ENVIRONMENTAL PRODUCT DECLARATION

TURKEY EPD®

ENVIRONMENTAL PRODUCT DECLARATIONS

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

GRP Pipes

from

SUPERLIT Pipe Industries

SUPERLIT®

PIPE INDUSTRIES

Programme:	EPD Turkey, a fully aligned regional programme www.epdturkey.org	The International EPD® System www.environdec.com
Programme operator:	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY	EPD International AB
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Geographical scope:	Global	

Programme Information

Programme	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/TURKEY www.epdturkey.org info@epdturkey.org	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm/SWEDEN www.environdec.com info@environdec.com

2019:14 Version 1.1. 2020-09-14 Construction Products
EN 15804:2012 + A2:2019 Sustainability of Construction Works

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

EPD process certification EPD verification ☑

Third party verifier: Vladimír Kočí, PhD

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

Company Information

SUPERLIT, the first company of KARAMANCI HOLDING that has a prominent role in the Turkish industrial sector, was established in 1961.

SUPERLIT, which manufactures and sells pressure and non-pressure GRP (Glassfiber Reinforced Polyester) pipes in compliance with international standards, has become a favored brand on 5 continents worldwide, thanks to a wide range of products, its reliable quality and before-sales and after-sales technical / consultancy services it renders. With regards to installed capacity, SUPERLIT is one of the leading establishments in the GRP pipe sector worldwide.

The pipes, manufactured in factories located in Düzce and Malatya in Turkey and Buzau in Romania, in compliance with local and international standards such as EN, ISO, ASTM and AWWA, with a diameter range of DN300 mm to DN4000 mm, with a stiffness of 2500 - 5000 - 10000 (and over by special design), and a pressure resistance between 1 - 32 bars (up to 40 bars by special design), are used in the following applications:

- Clean water and potable water
- Irrigation
- Hydroelectric power plants
- Sewer system
- Stormwater
- Water treatment
- Seawater intake and discharge
- Water storage systems
- Trenchless technologies

SUPERLIT is the sole pipe manufacturer in Turkey that can produce Glassfiber Reinforced Polyester (GRP) pipes by means of “Continuous Filament Winding” technology as well as “Centrifugal Casting” technology. Integrated Management Systems Certificates (ISO 9001, ISO 14001 & OHSAS 18001) have been granted by the internationally recognized and reputable independent organizations.

Being one of the world’s leading manufacturers in the pipe industry with an experience of more than half a century, SUPERLIT supplies pipes for projects in many regions of the world from Europe to Africa and from America to Asia and Australia.

Product Information

Product name:	GRP Pipe	
Product identification:	Glass fiber reinforced polyester pipe	
UN CPC code:	53251	
Geographical scope:	Global	
Product composition*:	For 1 tonne of GRP pipe - 27% Polyester Resin - 16% Glass Fiber - 56% Sand	For 1 tonne of coupling - 36% Polyester Resin - 64% Glass Fiber

Technical Properties

Properties	Unit	GRP Pipe
Flow Velocity (max)	m/s	4
Flow Coefficient Hazen–William flow coefficient (C) Manning coefficient (n) Colebrook - White (k)	 - - mm	 150 0.009 0.029 (for the pipes manufactured by the continuous filament winding method) 0.012 (for the pipes manufactured by the centrifugal casting method)
UV Resistance	-	Performance of GRP pipes is not negatively affected by UV rays
Poisson Ratio	-	0.22-0.29
Temperature	° C	-40 to +80
Thermal Coefficient	mm/mm/ °C	24-30x10^{-6}

(*):The values refer to average production figures for GRP pipes and couplings for the time period of 2017, 2018, 2019 and first six months of 2020. These values will vary according to different design requirements of specific product.

Continuous Filament Winding (FW) Method

The Continuous Filament Winding Process is the manufacturing of GRP pipes from continuously flowing glass fiber by winding it on an automatic machine. The wall of the pipe is constructed by pressing glass fiber and resin together, and filling material (sand) is then added. As a result of reinforcing a high ratio of polyester by glass fiber, the pipe become extremely robust against chemicals and it satisfies the design conditions.

Centrifugal Casting (CC) Method

In SUPERLIT GRP pipes manufactured by the Centrifugal Casting method, glass fiber, polyester resin, and silica sand are used. SUPERLIT GRP pipes, in this completely automatic and electronically controlled process, are manufactured by feeding the raw materials into the rotating mold, beginning from the outer surface of the pipe until reaching a predefined wall thickness.

