# **European Technical Approval**

# ETA 13/0384

Trade Name	Isobriq EU, Isobriq LE, Isobriq PA & Isobriq ZE
Holder of the approval	Isobriq sa 49 Rue Slar 4801 Stembert Belgium
Website	www.isobriq.be
Generic type and use of construction product	Non load-bearing permanent shuttering kits based on panels made of EPS
Validity from:	2013-06-30
to	2018-06-29
Manufacturing plant(s):	Seuropak bvba Nijverheidslaan, 10 8560 Gullegem Belgium
This European Technical Approval contains:	23 pages including 4 annexes which form an integral part of the document



European Organisation for Technical Approvals Organisation Européenne pour l'Agrément Technique Europäische Organisation für Technische Zulassungen

## I. LEGAL BASES AND GENERAL CONDITIONS

- 1. This European Technical Approval is issued by UBAtc 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<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>,
  - Belgian law of 25 March 1996 concerning the adaptation of legislative and administrative provisions of Member States to the Construction Products Directive (89/106/EEC) for construction products<sup>4</sup> and Belgian Royal Decree of 18 August 1998 concerning construction products<sup>5</sup>
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>
  - Guideline for European Technical Approval for Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete, ETA-Guideline Nr 009
- 2. The UBAtc is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). 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 laid down in the context of this European Technical Approval.
- 4. This European Technical Approval may be withdrawn by UBAtc, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of UBAtc. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.
- 6. Subject to the ETA application introduced, this European Technical Approval is issued by the approval body in its official languages. These versions correspond fully to the version circulated in EOTA. Translations into other languages have to be designated as such.
- $^{\rm 1}$  Official Journal of the European Communities N° L 40, 11.2.1989, p. 12
- $^2$  Official Journal of the European Communities N° L 220, 30.8.1993, p. 1
- <sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p. 1

7. The ETA holder confirms to guarantee that the product(-s) to which this approval relates, is/are produced and marketed in accordance with and comply with all applicable legal and regulatory provisions, including, without limitation, national and European legislation on the safety of products and services. The ETA-holder shall notify the UBAtc immediately in writing of any circumstance affecting the aforementioned guarantee. This approval is issued under the condition that the aforementioned guarantee by the ETA holder is continuously observed.

<sup>&</sup>lt;sup>4</sup> Belgian Law Gazette, 21.05.1996

<sup>&</sup>lt;sup>5</sup> Belgian Law Gazette, 11.09.1998

<sup>&</sup>lt;sup>6</sup> Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

## II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

## 1 Definition of product and intended use

#### 1.1 Definition of the product

Isobriq is a non-loadbearing permanent shuttering system based on hollow blocks made of expanded polystyrene (EPS) leaves and polypropylene spacers applicable as formwork for plain and reinforced concrete walls cast in-situ.

The concrete infill structural pattern is of continuous type.

All details about shape and dimensions of the shuttering elements are given in Annex 1.

Special elements as lintel, corner and closing element are also part of this ETA.

Renderings, coatings and plaster boards are not part of this ETA.

#### 1.2 Intended use

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

When using this type of construction below ground a waterproofing according to applicable national rules shall be provided.

The relevant and applicable use categories in accordance with EOTA TR 034 for the product are:

- Category IA2: product with no direct contact but possible impact on indoor air
- Category S/W 3: product with no contact to and no impact on soil, ground or surface water.

#### 1.3 Assumed working life

The provisions made in this European Technical Approval are based on an assumed working life of the shuttering kit of at least 50 years provided that the shuttering system is subjected to a suitable use and maintenance. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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 product and methods of verification

#### 2.1 Characteristics of product

#### 2.1.1 Shuttering leaves

The shuttering leaves are made of expanded polystyrene. They are in conformity with EN 13163.

	Inner shuttering leaf	Outer shuttering leaf
Isobriq EU	50	50
Isobriq LE	50	100
Isobriq PA	50	150
Isobria ZE	50	200

The upper and lower surfaces of the shuttering leaves are castellated and the vertical mating surfaces are tongue and mortise to form a tight fit when joined together.

