wienerberger

Environmental Product Declaration

EPD of multiple products, based on the average results of the product group. In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Clay masonry products

from

Wienerberger Téglaipari zRt.

PROGRAMME INFORMATION

Programme: The International EPD® System, www.environdec.com
Programme operator: EPD International AB
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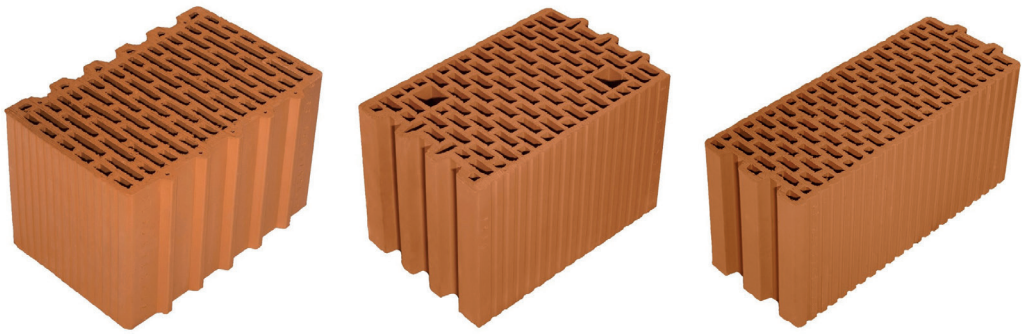
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



EPD®
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GENERAL INFORMATION

PROGRAMME INFORMATION

Programme: The International EPD® System

Address: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden

Website: www.environdec.com

E-mail: info@environdec.com

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 v1.3.2, Construction products

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life Cycle Assessment (LCA)

LCA accountability: denkstatt Hungary Kft.
LCA practitioners: Csongor Bajnóczki and Csaba Fűzfa

Third-party verification

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

☒ EPD verification by individual verifier

Third-party verifier: Anni Oviir, Rangi Maja OÜ 

Approved by: The International EPD® System

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: Wienerberger Téglaipari zRt.

Contact

Postal address: 1119 Budapest, Bártfai utca 34.

Phone: +36 1 464 7030

Email: info@wienerberger.hu

Description of the organization

Wienerberger Téglaipari zRt. Hungary is a member of the international company Wienerberger AG. The parent company was founded in Vienna in 1819, which has now grown into one of the largest ceramic block manufacturers in the world, is in first place in the production of facing bricks and occupies a leading position in the production of ceramic roof tiles in Europe. Next to the ceramic base products Wienerberger AG and its subsidiary companies produce concrete and plastic building materials for different purposes of use (paving, pipes, etc.) as well. Of the company's 9 manufacturing plants 5 produce ceramic blocks and lintels under the brand Porotherm. The plants are situated near Tiszavasvári, Solymár, Békéscsaba, Balatonszentgyörgy and Kőszeg covering all parts of Hungary.

Product-related or management system-related certifications

- ISO 9001: 2015

- ISO 14001: 2015

- ISO 45001: 2018

- ISO 50001: 2018

Name and location of production site(s)

Solymár, Hungary
Balatonszentgyörgy, Hungary
Tiszavasvári, Hungary
Békéscsaba, Hungary
Kőszeg, Hungary

Product information

Product name, product identification, and product description

Product Description

The Porotherm masonry units are made from clay and additives, fired at high temperature to achieve a ceramic bond. The intended use of blocks is in masonries which are protected against water penetration and are not in contact with soil and ground water (protected masonry). The products depending on their shape could be used in loadbearing or non-loadbearing (infill / partition / acoustic / etc.) walls as well.

Application - Porotherm

The application of the Porotherm products is possible with two different types of mortar depending on the height of the blocks. The traditional version with a height of 238 mm can be applied with a mortar thickness of 12 mm (general use mortar, or light weight mortar). The so-called grinded blocks have a height of 249 mm and can be applied with thin layer mortar or PU based glue (thickness 1 mm). The Porotherm masonry units have an interlocking system vertically where no mortar use is needed. One product has a mortar pocket connection system. The traditional full brick has no interlocking system and needs to be laid with both vertical and horizontal mortar. The recommended intended use is given by product family (Comfort, Classic, Partition, Acoustic, Floor system, Accessories).