GRP Full-face Coupling

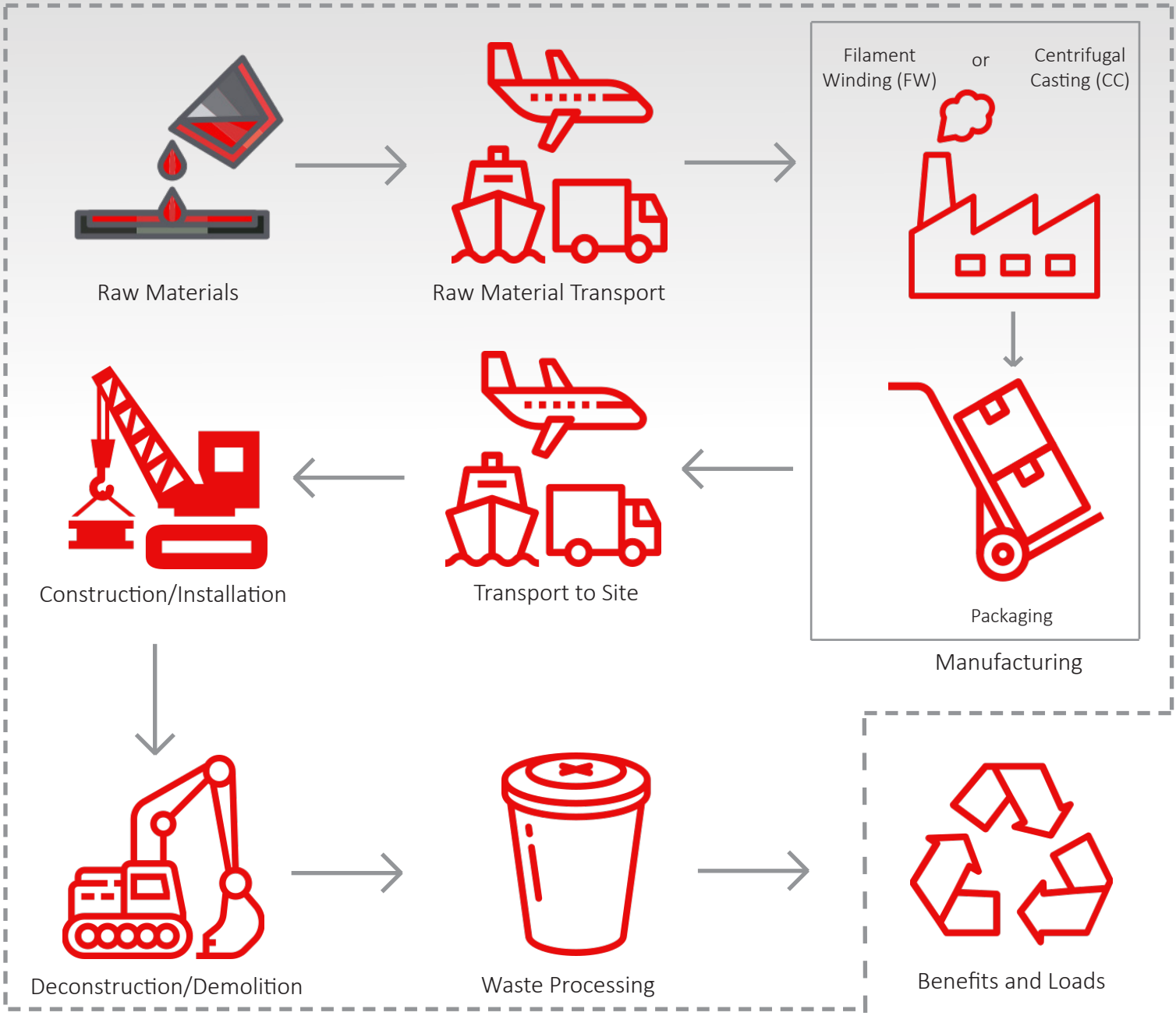
Jointing element of GRP pipe is manufactured by using glass fiber and resin. The inner surface is coated with an EPDM rubber seal which is factory integrated. It ensures the leak tightness by the special design of gasket profile.

LCA Information

Declared Unit	1 tonne of GRP pipe with coupling (with FW and CC production methods)
Time Representativeness	Average data for 2017,2018, 2019 and first six months of 2020
Database(s) and LCA Software Used	TLCID ver. 1.0 (Turkish Lifecycle Inventory Database), Ecoinvent 3.5 SimaPro 9.0

The inventory for the LCA study is based on the average production figures for GRP pipes (together with coupling) by SUPERLIT production plants in Düzce, Turkey for the time period of 2017, 2018, 2019 and first six months of 2020.

