
Composite insulating kit

Manufacturer:

KEPS
256 rue des Epinettes
73290 La Motte Servolex

Manufacturing plant(s):

KNAUF INDUSTRIE EST

Saint Etienne de Saint Geoirs

This European Technical Assessment contains:

11 pages including 2 Annex(es) which form an integral part of this assessment

Annex 2 contains confidential information and is/are not included in the European Technical Assessment when that assessment is publicly available

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

European Technical Approval Guideline No 009 (ETAG 009), edition June 2002 used as European Assessment Document (EAD)

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SPECIFIC PART

1. Technical description of the product

The shuttering system **KEPS** is a non-load-bearing permanent shuttering kit based on preassembled moulded expanded polystyrene panels (EPS) and accessory parts applicable as formwork for concrete walls cast in-situ (see annex 1).

The shuttering elements consist of one-layered expanded polystyrene (EPS) leaves which are assembled on building site with spacers of polypropylene.

The components of the kit are described below. Renderings, coatings and plasters are not part of this ETA. Structural analysis on concrete infill is not part of this ETA.

Components	Characteristics	
Panels	Nature	White expanded polystyrene
	Density (kg/m ³)	30 kg/m ³
	Length (mm)	1260
	Thickness of extern panel (mm)	90 – 160 – 210
	Thickness of intern panel (mm)	60 – 90
	Height (mm)	250
	Flame retardant	Yes
Spacers	Nature	polypropylene
	Height (mm)	250
	Spacing (mm)	240 - 280
End leaves	not applicable	/
Bottom leaves	not applicable	/
Concrete	Resistance (EN 206)	C 25/30
	Consistance (EN 206)	S3
	Maximal grain size (EN 206)	10 mm
	Working up	Without vibring
	Thickness of concrete core (mm)	160 – 200 - 250
Accessory parts	Propping system	see Annex 1- 4/4

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

The system is for use in forming loadbearing and nonloadbearing internal or external walls, for buildings. Once filled on site with concrete, the EPS formwork remains as a permanent part of the wall and so contributes to the overall thermal resistance of the completed wall construction.

When using this type of construction below ground a waterproofing membrane, according to applicable national rules and compatible with the EPS, should be provided on the external surface. The membrane should be applied in accordance with the manufacturer's installation instructions and be protected from damage using an impact-resistant protective layer or sand blinding.

For the intended use it is essential to protect the formwork against effects of the weather.

The provisions made for the shuttering kit **KEPS** in this ETA are based on an assumed working life for the system of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the Manufacturer or the Technical Assessment

Body, but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

Design, execution, maintenance and repair of the construction works shall take into account principles given in chapter 7 of the ETAG 009 and shall be done in accordance with national instructions.

3. Performances of the product and references to the methods used for their assessment

Performances of KEPS related to the basic requirements for construction works (hereinafter BWR), were determined according to chapters 4, 5 and 6 of the ETAG 009.

These performances, given in the following paragraphs, are valid as long as the components are the ones described in § 1 of this ETA.

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Resulting structural pattern

In end use conditions walls made with **KEPS** shuttering elements are walls of continuous type according to ETAG 009, paragraph 2.2.

3.1.2 Efficiency of filling

The requirements according to ETAG 009, section 6.1.2 are met through observation of the filling of a test panel with concrete and observation of filling technique. The efficient filling without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core is possible.

3.1.3 Possibility of steel reinforcement

The instructions in the KEPS Installation Manual are appropriate to install steel reinforcement for walls according to EN 1992-1-1 : 2004 or corresponding national rules. The requirements according to ETAG 009, section 6.1.3 are met satisfactorily.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

Euroclass E in accordance with EN 13501-1:2013.

It is pointed out in addition that the inner panels of the walls are intended to be covered by gypsum boards or other coatings under technical agreement. The reaction to fire classification shall be therefore verified according to the field application.

3.2.2 Resistance to fire

The fire resistance of a wall using **KEPS** system has been tested according EN 1363-1 of March 2013 and 1365-1 of December 2012. Test results are recorded in report 2015 CERIB 5049 and led to the following classification:

Thickness of the concrete core (mm)	Fire Resistance REI
160	REI 60

The required conditions for having this classification are given in test report 2015 CERIB 5049 The wall used for the test was 3.02 meters high; the compressive load was 61 kN/m.

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Dangerous substance

The shuttering system belong to Category SW2, according to EOTA Technical Report No 034.

A written declaration was submitted by the Manufacturer.

In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other requirements applicable to the shuttering system falling within its scope (e.g., transposed European legislation and national laws, regulations and administrative

provisions). In order to meet the provisions of the Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

3.3.2 Water vapour permeability

Water vapour diffusion resistance factor (μ) / EN 12086	20 to 60
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3.3.3 Water absorption

Water absorption (partial immersion) / EN 1609 – method A	< 1 kg/m ²
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3.3.4 Watertightness

Not relevant

3.4 Safety and accessibility in use (BWR 4)

3.4.1 Bond strength and resistance to load impact

The requirements of ETAG 009, section 6.4.1.3 are met satisfactorily.

