

# Environmental Product Declaration



THE INTERNATIONAL EPD® SYSTEM



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

## WOOD CEMENT FORMWORK BLOCKS

from

**ISOTEX SRL**



|                          |                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------|
| Programme:               | The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a> |
| Programme operator:      | EPD International AB                                                                      |
| EPD registration number: | S-P-01472                                                                                 |
| Publication date:        | 2018-12-18                                                                                |
| Revision date:           | 2024-03-20                                                                                |
| Valid until:             | 2029-03-20                                                                                |

*EPD of multiple products, based on a representative product*

*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

### Programme information

|                   |                                                                     |
|-------------------|---------------------------------------------------------------------|
| <b>Programme:</b> | The International EPD <sup>®</sup> System                           |
| <b>Address:</b>   | EPD International AB<br>Box 210 60<br>SE-100 31 Stockholm<br>Sweden |
| <b>Website:</b>   | <a href="http://www.environdec.com">www.environdec.com</a>          |
| <b>E-mail:</b>    | <a href="mailto:info@environdec.com">info@environdec.com</a>        |

### Accountabilities for PCR, LCA and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): *PCR 2019:14 Construction products, version 1.3.2*

PCR review was conducted by: *PCR Committee: IVL Swedish Environmental Research Institute, Secretariat of the International EPD<sup>®</sup> System*  
*Moderator: Martin Erlandsson, IVL Swedish Environmental Research Institute*

#### Life Cycle Assessment (LCA)

LCA accountability: *Ing. Francesca Intini, Arch. Daniela Petrone, T&A - Tecnologia & Ambiente srl*

#### Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

☒ EPD verification by accredited certification body

Third-party verification: *Bureau Veritas Italia S.p.A* is an approved certification body accountable for the third-party verification

The certification body is accredited by: *Accredia*

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: ISOTEX srl, via D'Este, 5/7-5/842028 Poviglio (RE)

Contact: Ing. Alessia Aldrovandi tecnico2@blocchiisotex.it

Description of the organisation: The Isotex construction system began its history in Germany in 1946 and since 1985 C&P Costruzioni Srl has been operating on Italian territory, creating around 400,000 eco-sustainable homes, of which around 90,000 in Italy alone, guaranteeing safety and experience. From the then C&P Costruzioni Srl, the ancient name of the company, to the modern Isotex Srl, an entirely Italian company, it has stood out for research, innovation and product quality, becoming the most important company in the production of formwork blocks and wood-concrete floors: Isotex Srl is today the European leader with 82% of the market share in the wood-cement sector. The company has a staff of over 100 people including employees and agents who cover the entire national and international territory.

The production includes formwork blocks, floors and elements for acoustic barriers in wood-cement and takes place entirely in the production plant in Poviglio (RE), where the company is based. The systems are highly technological and functional in order to guarantee a high quality standard, respect for the environment and customer satisfaction, meeting the consensus of technicians, builders and end users. The use of fully automated procedures and machinery guarantees the quality and precision of the products. The company uses machinery to check the specific characteristics of the raw materials used, especially wood, on which quality controls are carried out to validate the supplies before unloading. An automatic mixture regulation system allows the desired levels of the characteristics of the wood-cement conglomerate produced to be maintained constant. Inside the production site there is also a laboratory equipped with instrumentation compliant with the requirements of the specific standards for carrying out checks and controls, carried out on samples of each production batch: specific weight (density) checks and resistance tests are included mechanics.

Finally, the company is committed to the circular economy plan: this company policy aims to reduce and limit the use of non-renewable energy in favor of renewable energy, to reduce the use of virgin raw materials by encouraging the use of recovery, to avoid the generation of new waste. This last aspect is made possible through the reintroduction, into the production cycle itself, of wood-cement waste (scraps) deriving from production: the generation of waste deriving from the production cycle is in this way almost eliminated. As regards energy, the presence of a photovoltaic system for the production of electricity, located on the production plant, allows us to reduce the use of electricity from non-renewable sources. The primary objective of the Isotex construction system is to guarantee safety and living comfort. At a certification level, the characteristics of the products for the different aspects have been certified by authorized laboratories, university institutes, third party bodies, etc. in compliance with the regulations in force in Italy and abroad.

Product-related or management system-related certifications: Isotex obtained the following certifications:

- ISO 9001 – Quality Management System
- ANAB/ICEA – Conformity of materials with green building
- Factory production control compliance (ITC-CNR) – Evaluation and verification of constancy of performance in reference to ETA 08/0023, in accordance with the Construction Products Regulation (EU)

Name and location of production site(s): via D'Este, 5/7-5/842028 Poviglio (RE)



## Product information

Product name: Wood cement formwork block

Product identification: The block of wood-cement casing is its product used for the construction of the wall structure. The blocks comply with the UNI EN 15498 "Precast concrete products - Wood-chip concrete shuttering blocks - Product properties and performance". They are produced starting from Portland cement and fir wood, ground and mineralized with natural mineral, in order to make them inert. The wood used is exclusively recycled wood from end-of-life pallets, selected and untreated.

Product description: Wood cement formwork block HDIII 38/14

Included products: According to the General Programme Instruction (GPI) v. 4.0 and the PCR 2019:14 "Construction products" v.1.3.2, the results for each category of impact are represented for the product HDIII 38/14, identified as representative. This product is the model with the highest sales volumes in the 2022.