Porotherm Rapid

The wallblocks' lying surfaces are grinded during production, resulting dimensionally high-precision masonry units. Porotherm Rapid wallblocks can be laid with either thin layer mortar or PU glue with the thickness being 1 mm. The wallblocks are manufactured to a height of 249 mm. Both load-bearing and non-load-bearing masonry can be built from it, with excellent thermal insulation values.

Comfort

Masonry units with excellent thermal insulation performance, which are suitable for the construction of monolithic load-bearing masonry or masonry with optimal external thermal insulation system.
Products belonging to this family are the following: Porotherm 30 X-therm (Rapid), Porotherm 38 X-therm (Rapid), Porotherm 44 X-therm (Rapid).

Classic

Classic masonry units with an interlocking connection, suitable for building load-bearing masonry. In case of external masonry, the walls must be insulated with ETICS (external thermal insulation composite system).
Products belonging to this family are the following: Porotherm

38 N+F, Porotherm 30 N+F neo (Rapid), Porotherm 25 N+F (Rapid), Porotherm 38 Cellar brick.

Partition

Masonry units with an interlocking connection for partition walls.
Products belonging to this family are the following: Porotherm 20 N+F (Rapid), Porotherm 10 N+F neo (Rapid).

Acoustic

Masonry units with excellent sound insulation properties, which can only be laid with thick layer mortar to provide sufficient sound insulation values.
Products belonging to this family are the following: Porotherm 30 AKU Z.

Floor system

Porotherm floor system is a half monolithic solution, to create a ceramic surface slab from pre-manufactured beams and blocks and on-site concrete.
Products belonging to this family are the following: Porotherm 60/17, Porotherm 45/17.

Accessories

'Full brick' (=Nagyszilárdságú Tömör tégla) is a traditional product. Typical use is above lintels as a part of a composite lintel system. Porotherm U is a special use formwork which must be filled with reinforced concrete thus creating a system: e.g. wall-crown, columns, and on-site lintel. Products belonging to this family are the following: Porotherm U, Nagyszilárdságú tömör tégla.

