

## ATG Technical Approval with Certification



### ISOHEMP

Self-bearing masonry units  
made from hemp  
concrete

Valid from 16/01/2020  
until 15/01/2025

## Approval and Certification Body



Belgian Construction Certification Association  
Rue d'Arlon, 53 - 1040 Brussels  
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### Approval holder:

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## 1 Objective and scope of the Technical Approval

This Technical Approval is based on the favourable evaluation of the product (as described above) by an independent Approval Body designated by UBAtc, BCCA, for the application mentioned in this Technical Approval.

The Technical Approval serves as a record of the approval inspection. This inspection consists of the following: identification of relevant properties of the system for the intended application, laying/installation method, product design and reliability of production.

The Technical Approval provides a high level of reliability, based on the statistical interpretation of inspection results, regular monitoring, adjustments in order to keep abreast of the latest technical developments and quality monitoring by the Approval Holder.

In order to retain the Technical Approval, the approval holder must continuously provide evidence that he is taking all necessary steps to demonstrate that the system is suitable for use. In order to do so, it is vital that the conformity of the system with the Technical Approval is monitored. This monitoring is entrusted by the UBAtc to an independent Certification Body known as BCCA.

The approval holder [and the distributor] is [are] required to adhere to the inspection results described in the Technical Approval if they make information available to third parties. The UBAtc or Certification Body may take any steps that become appropriate if the approval holder [or the distributor] fails to do so (to a sufficient extent) of his own accord.

The Technical Approval and certification for conformity of the product to the technical approval are independent of tasks conducted individually. The contractor and/or architect remain fully responsible for the conformity of the completed work with the provisions contained in the specifications.

The Technical Approval is not concerned, except in specifically included provisions, with on-site safety, health aspects and the sustainable use of raw materials. As a result, the UBAtc shall not be responsible, under any circumstances, for any damage caused by the failure of the Approval Holder, contractor(s) and/or architect to respect provisions relating to on-site safety, health aspects and the sustainable use of raw materials.

Note: in this Technical Approval, the word "contractor" will always be used, when referring to the entity that completes the work. This word has the same meaning as other frequently used words, such as "operator", "installer" and "fitter".

## 2 Product

This ATG for ISOHEMP masonry units includes a technical description of self-bearing masonry units made from lime-hemp concrete, which meet the performance levels mentioned in § 5, provided they are handled according to the specifications listed in § 4.

This approval only refers to applications in which ISOHEMP masonry units are protected in the appropriate manner against moisture (see § 4.6).

## 3 Product identification

### 3.1 Description

The ISOHEMP masonry unit described in this approval is a self-bearing masonry unit, but does not aim at a structural purpose. It consists of hemp chips (hemp shives) and a mixture of air and hydraulic lime. The hemp chips have a granulometry of between 2 mm - 20 mm. The ratio of this mixture is based on a minimum hemp volume of 80%.

The ISOHEMP masonry unit have standard dimensions of 600 mm x 300 mm and are made in different thicknesses of between 60 mm - 360 mm. All the blocks consist of the same raw materials and have a constant mixture ratio.

### 3.2 Production sites and trade names

ISOHEMP masonry units are manufactured by the company IsoHemp S.A. in its factory in Fernelmont, the address of which is shown at the beginning of this document.

They are also marketed by the company IsoHemp S.A..

## 4 Applying the product

When using the masonry units, the contractor must follow the manufacturer's instructions, which are described below.

### 4.1 Bedding mortar

ISOHEMP mortar is used as bed and finishing joints. It consists of a dry mixture of coarse plaster, lime and sand.

ISOHEMP mortar is a factory-made mortar which is mixed on-site with clear and clean water. 7 l - 8 l of water are required to mix 25 kg of powder. The wet mixture is mixed manually or mechanically until a homogeneous paste is obtained. As soon as it appears to be setting, the mortar can no longer be used for laying blocks.

### 4.2 Applying the first layer of blocks

The ISOHEMP masonry unit must be kept away from any risk of rising damp. In order to prevent potential problems with capillary rising damp, it is necessary to place the first layer of masonry units on a PVC U-profile (dry laid) or waterproof membrane (block laid on standard mortar) up to a depth of 20 mm along the hemp block.

