ENVIRONMENTAL PRODUCT DECLARATION

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

DN200-500 Glassfiber Reinforced Plastic (GRP) Pipes

from Subor Boru San. ve Tic. A.Ş.



Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD Türkiye
EPD registration number:	EPD-IES-0030212
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Validity date:	2031-05-07
Type of EPD:	“EPD of multiple products, based on the average results of the product group”

EPD INTERNATIONAL EPD SYSTEM EPD TÜRKİYE INTERNATIONAL EPD SYSTEM ECO PLATFORM EPD VERIFIED

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



General Information

Programme Information	EPD Turkey, a fully aligned regional programme SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane-Istanbul/Türkiye www.epdturkey.org info@epdturkey.org	The International EPD System EPD International AB Box 210 60 SE-100 31 Stockholm/SWEDEN www.environdec.com support@environdec.com

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

Product Category Rules (PCR): PCR 2019:14 Construction products, version 2.0.1., Construction EN 15804:2012+A2:2019/AC:2021 Sustainability of Construction Works, UN CPC code is 53251

PCR review was conducted by:
The Technical Committee of the International EPD System. See www.environdec.com for a list of members.
Review Chair: Rob Rouwette (chair), Noa Meron (co-chair).
The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life Cycle Assessment (LCA)

LCA accountability: Furkan Can Akalın & Yıldıray Yılmaz- Metsims Sustainability Consulting
info@metsims.com

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

Individual EPD verification without a pre-verified LCA/EPD tool

Third-party verifier: Stephen Forson, ViridisPride

Approved by: International EPD System

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

Yes ✔ No

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

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

Information About EPD Owner

Owner of the EPD: Subor Boru San. ve Tic. A.Ş.

Address: Acıbadem, Sokullu Sokağı No:12, 34718 Kadıköy/İstanbul

Subor, founded in 1996 with the purpose of manufacturing and trading GRP (Glass-Fiber Reinforced Plastic) pipes worldwide, is a partnership of Yapı Merkezi Holding and Amiantit Group of Companies.

Having the privilege of being the first technological facility in Türkiye in the field of GRP pipe production using its own R&D and Advanced Continuous Filament Winding Technology, Subor offers solutions for different infrastructure applications for 30 years with its wide variety of products and service portfolio, including circular and non-circular pipes, jacking pipes for trenchless applications and biaxial pipes, built to meet diverse engineering needs with project-specific solutions.

With five production lines, four located at its Sakarya Plant and one at its Şanlıurfa Plant, Subor has an annual manufacturing capacity of 1,200km of GRP pipes in various diameters and pressure classes. The company offers fully customized, project-specific solutions with a comprehensive quality approach in line with internationally recognized standards such as AWWA, ASTM, ISO, EN, DIN, and BS.



Information About EPD Owner

Subor manufactures pipes and fittings ranging from 100 mm to 4,000 mm in diameter and from 1 bar to 40 bar in pressure, serving key infrastructure sectors such as:

- Potable water transmission
- Irrigation networks
- Power plant systems
- Trenchless installations
- Wastewater and stormwater management
- Industrial water conveyance systems and cooling water lines
- Desalination infrastructure including intake and discharge lines
- Pipeline rehabilitation and renewal projects

From the very beginning, Subor has positioned itself as a global brand. Today, it exports 70% of its production and operates confidently in over 85 countries across 6 continents, including Europe, the Balkans, the Middle East, Africa, the Far East, the United States, New Zealand and the CIS countries.

Recognized among the world's leading GRP pipe manufacturers, Subor takes pride in delivering water, the most essential resource of life, in a healthy, safe and sustainable way. With a strong track record, advanced engineering expertise and growing global presence, Subor continues to create value for its partners and contribute to a better quality of life for future generations.




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Product Information

Product name: DN200-500 Glassfiber Reinforced Plastic (GRP) Pipe
UN CPC code: 53251: Local pipelines
Production site: Ahmetler, Akyazı Cd., 54430 Karapürçek/Sakarya

The study covers SUBOR Glassfiber Reinforced Plastic, GRP, pipes in the DN200 to DN500 diameter category. The declared category represents the production-weighted average of DN200, DN300, DN400 and DN500 pipes produced during the reference year. For this diameter category, the average raw material recipe and energy consumption were calculated based on annual production data. Accordingly, the results and compositions presented in this EPD reflect the weighted average for the specified diameter category.

