

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

GF SILENTA PREMIUM DRAINAGE PIPES, FITTINGS AND ACCESSORIES



LIFE CYCLE ASSESSMENT STUDY HAS BEEN PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF EN 15804, EPD HUB PCR VERSION 1.2 (24 MAR 2025) AND JRC CHARACTERIZATION FACTORS EF 3.1.

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Georg Fischer Hakan Plastik Boru ve Profil Sanayi Tic. A.Ş.
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EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Thomas Vogel
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
EPD verifier	Magaly Gonzalez Vazquez as an authorized verifier for EPD Hub

This EPD is intended for business-to-business communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	GF Silenta Premium
Additional labels	-
Product reference	GF Silenta Premium drainage pipes, fittings and accessories
Place(s) of raw material origin	World
Place of production	Çerkezköy, Turkey
Place(s) of installation and use	EU, Turkey, MENA
Period for data	Calendar year 2025
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	3.95%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	3,96

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0,071 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	1,59
GWP-total, A1-A3 (kgCO ₂ e)	1,53
Secondary material, inputs (%)	0,42
Total energy use, A1-A3 (kWh)	5,54
Net freshwater use, A1-A3 (m ³)	0,04

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

With a rich history in industrial innovation since 1802, GF is actively reshaping itself to become the global leader in Flow Solutions for Buildings, Industry and Infrastructure. GF delivers Excellence in Flow through essential products and solutions that enable safe and sustainable transport of water and other fluids worldwide. Following the Uponor acquisition and integration, GF has brought together its collective expertise and technologies into a unified portfolio of Flow Solutions for Buildings. This allows GF to offer reliable systems that perform throughout a building's entire lifecycle – from construction to daily operations – ensuring they are both future-proof and sustainable. Headquartered in Switzerland, GF is listed on the SIX Swiss Exchange.

PRODUCT DESCRIPTION

GF Silenta Premium is a three-layer, mineral-reinforced polypropylene pipe, fitting and clamp system for non-pressurised soil and waste drainage within buildings. The system is designed for the gravity discharge of domestic wastewater, including both low- and high-temperature flows, and covers pipe diameters from 58 to 200 mm. Pipes and fittings are connected by push-fit socket joints with elastomeric seals, while dedicated system clamps support secure installation and contribute to the overall acoustic performance of the system. Its thick-walled, high-density construction helps reduce noise generated during wastewater discharge. The system is approved by DIBt, with acoustic performance tested in accordance with EN 14366 and evaluated with reference to DIN 4109. Reaction-to-fire performance is classified according to EN 13501-1 and DIN 4102.

Further information can be found at: www.georgfischer.com

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0	-
Minerals	55	EU
Fossil materials	45	EU
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,0328

1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND

A5 is not fully declared. Waste processing (from collection through to end-of-waste or final disposal) and full energy and biogenic carbon balancing are accounted for. Storage, product wastage, and installation into the building are excluded.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material

losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in The raw material supply (A1) includes the extraction and processing of polypropylene granulate, sourced from certified suppliers internationally. In this module transportation (A2) by trucks and ships from the raw material suppliers to the factory gate, as well as internal transport is considered. Manufacturing (A3) involves energy-efficient pipe extrusion with in-line socketing, conducted under controlled or cleanroom conditions to minimize contamination and ensure compliance with industry-specific purity standards. Fittings are manufactured by injection moulding, followed by cooling, quality inspection, assembly where applicable and packaging. The pipe and socket are made of the same materials polypropylene and mineral filler. Product assembly and quality control include rigorous inspection and testing procedures to ensure mechanical performance, dimensional accuracy, and purity. Waste generated during production is minimized; manufacturing waste is recycled internally. The manufacturing stages are:

- Materials conveying
- Extrusion (melting and processing of mixed material)
- Pipe profile calibration
- Cooling
- Pipe marking
- Cutting
- Packing

Packaging is designed to maintain product cleanliness during handling and transport. To ensure this, products are typically packed with plastic clamps, polyethylene (PE) bags and stretch film for protection, and packed in corrugated cardboard boxes or wooden crates depending on product type and shipping mode. Packaging materials are recyclable and comply with EU environmental and safety standards.

The use of renewable energy in manufacturing is demonstrated through contractual instruments (GOs, RECs), and its use is ensured throughout the validity period of this EPD.

