Environmental Product Declaration

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

Spirally Welded Steel Tube (SAWH)

from

MAZLUM MANGTAY ÇELİK BORU

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD TÜRKİYE
Type of EPD:	EPD of a single product from a manufacturer
EPD registration number:	EPD-IES-0028253:004
Version date:	2026-02-27
Validity date:	2031-02-26 *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	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): ***Construction products 2019:14, version 2.0.1, valid until 2030-04-07, UN CPC Code: 4128***
PCR review was conducted by: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/support.

Third-party Verification
☒ **EPD process certification* without a pre-verified LCA/EPD tool** Third-party verifier: *Hüdai Kara PhD, Metsims Sustainability Consulting, Oxford, U.K.* Approved by: 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 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.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: Mazlum Mangtay Çelik Boru A.Ş.

Address: Haci Sabanci Organize Sanayi Bölgesi, İstiklal Caddesi No: 10, Saricam, Adana, Türkiye

Contact: Mert Kahraman / uretim@mazlumboru.com

Contact details of the LCA practitioner: Gürçay Cevher / gurcay.cevher@tuv.at

Description of the organisation:
Mazlum Çelik Boru, founded by Mazlum Mangtay in Adana, is one of Turkey's leading manufacturers of steel and drilling pipes. The company began its journey in the 1950s, initially offering drilling services. By 1967, it had earned a solid reputation as a trusted name in the sector. In 1987, recognizing a critical shortage of high-quality drilling equipment pipes, the company expanded into manufacturing its own drilling pipes. This marked the company's first step into the steel pipe industry. Following this success, Mazlum Çelik Boru began producing spiral welded steel pipes in 1995 and solidified its position in the market under the brand name Mazlum Boru.
In June 2010, the company relocated to a modern 36,000 m² facility in the Adana Hacı Sabancı Organized Industrial Zone. With this investment, it increased its annual production capacity to 120,000 tons, ensuring compliance with both national and international standards. Today, Mazlum Çelik Boru serves not only the Turkish market but also exports to global markets.
The product portfolio includes pipes for oil, water, wastewater, piling, construction, and various special applications. Production adheres to globally recognized standards, including API, DIN, BS, AWWA, UNI, ASTM, and Turkish Standards.
In addition, Mazlum Çelik Boru offers coating solutions such as epoxy, bitumen, polyethylene, polypropylene, and polyurethane, tailored to meet customer specifications and applicable standards.

Product-related or management system-related certifications: Mazlum Mangtay Çelik Boru holds quality management system certificates such as API Spec Q1, ISO 9001, ISO 14001, and OHSAS 18001. Mazlum Mangtay Çelik Boru supplies Spirally Welded Steel Tubes according to the following standards, depending on the intended application:

Petroleum and Gas Line Pipes,
- API 5L PSL-1 & PSL-2
- ISO 3183
- EN 10208
- DIN 17172

Water Line Pipes,
- EN 10217-1
- AWWA C200
- EN 10224
- BS 534
- UNI 6363

Generel Purpose pipes,
- BS 3601
- NFA 49150
- DIN 1626

Piling pipes,
- EN 10219-1
- ASTM A-252

PRODUCT INFORMATION

Product name: Spirally Welded Steel Tube

Product identification: Spirally Welded Steel Tube is the process of winding a flat steel sheet in a spiral shape into a pipe and joining the edges of the tape from inside and outside using the submerged arc welding method. Spiral pipes, which can be used in the transportation of many liquids such as water, wastewater, oil can also be used as pile pipes in construction and as the feet of heavy structures such as advertising signs, billboards, totems.

UN CPC code: 4128 - Steel pipes and tubes

Product description: Mazlum Boru's pipe production capacity is 120,000 tons per year of Spirally Welded Steel Tubes with outer diameters of up to Ø 219.1 mm - Ø 3810 mm (8” - 150”) and wall thicknesses of up to 4.00 mm - 28.00 mm (0.157”-1.10”) in our facilities. Pipe lengths range from 4.00 m to 16.00 m (special production up to 46 m).

Name and location of the production site: MAZLUM BORU, Haci Sabanci Organize Sanayi Bölgesi, İstiklal Caddesi No: 10, Saricam, Adana, Türkiye

Website: https://www.mazlumboru.com.tr/

Usage Areas of Steel Pipes:

In parallel with technological developments, spiral welded steel pipes, which have gained a longer life thanks to corrosion protection techniques and materials, take the first place in their areas of use thanks to the features listed below.