SUBOR GRP pipes are glassfiber reinforced thermosetting plastic composite pipes manufactured using Continuous Filament Winding technology. The pipe wall structure is mainly composed of glass fiber reinforcement, unsaturated polyester resin and silica sand/aggregate filler. Glass fiber reinforcement contributes to pressure resistance, rigidity and axial strength, while the polyester resin binds the composite structure through thermoset polymerization. Silica sand/aggregate filler is incorporated in the core structure to contribute to pipe stiffness.

The broader SUBOR GRP pipe product family covers nominal diameters from DN200 to DN4000 and pressure ratings from PN1 to PN40 bar. Standard stiffness classes are SN2500, SN5000 and SN10000 N/m², while higher project-specific stiffness classes may be designed for special applications such as jacking pipes. These values describe the overall SUBOR GRP pipe product portfolio and shall not be interpreted as a DN-by-DN pressure or stiffness matrix for each EPD diameter category. The actual DN, PN and SN combinations are project/order-specific and are reflected in the annual production data used for the weighted-average calculation. Higher project-specific stiffness classes may be designed where required, particularly for special applications such as jacking pipes. Standard pipe lengths are 6 m and 12 m, while special lengths up to 15 m may be manufactured upon request. The pipes are typically connected by coupling systems with elastomeric gaskets; the final joint type depends on the pressure class, installation method and project requirements.

As this EPD declares a production-weighted average within the DN200 to DN500 category, it does not represent one single pipe diameter, pressure class or stiffness class. The applicable PN and SN combinations are project/order-specific and are represented in the annual production data used for the weighted-average calculation of this diameter category.

SUBOR GRP pipes are used in the following applications, subject to project-specific design requirements and compatibility with the conveyed fluid:

- Drinking water transmission lines and distribution networks
- Irrigation transmission and distribution lines
- Wastewater transfer lines, treatment plant pipelines and sewer lines
- Stormwater lines
- Raw water intake, discharge and cooling water lines of power plants
- Transmission and penstock lines of hydroelectric power plants
- Industrial pipeline systems, including desalination, chemical process and firefighting systems
- Renovation of existing pipelines by slip-lining
- Jacking pipes enabling trenchless installation, where applicable
- Use of GRP pipe sections/components in tank and silo production, where applicable

*Customized products are also available upon request. www.subor.com.tr/en/pipes





LCA Information

A1: Raw Material

The production starts with raw materials. For Subor's GRP pipes, the main inputs include glass fiber, resin, and quartz sand. The raw material stage covers the extraction and preparation of these inputs, as well as pre-treatment processes carried out before production.

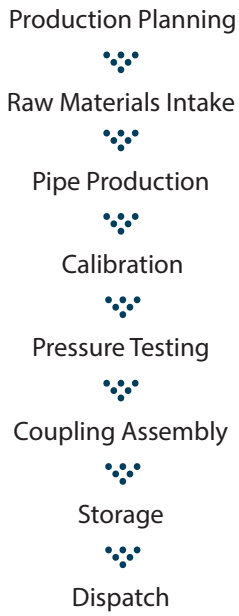
A2: Raw Material Transport

The transport is relevant for delivery of raw materials and other materials to the plant and for the internal transport of materials within the plant. The transport of raw materials to the production site is considered as the weighted average values for raw material supplier deliveries for the year 2024. Most of the raw materials are sourced domestically and delivered by road transport, while a smaller share is imported from abroad and transported by sea.

Transport Mode	Type
Road	Vehicle: Lorry Size Class: 16-32 metric ton Emission Standard: EURO6 Fuel Type: Diesel
Sea	Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil

A3: Manufacturing

GRP pipes are produced with continuous filament winding method. The process starts with the preparation of resin and fibers. After the preparation of the resin mix, composite pipe production starts. Then, the final products are quality checked and packaged for delivery. The packaging materials are timber, steel circle, and sandbag. The environmental impacts of these packaging materials are included in the analysis.



LCA Information

Scenarios used are realistic and representative of one of the most probable alternatives and shall not include processes or procedures that are not in current use, or which have not been demonstrated to be practical. (For module A4, A5, C1-C4, & D)

A4: Transport to Site

Product transport from the manufacturer to the customer is accounted for in the product material supply stage. The transport of the final product to the construction site is modeled using the weighted average transport values for 2024. Distances and routes are calculated accordingly. Depending on the customer's location, the final product is delivered primarily by road trucks, while other supplementary materials are transported by sea.