#### Table 2 - Characteristics of EPS

Characteristics	Unity	Value
nominal density	kg/m³	31
thermal conductivity λ <sub>90/90</sub>	W/mK	0,031
water vapour diffusion resistance	-	60
Reaction to fire	Euroclass	F

The inner and outer surfaces have grooves running vertically. Those grooves on the outer side allow the application of hydraulic coatings. Because of the grooves on the inner side, the concrete combines with the shuttering leaves in a perfect fit. The grooves on the inner side also form locks for end stops.

#### 2.1.2 Spacers

The spacers are made from polypropylene.

The horizontal distance between the spacers is 200 mm (see Annex 1).

The shape of the spacers makes them suitable for precise location of the reinforcement bars for the concrete and secure a correct position of the reinforcement.

The two ends of the spacers are embedded in the EPS of the shuttering leaves.

The sum of the cross-sectional areas of the spacers is less than 2% of the area of the concrete core.



#### 2.1.3 Shuttering elements

The length of the shuttering elements is 1200 mm and the height is 600 mm (see Annex 1).

#### 2.1.4 Mechanical resistance and stability (ER1)

#### 2.1.4.1 Resulting structural pattern

The structural pattern is of continuous type according to ETAG 009.

The dimensions and shape of the blocks are given in Annex 1.

#### 2.1.4.2 Efficiency of filling

The efficiency of filling was verified by erection of a trial structure in-situ.

Considering the instructions of clause 4.2 and the installation guide of the ETA-holder the efficient filling without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core is possible.

#### 2.1.4.3 Possibility of steel reinforcements

The instructions of the installation guide of the ETA-holder are appropriate to incorporate reinforcements in the walls, in accordance with the standard EN 1992-1-1 or with equivalent national calculation rules.

#### 2.1.5 Safety in case of fire (ER2)

#### 2.1.5.1 Reaction to fire

Euroclass F according to EN 13501-1 (no performance determined)

#### 2.1.5.2 Resistance to fire

With a minimum thickness of the continuous concrete core of 150mm and minimum concrete strength C16/20 according to Annex C of ETAG 009, the resistance to fire of wall is as follow:

Load-bearing wall: REI120 Non load-bearing wall: EI120

#### 2.1.6 Hygiene, health and the environment (ER3)

#### 2.1.6.1 Release of dangerous substances

The declaration of the manufacturer states that the raw material of Isobriq system contains flame retardant hexabromocyclododecane (HBCDD) which has been classified as dangerous according to General ER3 Checklist and listed in the "indicative list on dangerous substances".

The content of hexabromocyclododecane is  $\leq$  2,0 % w/w

#### 2.1.6.2 Water vapour permeability

The tabulated design value of water vapour diffusion resistance coefficient ( $\mu$ ) of expanded polystyrene, in accordance with the European standard EN ISO 10456 is 60.

The values for the water vapour diffusion resistance of concrete in dependence of density and type are tabulated in EN ISO 10456.

Based on calculations according to EN ISO 13788 using normal climatic boundary conditions, the kit's external envelope has been assessed to provide adequate moisture control for the intended use, provided that the building is heated during winter time.

#### 2.1.6.3 Water absorption

No adverse reaction caused by the capillarity of the shuttering leaves was observed during the filling test.

#### 2.1.6.4 Water tightness

Wall finishes (internal and external) are not part of the kit.

According to the installation guide of the ETA-holder, when this type of construction is used below ground an adequate waterproofing shall be provided.

For internal protection (in rooms with splashing water and/or high humidity), the recommendations of the ETA-holder shall be followed.

#### 2.1.7 Safety in use (ER4)

#### 2.1.7.1 Resistance to filling pressure

The resistance to filling pressure has been determined by testing the tensile strength of the spacers and the pull-out strength between spacers and shuttering leaves.

The minimal tensile strength of the spacer is 4140 N. The minimal pull-out strength between spacers and shuttering leaves is 2631 N.

Resistance to filling pressure is satisfactory for filling to 1 m high at once without bracing supports and to 2,40 m (storey's height) with bracing supports.

#### Table 3 - Resistance to filling pressure

characteristics	unity	value
Minimal tensile strength of the spacers	kN	4,14
Minimal strength to pull out of the spacers	kN	2,63
maximum pouring height without bracing supports	m	1

In addition, the resistance to filling pressure was verified by erection of a trial structure in-situ. The resistance to filling pressure has been controlled during filling and on completion of the filling. The requirements in respect to cracking and failure of the system elements and horizontal bowing of shuttering are satisfactorily met.