Usage Areas:

- Water Distribution Lines
- Oil Pipelines
- Natural Gas Distribution Lines
- Foundation Piles
- In Industrial Pipe Networks
- Steel Structures
- Pressurized Air Lines
- Drilling Wells
- Transportation of High Temperature Water
- Shipyard and Port Piles

Properties:

- High Strength
- Resistance to Pressure and Impacts
- High Carrying Capacity
- Continuity and Long Life
- Flexibility
- Ease of Assembly
- Easy Shaping Feature

Pipe Technical Specifications:

Annual Production Capacity

- 120,000 TONNES

Production Pipe Diameter Range

- Ø 219.1 mm – Ø 3810 mm (8” – 150”)

Wall Thickness Range

- 4.00 m - 28.00 m (0.157”-1.10”)

Pipe Length Range

- 4.00 mm - 16.00 m (special production up to 46 m)

Steel Raw Material Used

- Hot Rolled Steel Coil (HRC)

Welding Process

- Internal and external submerged arc welding single, double or triple welding types (SAW)

Production Standards and Material Qualities:

Spiral Welded Steel Pipes Are Manufactured in Accordance with The Following Standards and Material Qualities:

Production Standards	Steel Grades
API 5L	L175/A25, L175P/A25P, L210/A, L245/B, L290/X42, L320/X46, L390/X56, L415/X60, L450/X65, L485/X70, L245R/BR, L290R/X42R, L320N/X46N, L360N/X42N, L390N/X56N, L245N/BN, L290N/X42N, L320Q/X46Q, L360Q/X52Q, L390Q/X56Q, L245Q/BQ, L290Q/X42Q, L320M/X46M, L360M/X52M, L390M/X56M, L245M/BM, L290M/X42M, L415N/X60N, L450Q/X65Q, L485Q/Z70Q, L415Q/X60Q, L450M/X65M, L485M/X70M, L415M/X60M
EN 10217-1	P195TR1-P195TR2, P235TR1-P235TR2, P265TR1-P265TR2, S235JR, S275JR
EN 10219-1	S235JRH, S275J0H, S275J2H, S275NH, S275NLH, S355JOH, S355J2H, S355K2H, S355NH, S355NLH, S460NH, S460NLH, S420, S460, X60, X65, X70
AWWA C200	ASTM A-570, ASTM A-36, ASTM A-283
ASTM A53	Grade A, Grade B
ASTM A252	Grade 1, Grade 2, Grade 3
ISO 3183	L175/A25, L175P/A25P, L210/A, L245/B, L290/X42, L320/X46, L390/X56, L415/X60, L450/X65, L485/X70, L245R/BR, L290R/X42R, L320N/X46N, L360N/X42N, L390N/X56N, L245N/BN, L290N/X42N, L320Q/X46Q, L360Q/X52Q, L390Q/X56Q, L245Q/BQ, L290Q/X42Q, L320M/X46M, L360M/X52M, L390M/X56M, L245M/BM, L290M/X42M, L415N/X60N, L450Q/X65Q, L485Q/Z70Q, L415Q/X60Q, L450M/X65M, L485M/X70M, L415M/X60M
EN 10208-2	L245MB, L290MB, L360MB, L415MB
EN 10224	L235, L275, L355
EN 1090-2	L175/A25, L175P/A25P, L210/A, L245/B, L290/X42, L320/X46, L390/X56, L415/X60, L450/X65, L485/X70, L245R/BR, L290R/X42R, L320N/X46N, L360N/X42N, L390N/X56N, L245N/BN, L290N/X42N, L320Q/X46Q, L360Q/X52Q, L390Q/X56Q, L245Q/BQ, L290Q/X42Q, L320M/X46M, L360M/X52M, L390M/X56M, L245M/BM, L290M/X42M, L415N/X60N, L450Q/X65Q, L485Q/Z70Q, L415Q/X60Q, L450M/X65M, L485M/X70M, L415M/X60M, S235JRH, S275J0H, S275J2H, S275NH, S275NLH, S355JOH, S355J2H, S355K2H, S355NH, S355NLH, S460NH, S460NLH, S420, S460