Transport Mode	Type
Road	Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO6 Fuel Type: Diesel
Sea	Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil

A5: Installation

This stage includes the installation of GRP pipes in the construction site. For installing 1 tonne of GRP pipe, (average length is assumed as 47 m), 2.6 hours installation time is assumed by using a mobile crane which consumes 20 L of diesel per hour.

C1 : Deconstruction / Demolition

Accordingly, demolition impacts were calculated using an energy consumption of 1.1 kWh per tonne of product, as specified in PCR 2.0.1.

C2 : Transport to Disposal Site

This step includes the transport of materials after they reach their end-of-life. The average distance was assumed 80 km by truck from demolition site to a waste or recycling area.

C3 : Waste Processing

Since all waste products are landfilled there is no impact related to waste processing.

C4 : Disposal

It is assumed that all products are disposed of as inert waste in landfill at the end of their life.
Accordingly, the landfill impacts and the impacts related to the compaction of inert construction waste for landfill, as defined in PCR 2.0.1, are included in this stage.

D : Benefits and Loads

Since all end-of-life product waste is assumed to be landfilled, no benefits are declared for the product itself. Only the benefits associated with the incineration of wooden packaging materials have been calculated.

LCA Information

Declared unit 1 tonne of GRP pipe with coupling for average of DN200-DN500
Technical lifespan: 50 years
Time representativeness: Full year of 2024 (01.01.2024- 31.12.2024).

Geographical scope:

Module A1 and A2 Material suppliers are Global (Africa and Türkiye)
Module A3 production is located in Türkiye (TR)
Module A4 transport locations are Global (Türkiye, European, Asia)
Module A5, C and D scenarios are for Global

Database(s) and LCA software used: Ecoinvent 3.11 and SimaPro 10.2

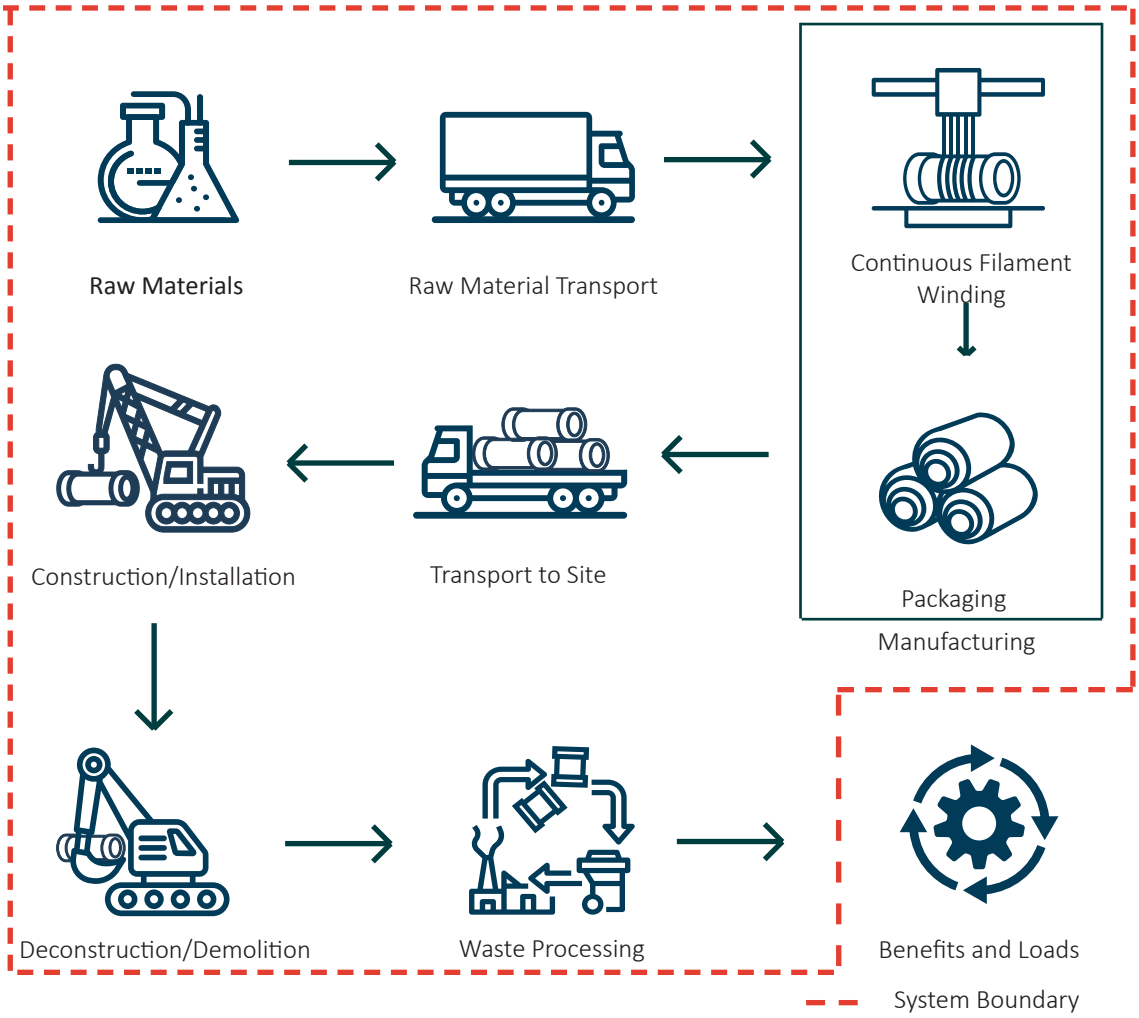
Description of system boundaries: Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).

