THE INTERNATIONAL EPD® SYSTEM

TURKEY EPD®

ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

ASTM C150 Type I/II Portland Cement

Manufactured by AKÇANSA

Programme: The International EPD® System	Programme Operator: EPD International AB	Local Operator: EPD Turkey	S-P Code: S-P-04789	Publication Date: 2022-06-09	Validity Date: 2027-06-08	Geographical Scope: Turkey

AKÇANSA

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.

Programme Information

The International EPD® System	EPD Turkey
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ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR):

2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 375 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

PCR review was conducted by:

The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

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

EPD process certification EPD verification ✓

Third party verifier: Will be determined.

Approved by: The International EPD® System Technical Committee, supported by the Secretariat

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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

About AKÇANSA

Akçansa, a joint venture of Sabancı Holding and HeidelbergCement, is the largest cement producer of Turkey, and is the leader company of its industry.
Akçansa was founded in 1996 as a result of the merger of Akçimento (founded in 1967) and Çanakkale Çimento (founded in 1974).

Operating in the Marmara, Aegean, and Black Sea regions, Akçansa produces cement and clinker in its three factories located in Istanbul-Büyükçekmece, Çanakkale, and Samsun-Ladik. Company also has total seven cement terminals located in Istanbul-Ambarlı, İzmir-Aliağa, Yalova, Yarımca, Hopa, Derince, and Marmara Ereğlisi.

Akçansa merged with its subsidiary Betonsa in 1998 and as a result of this merger, the company started providing service with its “Betonsa” brand, and produces concrete at approximately 30 plants in the Marmara, Aegean, and Black Sea regions. The company merged with another subsidiary, Agregasa Agrega, in 2002 and produces aggregate under the brand of “Agregasa” at 4 plants. Akçansa aims to be “the highest quality in production and service” in order to meet the demands of both its domestic and international customers and to compete beyond the price.

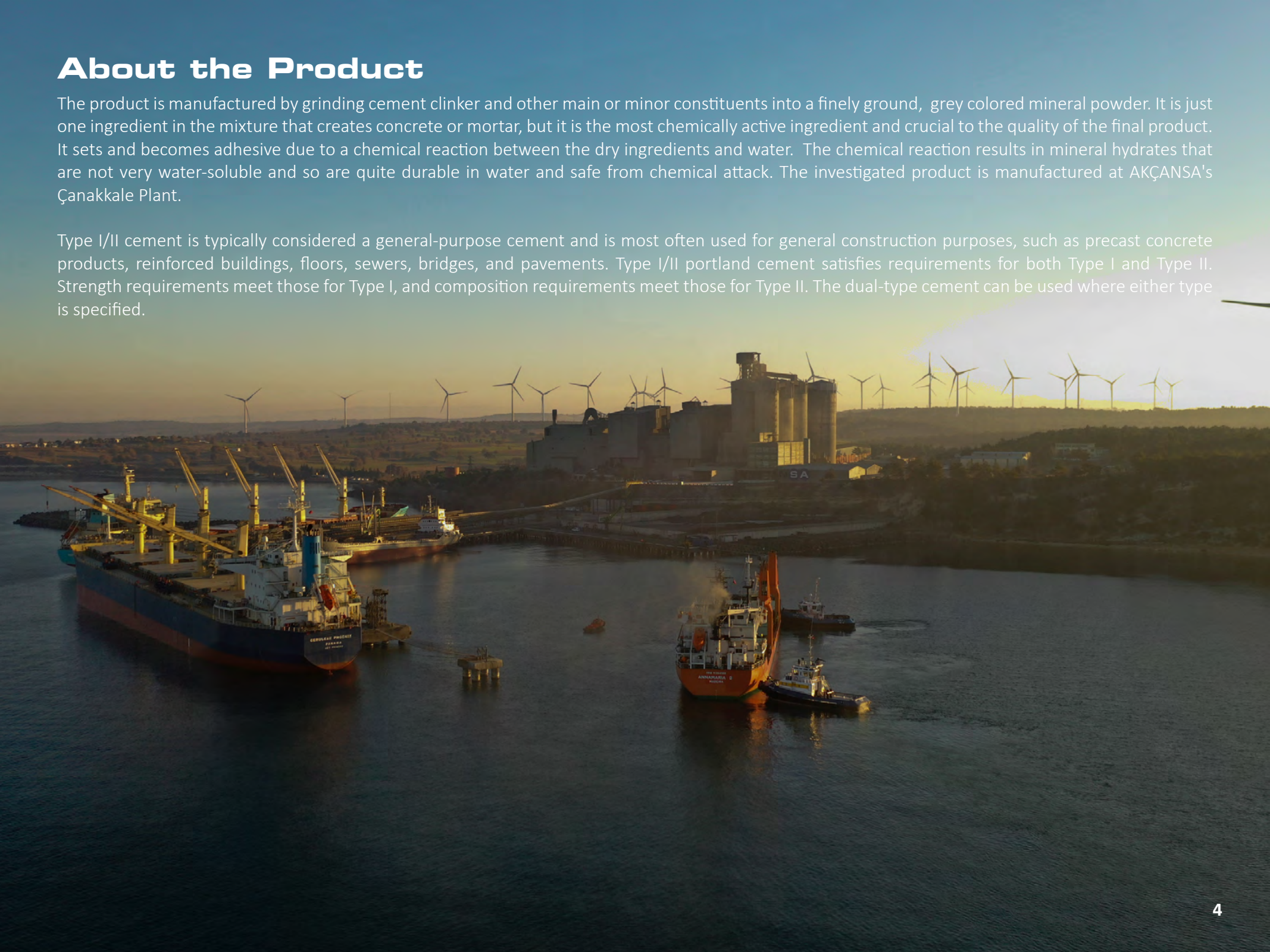
Akçansa, the leader of the Turkish cement industry, meets 10 % of Turkey’s cement need as well as 16 % of Turkey’s total cement and clinker export with its products complying to the global quality standards, its eco-friendly identity awarded by the Istanbul Chamber of Industry, its outstanding service understanding, and its plants equipped with high technology.