The products included in this EPD are formwork blocks divided by product family. They have thicknesses ranging from 20 cm to 44 cm and are divided into two macro categories: HB type blocks (without insulating insert) and HDIII blocks (with insulating insert). The insulating insert is made of EPS with graphite and its thickness can vary from 7 to 23 cm, depending on the type of HDIII block. The thickness of the reinforced concrete wall, to be cast and reinforced in place inside the formwork blocks, can have thicknesses from 14 to 21 cm, depending on the type of block.

Below is the list of formwork blocks included:

- **HB 20 – Standard block**
- **HB 25 – Standard block**
- **HB 30 – Standard block**
- **HB 44/15-2 – Standard block**



- HDIII 30/10 – *Infill blocks*
- **HDIII 30/7 – *Standard block***
- **HDIII 33/10 – *Standard block rd***
- HDIII 33/13 – *Infill blocks*
- HDIII 38/10 – *Particular blocks*
- **HDIII 38/14 – *Standard block***
- HDIII 38/17 – *Infill blocks*
- HDIII 44/14 – *Particular blocks*
- HDIII 44/17 – *Particular blocks*
- **HDIII 44/20 – *Standard block***
- HDIII 44/23 – *Infill blocks*



The above terminology refers to the NS block (normal blocks) with a double 'H' shape. Each of the above types, in turn, includes respective product sub-blocks which include the following special/supplementary blocks: UNI (for internal and non-internal corners), SHOULDER (for shoulders of doors and windows), PASS (of corner compensation), PILLAR (for pillar construction) and CORREA / DAS (for floor curb):



PILLAR block



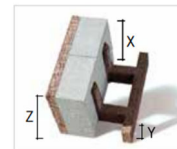
PASS block



SHOULDER block



UNIVERSAL block (UNI)



CORREA SLAB block

UN CPC code: 37520 "Boards, blocks and similar articles of vegetable fibre, straw or wood waste agglomerated with mineral binders"

Geographical scope: Europe

The dimensional characteristics and main technical specifications of the blocks are summarized in the Table:

|                   | Weight kg/m <sup>2</sup> |                    | Weight kg/m <sup>2</sup> |                    | Weight kg/m <sup>2</sup> |
|-------------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|
| <b>HB 20</b>      | 56                       | <b>HDIII 30/7</b>  | 80                       | <b>HDIII 33/10</b> | 83                       |
| <b>HB 25</b>      | 80                       | <b>HDIII 30/10</b> |                          | <b>HDIII 33/13</b> |                          |
| <b>HB 30</b>      | 85                       |                    |                          |                    |                          |
| <b>HB 44/15-2</b> | 128                      |                    |                          |                    |                          |

|                    | Weight kg/m <sup>2</sup> |                    | Weight kg/m <sup>2</sup> |
|--------------------|--------------------------|--------------------|--------------------------|
| <b>HDIII 38/10</b> | 88                       | <b>HDIII 44/14</b> | 95                       |
| <b>HDIII 38/14</b> |                          | <b>HDIII 44/17</b> |                          |
| <b>HDIII 38/17</b> |                          | <b>HDIII 44/20</b> |                          |

| <b>FORMWORK BLOCKS HB</b>                                                                                                                   |                                |              |              |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------|--------------|-------------------|
|                                                                                                                                             | <b>HB 20</b>                   | <b>HB 25</b> | <b>HB 30</b> | <b>HB 44/15-2</b> |
| <b>Technical performance</b>                                                                                                                |                                |              |              |                   |
| Maximum indicative load $R_{ck} \geq 30 \text{ N/mm}^2$<br>inter-floor h: 3,00 m [t/m]                                                      | 20                             | 37           | 45           | 32+32             |
| Thermal transmittance U of finished wall (with plaster), including surfaces resistances (Three-dimensional method) [W/m <sup>2</sup> K] (1) | -                              | 0,79         | 0,68         | 0,56              |
| Thermal transmittance U of finished wall (with plaster), including surfaces resistance (Two-dimensional method) [W/m <sup>2</sup> K] (2)    | -                              | -            | -            | -                 |
| Periodic Thermal Transmittance $Y_{IE}$ [W/m <sup>2</sup> K]                                                                                | -                              | -            | -            | -                 |
| Summer phase shifts values                                                                                                                  | Not applicable                 | -            | -            | -                 |
| Acoustic insulation $R_w$ of finished wall (with plaster) [dB] (3)                                                                          | -                              | 56           | 55           | 60                |
| Filling concrete [l/m <sup>2</sup> ]                                                                                                        | 110                            | 138          | 161          | 236               |
| Thickness of shells [cm]                                                                                                                    | 3                              | 4,5          | 5,5          | 4,5               |
| Thickness of concrete [cm]                                                                                                                  | 14                             | 16           | 19           | 15+15             |
| Thickness of thermal insulation (EPS with graphite) [cm]                                                                                    | -                              | -            | -            | -                 |
| Fire resistance REI class for concrete filled wall (without plaster) (4)                                                                    | REI 120                        |              |              |                   |
| Reaction to Fire (5)                                                                                                                        | B-s1,d0                        |              |              |                   |
| Facade fire behaviour                                                                                                                       | passing test LEPIR II (French) |              |              |                   |
| VOC (Volatile Organic Compounds) (6)                                                                                                        | INDOOR AIR COMFORT GOLD        |              |              |                   |

(1) according to standards UNI EN 10355 and UNI EN ISO 6946

(2) according to standards UNI EN ISO 6946, UNI EN 13788, UNI 10355 and UNI EN 10351

(3) test performed in laboratory according to standards UNI EN ISO 10140 and UNI EN ISO 717