System Boundary



Description of System Boundary

This EPD's system boundary has been defined as cradle to gate with options, modules C1-C4 and module D. Besides, A4: Transport to Plant and A5: Construction / Installation stages were added as optional.

Upstream	Core		Downstream												Other Environmental Information
Raw Material	Raw Material Transport	Manufacturing	Transport to Plant	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Disposal Site	Waste Processing	Disposal	Future reuse, recycling or energy recovery potential
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

Description of the system boundary (X = Included in LCA, ND=Not Declared)

A1: Raw Material

Production starts with raw materials. Raw material stage includes raw material extraction/preparation and pre-treatment processes before production.

A2: Raw Material Transport

Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production site is taken as the weight average values for transport from raw materials supplier for 2017, 2018, 2019 and first six months of 2020.

A3: Manufacturing

GRP pipes can be produced with 2 production technology as filament winding and centrifugal casting method. Both processes 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.

A4: Transport to Site

Transport of final product to construction site is taken as the weight average values for transport to plant for 2017, 2018, 2019 and first six months of 2020.

A5: Construction / Installation

This stage includes the installation of GRP pipes in the construction site. For installing 1 tonne GRP pipe, (average length is assumed as 7 m for the pipes produced by FW method, and 12 m for the ones which produced by CC method), 20 minutes installation time is assumed by using a mobile crane which consumes 18 L of diesel per hour. The depth which pipes were installed was assumed as 3.5 m, and the required area was assumed to be digged in 1 hour by a mobile crane which consumes 15 L diesel per hour.

C1 : Deconstruction / Demolition

For demolition 1 tonne GRP pipe, (average length is assumed as 7 m for the pipes produced by FW method, and 12 m for the ones which produced by CC method), 20 minutes installation time is assumed by using a mobile crane wich consumes 18 L of diesel per hour. The depth which pipes were installed was assumed as 3.5 m, and the required area was assumed to be digged in 1 hour by a mobile crane which consumes 15 L diesel per hour.

C2 : Transport to Disposal Site

This stage includes the transportation of the discarded pipes to final disposal. Average distance from demolition site to waste processing site for final disposal is assumed to be 100 km.

C3 : Waste Processing

As the waste is going to landfill, there is no need for any waste process.

C4 : Disposal

Disposal is the final stage of product life. Composite pipes may dispose with any disposal scenario after construction and demolition as their final fate and modelled as such for this EPD. It is assumed that 25% of the waste is used as inert filler, and the rest of the waste is send to the landfill.

D : Benefits and Loads

In this stage, benefits from the inert filler specified in the disposal stage were calculated.

More Information

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.

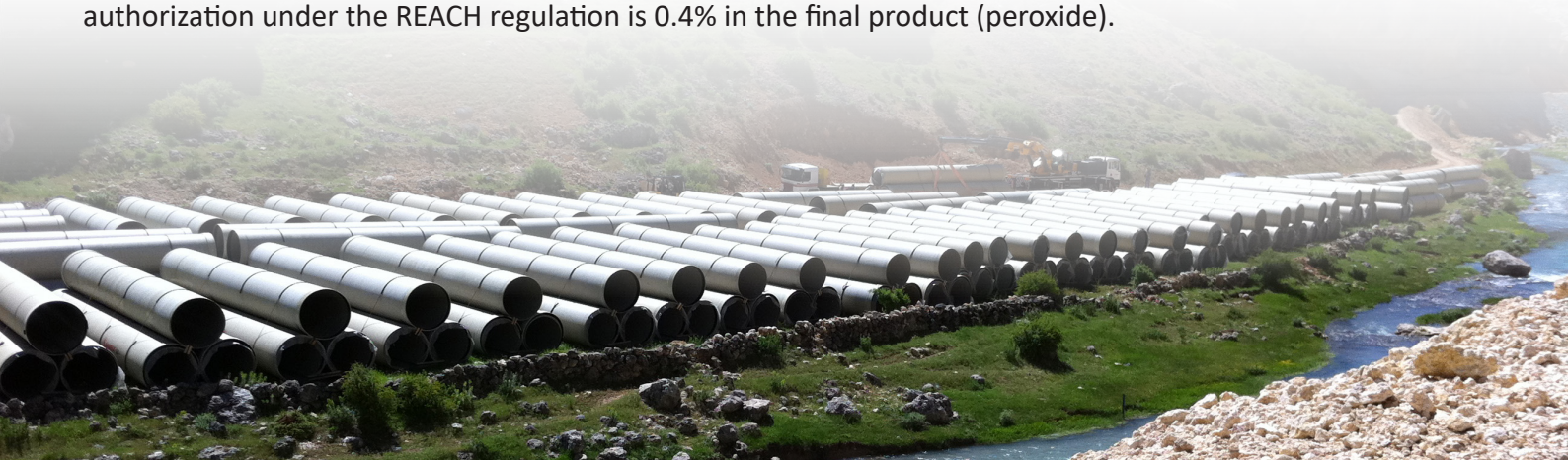
There are no co-products in the production. Hence, there is no need for co-product allocation.