UN CPC code: 154

Geographical scope: Hungary

LCA information

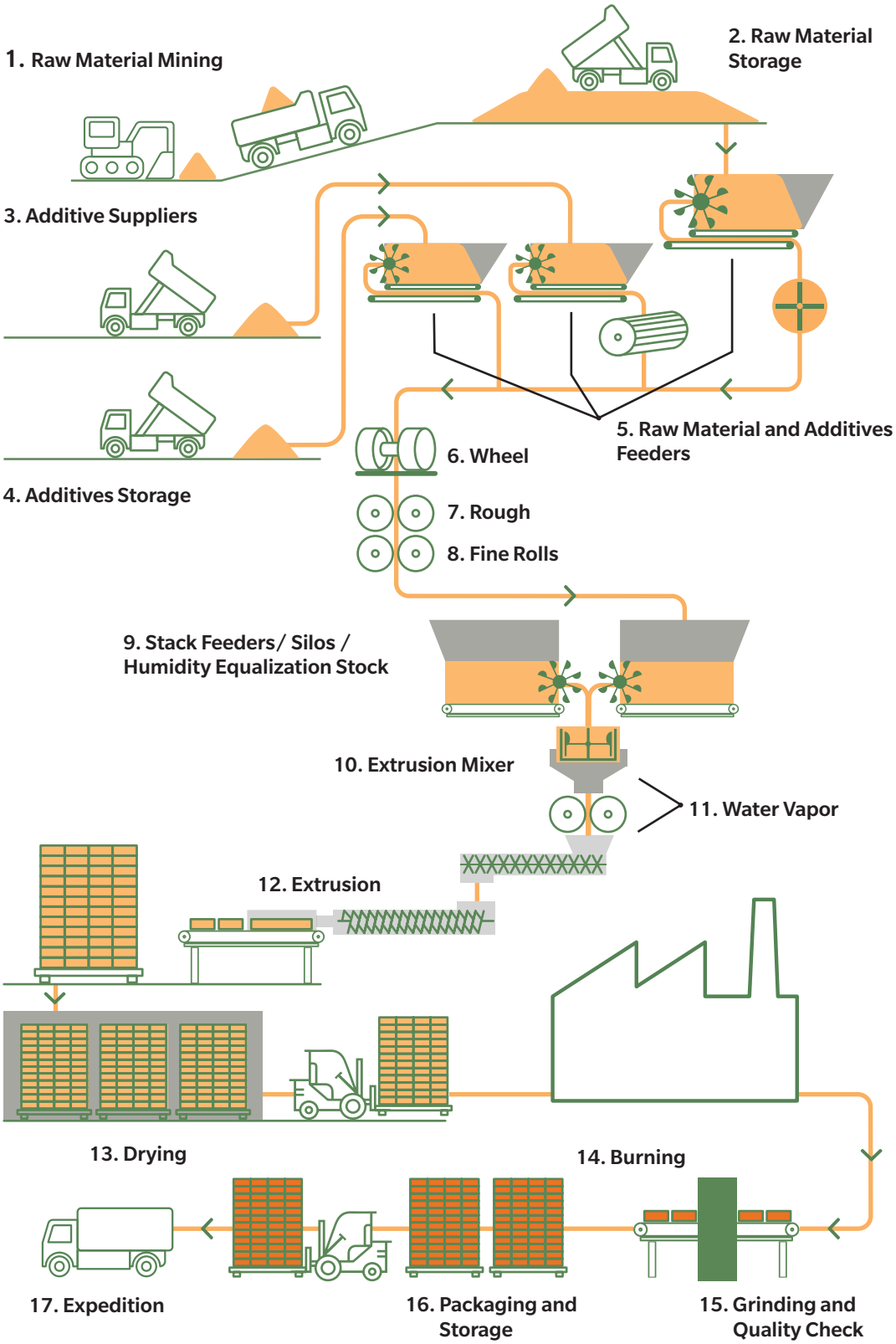
Declared unit: 1 metric ton

Declared products: all the clay masonry products manufactured at the five production facilities (Solymár, Balatonszentgyörgy, Tiszavasvári, Békéscsaba, Kőszeg)

Reference service life: 150 years
Time representativeness: 2022
Database(s) and LCA software used: ecoinvent 3.9.1 (the EN 15804 reference package based on EF 3.1 has been used) and Microsoft Excel
Description of system boundaries: Cradle to gate with modules A5, C1–C4, and module D (A1–A3 + A5 + C + D)
Energy in the manufacturing phase: Electricity information and CO_2 emission, kg CO_2-eq./kWh (GWP-GHG): electricity, low voltage, residual mix // HU, electricity, low voltage (Ecoinvent 3.9.1): 0,39 kg CO_2-eq./kWh.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing of product	Collected data	EPD owner	2022	Primary	68,1%
Generation of electricity used in manufacturing of product	Database	Ecoinvent 3.9.1	2022	Primary	6,1%
Materials	Database	Ecoinvent 3.9.1	2022	Representative generic data	0%
Transportation	Database	Ecoinvent 3.9.1	2022	Primary	0,7%
Direct process emissions	Collected data	EPD owner	2022	Primary	17,1%
Other processes	Database	Ecoinvent 3.9.1	2022	Representative generic data	0%
Total share of primary data, of GWP-GHG results for A1-A3					**92%**

MANUFACTURING PROCESS DIAGRAM



Manufacturing process

1. Extraction of clay - clay is extracted from clay mines located directly next to the brick factories.

2. The clay is being stored and prepared in raw mineral storages built after mining.

3.-4. The extracted clay is transported to the preparation machine, where it is crushed into small pieces while adding water. Additives like sawdust are being added and mixed with the clay during preparation.

5.-10. The mixture goes through rolls of different types and strengths in order to crush and mix the materials properly.

11. The water-content of the mixture is being controlled and equalized.

12. The prepared raw material is extruded by being pressed through the mouthpiece of the press and creates its brick shape. After the pressing machine, the elements are cut to the appropriate size by a wire cutter.

13. Then the raw bricks are taken to the dryer. At temperatures between 40 and 100 °C in the dryer, the brick loses the vast majority of its moisture. From the dryer, the bricks are transferred to special kiln carts.

14. This is followed by the most important process of brick production, the firing, which takes place at 800-900 °C in the kiln.