TRANSPORT AND INSTALLATION (A4-A5)

In stage A4, transport from the production site in Turkey to customers mainly in Turkey but also to Europe, East and Africa is primarily done with lorries (>32 metric tons, Euro 6) and an average of distance calculated on maps routes. The transportation distances to the different markets are defined according to the PCR. Transport distances and modes vary by destination but are optimized to reduce environmental impact, including route planning and shipment consolidation. The transport scenario is based on a weighted average scenario based on sales shares for the different markets. No materials are lost in transportation.

The installation scenario in this infrastructure product EPD is based on TEPPFA's (The European Plastic Pipe and Fittings Association) industry averaged EPDs. These documents and their background reports include industry consensus estimates of the resource use, emissions and effluents of typical European installations; these parameters have been used as input for the EPD modelling.

Environmental impacts from installation include metal fixations to building, standardized energy for drilling and screwdriver, water for flushing and pressure testing, waste packaging materials and release of biogenic carbon dioxide from wood pallets are considered.

The installation occurs on-site in dedicated spaces for drainage piping systems. Water usage for first flushing, testing and cleaning is considered as well as the associated water waste treatment. Due to product design and specification, it is considered that only 1% of product waste is generated at the installation site (cut-off). Wastes from installation are the packaging materials (cardboard boxes, EU pallet and stretch film). The packaging materials are collected on-site separately and sent for waste treatment

(50km/truck); acc, OneClickLCA EU scenarios handling with mix of landfill/incineration/recycling acc EU average.

PRODUCT USE AND MAINTENANCE (B1-B7)

This stage is not included in the scope

PRODUCT END OF LIFE (C1-C4, D)

The end-of-life scenarios included in the EPD are currently in use and are representative of one of the most likely scenarios. Product end-of-life primarily takes place in Turkey and Europe. It is assumed that deconstruction is a site activity and that the products are deconstructed after a lifetime of 50 years. Although the plastic components of the product are technically recyclable, due to their material properties, they are conservatively modelled with thermal energy recovery. Since the consumption of energy and natural resources is negligible for disassembling of the end-of-life product, the impacts of demolition are assumed negligible (C1).

The separately collected 50% from the demolition site is sent to incineration (C3), whereas the remaining 50% is sent within mixed waste to landfill (C4), both 70km per truck. The mineral material of the product is assumed to be disposed of in the inert material landfill.

Recycling, reuse and energy recovery routes for packaging materials as cardboard, plastic and wooden packaging are considered in module A5. Module D reports the net benefits and loads associated with recovered secondary materials and recovered energy replacing equivalent primary materials and conventional energy production in subsequent product systems.

The products are not biodegradable. Products meet the legal requirements at validation date on limited Substances of Very High Concern (SVHC).

The diagram illustrates the product lifecycle as a circular flow with 13 steps, each associated with an environmental impact category. The steps are arranged in a clockwise cycle, starting from Step 1 at the top and ending at Step 13 at the bottom. The environmental impact categories are represented by colored circles: blue for 'Declared' and grey for 'Not Declared'.

Legend:

- Declared
- Not Declared

Product Lifecycle Steps:

- Step 1:** Production of raw materials (Declared: A1)
- Step 2:** Transportation to factory (Declared: A2)
- Step 3:** Material handling, compounding, internal transportation (Declared: A3)
- Step 4:** Extrusion / Injection moulding (Declared: A3)
- Step 5:** Cooling (Declared: A3)
- Step 6:** Marking (laser marking and ink jet), labeling (Declared: A3)
- Step 7:** Packaging (Declared: A3)
- Step 8:** Stock and Dispatch (Declared: A3)
- Step 9:** Transport to internal warehouse (Declared: A3)
- Step 10:** Transportation to customers (Declared: A4)
- Step 11:** Installation on site (Declared: A5)
- Step 12:** Use phase (Not Declared: B)
- Step 13:** Deconstruction of products, End-of-life scenarios (Declared: C-D)

The flow continues from Step 13 back to Step 1, completing the cycle.

LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

This study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012 + A2:2019. Excluded modules are use stage modules (B1-B7).

The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit process which data are available for are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass. The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution and end-of-life stages.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterisation factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are made according to the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	Physical Properties
Packaging material	Physical Properties
Ancillary materials	Not applicable
Manufacturing energy and waste	Physical Properties

A minor deviation may occur between the results reported for Primary Energy (PENRT, A1–A3, “Total use of non-renewable primary energy resources” in the resource use table) and the ADP fossil fuels indicator (ADPfossil, A1–A3) reported in the impact category results according to EN 15804+A2.