(4) test performed in laboratory according to standards NF EN 13501-2

(5) test performed in laboratory according to standards EN 1365-1

(6) test performed in laboratory according to standards UNI EN 16516 - UNI EN ISO 16000-9

| FORMWORK BLOCKS HDIII 30 E HDIII 33                                                                                                               |                                |                |                |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------|----------------|----------------|
|                                                                                                                                                   | HDIII<br>30/7                  | HDIII<br>30/10 | HDIII<br>33/10 | HDIII<br>33/13 |
| <b>Technical performance</b>                                                                                                                      |                                |                |                |                |
| Maximum indicative load $R_{ck} \geq 30 \text{ N/mm}^2$<br>inter-floor h: 3,00 m [t/m]                                                            | 35                             | 28             | 35             | 28             |
| Thermal transmittance U of finished wall (with plaster),<br>including surfaces resistances<br>(Three-dimensional method) [W/m <sup>2</sup> K] (1) | 0,34                           | -              | 0,27           | -              |
| Thermal transmittance U of finished wall (with plaster),<br>including surfaces resistance<br>(Two-dimensional method) [W/m <sup>2</sup> K] (2)    | 0,30                           | 0,23           | 0,23           | 0,19           |
| Periodic Thermal Transmittance $Y_{IE}$ [W/m <sup>2</sup> K]                                                                                      | 0,019                          | 0,020          | 0,014          | 0,020          |
| Summer phase shifts values                                                                                                                        | 12h 19'                        | 11h 10'        | 12h 43'        | 11h 30'        |
| Acoustic insulation $R_w$ of finished wall (with plaster) [dB] (3)                                                                                | 54                             | 53             | 54             | 53             |
| Filling concrete [l/m <sup>2</sup> ]                                                                                                              | 130                            | 104            | 130            | 104            |
| Thickness of shells [cm]                                                                                                                          | 4                              | 4              | 4              | 4              |
| Thickness of concrete [cm]                                                                                                                        | 15                             | 12             | 15             | 12             |
| Thickness of thermal insulation (EPS with graphite) [cm]                                                                                          | 7                              | 10             | 10             | 13             |
| Fire resistance REI class for concrete filled wall<br>(without plaster) (4)                                                                       | REI 120                        |                |                |                |
| Reaction to Fire (5)                                                                                                                              | B-s1,d0                        |                |                |                |
| Facade fire behaviour                                                                                                                             | passing test LEPIR II (French) |                |                |                |
| VOC (Volatile Organic Compounds) (6)                                                                                                              | INDOOR AIR COMFORT GOLD        |                |                |                |

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| FORMWORK BLOCKS HDIII 38                                                                                                                       |                |                |                |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|----------------|
|                                                                                                                                                | HDIII<br>38/10 | HDIII<br>38/14 | HDIII<br>38/17 |
| <b>Technical performance</b>                                                                                                                   |                |                |                |
| Maximum indicative load $R_{ck} \geq 30 \text{ N/mm}^2$<br>inter-floor h: 3,00 m [t/m]                                                         | 45             | 35             | 28             |
| Thermal transmittance U of finished wall (with plaster), including<br>surfaces resistances (Three-dimensional method) [W/m <sup>2</sup> K] (1) | 0,27           | 0,21           | -              |
| Thermal transmittance U of finished wall (with plaster), including<br>surfaces resistance (Two-dimensional method) [W/m <sup>2</sup> K] (2)    | 0,23           | 0,18           | 0,15           |
| Periodic Thermal Transmittance $Y_{IE}$ [W/m <sup>2</sup> K]                                                                                   | 0,008          | 0,008          | 0,010          |
| Summer phase shifts values                                                                                                                     | 12h 50'        | 14h 06'        | 12h 36'        |
| Acoustic insulation $R_w$ of finished wall (with plaster) [dB] (3)                                                                             | 54             | 54             | 53             |
| Filling concrete [l/m <sup>2</sup> ]                                                                                                           | 161            | 130            | 104            |

|                                                                          |                                |     |     |
|--------------------------------------------------------------------------|--------------------------------|-----|-----|
| Thickness of shells [cm]                                                 | 4,5                            | 4,5 | 4,5 |
| Thickness of concrete [cm]                                               | 19                             | 15  | 12  |
| Thickness of thermal insulation (EPS with graphite) [cm]                 | 10                             | 14  | 17  |
| Fire resistance REI class for concrete filled wall (without plaster) (4) | REI 120                        |     |     |
| Reaction to Fire (5)                                                     | B-s1,d0                        |     |     |
| Facade fire behaviour                                                    | passing test LEPIR II (French) |     |     |
| VOC (Volatile Organic Compounds) (6)                                     | INDOOR AIR COMFORT GOLD        |     |     |

(1) according to standards UNI EN 10355 and UNI EN ISO 6946

(2) according to standards UNI EN ISO 6946, UNI EN 13788, UNI 10355 and UNI EN 10351

(3) test performed in laboratory according to standards UNI EN ISO 10140 and UNI EN ISO 717