15.-16. In the production of grinded technology (Porotherm Rapid bricks), another production phase appears after firing. The bricks cut to size pass between large grinding wheels, so the masonry elements become millimeter accurate. After that, only the packaging remains, these elements are also packed on pallets, foiled, and strapped.

More information

Detailed information on the products can be found at https://www.wienerberger.hu/. The underlying LCA study was carried out by denkstatt Hungary Kft.
(contact: denkstatt@denkstatt.hu).

Data quality

ISO 14044 was applied in terms of data collection and quality requirements. The data concerning the modules A1 (raw material supply), A2 (transportation) and A3 (product manufacturing) were provided by Wienerberger Téglaipari zRt. and involved all input and output materials to the plants, the consumed utilities (energy, water) and the distances and means of transport for each input stream. Data reliability is considered very good for energy consumption, material inputs, material outputs, transportation, and waste management.

Allocation

ISO 14040 defines the allocation as "partitioning the input or output flow of a unit process to the product system under study". Allocation was done to identify the associated quantity of flows that are common for the factory: electricity and petrol used for logistic purposes, product specific data (e.g., material inputs), transportation and use of packaging materials (EUR-pallets), water usage, and the delivery kilometers of the common ingredients. Allocation is based on product volume, mass (kg), because there is a linear correlation between energy demand and weight mass of materials (product volume) and the inputs and outputs were provided in mass (kg).

Justification behind the grouping of products and manufacturing sites

The products included in this EPD are all masonry elements with the same ingredients used in similar ratios used for similar purposes. The manufacturing steps and equipment used to make these products are also the same.

Allocation of co-products

During the manufacturing of clay masonry products, scrap is generated from time to time. The scrap is sold as clay rubble; thus, it is considered to be a co-product and generates positive economic value. For this reason, the environmental impacts in connection with the production of the clay masonry products and the production of the co-product is allocated on the base of physical properties (production volume), because there is a relevant underlying physical relationship between the products and co-products.

Cut-off rules

According to the PCR and EN 15804, not more than 5% of the incoming flows (by mass and energy) per module can be excluded. Data is provided for all inputs and outputs to the factory processes, and they are accounted in the model in full. Materials and processes with negligible contributions (less than 1%) are also included. For processes after the production stage, relevant scenarios are assumed regarding geographical scope and existent practices, e.g., for waste treatment options. Where site-specific data was missing, it was modelled with generic datasets from the Ecoinvent 3.9.1 database. Construction of buildings, machines and other equipment or infrastructure and consumption related to offices are not included as they do not have a direct relation to the production process.

Technical characteristics based on MSZ EN 771-1:2011+A1:2015:

Unit	Size (length*width*height) mm	Gross dry density kg/m³	Declared compressive strength N/mm²	Thermal conductivity W/mK	Fire resistance class Class	Unit/m² pcs
Porotherm 44 X-therm Rapid	250*440*249	740	10	0,1	A1	16
Porotherm 44 X-therm	250*440*238	740	10	0,1	A1	16
Porotherm 38 X-therm Rapid	250*380*249	740	10	0,1	A1	16
Porotherm 38 X-therm	250*380*238	740	10	0,1	A1	16
Porotherm 30 X-therm Rapid	250*300*249	740	10	0,087	A1	16
Porotherm 30 X-therm	250*300*238	740	10	0,087	A1	16
Porotherm 38 N+F	250*380*238	750	11	0,16	A1	16
Porotherm 30 N+F Rapid	250*300*249	750	11	0,16	A1	16
Porotherm 30 N+F	250*300*238	750	11	0,16	A1	16
Porotherm 30 N+F neo Rapid	250*300*249	670	11	0,148	A1	16
Porotherm 30 N+F neo	250*300*238	670	11	0,148	A1	16
Porotherm 25 N+F Rapid	375*250*249	750	11	0,3	A1	10,7
Porotherm 25 N+F	375*250*238	750	11	0,3	A1	10,7
Porotherm 38 Pincetégla	250*380*238	740	14	0,25	A1	16
Porotherm 20 N+F	500*200*238	750	11	0,3	A1	8
Porotherm 10 N+F Rapid	500*100*249	820	5	0,3	A1	8
Porotherm 10 N+F	500*100*238	820	5	0,3	A1	8
Porotherm 10 N+F neo Rapid	500*100*249	700	5	0,3	A1	8
Porotherm 10 N+F neo	500*100*238	700	5	0,3	A1	8
Porotherm 30 AKU Z	250*300*238	1150	15	0,35	A1	16
Porotherm 30 U zsalu	240*300*238	480	NPD	NPD	A1	NPD
Nagyszilárdságú tömör tégla	250*120*65	1600	40	NPD	A1	102
Porotherm 45/17	250*330*170	701-800	NPD	NPD	A1	8,89/7,02
Porotherm 60/17	250*480*170	701-800	NPD	NPD	A1	6,67/5,56

