Deutsches Institut für Bautechnik

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Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-07/0210 of 5 June 2018

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	ISORAST
Product family to which the construction product belongs	Non load bearing shuttering kit "ISORAST" based on shuttering elements of EPS
Manufacturer	isorast-Passivhaus-Produkte GmbH Chattenpfad 30 65232 Taunusstein-Hambach DEUTSCHLAND
Manufacturing plant	Schlaadt Plastics GmbH, Schwalbacher Str. 123, 65391 Lorch
This European Technical Assessment contains	34 pages including 26 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	ETAG 009, used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.
This version replaces	ETA-07/0210 issued on 8 May 2013

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Specific Part

1 Definition of the product and intended use

1.1 Definition of the construction product

The shuttering system "ISORAST" is a non load-bearing permanent shuttering kit based on standard shuttering elements (see Annexes A3.1 and A4.1 to A4.2), special shuttering elements (see Annexes A3.2 and A4.3 to A4.4), shuttering elements with increased sound absorption (see Annex A5), special elements (see Annexes A6 to A8) and accessory parts (see Annexes A9 and A10) applicable as formwork for plain and reinforced concrete walls cast in-situ.

The shuttering elements (see Annex A2) consist of shuttering leaves of expanded polystyrene (EPS shuttering leaves) and spacers of

- Type 1: expanded polystyrene (EPS spacers) respectively
- Type 2: steel wire (wire spacers).

The shuttering elements are generally used for non load-bearing and load-bearing, internal and external walls.

Finishes are not part of the shuttering system "ISORAST".

1.2 Shuttering elements

1.2.1 Standard Shuttering elements

The standard shuttering elements (see Annexes A3.1 and A4.1 to A4.2) consist of inner and outer shuttering leaves of expanded polystyrene (EPS shuttering leaves) and EPS spacers (Type 1) respectively wire spacers (Type 2). These components are preassembled (factory-made).

The EPS shuttering leaves are one-layered and the EPS spacers (Type 1) provide thicknesses of the concrete core of 140 mm respectively the wire spacers (Type 2) provide thicknesses of the concrete core of 140 mm, 202,5 mm and 265 mm and thicknesses of the wall in the range of 250 mm to 562,5 mm, as indicated in Table A1. The thickness of the inner EPS shuttering leaf is 55 mm and the thickness of the outer EPS shuttering leaf is in the range of 55 mm, 117,5 mm, 180 mm and 242,5 mm. The length of the standard shuttering elements with EPS spacers (Type 1) is 750 mm or 1500 mm respectively with wire spacers (Type 2) 1250 mm. The height of all standard shuttering elements is 250 mm.

1.2.2 Special shuttering elements / Shuttering elements with increased sound absorption / Special elements

Special shuttering elements (see Annexes A3.2 and A4.3 to A4.4) / Shuttering elements with increased sound absorption (see Annex A5) / Special elements (see Annexes A6 to A8) are also part of the shuttering system. Special shuttering elements / Shuttering elements with increased sound absorption / Special elements are designed in the same manner as the standard shuttering elements described above, see clause 1.2.1.

1.2.3 Accessory parts

Accessory parts (see Annexes A9 and A10) are end stops, straight height adjuster elements and height adjuster elements for oriel elements and curved edge elements.

2 Specification of the Intended use in accordance with the applicable European Assessment Document

The kit is intended to be used for the construction of internal walls as well as external walls above or below ground which are load-bearing (structural) or non load-bearing (non structural), including those which are subjected to fire regulations.

When using this type of construction below ground a waterproofing according to applicable national rules shall be provided depending on whether non pressing water or pressing water is to be dealt with. The waterproofing shall be protected from mechanical damage by an impact resistant protective layer.

According to EOTA TR 034 the following use categories apply:

- Category IA 2: Product with indirect contact to indoor air (e. g. covered by permeable products).
- Category S/W 3: Product with no contact to soil water, ground- and surface water.

The performances given in Section 3 are only valid if the shuttering elements are used in compliance with the specifications and conditions given in Annex B.

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the shuttering kit of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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.

3 Performance of the product and refernces to the methods

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Resulting structural pattern

In end use conditions walls made with shuttering elements "ISORAST" with EPS spacers (Type 1) are walls of a grid type according to ETAG 009, clause 2.2.

In end use conditions walls made with shuttering elements "ISORAST" with wire spacers (Type 2) are walls of a continuous type according to ETAG 009, clause 2.2.

3.1.2 Efficiency of filling

Considering the instructions of Annex B1 and the installation guide of the manufacturer an efficient filling without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core is possible.

The requirements according to ETAG 009, clause 6.1.2 are met.

3.1.3 Possibility of steel reinforcement

The instructions in the installation guide of the manufacturer are appropriate to install steel reinforcement for walls according to EN 1992-1-1 or corresponding national rules (see Annex B5).

The requirements according to ETAG 009, clause 6.1.3 are met.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

Shuttering elements "ISORAST" made of expanded polystyrene (EPS) fulfil the requirement of Class E according to EN 13501-1.

3.3 Hygiene, health and environment (BWR 3)

3.3.1 Content and/or release of dangerous substances

Essential characteristic	Performance
Contents of dangerous substances	The product does not contain CMR-substances actively used (in accordance with Regulation (EC) No 1272/2008) and no HBCDD.
Release scenario regarding BWR 3: IA2	

3.3.2 Water vapour permeability

The tabulated design value of the water vapour resistance factor of expanded polystyrene (EPS), according to EN ISO 10456 is $\mu = 60$.

The values of the water vapour resistance factor of concrete depending on type and density are tabulated in EN ISO 10456.

Using these values the verification of the annual moisture balance or the maximum amount of interstitial condensation according to EN ISO 13788 will be on the safe side.