(4) test performed in laboratory according to standards NF EN 13501-2

(5) test performed in laboratory according to standards EN 1365-1

(6) test performed in laboratory according to standards UNI EN 16516 - UNI EN ISO 16000-9

| FORMWORK BLOCKS HDIII 44                                                                                                                       |                                |                |                |                |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------|----------------|----------------|
|                                                                                                                                                | HDIII<br>44/14                 | HDIII<br>44/17 | HDIII<br>44/20 | HDIII<br>44/23 |
| <b>Technical performance</b>                                                                                                                   |                                |                |                |                |
| Maximum indicative load $R_{ck} \geq 30 \text{ N/mm}^2$<br>inter-floor h: 3,00 m [t/m]                                                         | 49                             | 42             | 35             | 28             |
| Thermal transmittance U of finished wall (with plaster), including<br>surfaces resistances (Three-dimensional method) [W/m <sup>2</sup> K] (1) | 0,21                           | 0,18           | 0,15           | -              |
| Thermal transmittance U of finished wall (with plaster), including<br>surfaces resistance (Two-dimensional method) [W/m <sup>2</sup> K] (2)    | 0,18                           | 0,15           | 0,13           | 0,11           |
| Periodic Thermal Transmittance $Y_{IE}$ [W/m <sup>2</sup> K]                                                                                   | 0,008                          | 0,008          | 0,004          | 0,010          |
| Summer phase shifts values                                                                                                                     | 13h 15'                        | 13h 26'        | 13h 18'        | 13h 16'        |
| Acoustic insulation $R_w$ of finished wall (with plaster) [dB] (3)                                                                             | 53                             | 53             | 53             | 53             |
| Filling concrete [l/m <sup>2</sup> ]                                                                                                           | 178                            | 154            | 130            | 104            |
| Thickness of shells [cm]                                                                                                                       | 4,5                            | 4,5            | 4,5            | 4,5            |
| Thickness of concrete [cm]                                                                                                                     | 21                             | 18             | 15             | 12             |
| Thickness of thermal insulation (EPS with graphite) [cm]                                                                                       | 14                             | 17             | 20             | 23             |
| Fire resistance REI class for concrete filled wall (without plaster)<br>(4)                                                                    | REI 120                        |                |                |                |
| Reaction to Fire (5)                                                                                                                           | B-s1,d0                        |                |                |                |
| Facade fire behaviour                                                                                                                          | passing test LEPIR II (French) |                |                |                |
| VOC (Volatile Organic Compounds) (6)                                                                                                           | INDOOR AIR COMFORT GOLD        |                |                |                |

(1) according to standards UNI EN 10355 and UNI EN ISO 6946

(2) according to standards UNI EN ISO 6946, UNI EN 13788, UNI 10355 and UNI EN 10351

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## LCA information

Functional unit / declared unit: The functional unit is 1 m<sup>2</sup> of surface composed of HDIII 38/14 wood-cement blocks. From phase B to phase D the functional unit is 1 m<sup>2</sup> of finished wall.