This deviation is due to differences in the underlying methodological approaches and characterisation factors applied for the respective indicators, as well as the specific datasets used within the validated LCA model. While both indicators are related to fossil resource use, they are defined and calculated differently in accordance with EN 15804+A2. The identified deviation is considered methodologically justified and does not represent an inconsistency in the data quality or modelling approach applied in this EPD.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on average results of product group - by total mass
Variation in GWP-fossil for A1-A3, %	3.95%

The environmental impacts reported in this EPD are based on a production-volume-weighted average of the products included within the declared scope. The average product group represents a three-layer mineral reinforced polypropylene drainage system consisting of pipes, fittings and accessories with comparable material composition, manufacturing technology and intended application. The environmental impacts declared in this EPD are based on averaged data representing the defined product group of plastic wastewater pipes. The results are representative of the included products, manufacturing processes, and supply chains within the declared scope. While the EPD provides a reliable basis for assessing the average environmental performance of the product family, deviations may occur for individual product variants.

The reported variation of 3.95% represents the spread of product-specific GWP-fossil results for modules A1-A3 within the single items of declared product group of 329 items, produced at 1 factory (Çerkezköy) in Turkey.. As the variation remains below 10%, the environmental impacts reported in this EPD are considered representative of the products included in the averaging approach.

The declared results are applicable within the geographical scope defined in this EPD and are representative for regions with comparable production conditions, energy mixes, transport scenarios, and end-of-life treatments. The applicability of the results outside this scope should be assessed carefully, particularly where significant regional differences exist. Comparisons with other EPDs are only valid when based on the same standards, system boundaries, and functional or declared units.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044.

The EPD Generator uses Ecoinvent v3.10.1 and 3.11 and One Click LCA databases as sources of environmental data.

- Allocation used in Ecoinvent environmental data sources follow the methodology allocation, Cut-off, EN 15804+A2.
- EU wooden packaging EoL scenario by EUROSTAT.

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	1,46E+00	5,05E-02	2,34E-02	1,53E+00	2,09E-01	7,06E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,70E-03	1,30E+00	5,42E-03	-5,97E-02
GWP – fossil	kg CO ₂ e	1,48E+00	5,04E-02	6,05E-02	1,59E+00	2,09E-01	3,19E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,70E-03	1,30E+00	5,40E-03	-1,07E-03
GWP – biogenic	kg CO ₂ e	-2,69E-02	1,14E-05	-3,86E-02	-6,55E-02	4,80E-05	3,86E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,77E-06	2,47E-05	2,24E-05	-5,88E-02
GWP – LULUC	kg CO ₂ e	2,48E-03	2,25E-05	1,50E-03	4,00E-03	9,30E-05	5,16E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,43E-06	3,75E-06	3,24E-06	1,41E-04
Ozone depletion pot.	kg CFC-11e	3,11E-08	7,33E-10	1,76E-09	3,36E-08	3,04E-09	4,68E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,12E-10	1,81E-10	1,41E-10	-9,56E-11
Acidification potential	mol H ⁺ e	6,05E-03	1,75E-04	2,31E-04	6,46E-03	7,26E-04	1,10E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,68E-05	1,65E-04	5,78E-05	-2,21E-05
EP-freshwater ²⁾	kg Pe	4,42E-04	5,47E-06	2,73E-05	4,74E-04	2,26E-05	8,28E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,34E-07	1,89E-06	8,59E-06	-1,69E-05
EP-marine	kg Ne	1,10E-03	5,80E-05	1,67E-04	1,33E-03	2,40E-04	4,06E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,85E-06	8,06E-05	1,47E-05	-3,38E-05
EP-terrestrial	mol Ne	1,12E-02	6,27E-04	7,18E-04	1,25E-02	2,60E-03	2,50E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,57E-05	8,51E-04	1,59E-04	-2,80E-04
POCP (“smog”) ³⁾	kg NMVOCe	4,89E-03	2,57E-04	2,75E-04	5,42E-03	1,06E-03	9,69E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,92E-05	2,09E-04	5,66E-05	-8,20E-05
ADP-minerals & metals ⁴⁾	kg Sbe	1,98E-05	1,44E-07	7,79E-06	2,77E-05	5,98E-07	3,27E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,20E-08	3,43E-08	1,06E-08	1,99E-08
ADP-fossil resources	MJ	1,36E+01	7,20E-01	1,23E+00	1,55E+01	2,98E+00	2,81E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-01	1,27E-01	1,20E-01	-3,68E-02
Water use ⁵⁾	m ³ e depr.	1,55E+00	4,20E-03	3,43E-02	1,59E+00	1,74E-02	1,84E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,41E-04	3,37E-02	5,29E-03	2,36E-02