CONTENT DECLARATION

Product content	Mass, kg	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Hot Rolled Flat Steel, obtained from scrap (EAF)	996.16	0%	0%
Powder coating	3,84	0%	0%
Total	1000	0%	0%

**The main raw material is scrap-based hot rolled steel coil produced via the EAF route. The supplier EPD confirms the use of steel scrap but does not specify the share of post-consumer versus pre-consumer scrap. Therefore, no specific recycled content percentage is declared. The use of secondary material is reflected in the SM indicator reported in the LCA results.*

The recycled material (scrap-based hot rolled steel) contributes more than 10% to the GWP-GHG results of modules A1–A3. Therefore, the GWP-GHG intensity of this recycled material is declared as 721 kg CO_2 eq./tonne, based on the supplier EPD (Tosçelik Profil ve Sac Endüstrisi A.Ş., EPD No: S-P-04880 (Hot Rolled Steel Coil).

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Wooden planks and wedges placed under the pipes during transportation	11	1.09	5.64

Hazardous substances from the candidate list of SVHC	EC No.	CAS No.	Mass-% per product or declared unit
No hazardous substances from the candidate list of SVHC	N/A	N/A	N/A

LCA INFORMATION

Declared unit: 1 tonne of Spiral Welded Steel Pipe manufactured by Mazlum Mangtay Çelik Boru A.Ş

Reference service life (RSL): 50 years
Steel pipes are generally not replaced during the lifetime of a building and the RSL may be taken as equal to the reference study period of the building, typically 50 years. Under EN 10224 and EN 10219 standards, corrosion-protected steel pipes have a design life exceeding 100 years in buried conditions. The technical lifespan of the product is assumed consistent with the RSL. Therefore, assuming 50 years is a conservative estimation.

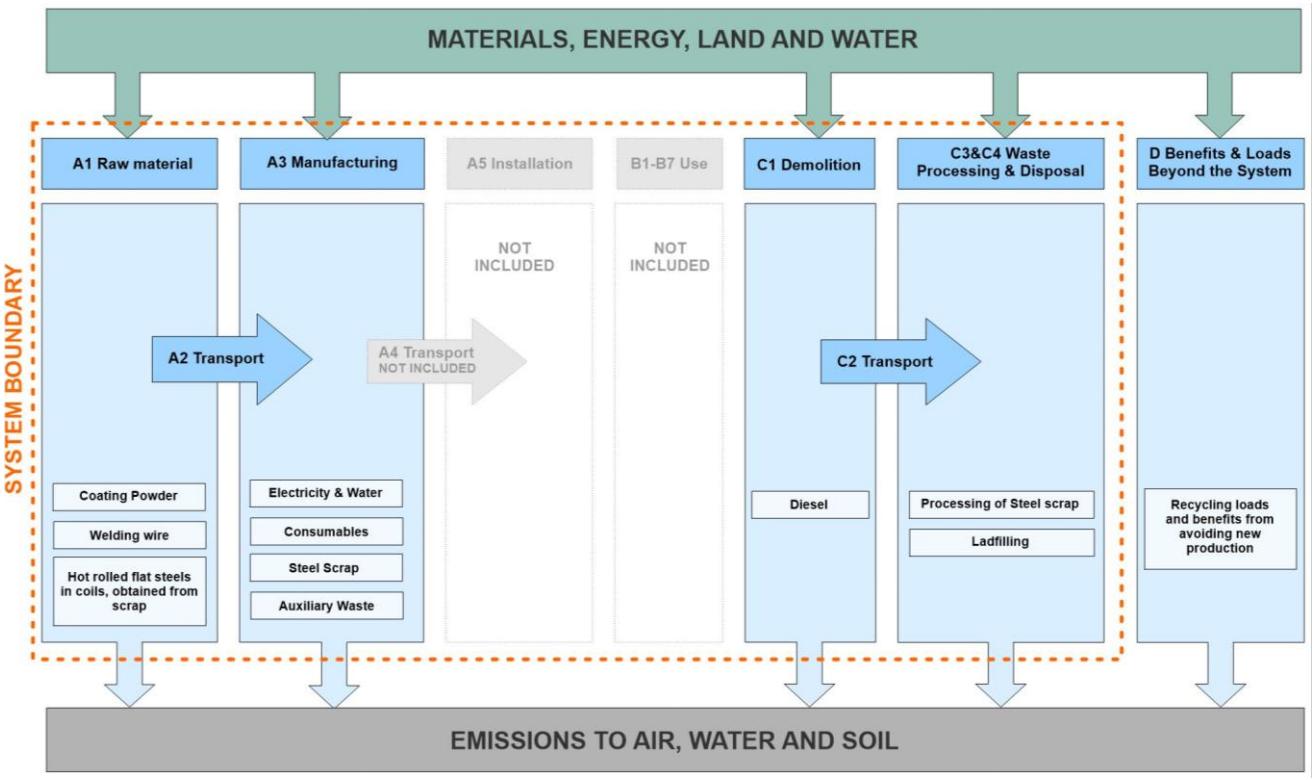
Time representativeness:
The collection of foreground data refers to January 2024 to December 2024.