Energy consumption and transport datasets were allocated based on the average production figures for 2017, 2018, 2019 and first six months of 2020, and weighted average of environmental impacts for the GRP pipes were presented.

Accordingly, hazardous and non-hazardous waste amounts were also allocated based on the average waste arisings for the period of 2017, 2018, 2019 and first six months of 2020.

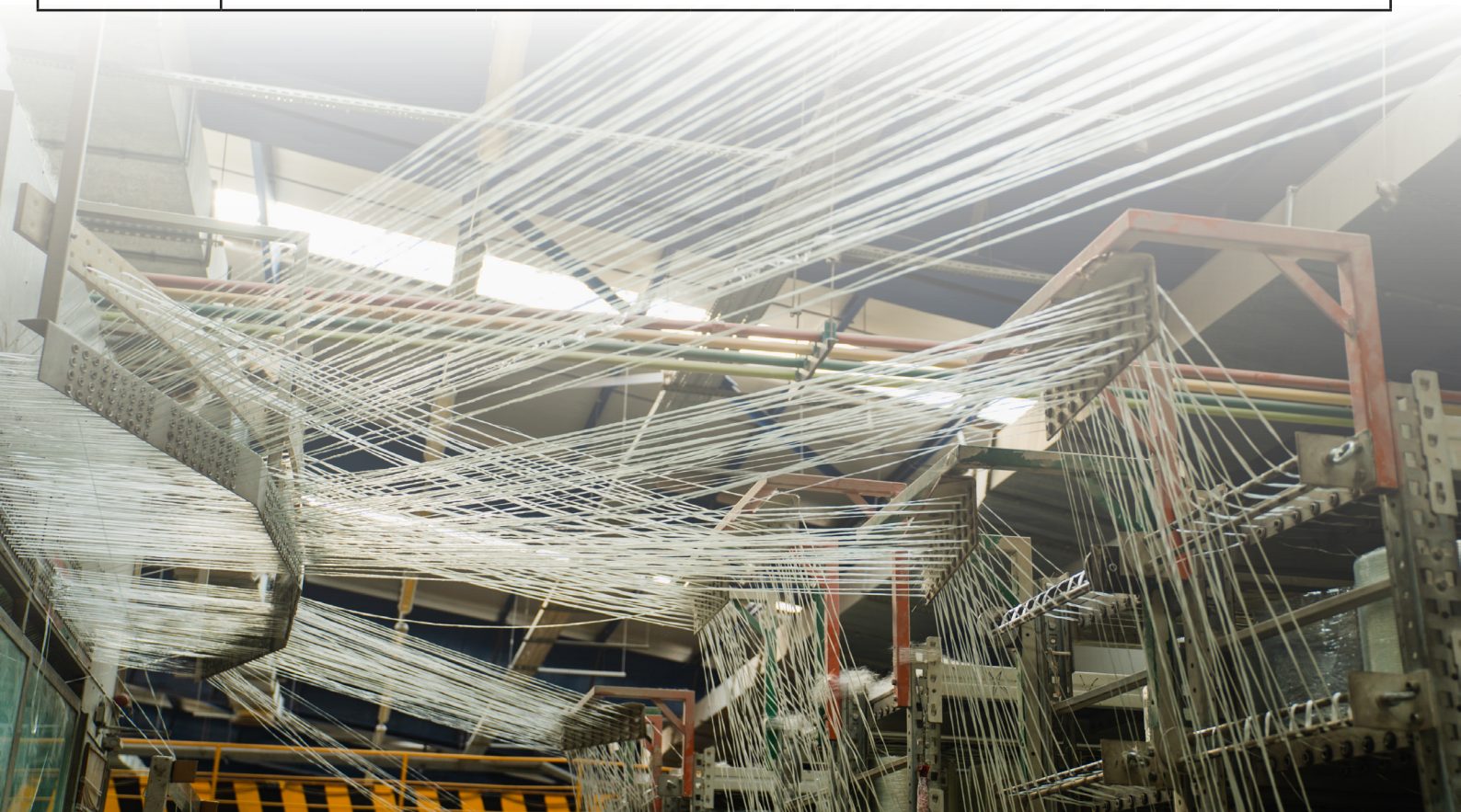
GRP pipes are theoretically outlasting/lifetime products. However, when they are scrapped or discarded, they are disposed as per Waste Management Plan of SUPERLIT in accordance with Turkish laws and regulations.