	Product Stage			Distribution/ installation stage		Use Stage							End of Life Stage				Beyond product life cycle
	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	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	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	TR	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Share of primary data	31%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation- products	+46% -14%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation- Sites	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = Declared, ND = Not Declared

LCA Information

Process flow diagram:



Electricity used in the manufacturing process in A3

Type of electricity mix	Residual electricity mix on the market			
Energy sources	Hydro	0	Geothermal	0
	Wind	0	Coal	68
	Biogas	0	Natural gas	32
	Biomass	0	Other	0
Climate impact (GWP-GHG)	0.91			
Method used to calculate residual electricity mix	The market consumption data is modified to exclude all the renewable sources as there is no 'secondary data' on the residual market mix in Türkiye.			
100% of electricity consumed sourced from Türkiye grid.				



LCA Information

Allocation

Source of raw material, water consumption, energy consumption and raw material transportation were weighted according to 2024 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the 2024 total waste generation.

Cut-Off Criteria

The criteria for exclusion were set so that individual input flows less than 1% of the total, with a cumulative limit of less than 5%, could be omitted. This was contingent upon confirming that these excluded flows did not significantly alter the reported data, with “significant” defined as affecting the total by less than 5%.

Data Quality

The EPD is based on data collected by Subor from one site over one year from January 2024. The EPD is average of the production 1 tonne of GRP pipe with coupling for DN200-500 product. The use and end-of-life stage of the EPD covers mostly Europe. Background data was sourced from the Ecoinvent 3.11 database. No fair, poor or very poor data was found during the assessment of relevant data using EN 15804:2012+A2:2019, Annex E, only E.2.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing processes	Collected data	EPD owner	2024	Primary data	29%
Transport of raw materials to manufacturing site	Database	Ecoinvent v3.11	2024	Primary data	2%
Production of raw materials	Database	Ecoinvent v3.11	2024	Secondary data	0%
Production of packaging	Database	Ecoinvent v3.11	2024	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3					31%



Content Declaration

Content Declaration

The content declaration is provided as intervals due to confidentiality reasons.

Content Name	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product
Sand	60-65%	0	0	0
Resin	20-25%	0	0	0
Glassfibre	10-15%	0	0	0
Styrene	5-10%	0	0	0
Catalyst	<1%	0	0	0
TOTAL	1000 kg	0	0	0

The percentages are representative for the product with the lowest diameter, 200 mm, and the product with the highest diameter, 500mm. The average recipe was calculated based on the annual production data.