Requirements of ETAG 009 clause 6.4.2 are filled satisfactorily.

#### 2.1.7.2 Safety against personal injury by contact

The shuttering elements do not have sharp or cutting edges, even if they were cut out for the realization of the particular points of construction. The surface of the shuttering leaves is soft. There is no risk of abrasion or of cutting injuries.

#### 2.1.7.3 Impact resistance

The wall finishes are not part of the kit. No impact resistance based on impact tests has been determined.

#### 2.1.8 Protection against noise (ER5)

#### 2.1.8.1 Airborne sound insulation

Airborne sound insulation has been measured according to EN ISO 10140-2.

#### Table 4 - Sound reduction index - laboratory results

	Rw(C;Ctr)
	dB
Isobriq EU	53(-4;-3)
Isobriq PA + gypsum board (12.5mm)	50(-1;-4)
Isobriq ZE	49(-1;-4)
Isobriq ZE + gypsum board (12.5mm)	46(0;-3)
Isobrig ZE + external render	50(-2;-5)

#### 2.1.8.2 Sound absorption

No performance determined.

#### 2.1.9 Energy and heat retention (ER6)

#### 2.1.9.1 Thermal resistance

The values of thermal resistance  $R_{\rm T}$  and the corresponding thermal transmittance coefficient U of the shuttering elements in end use conditions (with concrete filling but without inner and outer finishes) are given in Table 5. The calculation is carried out in accordance with EN ISO 6946 taking into account a thermal conductivity of 0.031 W/mK for the EPS and of 2 W/mK for concrete.

	Thickness [mm]				
Product	internal shuttering leaf	Concrete core	external shuttering leaf	R₁ [m²K/W]	U [W/ m²K]
Isobriq EU	50	150	50	3,47	0,29
Isobriq LE	50	150	100	5,08	0,20
Isobriq PA	50	150	150	6,69	0,15
Isobriq ZE	50	150	200	8,31	0,12
NOTE: The values $R_{si}$ and $R_{se}$ used to determined RT are respectively 0,125 m²K/W and 0,043 m²K/W					

#### Table 5 - Thermal resistance

#### 2.1.9.2 Thermal inertia

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

#### 2.1.10 Aspects of durability, serviceability and identification

#### 2.1.10.1 Resistance to deterioration

#### 2.1.10.1.1 Physical agents

The dimensional variations of the expanded polystyrene under the effect of one exposure to the temperature of 70°C during 48 hours are lower than 3%.

#### 2.1.10.1.2 Chemical agents

Isobrig shuttering elements do not contain any steel components and no corrosion could occur.

Expanded polystyrene is chemically inert and would only be at risk from petrol or diesel or similar solvents.

Wall finishes (internal and external) are not part of the kit.

No performance determined.

#### 2.1.10.1.3 Biological agents

The application of EPS as thermal insulating material for decades has shown that it sufficiently protects against fungi, bacteria, algae and insects.

EPS does not provide a food value and in general it does not contain voids suitable for habitation by vermin.

The product does not contain any biocide.

#### 2.1.10.2 Resistance to normal use damage

The product will be protected in use by internal finishing and external applications against normal use impacts.

The instructions given in the installation guide of the ETA-holder are suitable for the realization of perforations through the walls to make pass ducts.

The installation guide of the ETA-holder regarding fixings (hanging objects) shall be followed.

# 3 Evaluation of conformity and CE marking

#### 3.1 Attestation of conformity

According to the Decision 98/279/EC (amended by 2001/596/EC) of the European Commission the system 2+ of attestation of conformity applies.

This system of attestation of conformity is defined<sup>7</sup> as follows:

System 2+: Declaration of conformity of the product by the ETAholder on the basis of:

- a. Tasks for the ETA-holder:
  - Initial type-testing of the product;
  - Factory production control;
  - Testing of samples taken at the factory in accordance with a prescribed test plan;
- b. Tasks for the Notified Body:
  - Certification of factory production control on the basis of:
    - Initial inspection of factory and of factory production control;
    - Continuous surveillance, assessment and approval of factory production control.