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	ND	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	EU	EU	HU	N/A	EU	N/A	N/A	N/A	N/A	N/A	N/A	N/A	EU	EU	EU	EU	EU
Specific data used	<90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products[1]	-15/+38%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products[2]	1%-95%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	>10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] *In an EPD of multiple products, the difference (in %) between the declared GWP-GHG result, and the product with GWP-GHG results furthest away from the declared results shall be reported in the EPD. If the difference is below 10%, the actual difference or "<10%" shall be reported. Optionally, this variation can instead be declared as the difference between the declared result and lowest and highest result, respectively.*

[2] *If the EPD does not claim compliance with ISO 21930, variations above 10% are allowed, if justified in the LCA report and the EPD declares the variation of each impact indicator results for which the variation is above 10%.*

Variation - products[3]

	Unit	AP	GWP-t	GWP-b	GWP-f	GWP-l	ADP-f	EP-f	EP-m	EP-t	ADP-m&m	ODP	POCP	WDP
Balaton-szentgyörgy	PTH 44 X-therm	16%	1%	80%	11%	28%	40%	5%	16%	17%	8%	67%	29%	27%
	PTH 30 X-therm	16%	1%	80%	10%	28%	39%	5%	16%	17%	8%	66%	28%	27%
	PTH 30 N+F	16%	4%	79%	12%	28%	41%	6%	17%	18%	8%	68%	30%	28%
	PTH 30 N+F neo	48%	1%	49%	0%	73%	26%	0%	38%	47%	20%	55%	39%	41%
	PTH 25 N+F	17%	5%	79%	12%	28%	42%	7%	17%	18%	8%	68%	30%	29%
	PTH 38 Pincetégla	16%	5%	79%	12%	28%	41%	6%	17%	18%	8%	68%	30%	28%
	PTH 20 N+F	16%	4%	79%	12%	28%	41%	7%	17%	18%	8%	68%	30%	28%
	PTH 10 N+F	18%	8%	79%	15%	29%	44%	8%	19%	19%	9%	70%	32%	31%
	PTH 30 U zsalu	18%	7%	80%	15%	29%	44%	8%	19%	20%	10%	70%	32%	31%
	PTH 45/17	18%	8%	79%	15%	29%	44%	7%	18%	19%	9%	70%	31%	30%
	PTH 60/17	17%	8%	79%	14%	29%	43%	7%	18%	19%	9%	70%	31%	30%
Békéscsaba	PTH 38 N+F	21%	11%	85%	22%	35%	50%	18%	22%	23%	13%	73%	36%	43%
	PTH 30 N+F	21%	12%	83%	21%	34%	49%	17%	21%	22%	12%	73%	35%	42%
	PTH 30 N+F neo	29%	26%	86%	33%	38%	60%	30%	30%	30%	18%	80%	45%	53%
	PTH 25 N+F	20%	9%	85%	21%	34%	48%	17%	21%	22%	12%	73%	35%	41%
	PTH 20 N+F	23%	16%	85%	26%	35%	53%	19%	24%	25%	14%	76%	39%	44%
	PTH 10 N+F	24%	20%	85%	28%	35%	55%	21%	26%	26%	15%	77%	41%	47%
	PTH 30 AKU Z	24%	27%	73%	28%	33%	54%	19%	25%	26%	13%	77%	40%	44%
	PTH 30 U zsalu	0%	28%	57%	25%	30%	0%	7%	0%	0%	0%	0%	0%	0%
Kőszeg	Nagyszilárdságú tömörtégla	44%	5%	95%	41%	0%	74%	79%	44%	40%	24%	83%	52%	74%