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	5,99E-08	4,94E-09	3,20E-09	6,81E-08	2,05E-08	1,46E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,54E-10	8,62E-10	8,92E-10	-9,73E-11
Ionizing radiation ⁶⁾	kBq	2,24E-01	6,04E-04	5,46E-03	2,30E-01	2,50E-03	2,95E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,21E-05	1,36E-04	8,79E-05	4,35E-03
	11235e																		
Ecotoxicity (freshwater)	CTUe	1,34E+01	1,49E-01	1,64E+01	2,99E+01	6,19E-01	4,27E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,28E-02	2,50E-01	9,12E-02	5,40E-01
Human toxicity, cancer	CTUh	3,33E-10	7,92E-12	2,78E-11	3,69E-10	3,28E-11	8,53E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,21E-12	3,82E-11	2,05E-12	1,58E-12
Human tox. non-cancer	CTUh	9,00E-09	4,47E-10	5,33E-10	9,98E-09	1,85E-09	2,85E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,83E-11	1,84E-09	9,50E-11	1,15E-10
SQP ⁷⁾	-	7,13E+00	7,18E-01	4,25E-01	8,27E+00	2,97E+00	1,56E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-01	3,38E-02	2,86E-01	-4,65E+00

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	3,03E+00	1,00E-02	3,27E+00	6,30E+00	4,14E-02	-9,44E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,53E-03	3,18E-03	1,55E-03	-5,88E-01
Renew. PER as material	MJ	0,00E+00	0,00E+00	1,32E+00	1,32E+00	0,00E+00	-1,32E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,83E-01
Total use of renew. PER	MJ	3,03E+00	1,00E-02	4,59E+00	7,63E+00	4,14E-02	-2,27E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,53E-03	3,18E-03	1,55E-03	-5,33E-03
Non-re. PER as energy	MJ	1,31E+01	7,20E-01	-1,61E-01	1,36E+01	2,98E+00	5,14E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-01	-1,60E+01	1,20E-01	-4,72E-02
Non-re. PER as material	MJ	9,58E-01	0,00E+00	2,18E-01	1,18E+00	0,00E+00	-2,18E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-4,79E-01	-4,79E-01	9,87E-02
Total use of non-re. PER	MJ	1,40E+01	7,20E-01	5,70E-02	1,48E+01	2,98E+00	-1,67E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-01	-1,65E+01	-3,59E-01	5,15E-02
Secondary materials	kg	4,18E-03	3,01E-04	4,50E-02	4,95E-02	1,25E-03	6,69E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,60E-05	2,16E-04	4,15E-05	2,42E-02
Renew. secondary fuels	MJ	1,34E-02	3,93E-06	4,63E-03	1,80E-02	1,63E-05	1,82E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,00E-07	1,20E-06	8,36E-07	-3,92E-04
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m³	3,69E-02	1,03E-04	5,88E-04	3,76E-02	4,28E-04	3,67E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,58E-05	2,33E-04	-1,83E-03	1,29E-04