Packaging Materials

Material Name	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/declared unit
Plastic film	3.1	<1%	0
Wooden support	0.021	<1%	9.90E-06
TOTAL	3.12	<1%	**9.90E-06**

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 RESULTS

GRP PIPE

Environmental Performance

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks

Mandatory impact category indicators according to EN 15804

Results per declared unit

Impact category	indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change- total	GWP-total	kg CO_2 eq.	2.19E+03	3.74E+02	1.78E+02	3.75E-01	2.59E+01	0.00E+00	1.00E+01	-2.32E-02
Climate change- fossil	GWP-fossil	kg CO_2 eq.	2.12E+03	3.74E+02	1.78E+02	3.75E-01	2.59E+01	0.00E+00	9.97E+00	-2.31E-02
Climate change- biogenic	GWP-biogenic	kg CO_2 eq.	1.94E+00	2.44E-02	3.93E-02	1.88E-05	1.70E-03	0.00E+00	2.98E-02	0.00E+00
Climate change- land use and land-use change	GWP-luluc	kg CO_2 eq.	6.44E+01	1.90E-02	7.35E-03	1.54E-05	1.32E-03	0.00E+00	4.80E-03	-8.47E-05
Ozone depletion	ODP	kg CFC 11 eq.	5.81E-05	4.43E-06	2.71E-06	5.70E-09	3.07E-07	0.00E+00	2.53E-07	-1.04E-10
Acidification	AP	mol H+ eq.	9.69E+00	1.17E+00	1.64E+00	3.46E-03	7.32E-02	0.00E+00	1.15E-01	-1.67E-04
Eutrophication aquatic freshwater	EP-freshwater	kg P eq.	6.44E-02	2.58E-03	1.48E-03	3.53E-07	1.81E-04	0.00E+00	5.49E-04	-1.61E-06
Eutrophication aquatic marine	EP-marine	kg N eq.	2.47E+00	3.94E-01	7.75E-01	1.63E-03	2.53E-02	0.00E+00	2.93E-02	-2.11E-05
Eutrophication terrestrial	EP-terrestrial	mol N eq.	2.39E+01	4.34E+00	8.49E+00	1.79E-02	2.79E-01	0.00E+00	3.19E-01	-2.34E-04
Photochemical ozone formation	POCP	kg NMVOC eq.	1.58E+01	1.58E+00	2.53E+00	5.34E-03	1.04E-01	0.00E+00	1.12E-01	-7.13E-05
Depletion of abiotic resources- minerals and metals	ADP- minerals &metals*	kg Sb eq.	4.78E-02	3.02E-05	6.30E-06	1.31E-08	2.12E-06	0.00E+00	2.14E-06	-5.30E-10
Depletion of abiotic resources- fossil fuels	ADP-fossil*	MJ. net calorific value	3.47E+04	4.88E+03	2.33E+03	4.90E+00	3.39E+02	0.00E+00	2.31E+02	-2.30E-01
Water use	WDP*	m^3	5.36E+02	9.04E+00	2.44E+00	6.17E-03	6.32E-01	0.00E+00	-1.60E+02	-3.39E-03

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
General Disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).
Disclaimer 1	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

Mandatory impact category indicators according to EN 15804

Results per declared unit

Impact Category	indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate Change -GWP-GHG	GWP-GHG	kg CO_2 eq.	2.19E+03	3.74E+02	1.78E+02	3.75E-01	2.59E+01	0.00E+00	1.00E+01	-2.32E-02

Acronyms	GWP-GHG = Global warming potential greenhouse gas.
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).
Disclaimer 1	The GWP-GHG indicator is termed GWP-IOBC/GHG in the ILCD+EPD+ data format. The 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

Environmental Performance

Resource use indicators

Results per declared unit

indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	3.08E+03	9.87E+00	5.35E+00	1.07E-02	6.86E-01	0.00E+00	1.82E+00	-5.94E-02
PERM	MJ, net calorific value	2.65E-01	0.00E+00	-2.65E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ, net calorific value	3.09E+03	9.87E+00	5.08E+00	1.07E-02	6.86E-01	0.00E+00	1.82E+00	-5.94E-02
PENRE	MJ, net calorific value	3.46E+04	4.88E+03	2.46E+03	4.90E+00	3.39E+02	0.00E+00	2.31E+02	-2.30E-01
PENRM	MJ, net calorific value	1.32E+02	0.00E+00	-1.32E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	3.48E+04	4.88E+03	2.33E+03	4.90E+00	3.39E+02	0.00E+00	2.31E+02	-2.30E-01
SM	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
RSF	MJ, net calorific value	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, net calorific value	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^3	1.31E+01	2.15E-01	5.90E-02	1.48E-04	1.50E-02	0.00E+00	-3.71E+00	-9.30E-05
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								
General Disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).								