The amount of the substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulation is 0.4% in the final product (peroxide).



LCA Results

Environmental Impacts for 1 tonne of GRP Pipes with Coupling											
Impact Category	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP - Fossil	kg CO_2 eq	1.58E+3	135E+0	88.0E+0	211E+0	72.6E+0	72.6E+0	21.5E+0	0	46.9E+0	-9.64E+0
GWP - Biogenic	kg CO_2 eq	-1.20E+0	82.1E-3	183E-3	82.2E-3	12.0E-3	12.0E-3	4.32E-3	0	356E+0	-7.34E-3
GWP - Luluc	kg CO_2 eq	1.15E+0	54.0E-3	503E-3	102E-3	6.17E-3	6.17E-3	7.54E-3	0	6.70E-3	-4.85E-3
GWP - Total	kg CO_2 eq	1.58E+3	135E+0	88.7E+0	211E+0	72.6E+0	72.6E+0	21.5E+0	0	403E+0	-9.66E+0
ODP	kg CFC-11 eq	201E-6	28.6E-6	5.50E-6	42.6E-6	16.4E-6	16.4E-6	4.77E-6	0	2.53E-6	-1.95E-6
AP	mol H+ eq	9.28E+0	2.04E+0	389E-3	3.08E+0	761E-3	761E-3	86.2E-3	0	96.5E-3	-86.9E-3
EP - Freshwater	kg P eq	538E-3	14.2E-3	53.0E-3	28.8E-3	3.33E-3	3.33E-3	1.96E-3	0	7.04E-3	-1.54E-3
EP - Marine	kg N eq	1.76E+0	444E-3	71.1E-3	696E-3	330E-3	330E-3	24.3E-3	0	1.13E+0	-23.9E-3
EP - Terrestrial	mol N eq	19.2E+0	4.95E+0	664E-3	7.75E+0	3.63E+0	3.63E+0	268E-3	0	288E-3	-266E-3
POCP	kg NMVOC	9.17E+0	1.34E+0	198E-3	2.10E+0	996E-3	996E-3	81.6E-3	0	169E-3	-74.4E-3
ADPE	kg Sb eq	7.28E-3	194E-6	112E-6	248E-6	24.2E-6	24.2E-6	84.6E-6	0	11.4E-6	-27.4E-6
ADPF	MJ	30.7E+3	1.98E+3	1.12E+3	3.07E+3	1.05E+3	1.05E+3	321E+0	0	215E+0	-142E+0
WDP	m^3 depriv.	708E+0	13.1E+0	27.1E+0	22.5E+0	5.66E+0	5.66E+0	2.24E+0	0	5.51E+0	-15.5E+0
PM	disease inc.	80.6E-6	8.29E-6	1.68E-6	12.7E-6	19.9E-6	19.9E-6	1.32E-6	0	1.30E-6	-833E-9
IR	kBq U-235 eq	125E+0	10.8E+0	812E-3	17.7E+0	4.89E+0	4.89E+0	1.56E+0	0	1.42E+0	-796E-3
ETP - FW	CTUe	47.0E+3	1.36E+3	520E+0	2.31E+3	594E+0	594E+0	236E+0	0	2.14E+3	-119E+0
HTTP - C	CTUh	2.61E-6	42.7E-9	22.2E-9	84.4E-9	20.4E-9	20.4E-9	7.84E-9	0	14.0E-9	-6.65E-9
HTTP - NC	CTUh	59.8E-6	1.29E-6	618E-9	2.32E-6	519E-9	519E-9	264E-9	0	698E-9	-140E-9
SQP	Pt	4.11E+3	774E+0	172E+0	1.78E+3	133E+0	133E+0	186E+0	0	403E+0	-97.0E+0
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, A2: Raw Material Transport, A3: Manufacturing, A4: Transport to Site, A5: Construction/Installation, C1: Deconstruction/ Demolition, C2: Transport to Disposal Site, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.										