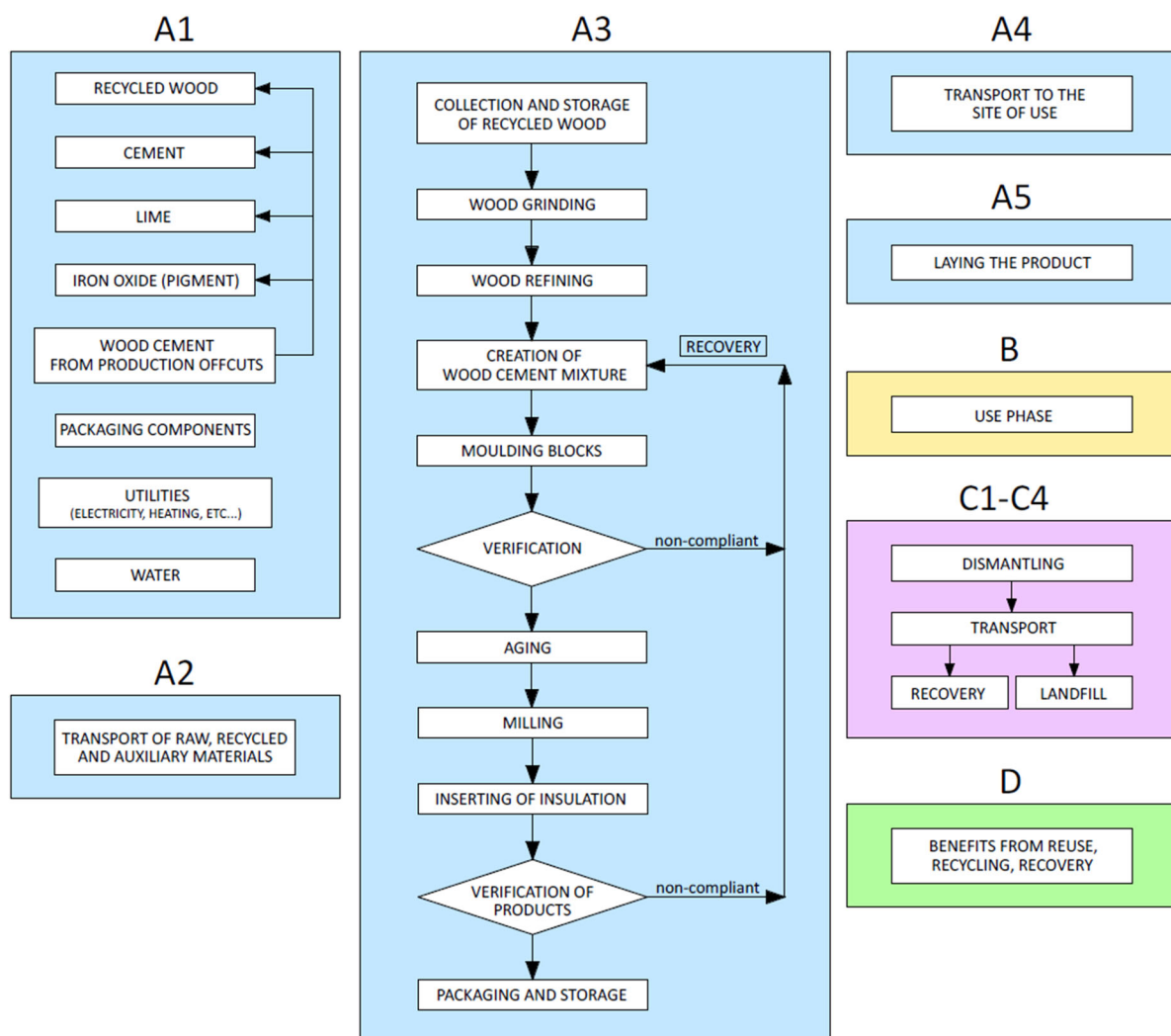
Reference service life: **100 years**

Time representativeness: 2022

Database(s) and LCA software used: The Ecoinvent database v.3.9.1 ([www.ecoinvent.org](http://www.ecoinvent.org)) provides the life cycle inventory data for the raw and process materials obtained from the background system. LCA software used is SimaPro 9.5.0.2.

Description of system boundaries: Cradle to grave and module D (A + B + C + D).

System diagram:



The products are shipped to construction sites located in Italy and Europe, with an average distance of 533 km

The wood-cement formwork blocks are laid dry, thus eliminating the various inconveniences caused by the use of mortar, they are subsequently filled with concrete, finally a vertical and horizontal reinforcement is inserted inside them, thus guaranteeing excellent bearing structure. The reinforcement is evaluated by the designers and therefore not subject to analysis. The quantity of concrete in the installation phase depends on the block model.

In B if the installation phases have been carried out correctly and according to the technical indications provided by Isotex, the product does not undergo variations and is not subject to ordinary maintenance works. In this phase the contribution of carbonation was considered.

The impacts associated with the demolition phase require energy for the use of excavators and other machinery

The transport of the product at the end of its life is modelled with a scenario equal to 20 km by truck.

In the case of selective demolition of buildings, the product can be recovered and sent to companies specialized in recovery. A recovery percentage of 80% is estimated and the remainder sent to landfill.

The impacts relating to the avoided impacts of the virgin raw material with a yield of 90% were quantified.

Cut-off rules: 1% cut-off is applied. Plant maintenance operations, infrastructure processes and machinery were excluded from the study.

Quality data: Specific data are used for raw materials, electricity, fuel data, emissions, waste data, average distances and means of transport in modules A2 and A4.

Electricity mix: The electricity used in the production process (phase A1-A3) was modeled using the national Residual Mix provided by the AIB (Association of Issuing Bodies) 2022 for a share of 89% and by the photovoltaic system for 11%. The GWP-GHG of the electricity mix is equal to: 0.522 kg CO<sub>2</sub>eq./kWh

Allocation rules: In A1-A3 modules an allocation was used based on the quantity and type of products in the reference year.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

|                      | Product stage       |           |               | Construction process stage |                           | Use stage |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Resource recovery stage            |
|----------------------|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|------------------------------------|
|                      | Raw material supply | Transport | Manufacturing | Transport                  | Construction installation | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| Module               | A1                  | A2        | A3            | A4                         | A5                        | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D                                  |
| Modules declared     | X                   | X         | X             | X                          | X                         | X         | X           | X      | X           | X             | X                      | X                     | X                          | X         | X                | X        | X                                  |
| Geography            | IT                  | IT        | IT            | EU                         | EU                        | EU        | EU          | EU     | EU          | EU            | EU                     | EU                    | EU                         | EU        | EU               | EU       |                                    |
| Specific data used   | > 90%               |           |               | -                          | -                         | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |
| Variation – products | -38%+12%            |           |               | -                          | -                         | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |
| Variation – sites    | -                   |           |               | -                          | -                         | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |

The following table shows the range of variability for each module and for each category of impact. These values are required by PCR 2019:14 v.1.3.2 for EPD of multiple products with variances greater than 10%.

| Module A1-A3        | HB 20 | HB 25 | HB 30 | HB 44/15-2 | HDIII 30/10 | HDIII 30/7 | HDIII 33/10 | HDIII 33/13 | HDIII 38/10 | HDIII 38/17 | HDIII 44/14 | HDIII 44/17 | HDIII 44/20 | HDIII 44/23 |
|---------------------|-------|-------|-------|------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ODP                 | -50%  | -35%  | -32%  | -5%        | -14%        | -20%       | -12%        | -5%         | -8%         | 6%          | 5%          | 11%         | 18%         | 24%         |
| AP                  | -38%  | -17%  | -13%  | 25%        | -10%        | -12%       | -7%         | -5%         | -3%         | 2%          | 7%          | 9%          | 11%         | 13%         |
| EP-freshwater       | -35%  | -19%  | -19%  | 18%        | -12%        | -14%       | -6%         | -4%         | -3%         | 2%          | 9%          | 11%         | 13%         | 15%         |
| EP- marine          | -36%  | -15%  | -11%  | 28%        | -10%        | -11%       | -6%         | -5%         | -2%         | 2%          | 7%          | 8%          | 10%         | 12%         |
| EP-terrestrial      | -38%  | -29%  | -28%  | -7%        | -11%        | -17%       | -9%         | -3%         | -7%         | 5%          | 5%          | 10%         | 15%         | 20%         |
| POCP                | -35%  | -14%  | -10%  | 29%        | -9%         | -11%       | -6%         | -5%         | -2%         | 1%          | 7%          | 8%          | 10%         | 11%         |
| ADP-minerals&metals | -50%  | -36%  | -33%  | -6%        | -14%        | -20%       | -12%        | -5%         | -9%         | 6%          | 5%          | 11%         | 18%         | 24%         |
| WDP                 | -34%  | -24%  | -22%  | -2%        | -10%        | -14%       | -7%         | -3%         | -5%         | 4%          | 4%          | 8%          | 12%         | 16%         |
| GWP-GHG             | -38%  | -16%  | -12%  | 28%        | -10%        | -12%       | -7%         | -5%         | -2%         | 2%          | 7%          | 9%          | 10%         | 12%         |