Geographical scope: Turkey (TR)

Database(s) and LCA software used:
SimaPro 10.1 LCA software was used for the LCA study. Primary data used in the study is obtained from the manufacturing plant of the EPD owner - Mazlum Mangtay Çelik Boru A.Ş., background data is obtained from Ecoinvent 3.10 database.

Description of system boundaries:
The system boundaries cover type a) EPD: Cradle to gate, modules C1-C4 and module D (production stage A1-A3 + end-of-life stage C1-C4 + benefits and loads beyond the system boundary D).

Process flow diagram:



A1 – Raw Material Supply

The raw materials in Mazlum Boru's supply chain are sourced from Tosçelik Profil ve Sac Endüstrisi A.Ş., a certified member of UK CARES. These raw materials consist of scrap-based hot-rolled flat steel coils produced using Electric Arc Furnace (EAF) technology, all of which are manufactured by TOSÇELİK from recycled scrap steel. For the Raw Material Supply phase, this study utilized data from the Environmental Product Declaration (EPD) owned by Tosçelik Profil ve Sac Endüstrisi A.Ş., which is the actual supplier of the raw material.

A2 – Raw Material Transport

Module A2 includes the transportation of raw materials from the suppliers to the manufacturing site. Transport is modelled using average freight transport datasets. The transport mode, vehicle type, fuel, and distance reflect the primary logistics data provided by the manufacturer.

For this module 1 tonne of product delivered to the manufacturing gate was considered. No additional processing or intermediate storage is included in this phase.

Parameters A2 Module	
Mode of transport	Road transport (truck)
Transport by road*	Lorry > 32 metric tonne
Distance (truck)	123 km
Vehicle Type	Euro 6
Vehicle Fuel	Diesel

A3 – Manufacturing

Module A3 covers all processes required for the manufacturing of the product, including the transformation of steel sheets, forming and welding operations, auxiliary material use, and internal handling.
LCA model includes electricity consumption, welding processes, powder coating, use of lubricating oils and processing aids, water consumption, and all auxiliary and packaging materials used during production.
Waste generated in the manufacturing process (steel scrap, plastic and paper packaging, waste oil, wastewater, and hazardous waste) is modelled with the corresponding waste treatment datasets.
Production scrap in the amount of 1.43% yield loss.
Biogenic carbon uptake from pallet wood is balanced in A3, as required for type-a EPDs.
The output of Module A3 is 1 tonne of finished product at the factory gate.

A3 Manufacturing Parameters (per 1 tonne of product)	
Electricity Consumption Per Tonne (kWh)	53.42
Energy Source Used	Grid Electricity
Steel coils, (kg)	1014
Water Consumption Per Tonne (m^3)	0.151
Internal Waste Rate (%)	1.43
Coating Powder Per Tonne (kg)	3.84
Welding Wire Per Tonne (kg)	4.04
Auxiliary materials incl. their packaging (kg)	0.611
No of use of Wood pallets (reuse)	3

C1 – Deconstruction & Demolition

Module C1 covers the deconstruction and removal of the steel product at the end of its service life, in accordance with PCR 2019:14, Section 4.8.4 'End-of-Life Stage, Modules C1–C4'. The modelling uses the default assumptions and data provided in Table 4 of the PCR, based on Erlandsson et al. (2015) and OVAM (2018).

C2 – Waste Transport

Module C2 covers the transport of the product from the point of deconstruction to the waste processing or recycling facility.

The model of this stage includes the data from Table 4. Default data for modelling module C2, using a 16–32 metric tonne lorry (EURO 5).
The output of Module C2 is the product delivered to a waste processing or recycling facility for further treatment in Module C3.

