



ENVIRONMENTAL PRODUCT DECLARATION (EPD) FOR WOOD CEMENT ELEMENTS AND PANELS FOR FLOORING SYSTEMS





Company: ISOTEX Srl Via D'Este, 5/7-5/842028 Poviglio (RE) www.blocchiisotex.com Programme operator: The International EPD ® System – c/o EPD International AB Valhallavägen 81 SE-114 27 Stockholm Sweden www.environdec.com PCR: 2012:01 Construction products and construction services version 2.2 Geographical scope: Europe EPD registration number: S-P-01291 ECO EPD reference number: 00000794 Date of publication (issue): 2018-12-13 Date of validity: 2023-11-15

SUMMARY

1 PROGRAMME RELATED INFORMATION	
2 PRODUCT RELATED INFORMATION	
2.1 THE COMPANY	
2.2 THE PRODUCTS	
2.2.1 PRODUCT COMPOSITION	6
3 ENVIRONMENTAL PRODUCT DECLARATION	7
3.1 METHODOLOGY	7
3.2 DECLARED UNIT	
3.3 SYSTEM BOUNDARY	
3.4 MAIN ASSUMPTIONS	9
3.5 PARAMETERS DESCRIBING THE ENVIRONMENTAL IMPACTS	11
3.6 INDICATORS OF RESOURCES USE, WASTE AND OUTPUT FLOWS	12
3.7 INDICATORS OF WASTE AND OUTPUT FLOWS	13
4 REFERENCE	14
5 GLOSSARY	14
6 ADDITIONAL INFORMATION	16
7 VERIFICATION AND REGISTRATION	16

1 PROGRAMME RELATED INFORMATION

This EPD is developed under the program The International EPD [®] System, in compliance with the General Program Instruction version 2.5 for the EPD development and the Product Category Rules PCR CPC 54 "Construction products and Construction services" 2012:01 version 2.2.

More information about the International EPD [®] System is available on the website: <u>https://www.environdec.com/</u>

2 PRODUCT RELATED INFORMATION

2.1 THE COMPANY

ISOTEX is the first Italian company which manufacture wood cement blocks. This building system technique has been used in Germany since 1946.

So far, the ISOTEX[®] systems has been used in around 400,000 homes in Europe (of which approximately in Italy), due to the high reliability obtained by ISOTEX Company and its products in these years.

The manufacturing process is entirely performed in the company's site and make use of procedures and fully automatized machinery, which guarantees high quality and precise products.

More in detail, the company uses in its products just recycled wood (post-consumer) and as a such it performs accurate check on the quality of wood reaching the factory in order to validate the supply.

The company is equipped with machinery to check the specific characteristics of used raw materials, with special focus on the wood, and to adjust the mixture accordingly in order to keep constant and at the desired level the characteristics of the wood-cement produced.

Isotex owns a on site laboratory with equipment compliant to the requirements of the specific standard for checks and controls which are performed on each production lot are performed, including checks on specific weight (density) of the wood cement and mechanical tests.

Finally, the company is committed in the reduction and limitation of energy and resources from the environment. Indeed, the company re-uses in the production the wood cement products eventually not compliant and the scrap as well. In addition, the company has recently substituted part of the diesel forklift for the internal handling of the products with electric ones and has installed a Photovoltaic System for electricity generation.

Safety and living comfort represent the ISOTEX main goals for developing its building system. The technical performance of the products, in accordance with current Italian and European regulations, is guaranteed with tests in laboratories, university institutes and third party certification bodies.

The ISOTEX building system, with blocks and panels in wood cement, is the most widely used alternative to the traditional systems. Thanks to ease of use, remarkable technical characteristics, high-level living comfort and competitive costs, ISOTEX is the European leader company for the manufacturing of wood cement blocks and panels in wood-cement for over 30 years. Moreover, the company has become a reference point for technicians, builders and sellers.

The company has been implemented a quality management system according to the EN ISO 9001:2008 standard and it is certified by ANAB-ICEA (Italian National Association for Green Construction) for green construction material.



Figure 1: View of the ISOTEX site

2.2 THE PRODUCTS

The products covered by the present EPD are ISOTEX[®] wood cement elements and panels for flooring systems. Products are used for the construction of flooring systems and can be produced in difference thicknesses. More in detail, the references included in the present EPD are:

- Element S20, S25, S39
- Panels (flooring panels) S20, S25, S30 and S39

The panels are compliant with the standard "UNI EN 15037-1 Precast concrete products - Beam-and-block floor systems - Part 1: Beams". Elements are produced starting from fir wood grinded and refined, and bonded by cement Portland. The wood in input is recycled wood exclusively from pallets at end-of-life, selected and not treated. Panels are obtained by assembly of elements on the manufacturing plant into panels and then they are further assembled at construction site base on specific design requirements. More in detail, the elements are assembled by lattice girder, steel bar and cast concrete. The production process is represented in Figure 2.