If there is no risk of rising damp, the first course of ISOHEMP masonry units should be placed on a general purpose masonry mortar if being used on a concrete floor or glued with an adhesive foam if they are to be laid on a wooden/OSB floor.

When applied outside, the first layer shall be placed at least 200 mm from the ground.

### 4.3 Other layers

The next masonry units are laid on the first course using ISOHEMP mortar. The masonry bond is such as there is a shift at least 200 mm between two successive layers.

When facing existing walls, at least five mechanical fasteners are required per square metre, in order to tie the ISOHEMP masonry units onto the existing walls. At specific locations, such as on top of cavities or openings, mechanical fastening of each masonry unit is recommended.

### 4.4 Top layer

The ISOHEMP masonry units used in the top layer are cut so that only a minimum amount of space is left (maximum 2 cm) between the wall and the ceiling. This space is then sealed using a mortar, flexible insulation material or adhesive foam.

### 4.5 Wall attachments

Light objects can be fixed to a wall made of ISOHEMP masonry units using wood screws with a minimum diameter of 6 mm (anchorage depth: 7 cm). The weight per attachment point must not exceed 5 kg.

Heavier objects must be secured using wood screws with a diameter of 10 mm or a special plug, as stipulated by IsoHemp. The weight per attachment point must not exceed 25 kg.

For much heavier objects, a chemical seal is required. The weight per attachment point must not exceed 50 kg.

### 4.6 Exposure to moisture

Due to the value of the hygroscopic shrinking-swelling (see Table 1 in § 5), the block must be protected against moisture using an appropriate material.

## 5 Characteristics and performance

The characteristics and performance of ISOHEMP masonry unit are indicated below.

All these performance levels have been measured on 120 mm-thick masonry units, except for the compressive strength test (200 mm-thick masonry units), the impact resistance test (150 mm-thick masonry units) and fire reaction / hygroscopic sorption tests (60 mm-thick masonry units).

Table 1 – Characteristics and performance of ISOHEMP masonry units

Characteristic	Test method	Criterion	Result
<b>Performance of masonry units</b>			
Mean compressive strength	NBN EN 772-1	$> 0.22 \text{ N/mm}^2$	$f_{\text{mean}} (50/95) = 0.27 \text{ N/mm}^2$
Thermal conductivity ( $\lambda_{\text{U}} = \lambda_{90/90,23-50}$ )	NBN EN 12664	$\lambda_{23-50} < 0.077 \text{ W/mK}$	0.071 W/m.K
Heat expansion coefficient	NBN EN 14581	/	Overall average: $15,3 \times 10^{-6} \text{ m/mK}$ (C.o.V.: 15%)
Gross dry density	NBN EN 772-13	$337 \text{ kg/m}^3 \pm 10\%$	$337 \text{ kg/m}^3$