3.4.2 Resistance to filling pressure

Resistance of connection spacer to shuttering leaf

Average resistance (daN/spacer)	215.84
Standard deviation (daN/spacer)	20
Characteristic resistance (daN/spacer)	207.26
Number of spacers/ml	= 8
Characteristic load resistance / m² (kPa)	20,7 kPa

Tensile strength perpendicular to the face of EPS

Tensile strength perpendicular to the faces in dry conditions / EN 1607	≥ 150 kPa
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Test on a wall – resistance to filling pressure

Description of filling test	
Propping system	Every 120 cm (internal side)
Thickness of panels (mm)	External side : 90 mm Internal side : 60 mm
Thickness of concrete (mm)	200 mm
High of wall (m)	3
Length (m)	2,4
Consistence of concrete	S3
Speed of filling	One layer of 3 meters (in one time)
Maximal deformation (mm)	At 0,5 m : 8,63 mm At 1,0 m : 5,85 mm At 1,5 m : 4,31 mm

3.4.3 Safety against personal injuries by contact

As delivered on site the shuttering elements do not have sharp or cutting edges. Because of the soft surface of the shuttering leaves there is no risk of abrasion or of cutting to people.

The requirements contained in ETAG 009 chapter 6.4.3 are regarded as satisfied.

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation

The sound insulation of a wall using **KEPS** system has been tested according EN 10140.

Description of the wall	Rw (C;Ctr)
Plaster board (thickness 13 mm) Render (thickness 10 mm) Thickness of external EPS : 60 mm Thickness of internal EPS : 60 mm Thickness of concrete : 160 mm	47 (-2; -3)

3.5.2 Sound absorption

The « no performance determined » option in ETAG 009 is used.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal resistance

	Thermal conductivity (W/m.K)
EPS	0.035
Concrete	2
Spacers	0.22
Security coefficient on thermal conductivity	1,5

Thermal conductivity of polystyren W/(m.K)	Thickness (mm) Int/concrete/ext	Thickness of block	Up [W/(m².K)]	Rp [m².K/W]
0,040	90/ 160 / 90	340	0,211	4,75
	90 / 200 / 90	380	0,210	4,77
	60 / 160 /160	380	0,174	5,75
	60 / 200 /160	420	0,173	5,77
	60 / 160 / 210	430	0,143	7,00
	60 / 200 / 210	470	0,142	7,02
	90 / 160 /160	410	0,154	6,50
	90 / 200 /160	450	0,153	6,52
	90 / 160 / 210	460	0,129	7,75
	90 / 200 / 210	500	0,129	7,77

Once moulded and cured, the EPS has a nominal density of 30 kg/m³ with a nominal thermal conductivity of 0,035 W/(m.K)

For thermal resistance, the nominal value of the thermal resistance R of the wall using **KEPS** elements, once filled with concrete, can be determined in accordance with EN ISO 6946 : 2007, EN 13163 : 2008 and EN 12524 : 2000.

3.6.2 Influence of moisture transfer on insulating capacity of the wall

The impacts of moisture accumulation have not been examined in this ETA.

3.6.3 Thermal inertia

The tabulated values for heat capacity and diffusivity of concrete and expanded polystyrene are given in EN ISO 10456.

3.7 Sustainable use of natural resources (BWR 7)

No performance

3.8 Aspects of durability and serviceability

3.8.1 Resistance to deterioration

Physical agents

The requirements contained in guide 009 chapter 6.7.1.1 are regarded as satisfied.

Chemical agents

The requirements contained in guide 009 chapter 6.7.1.2 are regarded as satisfied.

Biological agents

The requirements contained in guide 009 chapter 6.7.1.3 are regarded as satisfied.

3.8.2 Resistance to normal use damage

Incorporation of ducts

The instructions given in the installation guide of the manufacturer are suitable for the realization of perforations through the walls to make pass ducts. Generally, ducts should be incorporated in twin shuttering elements prior to concreting.

Anchorage of suspended objects

The anchorage of suspended objects is not allowed into the shuttering leaves. It must be anchored into the concrete core.

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

According to Decision 98/279/EC of 5/12/1997 of the European Commission, the systems of AVCP given in the following table apply:

Product	Intended use	Levels or classes (Reaction to fire)	System
Non load-bearing permanent shuttering kit based on insulating materials	Construction of external and internal walls subject to fire regulations	E	2+

The systems of AVCP are described in Annex V of Regulation (EU) No 305/2011.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at the CSTB.

The control plan is given in Annex 2. As the control plan contains confidential information, Annex 2 is not included in the published parts of this ETA.

Issued in Marne-la-Vallée on 22/06/2016 by
Charles BALOCHE, Technical Manager of the CSTB