Figure 2: Production process of the ISOTEX® wood cement elements and panels for flooring system



Figure 3: View of the ISOTEX® wood cement element (on the left) and panel for flooring system (on the right)

A picture of an element and a panel is showed in Figure 3.

Table 1 reports dimension specifications for the wood cement elements and design instructions for finished slab systems, for which concrete C25/30 and steel B450c are considered.

Table 1: Dimension specifications for wood cement elements and design instructions for finished slab systems

Dimension specifications for wood- cement elements	S20	S25	S30 (S25+5)	S39	
Length of the wood-cement element	1000 mm	1000 mm	-	1000 mm	
Width of the wood-cement element	265 mm	265 mm	-	250 mm	
Height of the wood-cement element	200 mm	250 mm	-	390 mm	
Weight of the wood-cement element	20 kg	24 kg	-	39 kg	
Design information for slabs	S20	S25	S30 (S25+5)	S39	
Weigh of the wood cement element	20 kg	24 kg	24 + 4 kg (element S25+50 mm of insulation in wood-cement)	39 kg	
Height of joist implemented in factory	5 cm	5 cm	5 cm	5 cm	
Weight of the joist	40 kg/m²	40 kg/m²	40 kg/m²	40 kg/m²	
Weight of the panel (including 4 cm of collaborating concrete)	4 elements * 20 kg = 80 + 40 = 120 kg/m ²	4 elements * 24 kg = 96 + 40 = 136 kg/m ²	4 elements * 28 kg = 112 + 40 = 152 kg/m ²	4 elements * 39 kg = 156 + 40 = 196 kg/m²	
Weight of filling concrete for the slab	180 kg/m²	224 kg/m²	262 kg/m²	168 kg/m²	
Total weight of the slab, including 4 cm of collaborating concrete	300 kg/m²	360 kg/m²	414 kg/m²	364 kg/m²	

The maximum load for slab (beyond its own weigh) assuming an indicative reinforcing steel with an axle spacing of 50 cm, varies between 300 and 700 kg/m² based on the steel diameter and slab length. Table 2 reports main technical characteristics of finished slab systems.

Table 2: Technical characteristic of the wood cement finished slab systems

Technical performance	S20	S25	S30	S39
Fire resistance REI class of the slab including the cast-in-situ concrete, without collaborating concrete (Standard UNI EN 13501-2)	240	240	240	240
Thermal resistance R of the slab including the cast- in-situ concrete and 4 cm of collaborating concrete [m ² K/W] (Standard UNI EN 10355 and UNI EN 6946)	0,846	0,921	0,921	3,407
Thermal resistance R of the finished slab, including surface resistance [m ² K/W]* (Standard UNI EN 10355 and UNI EN 6946)	1,588	1,663	1,663	4,089
Thermal transmittance U of the finished slab [W/m ² K]* (Standard UNI EN 10355 and UNI EN 6946)	0,63 (internal)	0,60 (internal)	0,60 (internal)	0,24 (internal) 0,28 (external)

* It is assumed a slab of weight between 300 and 400 kg/m². Elements S20, S25, S30 are used for internal slabs, S39 can be used also for external slabs. The following assumptions are done for internal slab: lightweight concrete 8 cm (λ = 0,28 W/mK), acoustic insulation 0,7 cm (λ = 0,35 W/mK), screed concrete 1800 kg/m³ 4 cm (λ = 0,93 W/mK), floor finishing in ceramic tiles 1,3 cm (λ = 1 W/mK). The following assumptions are done for external slab: internal plaster + slab + screed (bituminous sheath).

2.2.1 PRODUCT COMPOSITION

The ISOTEX[®] wood cement elements and panels for flooring systems do not contain SVHC. The composition of 1 m² of elements and panels are reported in Table 3 andTable 4, respectively.