#### 3.2 Responsibilities

#### 3.2.1 Tasks of the ETA-holder

#### 3.2.1.1 Initial type-testing of the product

#### 3.2.1.2 Factory production control (FPC)

The ETA-holder exercises permanent internal control of the production. All the elements, requirements and provisions adopted by the ETA-holder are being documented in a systematic manner in the form of written policies and procedures. This factory production control system ensures that the products are in conformity with the European Technical Approval (ETA).

The ETA-holder shall only use such materials and components as covered in this European Technical Approval.

The factory production control shall be in accordance with a written quality manual ("Control Plan") which is part of the technical documentation of this ETA.

The personnel involved in the production process have been identified, sufficiently qualified and trained to operate and maintain the production equipment. Machinery equipment is being regularly maintained and this is being documented. All processes and procedures of production are being recorded at regular intervals.

The ETA-holder maintains a traceable documentation of the production process from purchasing or delivery of raw or basic raw materials up to the storage and delivery of finished products.

The ETA-holder proceeds to controls during the production according to specific policies. Those controls include:

- Control of the incoming raw material
  - Examination of type, quality and dimensions of all materials and components incorporated in the kit.
  - Archiving of the delivery notes of the incoming goods in self-monitoring.
  - Control in production o Control of the shuttering elements (dimensions, quality, ...) on basis of the plans

<sup>7</sup> According to Council Directive (89/106/EEC) Annex III

- o Control of voids on basis of plans
- Outgoing inspection with the loading
- o Control of completeness
- o Comparison with plans
- o Damage control

The production control system specifies how the control measures are carried out, and at which frequencies.

Products that do not comply with requirements as specified in the ETA are being separated from the conforming products and marked as such. The ETA-holder registers non-compliant production and action(-s) is (are) taken to prevent further non-conformities. External complaints are also being documented, as well as actions taken.

#### 3.2.1.3 Testing of samples taken at the factory

No additional tests are required.

Tests shall only be carried out on the final product or samples which are representative for the final product

#### 3.2.1.4 Declaration of conformity

When all the criteria of the Conformity Attestation are satisfied the ETA-holder 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 of Notified Bodies

# 3.2.2.1 Initial inspection of factory and factory production control

The Notified Body shall conduct initial inspection of the factory in order to ensure that the ETA-holder has acceptable premises, technical equipment, qualified personnel and a factory production control system which is in accordance with the provisions in the ETA Guideline and this ETA.

# 3.2.2.2 Continuous surveillance, assessment and approval of the factory production control.

The Notified Body shall normally visit the factory at least once a year for surveillance to check if the production is in conformity with the factory production control plan.

The Notified Body shall in particular check:

- The control registers of raw materials, products in course of manufacturing and finished products,
- The document attesting the respect of the control frequencies,
- The conformity of the products subjected to this ETA.

Continuous surveillance of factory production control necessary to ensure continuing conformity with the ETA has to be performed according to control plan.

#### 3.2.2.3 Certification

When all the criteria of the Conformity Attestation are satisfied the notified body shall issue an EC Certificate of Factory Production Control.

In cases where the provisions of the European Technical Approval and the control plan are no longer fulfilled the Certification of Factory Production Control shall be withdrawn.

#### 3.3 CE marking

The letters "CE" shall correspond to the Council Directive 93/68/EC

The CE marking shall be affixed on the packaging or on accompanying commercial document. In accordance with ETAG 009, the required information to accompany the CE symbol is:

- Identification number of the Notified Body involved,
- Name or identifying mark of the ETA-holder and name of his manufacturing plant,
- Legal address of the ETA-holder,
- last two digits of the year in which the marking was affixed,
- Number of the EC Certificate of conformity,
- Reference to the ETAG 009,
- Number of this ETA,
- Trade name of the product
- Characteristics and performances of the product and/or designation code<sup>8</sup>.

<sup>8</sup> Notes:

- If the ETA provides all the information regarding the performance characteristics, then reference to the ETA is sufficient.
- If the ETA covers more than one type of shuttering element, and the type designation provides all the information regarding the performance characteristics, then reference to the ETA and the relevant type is sufficient.