## Content information (reference to representative product)

| Product components           | Weight, kg | Post-consumer material, weight-% | Pre-consumer material, weight-% | Biogenic material, weight-% and kg C/kg |
|------------------------------|------------|----------------------------------|---------------------------------|-----------------------------------------|
| Cement                       | 43,88      | -                                | 7,07%                           | -                                       |
| Recycled wood (fir)          | 27,16      | 100%                             | -                               | 0,51                                    |
| Lime                         | 3,78       | -                                | 2,83%                           | -                                       |
| Iron oxide                   | 0,26       | -                                | -                               | -                                       |
| EPS insulation with graphite | 2,1        | 15%                              | -                               | -                                       |
| Water                        | 10,82      | -                                | -                               | -                                       |
| TOTAL                        | 88,00      | 31,22%                           | 3,64%                           | -                                       |
| Packaging materials          | Weight, kg | Weight-% (versus the product)    |                                 | Weight biogenic carbon, kg C/kg         |
| Plastic                      | 0,090      | -                                | -                               | -                                       |
| TOTAL                        | 0,090      | -                                | -                               | -                                       |

**\*All production waste is completely reinserted into the production cycle and taken into consideration in the evaluation.**

The product do not contain substances which exceed the limits for registration with the European Chemicals Agency regarding the "Candidate List of Substances of Very High Concern for Authorisation".

## Results of the environmental performance indicators

### Mandatory impact category indicators according to EN 15804

| Results per functional unit 1 m <sup>2</sup> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |           |               |           |           |          |           |           |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|-----------|---------------|-----------|-----------|----------|-----------|-----------|
| Indicator                                    | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A1-A3     | A4       | A5        | B             | C1        | C2        | C3       | C4        | D         |
| GWP-fossil                                   | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5,73E+01  | 1,25E-01 | 2,83E+01  | -<br>2,38E+00 | 1,83E+00  | 1,48E+00  | 4,17E-01 | 8,84E-01  | -6,59E+00 |
| GWP-biogenic                                 | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -5,47E+01 | 0,00E+00 | -1,27E-01 | 0,00E+00      | -2,52E-03 | -9,11E-03 | 5,46E+01 | -1,07E-01 | 1,32E-01  |
| GWP-luluc                                    | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 8,39E-03  | 5,72E-05 | 2,22E-03  | 0,00E+00      | 2,05E-04  | 7,30E-04  | 1,04E-03 | 5,27E-03  | -2,56E-03 |
| GWP-total                                    | kg CO <sub>2</sub> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2,64E+00  | 1,25E-01 | 2,81E+01  | -<br>2,38E+00 | 1,82E+00  | 1,47E+00  | 5,50E+01 | 7,82E-01  | -6,46E+00 |
| ODP                                          | kg CFC 11 eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 8,51E-07  | 2,72E-09 | 1,23E-07  | 0,00E+00      | 2,90E-08  | 3,22E-08  | 7,95E-09 | 2,28E-08  | -8,61E-08 |
| AP                                           | mol H <sup>+</sup> eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1,62E-01  | 1,24E-01 | 6,34E-02  | 0,00E+00      | 1,82E+00  | 1,47E+00  | 3,79E-01 | 7,82E-01  | -6,46E+00 |
| EP-freshwater                                | kg P eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3,33E-04  | 9,83E-07 | 3,42E-04  | 0,00E+00      | 6,59E-06  | 1,20E-05  | 4,12E-05 | 2,44E-05  | -1,73E-04 |
| EP-marine                                    | kg N eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4,24E-02  | 1,32E-04 | 1,93E-02  | 0,00E+00      | 7,83E-03  | 7,95E-04  | 3,00E-04 | 1,62E-03  | -5,73E-03 |
| EP-terrestrial                               | mol N eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1,72E-01  | 1,41E-03 | 2,22E-01  | 0,00E+00      | 8,53E-02  | 8,28E-03  | 3,50E-03 | 1,75E-02  | -6,86E-02 |
| POCP                                         | kg NMVOC eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,58E-01  | 5,84E-04 | 6,61E-02  | 0,00E+00      | 2,53E-02  | 5,02E-03  | 1,12E-03 | 7,18E-03  | -2,83E-02 |
| ADP-minerals&metals*                         | kg Sb eq.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2,14E-05  | 3,99E-07 | 1,08E-05  | 0,00E+00      | 2,39E+01  | 2,10E+01  | 9,48E+00 | 1,57E+01  | -1,44E+02 |
| ADP-fossil*                                  | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5,36E+02  | 1,76E+00 | 1,33E+02  | 0,00E+00      | 6,37E-07  | 4,83E-06  | 5,05E-06 | 1,13E-06  | -2,22E-05 |
| WDP*                                         | m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6,58E+00  | 6,67E-03 | 1,33E+00  | 0,00E+00      | 5,15E-02  | 8,65E-02  | 1,07E-01 | 2,54E-01  | -4,75E+00 |
| Acronyms                                     | GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption |           |          |           |               |           |           |          |           |           |