During the production, AKÇANSA makes use of the waste heat and benefits from its wind power plant. This reduces the amount of mains electricity that AKÇANSA needs to use.

About the Product

The product is manufactured by grinding cement clinker and other main or minor constituents into a finely ground, grey colored mineral powder. It is just one ingredient in the mixture that creates concrete or mortar, but it is the most chemically active ingredient and crucial to the quality of the final product. It sets and becomes adhesive due to a chemical reaction between the dry ingredients and water. The chemical reaction results in mineral hydrates that are not very water-soluble and so are quite durable in water and safe from chemical attack. The investigated product is manufactured at AKÇANSA's Çanakkale Plant.

Type I/II cement is typically considered a general-purpose cement and is most often used for general construction purposes, such as precast concrete products, reinforced buildings, floors, sewers, bridges, and pavements. Type I/II portland cement satisfies requirements for both Type I and Type II. Strength requirements meet those for Type I, and composition requirements meet those for Type II. The dual-type cement can be used where either type is specified.



Technical specifications of the product

Item	Limit	Item	Limit
Al_2O_3 (%)	≤ 6.0	False Set (%)	≥ 50
Fe_2O_3 (%)	≤ 6.0	Blaine Fineness (m^2/kg)	≥ 260
MgO (%)	≤ 6.0	Autoclave Expansion (%)	≤ 0.8
SO_3 (%)	≤ 3.0	Initial Set (minutes)	≥ 45
Loss on Ignition (%)	≤ 3.5	Final Set (minutes)	≤ 375
Insoluble Residue (%)	≤ 1.5	Air Content Volume (%)	≤ 12
Limestone (%)	≤ 5.0	CS 3 days (psi)	≥ 1450
$CaCO_3$ in Limestone (%)	≥ 70	CS 7 days (psi)	≥ 2470
C_3A	≤ 8.0	Mortar Bar Expansion (%)	≤ 0.020
$C_3S+4.75*C_3A$	≤ 100		

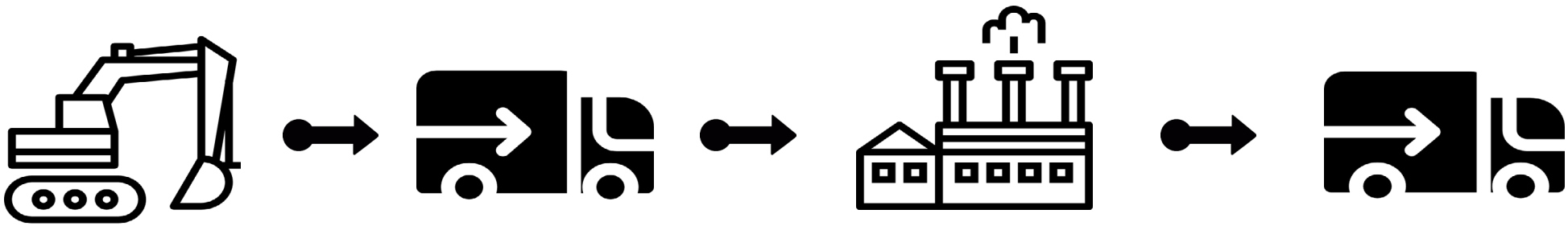
Product Composition

- Clinker: 92 %
- Gypsum: 5 %
- Limestone: 3 %

Packaging

There is no packaging used in the final product as it is sold in bulks.