3.3.3 Water absorption

The requirements according to ETAG 009, clause 6.3.3 are met.

3.3.4 Watertightness

Because finishes are not part of the shuttering system "ISORAST" the "No performance assessed" option in ETAG 009, Table 3 is used.

3.4 Safety and assesibility in use (BWR 4)

3.4.1 Bond strength between layers of an EPS shuttering leaf respectively between EPS shuttering leaves and concrete core and resistance to impact load

Under end use conditions the EPS shuttering leaves are durable fixed by EPS spacers (Type 1) respectively wire spacers (Type 2). The bond strength is at least equal to the resistance of the EPS shuttering leaves against the pressure of fresh concrete, see clause 3.4.2. Furthermore the vertical element-high dovetail grooves on the inside face of each EPS shuttering leaf provide a mechanical interlock between EPS shuttering leaves and concrete core.

Concrete walls (without consideration of the finishes), constructed with shuttering system "ISORAST" and designed according EN 1992-1-1 or according to national design rules, lead to the assumption that concrete core insures an adequate resistance of the complete wall under normal used impact loads.

The requirements according to ETAG 009, clause 6.4.1 are met.

3.4.2 Resistance to pressure of fresh concrete

To resist the pressure of fresh concrete the bending tensile strength of the EPS shuttering leaves shall be at least 200 kPa, see designation code "BS200" of EPS in Annex A1, page 2.

The tensile strength of the wire spacers (Type 2) shall be at least 690 MPa. The pull-out strength between spacers and the EPS shuttering leaves shall be at least

- 624 N with EPS spacers (Type 1) respectively
- 575 N with wire spacers (Type 2).

The requirements according to ETAG 009, clause 6.4.2 are met.

3.4.3 Safety against personal injury by contact

Delivered on site the shuttering elements do not have sharp or cutting edges.

Because of the soft surface of the EPS shuttering leaves there is no risk of abrasion or of cutting people.

The requirements according to ETAG 009, clause 6.4.3 are met.

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation

The "No performance assessed" option in ETAG 009, Table 3 is used for shuttering elements according to Table A1, see Annexes A2 to A4.

The values of weighted sound reduction index R_W according to EN ISO 717-1 of walls made of shuttering elements with increased sound absorption (see Annex A5) depending on the wall construction are tabulated in Table 1.

Table 1: Weighted sound reduction index R_W of walls made of shuttering elements with increased sound absorption (see Annex A5)

Wall construction	R_W [dB]
Gypsum plaster: 15 mm Thickness of the wall: 25 cm Gypsum plaster: 24 mm	51
Gypsum plaster: 18 mm Thickness of the wall: 25 cm Gypsum plaster: 27 mm	53
Gypsum plaster: 12,5 mm Thickness of the wall: 31,25 cm Gypsum plaster: 12,5 mm	53

3.5.2 Sound absorption

The "No performance assessed" option in ETAG 009, Table 3 is used.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Declared value of thermal conductivity

The declared value of the thermal conductivity of the expanded polystyrene determined in accordance with EN 13163, section 4.2.1 is λ = 0,032 W / (m × K) with a density ρ_a according to EN 1602 of not more than 29 kg / m³.

3.6.2 Influence of moisture transfer on insulating capacity of the wall

Using the values of clause 3.3.2 the verification of the annual moisture balance or the maximum amount of interstitial condensation according to EN ISO 13788 will be on the safe side.

3.6.3 Heat capacity

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

3.7 General aspects

3.7.1 Resistance to deterioration

Physical agent

As given in the designation code "DS(70,-)3" of the EPS (see Annex A1, page 2) the relative changes of the EPS shuttering leaves in length, width and thickness under specified temperature and humidity conditions shall not exceed 3 % after exposing them for 48 h at 70 °C, according to EN 13163.

The requirements according to ETAG 009, clause 6.7.1.1 are met.

Chemical agent

There is no corrosion of the EPS spacers (Type 1) in concrete.

The wire spacers (Type 2) are only necessary for the resistance to pressure of fresh concrete. When the concrete core has sufficiently hardened the bond between concrete core and EPS shuttering leaves is given by the vertical dovetail grooves on the inside face of each EPS shuttering leaf (see clause 3.4.1).

The finishes of the wall are not part of the ETA. Determination of the cleaning agent of the surface is not possible.

The requirements according to ETAG 009, clause 6.7.1.2 are met.

Biological agent

The shuttering leafs do not contain wood.

The requirements according to ETAG 009, clause 6.7.1.3 are met.

3.7.2 Resistance to normal use damage

Normal use impacts

Concrete walls (without consideration of the finishes), constructed with shuttering system "ISORAST" and designed according EN 1992-1-1 respectively or according to national design rules, lead to the assumption that concrete core insures an adequate resistance of the complete wall under normal used impact loads.

The requirements according to ETAG 009, clause 6.7.2.1 are met.

Incorporation of ducts

The instructions in the installation guide of the manufacturer are appropriate to produce horizontal perforations through the walls, which are necessary for passing through ducts, see Annex B1, 4.

The requirements according to ETAG 009, clause 6.7.2.2 are met.

Fixing of objects

Fixing of objects in the EPS shuttering leaves is not possible. The part of fixings which is significant for the mechanical resistance shall be inside the concrete core.

The requirements according to ETAG 009, clause 6.7.2.3 are met.

4 Assessment and verification ov constancy of performance (AVCP) system applied, with reference to the legal base

In accordance with guideline for European technical approval ETAG 009, June 2002, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [98/279/EC] as amended by European legal act [2001/596/EC].

The system to be applied is: 2+

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan, deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 5 June 2018 by Deutsches Institut für Bautechnik

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beglaubigt:
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