Resource Use for 1 tonne of GRP Pipes with Coupling

Impact Category	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.13E+3	31.8E+0	121E+0	66.5E+0	6.08E+0	6.08E+0	3.76E+0	0	7.56E+0	-3.09E+0
PERM	MJ	0	0	0	0	0	0	0	0	0	0
PERT	MJ	1.13E+3	31.8E+0	121E+0	66.5E+0	6.08E+0	6.08E+0	3.76E+0	0	7.56E+0	-3.09E+0
PENRE	MJ	30.7E+3	1.98E+3	1.12E+3	3.07E+3	1.05E+3	1.05E+3	321E+0	0	215E+0	-142E+0
PENRM	MJ	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	30.7E+3	1.98E+3	1.12E+3	3.07E+3	1.05E+3	1.05E+3	321E+0	0	215E+0	-142E+0
SM	kg	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	11.0E+0	282E-3	56.2E+3	566E-3	92.1E-3	92.1E-3	53.7E-3	0	197E-3	-374E-3

Waste & Output Flows for 1 tonne of GRP Pipes with Coupling

Impact Category	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	29.7E+0	0	0	0	0	0	0	0
NHWD	kg	0	0	15.2E+0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0
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, 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.										
Legend	A1: Raw Material, A2: Raw Material Transport, A3: Manufacturing, A4: Transport to Site, A5: Construction/Installation, C1: Deconstruction/Demolition, C2: Transport to Disposal Site, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.										

Result per funtional declared unit

Biogenic Carbon Content	Unit	A1-A3
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0

References

/GPI/ General Programme Instructions of the International EPD® System. Version 3.0.

/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 1.1 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

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

/TLCID/ Turkish Life Cycle Inventory Database, Turkish Center for Sustainable Production Research and Design (SURATAM), www.suratam.org

Contact Information

Programme	EPD registered through fully aligned regional programme: EPD Turkey www.epdturkey.org TURKEY EPD® THE INTERNATIONAL EPD® SYSTEM	The International EPD® System www.environdec.com EPD® THE INTERNATIONAL EPD® SYSTEM
Programme operator	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15, 34415 Kağıthane - Istanbul / TURKEY www.epdturkey.org info@epdturkey.org	EPD International AB Box 210 60 SE-100 31 Stockholm / Sweden www.environdec.com info@environdec.com
Owner of the declaration	SUPERLIT® PIPE INDUSTRIES Superlit Boru San. A.Ş Cumhuriyet Cad. No 155/3 Harbiye 34367 Istanbul / TURKEY	Contact: Hasan Güner Design and R&D Leader Phone: (+90) 212 315 31 31 Fax: (+90) 312 231 49 51 www.superlit.com sales@superlit.com
LCA practitioner	metsims Sustainability Consulting Turkey: Lalegül Sok. No:7/18 Kağıthane 34415 4. Levent – Istanbul / TURKEY +90 212 281 13 33	The United Kingdom: 4 Clear Water Place Oxford OX2 7NL, UK 0 800 722 0185 www.metsims.com info@metsims.com
3rd party verifier	LCA studio	Vladimír Kocí, PhD LCA Studio Šárecká 5,16000 Prague 6 - Czech Republic www.lcastudio.cz

SUPERLIT®

PIPE INDUSTRIES

İstanbul Headquarter	Düzce Factory	Malatya Factory	Romania Headquarter	Romania Buzau Factory
Cumhuriyet Cad. No 155/3 Harbiye 34367 İstanbul / TURKEY	Karaçalı Mah. Düzce Cd. No:60/60A Kaynaşlı-Düzce / TURKEY	2.Organize Sanayi Bölgesi 2.Kısım 9.Cadde No:14 Malatya / TURKEY	13 September Way, No:90 5.01 Building, 5th District Bucharest / ROMANIA	Sos. Brailei, Nr. 15, Loc. Buzau, Jud. Buzau / ROMANIA
Tel: +90 (212) 315 31 31 Fax: +90 (212) 231 49 51	Tel: +90 (380) 544 44 00 Fax: +90 (380) 544 44 05	Tel: +90 (422) 244 02 88 Fax: +90 (422) 244 0299	Tel: +40 21 310 40 81 / 82 Fax +40 21 311 07 57	Tel: +40 0238 402 240 / 242 Fax: +40 0238 712 266

www.superlit.com
sales@superlit.com