System Boundaries and Description



A1 - Raw Material Supply	Production for each product starts with locally sourced but some transported materials from other parts of the world. 'Raw material supply' includes raw material extraction and pretreatment processes before production. The materials used in the products are clinker, gypsum, and limestone.
A2 - Transport	Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. The transport distances and routes are calculated based on the given information from the manufacturer for 2021.
A3 - Manufacturing	Cement production starts with quarry operation. After the crushing and homogenization process, raw material mix is sent to the raw mills. Production continue with burning and cooling. Finally, additional raw materials are added to the mixture, mixed and ready for use. Additionally, since AKÇANSA produces clinker used in the cement, the effects of clinker production is included in this stage.
A4 - Transport	Transport of final product to customers are considered and the routes and distances are calculated accordingly. Transport routes were provided by the manufacturer for 2021.

LCA Information

Declared Unit	1 tonne of ASTM C150 Type I-II Portland Cement
Time Representativeness	2021
Database(s) and LCA Software	Ecoinvent 3.8 and SimaPro 9.3
System Boundaries	Cradle to gate with options (A1+A2+A3+A4)

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / demolition	Transport	Waste Processing	Disposal	Future reuse. recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	GLO	GLO	TR	USA	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific Data Used	>90%	>90%	>90%	>90%	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	NR					-	-	-	-	-	-	-	-	-	-	-	-

The inventory for the LCA study is based on the 2021 production figures. This EPD's system boundary is cradle to gate with options (A1–A3 + A3 + A4).
Since the product is physically integrated with other products during installation and cannot be physically separated from them at end of life, the end-of-life modules are not considered.

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2021 production figures. In addition, hazardous and nonhazardous waste amounts were also allocated from the 2021 total waste generation.

Cut-Off Criteria

1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The regional energy datasets were used for all energy calculations.

LCA RESULTS

Impact Category	Unit	A1	A2	A3	A1-A3	A4
GWP- Fossil	kg CO_2 eq	0.140	6.53	916	923	68.7
GWP- Biogenic	kg CO_2 eq	387E-6	0.006	-0.266	-0.260	-0.015
GWP- Luluc	kg CO_2 eq	124E-6	0.003	0.430	0.432	0.062
GWP- Total	kg CO_2 eq	0.141	6.53	916	923	68.7
ODP	kg CFC-11 eq	22.7E-9	1.5E-6	25.0E-6	26.6E-6	13.5E-6
AP	mol H+ eq	0.003	0.019	2.72	2.74	2.00
*EP- Freshwater	kg P eq	23.4E-6	428E-6	0.151	0.151	0.003
EP- Freshwater	kg (PO_4) eq	71.8E-6	1.31E-3	463E-3	463E-3	9.21E-3
EP- Marine	kg N eq	0.001	0.004	0.830	0.835	0.450
EP- Terrestrial	mol N eq	0.015	0.041	9.37	9.42	5.01
POCP	kg NMVOC	0.003	0.016	2.27	2.29	1.32
ADPE	kg Sb eq	583E-9	23.1E-6	268E-6	291E-6	115E-6
ADPF	MJ	1.852	98.9	3995	4095	876
WDP	m^3 depriv.	0.066	0.301	30.0	30.4	1.84
PM	disease inc.	62.5E-9	526E-9	12.4E-6	13.0E-6	2.1E-6
IR	kBq U-235 eq	0.013	0.510	7.28	7.80	3.96
ETP- FW	CTUe	121	77.7	14308	14507	559
HTTP- C	CTUh	68.6E-12	2.5E-9	106E-9	109E-9	48.2E-9
HTTP- NC	CTUh	1.8E-9	78.5E-9	6.1E-6	6.1E-6	368E-9
SQP	Pt	-0.666	69.0	4139	4207	121

Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics- particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport.
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
*Disclaimer 3	EP-freshwater: This indicator is calculated both in kg PO_4 eq and kg P eq as required in the charactarization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

Resource use

Impact Category	Unit	A1	A2	A3	A1-A3	A4
PERE	MJ	0.095	1.41	159	161	6.83
PERM	MJ	0	0	0	0	0
PERT	MJ	0.095	1.41	159	161	6.83
PENRE	MJ	1.85	98.9	3995	4095	876
PENRM	MJ	0	0	0	0	0
PENRT	MJ	1.85	98.9	3995	4095	876
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m^3	0.004	0.017	0.777	0.797	0.087
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.					

Waste&Output Flows

Impact Category	Unit	A1	A2	A3	A1-A3	A4
HWD	kg	0	0	0.09	0.09	0
NHWD	kg	0	0	0.58	0.58	0
RWD	kg	0	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	0	0	0	0	0
MER	kg	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.					

Climate impact

Indicator	Unit	A1	A2	A3	A1-A3	A4
*GHG-GWP	kg CO_2 eq	0.137	6.47	913	920	68.2

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology
* The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013

Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport

References

/GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

/EN ISO 9001/ Quality Management Systems- Requirements

/EN ISO 14001/ Environmental Management Systems- Requirements

/EN ISO 50001/ Energy Management Systems- Requirements

/ISO 14020:2000/ Environmental Labels and Declarations — General principles

/EN 15804:2012+A2:2019/ 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 declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management- Life cycle assessment- Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.11 DATE 2019-12-20

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

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