C2 Transport Parameters	
Mode of transport	Road transport (truck)
Transport by road*	Lorry 16-32 metric tonne
Distance (truck)	80 km
Vehicle Type	Euro 5
Load factor	50%
Database	Table 4/PCR 2019:14, Ecoinvent v 3.10

C3 – Waste Processing

Module C3 covers the processing steps at the end of life of the product. Sorting and pressing of scrap before disposal or recycling are considered. No recycling credit is allocated in C3; benefits of scrap use in steel production are reported exclusively in Module D in accordance with EN 15804+A2 and PCR 2019:14.
The model of this stage includes the data from Table 4 from the PCR. Default data for modelling module C3. Loading and unloading at sorting facility, sorting and fragging of steel.

C4 – Disposal

The scenario assumes that the 100% of the steel mass is recovered as scrap and transferred to the scrap market. According to the "World Steel Association (2023). worldsteel LCA eco-profile Global | Engineering steel – Construction.", the recycling rate of steel is 95%. 95% of the steel is assumed to be recycled and 5% landfilled.
The model includes the data from Table 4 from the PCR. Default data for modelling of module C4 is compacting of inert construction waste for landfills (including backfilling).
In addition to the main scenario (95% recycling, 5% landfilling), two supplementary scenarios are reported at the end of the EPD in section "Additional LCA results" - a 100% landfilled scenario and 100% recycled scenario.

D – Reuse, Recovery or Recycling

This module reflects the benefits of avoiding the production of an equivalent amount of steel manufactured via the electric arc furnace (EAF) route. The net amount of recyclable steel scrap leaving the product system at end-of-life (95% of product mass) is assumed to substitute the same amount of EAF steel production, following the net scrap method defined in EN 15804+A2.

Module D credits correspond to the avoided burdens of EAF steel production minus the burdens associated with recycling operations.

Allocation:

Allocation of specific data was done for the manufacturing processes in the A3 module. All the data was obtained per year and allocated by mass of total yearly production to per ton steel pipe. Raw material, water consumption, energy consumption, auxiliary materials and waste 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 rules:

In the LCA study no process, material flow, energy flow, or waste stream has been excluded. No known potentially hazardous or environmentally relevant flows were excluded. All known and relevant inputs and outputs across the system boundary are included in the model. If any minor data gaps exist (e.g., negligible additives, auxiliary materials, or emissions), they are estimated to be well below the 1% threshold for mass, energy, and environmental relevance.

Averaging rules:

Averaging for all primary (site-specific) data is performed by dividing annual totals for energy, water, materials, and waste by the total mass of products produced in 2024.
Secondary data uses European or Rest-of-World averages, consistent with PCR 2019:14 requirements.
No averaging of EPDs from multiple plants is performed as the EPD represents one production site and one calendar year.

Data quality:

Data quality was assessed in accordance with EN 15804+A2 and the General Programme Instructions of the International EPD System (GPI v5.0.1, Annex A).

Primary data were collected for all processes under the operational control of the manufacturer (A3 and transport to manufacturing in A2) for the reference year 2024.
Secondary data were taken from ecoinvent v3.10 and from the supplier EPD for steel (Tosçelik Profil ve Sac Endüstrisi A.Ş., EPD No: S-P-04880 (Hot Rolled Steel Coil).).
The quality level in this study is qualified as Good.

- Temporal representativeness: Primary data: 2024; secondary datasets < 10 years old.
- Geographical representativeness: Primary data: Türkiye; secondary datasets: RoW/GLO where regional data is unavailable.
- Technological representativeness: Data reflect current technology for spiral welded steel pipe production.

The share of primary data contributing to the GWP-GHG results for modules A1–A3 is 13,4%.

Process	Source Type	Source	Reference Year	Data Category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing of product	**Collected Data**	**EPD owner, Ecoinvent v3.10**	2024	Primary data,	12.1%
Transport of steel to manufacturing site	**Collected Data**	**EPD owner, Ecoinvent v3.10**	2024	Primary data,	1.3%
Raw material Extraction	**EPD Data**	**EPD owner, an upstream EPD (Tosçelik Profil ve Sac Endüstrisi A.Ş., EPD No: S-P-04880 (Hot Rolled Steel Coil).)**	2022	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3					13.4%
Note	The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.				