**Table 2 - Characteristics and performance of ISOHEMP masonry units**

Characteristic		Test method	Criterion	Result
Hygrometric shrinking-swelling <sup>(1)</sup>		NBN EN 772-14	/	Total dimensional variation: – Lower face: 2,98 mm/m – Outer face: 3,10 mm/m
Hygroscopic sorption: Equilibrium moisture content of 23° and 50 % moisture ( $\Psi_{23,50}$ )		NBN EN 12571	/	0.012 m <sup>3</sup> /m <sup>3</sup>
Bending tensile strength		NBN EN 772-6	/	0.23 N/mm <sup>2</sup>
Surface cohesion		NBN B 14-210	/	– pellets Ø 50 mm: 0.20 N/mm <sup>2</sup> – pellets Ø 80 mm: 0.15 N/mm <sup>2</sup> – pellets Ø 100 mm: 0.11 N/mm <sup>2</sup>
Water vapour diffusion resistance factor ( $\mu$ value)		NBN EN 12572	/	M value: 2,8
Dimensional tolerances		NBN EN 771-3	Dm ((+0/+6), (-3/+6), (+0/+5.0))	(+0/+4.7), (-1.0/+2.9), (+0/+5.0)
Plane parallelism of bed faces –maximum default		NBN EN 772-16	< 3 mm	2.6 mm
Flatness		NBN EN 772-20	< 2.4 mm	– Bed faces: 0,6 and 0,7 mm
			/	– Shell faces (2): 1,7 and 1,9 mm
Reaction to fire		NBN EN 13823 NBN EN 13501-1	/	Test conducted with 60 mm-thick blocks: B-s1, d0
Initial rate of water absorption (only for concrete materials that are exposed to the outdoor climate)		NBN EN 772-11	/	– Bed face after 1 min: 41.6 g/m <sup>2</sup> s – Bed face after 10 mins: 6.9 g/m <sup>2</sup> s (168 g/m <sup>2</sup> s <sup>0.5</sup> ) – Shell face after 10 mins: 4.1 g/m <sup>2</sup> s (100 g/m <sup>2</sup> s <sup>0.5</sup> )
<b>Performance of wall attachment devices in masonry units</b>				
Transversal resistance of anchored devices		Adapted from ETAG 001, Annex A	/	– Wood screws - diameter 6 mm: 809 N – Wood screws - diameter 8 mm: 1116 N – Screw for cellular concrete- diameter 8 mm: 960 N – M10 x 120 + chemical seal: 2340 N
Axial strength (traction) of anchored devices		Adapted from ETAG 001, Annex A	/	– Wood screws - diameter 6 mm: 565 N – Wood screws - diameter 8 mm: 1034 N – Screw for cellular concrete - diameter 8 mm: 826 N – M10 x 120 + chemical seal: 2116 N
Tensile and compressive strength of wall ties in the hemp block		NBN EN 846-6	/	– Traction: 510 N – Compression: 1370 N
<b>Performance of wall attachment devices in blocks in the bedding mortar</b>				
Tensile and compressive strength of wall ties in the bedding mortar (elbow connector integrated into the block)		NBN 846-5	/	– Traction: 620 N – Compression: 760 N
<b>Performance masonry</b>				
Initial shear strength		NBN EN 1052-3/A1	/	– Average: 0.09 MPa – Characteristic: 0.07 MPa
Bond strength ('bond wrench method)		NBN EN 1052-5	/	– Average: 0.15 MPa – Characteristic: 0.07 MPa
Mortar- element adhesion in response to traction		NBN EN 12860	/	– Standard conditions: 0.03 MPa – 24h – 40 °C: 0.04 MPa

**Table 3 – Characteristics and performance of ISOHEMP masonry units**

Characteristic	Test method	Criterion	Result
<b>Performance of the masonry</b>			
Sound attenuation index R of a building material - unplastered blocks	NBN EN ISO 10140-2; NBN EN ISO 717-1	/	<ul style="list-style-type: none"> <li>– Attenuation index R expressed in dB(A) for pink noise emission: <math>R_{rose} = 8.5</math> dB(A)</li> <li>– Attenuation index R expressed in dB(A) for road noise emission: <math>R_{route} = 6.0</math> dB(A)</li> </ul>
Sound attenuation index R of a building material – blocks plastered on 1 side	NBN EN ISO 10140-2; NBN EN ISO 717-1	/	<ul style="list-style-type: none"> <li>– Attenuation index R expressed in dB(A) for pink noise emission: <math>R_{rose} = 38.4</math> dB(A)</li> <li>– Attenuation index R expressed in dB(A) for road noise emission: <math>R_{route} = 33.3</math> dB(A)</li> </ul>
Sound absorption coefficient in an echo chamber	NBN EN ISO 354; NBN EN ISO 11654	/	$\alpha_w = 0,85$ (Sound absorption class: B)
Impact resistance tests on a piece of wall (150 mm-thick hemp blocks laid on bedding mortar for ISOHEMP hemp blocks).	TR 001 "Determination of impact resistance of panels and panel assemblies" version 2003	/	See Table 2
<p>(1): The supplied test tubes are not hermetically sealed in a bag (deviation of the standard). The age of the test tubes at the start of the test is 34 - 36 weeks instead of 22 days as required by the standard.</p> <p>(2): The outer face has a marked profile (groove height 12.1 mm). The above values do not take into account the height of the grooves.</p>			