Table 3: Product composition (in weight) of 1 m² of elements

Material and specification (in brackets)	UM	Element S20	Element S25	Element S39
Portland cement (Cement)	kg	43,12	47,97	74,93
Fir (Wood)	kg	29,61	32,94	51,44
Hydraulic lime, clinker based (Lime)	kg	4,42	4,91	7,67
Iron oxide (Pigment suspension)	kg	0,25	0,28	0,44
PSE with Graphite (Insulation)	kg			0,69

Table 4: Product composition (in weight) of 1 m² of panels

Material and specification (in brackets)	UM	Panel	Panel	Panel	Panel
		S20	S25	S30	S39
Portland cement (Cement)	kg	43,12	47,97	47 <i>,</i> 97	74,93
Fir (Wood)	kg	29,61	32,94	32,94	51,44
Hydraulic lime, clinker based (Lime)	kg	4,42	4,91	4,91	7,67
Iron oxide (Pigment suspension)	kg	0,25	0,28	0,28	0,44
Wood wool (Insulation)	kg			12,24	
PSE with Graphite (Insulation)	kg				0,69
Portland cement (Cement)	kg	8,66	9	9	9,33
Gravel (Inerts)	kg	36,44	37,84	37,84	39,24
Reinforcing bar (Steel)	kg	4,93	5,12	5,12	5,31
Lattice Girder (Steel)	kg	1,97	2,05	2,05	2,12

3 ENVIRONMENTAL PRODUCT DECLARATION

3.1 METHODOLOGY

The study behind the present EPD has been performed according to the state of art of the LCA methodology, with specific reference to the construction sector, in accordance to the following standard and guide lines:

- ISO 14040: 2006;
- ISO 14044: 2006;
- ILCD, International Reference Life Cycle Data System, Handbook. General Guidance for life cycle assessment. Detailed Guidance;
- ISO 14025:2006,
- International EPD System, General Programme Instructions for the International EPD System vers.
 2.5
- International EPD System, 2012:01 Construction products and construction services, version 2.2
- EN 15804:2012+A1:2013 "Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products".

The goal of the study is the evaluation of the potential environmental impacts of elements S20, S25, S39 and panels S20, S25, S30 and S39.

The EPD is mainly addressed to the business-to-business communication. The data elaboration has been performed with the Gabi software, version 8.0.6.0.20. The LCIA method used is CML 2001 version 4.2 (April 2013).

3.2 DECLARED UNIT

The declared unit is 1 m² of surface composed of ISOTEX[®] wood cement elements / panels for flooring systems.

3.3 SYSTEM BOUNDARY

System boundaries are "from cradle to gate" as represented in Table 5 and in showed in Figure 4.

Table 5: Life cycle stages included in the study for ISOTEX® wood cement elements and panels for flooring systems

PRODUCT STAGE		CONSTRUCTION PROCESS STAGE		USE STAGE			END-O	F-LIFE ST	AGE		BENEFITS and LOADS BEYOND SYSTEM BOUNDARY			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	С3	C4	D
Raw Material Supply	Transport	Manufacturing	Transport to the installation site	Construction, Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction, Demolition	Transport	Waste processing	Disposal	Reuse, Recycling potential
х	х	х	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*	Mnd*

* Module Not Declared

Figure 4: System boundaries for the ISOTEX® wood cement elements and panels for flooring systems



The following stages are included in the study:

Raw Material supply (A1). Production of raw materials used in the products, of as well as the production of energy carriers used in the production process.

Transport of raw materials to the factory and internal handling (A2)

Manufacturing of the ISOTEX[®] wood cement elements and panels for flooring systems (A3). It includes the following production phases:

- Collection and storage of (recycled) wood
- Grinding and refining of wood
- Creation of the mixture of wood-cement
- Moulding of blocks and check on semi-finished products
- Aging of blocks
- Milling of blocks
- Assembly of panels
- Final check on finished products and packaging.

Moreover, in module A3, the production of primary packaging and of the ancillary materials and the treatment of waste generated from the manufacturing processes are accounted for.

The electricity used in the manufacturing processes is from a specific supplier from Italy.

The reference year of the study is 2017.

3.4 MAIN ASSUMPTIONS, CUT OFFS AND BACKGROUND DATA INFORMATION

Regarding the exclusion of product life cycle stages and processes, the capital goods have not been accounted for, as well as the use and the end of life phases.

The main assumptions applied in the study are reported below.

- For the majority of the raw materials as well as for the packaging for the finished products an European production is assumed.
- A default mean a transportation (truck Euro 4 > 32 t) with an utilisation ratio of 0,61 has been assumed when primary data on transport were not available.
- For the energy consumption and the ancillary consumption in the manufacturing process, an allocation based on the mass of wood-cement has been applied.
- All the impacts related to the on-site production of energy have been allocated to the manufacturing process as conservative approach.
- For modelling the specific electricity mix purchased by ISOTEX from an Italian electricity supplier, the Guarantee of Origin certificate was used as reference for the composition of the energy sources, more in detail the last GO available at the moment of the development of the present EPD, i.e. 2016.