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

## Additional mandatory and voluntary impact category indicators

| Results per functional unit 1 m <sup>2</sup> |                                                                      |          |          |          |           |          |          |          |          |           |
|----------------------------------------------|----------------------------------------------------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|-----------|
| Indicator                                    | Unit                                                                 | A1-A3    | A4       | A5       | B         | C1       | C2       | C3       | C4       | D         |
| GWP-GHG <sup>1</sup>                         | kg CO <sub>2</sub> eq.                                               | 5,72E+01 | 1,25E-01 | 2,83E+01 | -2,38E+00 | 1,83E+00 | 1,48E+00 | 4,20E-01 | 8,90E-01 | -6,63E+00 |
| PM                                           | disease inc.                                                         | 1,31E-06 | 8,50E-09 | 6,57E-07 | 0,00E+00  | 4,72E-07 | 1,10E-07 | 2,37E-06 | 1,05E-07 | -3,94E-07 |
| IRP                                          | kBq U-235 eq                                                         | 1,30E+00 | 1,03E-03 | 4,94E-01 | 0,00E+00  | 4,89E-03 | 1,06E-02 | 8,56E-02 | 7,95E-03 | -2,10E-01 |
| Acronyms                                     | PM = Particulate Matter Emissions; IRP= Ionising Radiation Potential |          |          |          |           |          |          |          |          |           |

## Resource use indicators

| Results per functional unit 1 m <sup>2</sup> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |          |          |          |          |          |          |          |           |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Indicator                                    | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | A1-A3    | A4       | A5       | B        | C1       | C2       | C3       | C4       | D         |
| PERE                                         | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4,02E+01 | 3,07E-02 | 1,92E+01 | 0,00E+00 | 1,36E-01 | 3,30E-01 | 2,13E+00 | 2,00E+00 | -7,63E+00 |
| PERM                                         | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3,35E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| PERT                                         | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3,75E+02 | 3,07E-02 | 1,92E+01 | 0,00E+00 | 1,36E-01 | 3,30E-01 | 2,13E+00 | 2,00E+00 | -7,63E+00 |
| PENRE                                        | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3,53E+02 | 1,87E+00 | 1,40E+02 | 0,00E+00 | 2,54E+01 | 2,23E+01 | 9,94E+00 | 1,67E+01 | -1,55E+02 |
| PENRM                                        | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2,01E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| PENRT                                        | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5,54E+02 | 1,87E+00 | 1,40E+02 | 0,00E+00 | 2,54E+01 | 2,23E+01 | 9,94E+00 | 1,67E+01 | -1,55E+02 |
| SM                                           | kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3,07E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| RSF                                          | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| NRSF                                         | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| FW                                           | m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1,62E-01 | 2,54E-04 | 4,65E-01 | 0,00E+00 | 1,88E-03 | 3,02E-03 | 7,67E-03 | 1,40E-02 | -2,09E-01 |
| Acronyms                                     | PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water |          |          |          |          |          |          |          |          |           |

<sup>1</sup> This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO<sub>2</sub> is set to zero.

## Waste indicators

| Results per functional unit 1 m <sup>2</sup> |      |          |          |          |          |          |          |          |          |           |
|----------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Indicator                                    | Unit | A1-A3    | A4       | A5       | B        | C1       | C2       | C3       | C4       | D         |
| Hazardous waste disposed                     | kg   | 2,91E+01 | 1,12E-05 | 4,81E-04 | 0,00E+00 | 1,61E-04 | 1,34E-04 | 1,66E-05 | 2,30E+00 | -1,27E-04 |
| Non-hazardous waste disposed                 | kg   | 7,74E-01 | 7,25E-02 | 2,79E+00 | 0,00E+00 | 3,42E-02 | 1,04E+00 | 3,81E-02 | 6,98E+01 | -4,57E-01 |
| Radioactive waste disposed                   | kg   | 2,11E-04 | 6,97E-07 | 2,73E-04 | 0,00E+00 | 2,62E-06 | 6,90E-06 | 6,84E-05 | 4,92E-06 | -1,43E-04 |

## Output flow indicators

| Results per functional unit 1 m <sup>2</sup> |      |          |          |          |          |          |          |          |          |          |
|----------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Indicator                                    | Unit | A1-A3    | A4       | A5       | B        | C1       | C2       | C3       | C4       | D        |
| Components for re-use                        | kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Material for recycling                       | kg   | 3,54E-01 | 0,00E+00 | 9,00E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,18E+02 | 0,00E+00 | 0,00E+00 |
| Materials for energy recovery                | kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy, electricity                 | MJ   | 1,83E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy, thermal                     | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