Waste indicators

Results per declared unit

indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	7.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.52E+01	0.00E+00	3.10E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+03	0.00E+00
RWD	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
Acronyms	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed								
General Disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).								

Output flow indicators

Results per declared unit

indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CRU	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
MFR	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
MER	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
EEE	MJ, net calorific value	0.00E+00	0.00E+00	7.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ, net calorific value	0.00E+00	0.00E+00	1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronyms	CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.								
General Disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).								

Version History

Version History
Original version of the EPD, 2026-05-08.

2026-06-26
Company information and company logo have been updated.

References

Ecoinvent 3.11 / Ecoinvent Centre, www.ecoinvent.org

EN 15804:2012+A2:2019 / AC:2021 Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

GPI / General Programme Instructions for the International EPD® System. Version 5.0.1. www.environdec.com.

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

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ISO 5001:2018 / Energy Management System

ISO 9001:2015 / Quality Management System

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

SimaPro 10.2 / SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

Subor / www.subor.com.tr

Metsims / www.metsims.com

Additional LCA Results

Additional LCA results (other environmental performance results) of the product

The table below shows the ratio of mandatory indicator results for the selected density to the minimum and maximum DN values. For example, a value of 149% indicates that it is 1.49 times the representative value, while a value of 86% indicates it is 0.86 times the representative value for GWP-Total indicator.

indicator	Unit	Min (DN 500)	Average	Max (DN 200)
GWP-Total	kg CO_2 eq	86%	2.19E+03	149%
GWP-Fossil	kg CO_2 eq	85%	2.12E+03	151%
GWP-Biogenic	kg CO_2 eq	91%	1.94E+00	137%
GWP-Luluc	kg CO_2 eq	101%	6.44E+01	92%
ODP	kg CFC11 eq	90%	5.81E-05	134%
AP	mol H+ eq	82%	9.69E+00	149%
EP – Freshwater	kg P eq	85%	6.44E-02	167%
EP – Marine	kg N eq	76%	2.47E+00	153%
EP – Terrestrial	mol N eq	73%	2.39E+01	161%
POCP	kg NMVOC eq	88%	1.58E+01	127%
ADPE	kg SB eq.	90%	4.78E-02	146%
ADPF	MJ	88%	3.47E+04	142%
WDP	m^3 depriv.	95%	5.36E+02	120%
Additional environmental impact indicators (Mandatory)	**Unit**	**Min (DN 500)**	**Average**	**Max (DN 200)**
GWP-GHG	kg CO_2 eq.	86%	2.19E+03	149%
Core environmental impact indicators (Mandatory)	**Unit**	**Min (DN 500)**	**Average**	**Max (DN 200)**
PERE	MJ	91%	3.08E+03	138%
PERM	MJ	100%	2.65E-01	100%
PERT	MJ	91%	3.09E+03	138%
PENRE	MJ	88%	3.46E+04	142%
PENRM	MJ	100%	1.32E+02	100%
PENRT	MJ	88%	3.48E+04	142%
SM	kg	0%	0.00E+00	0%
RSF	MJ	0%	0.00E+00	0%
NRSF	MJ	0%	0.00E+00	0%
FW	m3	94%	1.31E+01	122%
Waste & Output indicators	**Unit**	**Min (DN 500)**	**Average**	**Max (DN 200)**
Hazardous Waste	Kg	100%	7.74E-01	100%
Non-Hazardous Waste	Kg	100%	5.66E+01	100%
Radioactive waste	kg	0%	0.00E+00	0%
Waste & Output indicators	**Unit**	**Min (DN 500)**	**Average**	**Max (DN 200)**
Components for reuse	kg	0%	0.00E+00	0%
Material for recycling	kg	0%	0.00E+00	0%
Materials for energy recovery	kg	0%	0.00E+00	0%
Exported energy, electricity	kg	0%	0.00E+00	0%
Exported energy, thermal	kg	0%	0.00E+00	0%

Additional LCA Results

In compliance with the PCR requirements, 100% recycling scenario have been modelled for the product. Tables below present the results for modules C3, C4 and D, based on these scenarios, covering all mandatory impact indicators as specified in EN 15804.