The construction of the manufacturing site (capital goods) in not included in the LCA study.

Background data used in the study are from LCI database implemented in the GaBi software and are not older than 5 years.

3.5 PARAMETERS DESCRIBING THE ENVIRONMENTAL IMPACTS

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Impact category	Modul	e A1-A3 Ele	ments				
	S20	S25	S39	S20	S25	S30	S 39
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	1,35E-05	1,52E-05	2,38E-05	2,13E-05	2,29E-05	2,54E-05	3,06E-05
Abiotic Depletion (ADP fossil) [MJ]	2,06E+02	2,31E+02	4,18E+02	4,14E+02	4,44E+02	5,51E+02	5,75E+02
Acidification Potential (AP) [kg SO2- Equiv.]	6,03E-02	6,74E-02	1,08E-01	1,21E-01	1,30E-01	1,48E-01	1,68E-01
Eutrophication Potential (EP) [kg Phosphate-Equiv.]	2,70E-02	3,25E-02	4,90E-02	3,96E-02	4,08E-02	4,38E-02	4,64E-02
Global Warming Potential (GWP 100 years) [kg CO2-Equiv.]	3,92E+01	4,34E+01	7,00E+01	6,30E+01	6,86E+01	1,83E+02	9,53E+01
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	4,36E-08	5,45E-08	8,00E-08	-8,88E-09	-1,15E-08	4,11E-07	-1,37E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	5,35E-03	6,02E-03	2,00E-02	1,24E-02	1,32E-02	2,56E-02	1,65E-02

3.6 INDICATORS OF RESOURCES USE

Table 7: Indicators of resources use for the ISOTEX® wood cement elements S20, S25, S39 and for the ISOTEX® wood cement panels S20, S25, S30 and S39 for flooring system

Indicators of resources use	Modul	e A1-A3 - Ele	ments	Module A1-A3 - Panels			
	S20	S25	S 39	S20	S25	S30	S39
Use of renewable primary energy excluding renewable							
primary energy resources used as raw materials [MJ, net calorific value]	1,02E+02	1,14E+02	1,78E+02	1,16E+02	1,28E+02	1,66E+02	1,92E+02
Use of renewable primary energy resources used as	3,61E+02	4,01E+02	6,27E+02	3,61E+02	4,01E+02	4,01E+02	6,27E+02
Total use of renewable primary energy resources							
(primary energy and primary energy resources used as	4,63E+02	5,15E+02	8,05E+02	4,77E+02	5,30E+02	5,67E+02	8,19E+02
raw materials) [MJ, net calorific value]							
Use of non- renewable primary energy excluding non-							
renewable primary energy resources used as raw materials [MJ, net calorific value]	2,30E+02	2,57E+02	4,60E+02	4,50E+02	4,84E+02	5,95E+02	6,29E+02
Use of non- renewable primary energy resources used	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
as raw materials [ivij, net calorific value]							
(primary energy and primary energy resources used as	2.30E+02	2.57E+02	4.60E+02	4.50E+02	4.84F+02	5.95E+02	6.29E+02
raw materials) [MJ, net calorific value]	_,	_,;; = = =	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.,	.,	0,001 01	0,202 02
Use of secondary material [kg]	2,96E+01	3,29E+01	5,14E+01	2,96E+01	3,29E+01	3,29E+01	5,14E+01
Use of non renewable secondary fuels [MJ, net calorific value]	3,91E+01	4,35E+01	6,79E+01	4,69E+01	5,16E+01	5,16E+01	7,64E+01
Use of renewable secondary fuels [MJ, net calorific value]	4,55E-15	5,44E-15	7,79E-15	2,86E-15	3,18E-15	3,91E-09	4,97E-15
Use of net fresh water [m3]	1,38E+00	1,70E+00	2,53E+00	1,86E+00	1,88E+00	3,01E+00	2,02E+00

3.7 INDICATORS OF WASTE AND OUTPUT FLOWS

Indicators of waste	Module	e A1-A3 - Ele	ements		Module A1-	A3 - Panels	
	S20	S25	S3 9	S20	S25	S30	S39
Hazardous waste disposed [kg]	1,50E-06	1,67E-06	2,63E-06	7,76E-06	8,18E-06	8,41E-06	9,35E-06
Non-hazardous waste disposed [kg]	3,01E-01	3,35E-01	5,47E-01	2,13E+00	2,24E+00	2,31E+00	2,47E+00
Radioactive waste disposed [kg]	9,18E-03	1,02E-02	1,63E-02	1,29E-02	1,41E-02	1,56E-02	1,99E-02