Only when the above two options do not provide all the necessary information regarding the mandated performance characteristics, then additional information regarding the performance characteristics needs to accompany the CE Marking.

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

#### 4.1 Manufacturing

The shuttering elements are manufactured in accordance with the provisions of this ETA using the manufacturing process as identified during the inspection of the manufacturing plants by the approval body and laid down in the technical documentation.

#### 4.2 Installation

#### 4.2.1 Installation of the shuttering elements

The shuttering elements are put together on site in layers without mortar or adhesive. The elements shall be installed with staggered vertical joints, where the distance between joints in adjacent layers is minimum one quarter of the element length.

The levelling to the subsoil is performed according to the installation guide of the ETA-holder.

If required, bracings according to the installation guide of the ETA-holder are to be used in order to keep the walls aligned vertically during the installation. The bracing supports are then placed on the inner side of the wall at a maximum distance of 1,20 m.

#### 4.2.2 Installation of the reinforcement

The necessary steel reinforcement according to static calculation shall be installed. Minimum and maximum distance between reinforcing bars and the required concrete cover shall be in accordance with EN 1992-1-1 or corresponding national rules.

Isobriq recommends using of reinforced concrete steel fibers of the type Dramix QPC.

#### 4.2.3 Concrete

The maximum aggregate size shall be 16 mm and the slump class of the concrete shall be S4 according to EN 206-1 table 3. The concrete shall have rapid or middle strength development according to EN 206-1 table 12.

Pouring the concrete shall only be performed by persons who have been introduced in the works and in the proper handling of the shuttering system.

When no bracing supports are foreseen, pouring the concrete shall be performed in layers of 1 m at an average vertical concreting rate of 1.6 m/h.

After the concrete has been poured the wall's deviation from a vertical line should not be more than 5 mm per running meter of the wall height.

#### 4.2.4 Requirements

The fitness for use of the system can be assumed if the elements are installed correctly in accordance with the following requirements:

- installation is carried out under the direction of personnel trained and qualified and verified as competent to install the product by the ETA holder or its agent
- installation is in accordance with the ETA-holder's Installation Guide
- the specified products and accessories are used.

## **5** Recommendations

#### 5.1 Recommendations on packaging, transport and storage

The ETA-holder's instructions regarding transport and storage shall be followed.

The shuttering elements shall be handled and stored with care, protected from accidental damage.

Before the installation, it shall be verified that elements have not been damaged during transport or storage. Damaged elements shall be replaced by sound ones.

#### 5.2 Recommendations on use, maintenance, repair

It is the responsibility of the ETA-holder to ensure that proper information for the use of the shuttering elements is available at each delivery, including general guidance on the basis of this ETA and the specific installation plans and construction details mentioned in clause 4.2.

Constitutive materials of the wall (concrete, insulating parts and spacers) do not induce specific problem of durability. But regular controls should be carried out on the outside rendering in order to be able to detect any damage and to repair it as quickly as possible.

The recommendation on use, maintenance and repair of ETAG 009 clause 7.5 shall be considered.

## Annex I Description of product



Isobriq proposes four different blocks (Isobriq EU, LE, PA or ZE) depending on the thickness of the external leaf.

#### Isobriq EU







<u>نا الت</u>

n n



## Isobriq PA







## Annex II Assembly details

This annex provides details about the assembly of the different building components with the shuttering elements.







For the connection between an inner wall and an outer wall, it is necessary to cut and remove a portion of the block (inner leaf of the outer wall) to obtain a monolithic wall. Steel reinforcement can be expected to strengthen the connection.







## Lintel

### In case of EPS selfsupporting panels



In case of precast concrete hollow core slabs



## Annex IV Example of CE – Marking

CE	CE conformity marking, consisting of the "CE" symbol given in Directive 93/68/EEC
nnnn	Number of Notified Body
Isobriq sa 49 Rue Slar 4801 Stembert Belgium	Name and address of the ETA-holder
13	Two last digits of the year of affixing CE marking
nnnn-CPD-XXXX	Number of EC certificate of conformity
ETAG 009	ETAG Reference
ETA 13/0384	ETA Number
Isobriq EU / Isobriq LE / Isobriq PA / Isobriq ZE	Trade Name