Additional LCA results for 100% recycling scenario

indicator	Unit	C3	C4	D
GWP-Total	kg CO_2 eq	6.13E-01	0.00E+00	-3.39E+01
GWP-Fossil	kg CO_2 eq	6.13E-01	0.00E+00	-3.38E+01
GWP-Biogenic	kg CO_2 eq	3.07E-05	0.00E+00	-6.51E-03
GWP-Luluc	kg CO_2 eq	2.53E-05	0.00E+00	-5.72E-02
ODP	kg CFC11 eq	9.33E-09	0.00E+00	-4.85E-07
AP	mol H+ eq	5.66E-03	0.00E+00	-2.89E-01
EP – Freshwater	kg P eq	5.11E-06	0.00E+00	-2.10E-03
EP – Marine	kg N eq	2.67E-03	0.00E+00	-9.50E-02
EP – Terrestrial	mol N eq	2.93E-02	0.00E+00	-1.04E+00
POCP	kg NMVOC eq	8.73E-03	0.00E+00	-3.13E-01
ADPE	kg SB eq.	2.15E-08	0.00E+00	-3.14E-06
ADPF	MJ	8.02E+00	0.00E+00	-4.37E+02
WDP	m^3 depriv.	1.01E-02	0.00E+00	-4.53E+01
Additional environmental impact indicators (Mandatory)	**Unit**	**C3**	**C4**	**D**
GWP-GHG	kg CO_2 eq.	6.13E-01	0.00E+00	-3.39E+01
Core environmental impact indicators (Mandatory)	**Unit**	**C3**	**C4**	**D**
PERE	MJ	1.75E-02	0.00E+00	-3.72E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.75E-02	0.00E+00	-3.72E+00
PENRE	MJ	8.02E+00	0.00E+00	-4.38E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8.02E+00	0.00E+00	-4.38E+02
SM	kg	1.61E-05	0.00E+00	-6.14E-03
RSF	MJ	2.80E-06	0.00E+00	-8.53E-05
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
FW	m3	2.43E-04	0.00E+00	-1.06E+00
Waste & Output indicators	**Unit**	**C3**	**C4**	**D**
Hazardous Waste	Kg	0.00E+00	0.00E+00	0.00E+00
Non-Hazardous Waste	Kg	0.00E+00	0.00E+00	0.00E+00
Radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00
Waste & Output indicators	**Unit**	**C3**	**C4**	**D**
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	1.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	kg	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	kg	0.00E+00	0.00E+00	0.00E+00

Abbreviations

Abbreviation	Definition
ADP	Abiotic depletion potential
ADP-fossil	Abiotic depletion potential for non-fossil resources (MJ)
ADP-minerals&metals	Abiotic depletion potential for minerals & metals (kg Sb eq.)
AP	Acidification Potential (mol H+ eq.)
CAS No.	Chemical Abstracts Service Number
CEN	European Committee for Standardization
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CFR	Components for Reuse (kg)
CLC	Co-location centre
CO_2 eq.	Carbon Dioxide Equivalents
CPC	Central product classification
EC No.	European Community Number
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
EF	Environmental Footprint
EN	European Norm (Standard)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
FW	Use of net fresh water (m^3)
GHG	Greenhouse gas
GHS	Globally harmonized system of classification and labelling of chemicals
GLO	Global
GPI	General Programme Instructions
GRI	Global Reporting Initiative
GWP	Global Warming Potential (kg CO_2 eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO_2 eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO_2 eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO_2 eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO_2 eq.)
GWP-total	Total Global Warming Potential (kg CO_2 eq.)
HW	Hazardous Waste (disposed) (kg)
ISO	International Organization for Standardization
kg	Kilogram
kg C	Kilograms of Carbon
kg CO_2 eq.	Kilograms of Carbon Dioxide Equivalent
m^3	Cubic Meter
MER	Materials for Energy Recovery (kg)
MJ	Megajoule
MR	Material for Recycling (kg)
N eq.	Nitrogen Equivalents

Abbreviations

Abbreviation	Definition
ND	Not Declared
NHW	Non-Hazardous Waste (disposed) (kg)
NMVOC	Non-Methane Volatile Organic Compounds
NRSF	Use of non-renewable secondary fuels (MJ)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
P eq.	Phosphorus Equivalents
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
RSF	Use of renewable secondary fuels (MJ)
RW	Radioactive Waste (disposed) (kg)
Sb eq.	Antimony Equivalents
SM	Use of secondary material (kg)
SVHC	Substances of Very High Concern
TR	Türkiye
WDP	Water Deprivation Potential (m^3)

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