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	5,95E-02	4,60E-03	8,15E-03	7,23E-02	1,91E-02	3,12E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,02E-04	1,17E-02	6,22E-04	1,43E-03
Non-hazardous waste	kg	1,87E+00	9,09E-02	2,65E-01	2,23E+00	3,77E-01	3,34E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,39E-02	5,25E-01	1,31E+00	-1,83E-01
Radioactive waste	kg	4,59E-05	1,44E-07	1,08E-06	4,71E-05	5,98E-07	6,31E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,20E-08	3,34E-08	2,09E-08	1,12E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	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	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,45E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	4,95E-01	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,53E-02	ND	ND	ND	ND	ND	ND	ND	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	3,57E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,96E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	1,47E+00	5,02E-02	6,20E-02	1,58E+00	2,08E-01	3,68E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,65E-03	1,30E+00	5,37E-03	-7,45E-04
Ozone depletion Pot.	kg CFC-11e	2,82E-08	5,85E-10	1,46E-09	3,02E-08	2,42E-09	4,22E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,93E-11	1,51E-10	1,12E-10	-7,88E-11
Acidification	kg SO ₂ e	5,05E-03	1,34E-04	1,71E-04	5,36E-03	5,54E-04	8,94E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,04E-05	1,15E-04	4,62E-05	-7,22E-06
Eutrophication	kg PO ₄ ³ e	2,30E-03	3,62E-05	3,12E-04	2,65E-03	1,50E-04	4,33E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,53E-06	3,94E-05	1,97E-05	-2,25E-06
POCP ("smog")	kg C ₂ H ₄ e	3,97E-04	1,16E-05	2,25E-05	4,31E-04	4,83E-05	8,13E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,78E-06	7,36E-06	3,07E-06	-3,64E-06
ADP-elements	kg Sbe	1,97E-05	1,40E-07	7,79E-06	2,76E-05	5,82E-07	3,25E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,14E-08	2,67E-08	1,02E-08	2,05E-08
ADP-fossil	MJ	1,04E+01	7,10E-01	1,15E+00	1,23E+01	2,94E+00	2,38E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,08E-01	1,24E-01	1,19E-01	-1,14E-01

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁹⁾	kg CO ₂ e	1,48E+00	5,05E-02	6,20E-02	1,60E+00	2,09E-01	3,20E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,70E-03	1,30E+00	5,40E-03	-9,27E-04

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO₂ is set to zero

ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	1,45E+00	4,97E-02	6,11E-02	1,56E+00	2,06E-01	3,60E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,59E-03	1,30E+00	5,29E-03	-6,64E-04
Ozone Depletion	kg CFC-11e	3,39E-08	7,69E-10	1,87E-09	3,65E-08	3,18E-09	5,10E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,17E-10	1,90E-10	1,48E-10	-1,05E-10
Acidification	kg SO ₂ e	5,07E-03	1,58E-04	1,95E-04	5,42E-03	6,55E-04	9,39E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,41E-05	1,53E-04	4,97E-05	-2,79E-05
Eutrophication	kg Ne	1,17E-03	2,15E-05	1,95E-04	1,39E-03	8,90E-05	4,19E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,28E-06	5,34E-05	9,73E-06	-2,16E-05
POCP ("smog")	kg O ₃ e	6,98E-02	3,96E-03	3,65E-03	7,74E-02	1,64E-02	1,50E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,04E-04	4,93E-03	9,75E-04	-1,57E-03
ADP-fossil	MJ	0,00E+00	0,00E+00	1,21E-03	1,21E-03	0,00E+00	2,59E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,23E-02

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity production, hydro, run-of-river, Turkey, Ecoinvent, 0.0046 kgCO₂e/kWh
2. Electricity production, hydro, run-of-river, Turkey, Ecoinvent, 0.0046 kgCO₂e/kWh
3. Market for diesel, low-sulfur, europeWithoutSwitzerland, Ecoinvent, 0.99 kgCO₂e/kg
4. Natural gas production (2020), Turkey, ProBas, 0.0015 kgCO₂e/MJ
5. Unsaturated hydrocarbons production, steam cracking operation, average, Turkey, Ecoinvent, 1.65 kgCO₂e/kg

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 4000 km
2. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 2000 km
3. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 700 km
4. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 2000 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	70
Bulk density of transported products	134
Volume capacity utilization factor	<1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	0
Water use (m ³)	0,2 kg for flushing and tightness check
Ancillary materials: type and mass (kg)	0
Waste materials: type and mass (kg)	1% of product for installation corrections. 0,2kg tap water from cleaning and pressure test. 0,065 kg Packaging waste (cardboard, wood).
Waste materials: output routes	50km transportation by trucks
Direct emissions (kg)	0

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	0,5
Collection process: Mixed waste (kg)	0,5
Recovery: re-use (kg)	0
Recovery: recycling (kg)	0
Recovery: energy recovery (kg)	0,5
Disposal (kg)	0,5
Scenario assumptions e.g. transportation (mode, km) & other	70km by truck to next landfill/incineration plant.

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez

Tool verification validity: 27 March 2025 - 26 March 2028

Magaly Gonzalez Vazquez as an authorized verifier for EPD Hub Limited
23.10.2026