	Unit	AP	GWP-t	GWP-b	GWP-f	GWP-l	ADP-f	EP-f	EP-m	EP-t	ADP-m&m	ODP	POCP	WDP
Solymár	PTH 38 X-therm Rapid	16%	1%	80%	11%	28%	40%	5%	16%	17%	8%	67%	29%	27%
	PTH 38 X-therm	16%	1%	80%	10%	28%	39%	5%	16%	17%	8%	66%	28%	27%
	PTH 30 X-therm Rapid	16%	4%	79%	12%	28%	41%	6%	17%	18%	8%	68%	30%	28%
	PTH 30 X-therm	48%	1%	49%	0%	73%	26%	0%	38%	47%	20%	55%	39%	41%
	PTH 30 N+F Rapid	17%	5%	79%	12%	28%	42%	7%	17%	18%	8%	68%	30%	29%
	PTH 30 N+F	16%	5%	79%	12%	28%	41%	6%	17%	18%	8%	68%	30%	28%
	PTH 30 N+F Neo Rapid	16%	4%	79%	12%	28%	41%	7%	17%	18%	8%	68%	30%	28%
	PTH 30 N+F Neo	18%	8%	79%	15%	29%	44%	8%	19%	19%	9%	70%	32%	31%
Tiszavasvári	PTH 44 X-therm Rapid	22%	15%	84%	24%	30%	52%	17%	24%	24%	14%	75%	38%	44%
	PTH 44 X-therm	22%	15%	83%	23%	30%	51%	15%	23%	24%	13%	75%	38%	43%
	PTH 30 X-therm Rapid	18%	7%	82%	17%	28%	45%	10%	19%	20%	11%	71%	33%	37%
	PTH 30 X-therm	18%	6%	83%	16%	28%	44%	8%	19%	20%	10%	70%	32%	36%
	PTH 38 N+F	18%	0%	85%	15%	29%	43%	8%	19%	19%	10%	69%	32%	36%
	PTH 30 N+F Rapid	19%	7%	85%	18%	29%	47%	10%	20%	21%	11%	72%	34%	38%
	PTH 30 N+F	17%	1%	85%	15%	29%	44%	8%	18%	19%	10%	70%	32%	36%
	PTH 30 N+F neo Rapid	52%	8%	59%	8%	73%	33%	2%	41%	51%	21%	59%	44%	43%
	PTH 30 N+F neo	52%	7%	58%	7%	73%	31%	1%	41%	51%	19%	58%	43%	43%
	PTH 25 N+F Rapid	18%	2%	85%	16%	29%	45%	11%	19%	20%	11%	70%	32%	37%
	PTH 25 N+F	18%	1%	85%	15%	29%	44%	9%	19%	20%	10%	70%	32%	37%
	PTH 20 N+F Rapid	18%	1%	85%	16%	29%	45%	11%	19%	20%	11%	70%	33%	38%
	PTH 20 N+F	18%	1%	85%	16%	30%	45%	9%	19%	20%	11%	70%	33%	38%
	PTH 10 N+F Rapid	23%	15%	85%	25%	30%	53%	16%	24%	25%	14%	76%	39%	44%
	PTH 10 N+F	22%	14%	85%	24%	30%	52%	13%	24%	24%	13%	76%	39%	43%
	PTH 30 AKU Z	27%	30%	79%	32%	30%	58%	17%	28%	29%	14%	80%	44%	48%

[3] *If the EPD does not claim compliance with ISO 21930, variations above 10% are allowed, if justified in the LCA report and the EPD declares the variation of each impact indicator results for which the variation is above 10%.*

Content information per functional unit

Product components	Weight kg	Post-consumer material weight-%	Biogenic material weight-% and kg C/kg
Clay	800-1000	0	0
Sawdust	0-200	0	49%, 0,494
TOTAL	1000	0	0-20%, 0-0,2 kg

Packaging materials	Weight kg	Weight % (versus the product)	Weight biogenic carbon kg C/kg
EUR wooden pallet	21,23	2,12%	0,45
Plastic foil	0,76	0,08%	0
Plastic band	0,07	0,01%	0
TOTAL	22,06	2,21%	0,44