## Additional environmental information

### Recycled content

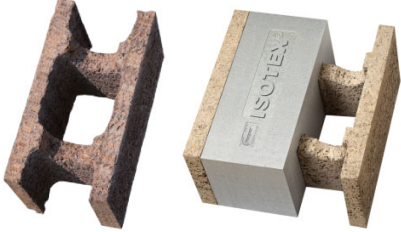
Isotex block, due to its making and its optimized productive cycle, allows to have a high amount of either recycled or recovered or by-product material content, **getting to a whole percentage of 48% per m<sup>2</sup> of product**. This percentage comes from adding the inner producing-cycle-by-product (cement formwork trimmings) to the 100% of recycled wood wholly deriving from recycling production chain, plus the recycled content of other materials composing the block. The assessment method approached to define the percentage of recycled content of the cement formwork is the method of mass balance. The following calculation has been made taking into consideration the **block HDIII 38/14** per m<sup>2</sup>:

| WOOD-CEMENT CASING                              | WEIGHT % | WEIGHT (kg/m <sup>2</sup> ) |
|-------------------------------------------------|----------|-----------------------------|
| PRE-CONSUMER RECYCLED CONTENT                   | 9,9%     | 2,4                         |
| POST-INDUSTRIAL RECYCLED CONTENT                | 100%     | 20,4                        |
| BY-PRODUCT                                      | 100%     | 18,6                        |
| Subtotal 1:                                     |          | 41,4 kg/m <sup>2</sup>      |
| EPS-GRAPHITE INSULATOR INSERT                   | WEIGHT % | WEIGHT (kg/m <sup>2</sup> ) |
| WHOLE AMOUNT OF RECYCLED CONTENT AND BY-PRODUCT | 15%      | 0,3                         |
| Subtotal 2:                                     |          | 0,3kg/m <sup>2</sup>        |
| <b>TOTAL (subtotal 1+ subtotal 2):</b>          |          | <b>42 kg/m<sup>2</sup></b>  |

| HDIII 38/14 with EPS-GRAPHITE (per m <sup>2</sup> )                                 |                                                    |
|-------------------------------------------------------------------------------------|----------------------------------------------------|
|  | WEIGHT: 88 kg/m <sup>2</sup> made of:              |
|                                                                                     | 42 kg/m <sup>2</sup> RECYCLED/RE-USED/BY-PRODUCT   |
|                                                                                     | 48% PER m <sup>2</sup> RECYCLED/RE-USED/BY-PRODUCT |

In a similar way, broadening this assessment to the whole range of blocks, we have:

#### CASING BLOCKS TYPE “HB” and HDIII” (per m<sup>2</sup>)

|                                                                                   |                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>48% PER m<sup>2</sup> RECYCLED/RE-USED/BY-PRODUCT</b></p> <p><i>Due the weight irrelevance of EPS, we get the same percentage as above both for the insulating casing blocks (HDIII type) and for the casing blocks without insulating (HB type).</i></p> |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The insulating material used and inserted in the block in itself has a 15% recycled content, fully complying with the demands of construction CAMS.

The value of the insulator recycled content is documented by the producer through proper certificates.

### Disassembling and end of life of the casing blocks wall

The 30th/05/2018 EU 2018/851/guideline in the context of Construction and Demolition activities explicitly refers to the need to “encourage the rebuilding, refurbishing and, when it is possible, the reconversion of products, as well as to share platforms” and adopt “measures meant to promote selective demolition to allow clearance and safe treatment of dangerous chemicals and facilitate high quality re-using and recycling through a selective removal of materials, as well as to guarantee construction and demolition waste selection systems at least as far as it concerns wood, mineral parts (cement concrete, bricks, tiles, ceramics and stones), metals, glass, plastic and chalk”.

It is possible to comply with this goal, also mentioned in the Construction CAMS, editing a waste and disassembling management plan.

**To edit a “disassembling/end-of-life plan” of a building designed and made with Isotex blocks walls, we can assume these latter made of re-usable materials and consequently able to undergo a selective end-of-life and disassembling process.**

**As a precautionary measure, the hypothetical end-of-life-scenario takes into account a percentage ranging from 10% to 20% of non-reusable material to be sent to a waste disposal site; the EPD assessments have been made taking into consideration the worse possible scenario of 20%** (sources: 2023 special waste annual report of Ispra).

Here a list of Isotex block materials that can be re-used or recycled according to the related CER codes. It is important to highlight that in the Isotex building system **there are no dangerous chemicals needing a special process.**

Starting assessment hypothesis: a 1 m<sup>2</sup> wall is made of 8 blocks.

We assume the presence of processing/recycling plants in the area and the mechanical separation of component materials is made on the spot or outside the building site. Here follows the CER code information related to the single block.

| STRATIGRAPHIC Component  | CER      | CER Description                                                                                   | End-of-life scenario |                                                                                                                                 |
|--------------------------|----------|---------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| EPS                      | 17.02.03 | plastic                                                                                           | RE-USE               | Recycle or re-use in the EPS process centres chain.                                                                             |
| WOOD-CEMENT CASING BLOCK | 17.01.07 | Blend or wastes of cement, bricks, tiles, ceramics different from the ones mentioned in 17.01.06. | RE-USE               | To produce recovered aggregated as building and demolition not-dangerous inert waste (ref. Decree 27th September 2022, n. 152). |

## Differences versus previous versions

Compared to the previous version of this EPD, the SimaPro software and the Ecoinvent database have been updated to the latest version. Company impacts, distribution statistics, end-of-life scenarios based on statistics from the new reference year (2022).

## References

- General Programme Instructions of the International EPD<sup>®</sup> System. Version 4.0.
- PCR 2019:14 Construction products, version 1.3.2
- Analisi del ciclo di vita dei prodotti in Legno Cemento, Ver.1.1, Febbraio 2024
- EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental
- ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment-Principles
- AIB – Association of issuing bodies nel report “European Residual Mixes – Results of the calculation of residual mixes for the calendar year 2022
- EN 16757: 2022 - Sustainability of construction works – Environmental product declarations - Product Category Rules for concrete and concrete elements
- Data from TOOL EPD Buzzi Unicem
- ISPRA, Rapporto rifiuti speciali Edizione 2023