**Table 4 – Impact resistance test**

Test body	Number of impacts	Energy	Fall height	Criterion
	(-)	(Nm)	(cm)	
<b>Service tests</b>				
Soft impacts (50 kg sand bag)	3	60	12	Wall cracked at the 3 <sup>rd</sup> joint across its entire width and thickness
		120	24	Not conducted
Hard impact (0.500 kg steel ball)	3	2.5	50	Indentation $\varnothing$ 21 - 25 mm
		6	120	Indentation 3 x $\varnothing$ 26 mm
<b>Safety tests</b>				
Soft impacts (50 kg sand bag)	1	100	20	Crack present but not spreading
		200	40	Ditto
		300	60	Ditto + 2 <sup>nd</sup> crack on the lower joint
		400	80	Wall collapsed
		500	100	Not conducted
Soft impacts (1,000 kg steel ball)	1	10	100	Indentation $\varnothing$ 37 mm

## 6 Conditions

- A. This technical approval refers exclusively to the product mentioned on the cover page of the technical approval.
- B. Only the Approval Holder and, if applicable, the distributor may assert rights based on the Technical Approval.
- C. The Approval Holder and, if applicable, the distributor are not permitted, in any way, to use the name of the UBAtc, its logo, the Technical Approval mark, the Technical Approval or the approval number to demand the evaluation of products that fail to comply with the Technical Approval or products, equipment or systems, including their properties or characteristics, which do not form the object of the Technical Approval.
- D. Information provided in any way by the approval holder, distributor or an approved contractor or by their representatives for (potential) users of the product, which is described in the technical approval (e.g. for clients, contractors, architects, consultants, designers, etc.) must not be incomplete or contradict the content of the technical approval or information mentioned in the technical approval.
- E. The Approval Holder is bound at all times to provide UBAtc, the Approval Body and the Certification Body with prompt or prior notification of any adjustments made to primary materials and products, installation instructions and/or the manufacturing, installation and equipment process. According to the information communicated, the UBAtc, the Approval Body and the Certification Body will judge whether it is necessary to adjust the Technical Approval.
- F. The Technical Approval is based on the available knowledge and technical/scientific information, together with information provided by the applicant and complemented by an approval inspection, which takes account of the specific nature of the product. However, users remain responsible for selecting the product, as described in the Technical Approval, for the specific use intended by the user.
- G. The intellectual property rights associated with the Technical Approval, including the copyright, belong exclusively to the UBAtc.
- H. Any references to the technical approval must be accompanied by a Technical Approval index (ATG 3169) and the validity period.
- I. The UBAtc, the approval body and the certification body cannot be held responsible for any damage or adverse consequences suffered by third parties (e.g. the user) that result from the failure of the approval holder or distributor to respect the provisions of Article 6.



UBAtc asbl is an approval body and member of the European Union of Agrément for Construction (UEAtc, see [www.ueatc.eu](http://www.ueatc.eu)) notified by the FPS Economy within the framework of Regulation 305/2011/EEC and member of the European Organisation for Technical Approvals (EOTA, see [www.eota.eu](http://www.eota.eu)). Certification bodies designated by UBAtc asbl operate in compliance with a system that is set to be accredited by BELAC ([www.belac.be](http://www.belac.be)).



This technical approval has been published by UBAtc, under the responsibility of the approval body BCCA, and based on favourable feedback from the specialist "MAIN STRUCTURE AND CONSTRUCTION SYSTEMS" group, issued on March 26<sup>th</sup> 2019.

In addition, the BCCA certification body has confirmed that the production process meets the conditions for certification and that a certification agreement was signed by the Technical Approval holder.

Date of issue: July 13<sup>th</sup> 2020.

This ATG replaces ATG 3169, published on 16/01/2020. The modifications compared with previous version are summarised below:

Modifications compared with the previous version
Correction of the transversal resistance of an attachment device using a wood screw with a diameter of 8 mm: 1116N instead of 116N

For UBAtc, declaration of the validity of the approval process

For the approval and certification body

  
Peter Wouters,  
Director

  
Benny De Blaere,  
Managing director

This Technical Approval shall remain valid, provided the product, its manufacture and all processes that are appropriate for this purpose:

- are maintained, in order to achieve, as a minimum, the test results defined in the approval document;
- are continuously monitored by the Certification Body, which confirms that the certification continues to be valid;

If these conditions are no longer met, the Technical Approval shall be suspended or withdrawn and the approval document shall be deleted from the UBAtc website. The technical approvals are regularly updated. It is recommended that you always use the version published on the UBAtc website ([www.ubatc.be](http://www.ubatc.be)).

The most recent version of the Technical Approval can be consulted using this QR code.