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2

RESULTS OF THE ENVIRONMENTAL PERFORMANCE INDICATORS

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2,47E+02	8,07E+01	3,56E+00	8,30E+01	5,16E+00	2,83E-01	-1,96E+00
GWP-biogenic	kg CO_2 eq.	-2,99E+01	3,25E+01	7,68E-04	6,88E-02	5,95E-02	8,43E-04	-2,11E-03
GWP-luluc	kg CO_2 eq.	2,52E-01	6,66E-02	4,00E-04	4,88E-02	5,73E-03	5,57E-05	-2,21E-04
GWP-total	kg CO_2 eq.	2,17E+02	8,21E+01	3,56E+00	8,31E+01	5,22E+00	2,84E-01	-1,96E+00
ODP	kg CFC 11 eq.	7,79E-06	3,88E-06	5,66E-08	1,81E-06	1,11E-07	9,80E-09	-2,93E-08
AP	mol H^+ eq.	9,90E-01	9,38E-01	3,30E-02	3,22E-01	3,28E-02	1,83E-03	-4,82E-02
EP-freshwater	kg P eq.	1,90E-02	2,81E-02	1,09E-04	7,06E-03	1,98E-03	1,32E-05	5,38E-05
EP-marine	kg N eq.	2,73E-01	7,80E-02	1,53E-02	1,17E-01	1,11E-02	7,96E-04	-1,74E-02
EP-terrestrial	mol N eq.	4,06E+00	7,68E-01	1,66E-01	1,25E+00	1,17E-01	8,54E-03	-2,46E-01
POCP	kg NMVOC eq.	1,00E+00	3,31E-01	4,93E-02	4,59E-01	3,87E-02	3,39E-03	-5,36E-02
ADP-minerals & metals*	kg Sb eq.	6,54E-04	7,67E-04	1,25E-06	3,73E-04	2,53E-05	3,02E-07	-5,84E-06
ADP-fossil*	MJ	2,77E+03	1,40E+03	4,70E+01	1,18E+03	1,00E+02	7,24E+00	-2,24E+01
WDP*	m^3	3,25E+01	7,44E+01	1,16E-01	6,72E+00	1,14E+00	2,49E-02	-3,32E+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.*

*** Disclaimer: The information provided by modules A1-A3 is intended for informational purposes only. While these modules may yield valuable insights, it is crucial to consider the results from module C in conjunction with them.*

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
GWP-GHG[4]	kg CO_2 eq.	2,47E+02	8,08E+01	3,56E+00	8,31E+01	5,16E+00	2,83E-01	-1,96E+00

Resource use indicators

Results per functional or declared unit								
Indicator	Unit	A1-A3	A5	C1	C2	C3	C4	D
PERE	MJ	3,18E+03	1,16E+02	2,64E-01	2,55E+01	7,95E+00	1,43E-01	-2,22E+00
PERM	MJ	6,92E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,88E+02	0,00E+00
PERT	MJ	3,87E+03	1,16E+02	0,00E+00	2,55E+01	7,95E+00	-3,88E+02	-2,22E+00
PENRE	MJ	1,88E+03	8,81E+02	4,70E+01	1,18E+03	1,00E+02	7,24E+00	-2,24E+01
PENRM	MJ	7,84E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,66E+03	8,81E+02	0,00E+00	1,18E+03	1,00E+02	7,24E+00	0,00E+00
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,50E+02
RSF	MJ	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
FW	m^3	3,25E+01	7,44E+01	1,16E-01	6,72E+00	1,14E+00	2,49E-02	-3,32E+00

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

[4] *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_2 is set to zero.*

Waste indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2,30E+00	4,55E+00	2,16E-02	8,87E-01	1,19E-01	2,13E-03	-2,21E-02
Non-hazardous waste disposed	kg	6,89E+01	2,04E+02	4,31E-01	3,13E+01	7,89E+00	5,40E-02	4,06E-01
Radioactive waste disposed	kg	3,81E-03	1,42E+03	5,10E-06	5,76E-04	2,45E-04	1,56E-06	2,39E-05

Output flow indicators

Results per functional or declared unit								
Indicator	**Unit**	**A1-A3**	**A5**	**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
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,50E+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
Exported energy, electricity	MJ	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

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