Table 8: Indicators of waste for the ISOTEX® wood cement elements S20, S25, S39 and for the ISOTEX® wood cement panels S20, S25, S30 and S39 for flooring system

4 REFERENCE

EC-JRC, 2010. International reference Life Cycle data System Handbook. General Guidance for life cycle assessment. Detailed Guidance

Ecoinnovazione, 2018. Technical report: LCA study of wood cement products and components for wall and flooring systems and for acoustic barriers

EN 15804:2012+A1:2013 "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

International EPD[®] System, 2017. General Programme Instructions for the International EPD System, vers. 2.5

International EPD® System, 2012. PCR 2012:01 Construction products and construction services, version 2.2

International Organisation for Standardization (ISO), 2006a Environmental management – Life Cycle assessment – Principles and framework. ISO 14040:2006, Geneva

International Organisation for Standardization (ISO), 2006b Environmental management – Life Cyle assessment – Requirements and guidelines. ISO 14044:2006, Geneva

International Organisation for Standardization (ISO), 2006c Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures. ISO 14025:2006, Geneva

5 GLOSSARY

ENVIRONMENTAL IMPACT: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects [ISO 14001:2015].

ENVIRONMENTAL DECLARATION: Claim which indicates the environmental aspects of a product or service. An environmental label or declaration may take the form of a statement, symbol or graphic on a product or package label, in product literature, in technical bulletins, in advertising or in publicity, amongst other things. [ISO 14020:2000].

HAZARDOUS WASTE: Hazardous waste is waste that poses substantial or potential threats to public health or the environment [EPD, General Programme Instructions 2.5].

IMPACT CATEGORY: Class representing environmental issues of concern to which life cycle inventory analysis results may be assigned [ISO 14040:2006]

LIFE CYCLE ASSESSMENT (LCA): Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle [ISO 14040:2006]

PRODUCT CATEGORY RULES (PCR): Set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories [ISO 14025:2006].

RAW MATERIAL: Primary or secondary material that is used to produce a product. Secondary material includes recycled material. [ISO 14040:2006]

RECOVERED (**RECLAIMED**) **MATERIAL**: Material that would have otherwise been disposed of as waste or used for energy recovery but has instead been collected and recovered (reclaimed) as a material input, in lieu of new primary material, for a recycling or a manufacturing process. [ISO 14021:2016].

SYSTEM BOUNDARY: Set of criteria specifying which unit processes are part of a product system [ISO 14040:2006].

SVHC: Substances that may have serious and often irreversible effects on human health and the environment can be identified as substances of very high concern (SVHCs). If a substance is identified as an SVHC, it will be added to the Candidate List for eventual inclusion in the Authorization List of the REACH Regulation). The inclusion in this list implicates legal duties for manufacturers, importers o companies, which use those substances as such, in formulation or in their products.

6 ADDITIONAL INFORMATION

EPDs within the same product category but from different programme may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. Environmental product declarations within the same product category from different programs may not be comparable. This EPD and the PCR CPC 54 "Construction products and Construction services" are available on the website of the International EPD® System (www.environdec.com).

The verifier and the Programme Operator do not make any claim nor have any responsibility of the legality of the products included in the present EPD.

Additional information on the company and on the products covered by the present EPD are available at https://www.blocchiisotex.com/

The LCA study and the present EPD have been issued with the technical scientific support of Ecoinnovazione S.r.l., spin-off ENEA (<u>http://ecoinnovazione.it/?lang=en</u>).

7 VERIFICATION AND REGISTRATION

CEN standard EN 15804 served as core PCR	
EPD Programme:	The International EPD [®] System For more information – www.environdec.com
PCR:	PCR 2012:01 Construction products and construction services version 2.2
PCR review was conducted by:	The Technical Committee of the International EPD [®] System. Contact via info@environdec.com
EPD Registration n°:	S-P-01291
EPD validity:	2023-11-15
EPD valid within the following geographical area:	Europe
Technical support:	Ecoinnovazione S.r.l. – spin-off ENEA Via d'Azeglio 51, 40123 Bologna COCOCOCOCOCOCOC spin off ENE Www.ecoinnovazione.it
Independent verification of the declaration and data according to ISO 14025:	EPD verification (external)
Third party verifier:	Tecnalia R&I Certificación
Accredited or approved by:	ENAC nº125/C-PR283 accreditation