Infrastructure and capital goods:

Infrastructure and capital goods are not modelled explicitly in the LCA study. Infrastructure that is already included in the background datasets from ecoinvent v3.10 (e.g. in electricity, transport and material processes) is kept as provided in those datasets, but no additional site-specific infrastructure has been added.

Electricity modelling:

Electricity consumption is modelled using EN 15804+A2 characterisation factors.

In accordance with the standard, the GWP-GHG value for Turkish low-voltage grid electricity is taken from the impact category ‘Climate change – Fossil’, which includes only fossil greenhouse gas emissions as defined by EN 15804+A2.

Based on the ecoinvent v3.10 dataset (Electricity, low voltage {TR} | Cut-off, U), the resulting GWP-GHG intensity used in the LCA model is: 0.155 kg CO_2-eq per kWh.

Characterisation methods:

All environmental impact indicators in the LCA study are calculated using the EN 15804+A2 ILCD characterisation package, implemented in SimaPro as the “EF 3.1 – EN15804 reference package”. This package includes all mandatory indicators required by EN 15804:2012+A2:2019 and PCR 2019:14 v2.0.1.
The following indicator groups are included:
Climate change (GWP-total, GWP-fossil, GWP-biogenic, GWP-luluc)

Ozone depletion (ODP)
Acidification (AP)
Eutrophication (EP-freshwater, EP-marine, EP-terrestrial)
Photochemical ozone formation (POCP)
Abiotic resource depletion – minerals & metals (ADP-minerals&metals
Abiotic resource depletion – fossil (ADP-fossil)
Water use (WDP)
All characterisation factors are consistent with the EF 3.1 / EN 15804 reference package, which uses: IPCC 2021 factors for climate change (100-year horizon),
CML / LOTOS-EUROS / ReCiPe-derived methods for other impact categories, AWaRe method for water use (Boulay et al. 2016).

Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Production			Installation		Use Stage							End-of-Life				Next product system
	Raw material supply	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to EoL	Waste processing for reuse, recovery, recycle	Disposal	Reuse, recovery, or recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	TR	TR	TR	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Primary data share	13,4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – Sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Modules/processes/life-cycle stages declared
ND: Modules/processes/life-cycle stages not declared

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

The environmental performance of Mazlum Boru spiral welded steel pipe for 1 tonne declared unit is reported below using the parameters and units specified in PCR 2019:14 v2.0.1
The estimated impact results are relative statements only and do not indicate the extremes of the impact categories, exceedances of threshold values, safety margins and/or risks.

Mandatory impact category indicators according to EN 15804 +A2:2019

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-luluc	kg CO_2 eq.	2,90E+00	1,28E-05	3,61E-04	2,12E-02	6,49E-06	-1,86E-01
GWP-fossil	kg CO_2 eq.	7,14E+02	3,72E-01	1,23E+01	6,60E+00	1,63E-01	-1,71E+02
GWP-biogenic	kg CO_2 eq.	3,29E+00	1,45E-05	5,03E-04	2,95E-03	1,11E-05	-1,11E-01
GWP-total	kg CO_2 eq.	7,21E+02	3,73E-01	1,24E+01	6,64E+00	1,63E-01	-1,72E+02
ODP	kg CFC -11 eq.	3,26E-05	4,62E-09	1,31E-07	7,32E-08	1,93E-09	-1,48E-06
AP	Mole of H^+ eq.	3,92E+00	3,48E-03	3,35E-02	4,80E-02	1,49E-03	-6,31E-01
EP- freshwater	kg P eq.	7,84E-02	3,04E-06	2,51E-04	1,30E-03	4,32E-06	-2,66E-02
EP- marine	kg N eq.	7,32E-01	1,64E-03	1,22E-02	1,99E-02	6,80E-04	-1,95E-01
EP- terrestrial	Mole of N eq.	7,99E+00	1,79E-02	1,34E-01	2,14E-01	7,45E-03	-2,08E+00
POCP	kg NMVOC eq.	2,37E+00	5,33E-03	5,00E-02	6,42E-02	2,25E-03	-7,00E-01
ADPE	kg Sb eq.	7,45E-04	1,56E-08	7,34E-07	3,41E-07	6,52E-09	-1,80E-04
ADPF	MJ	7,12E+03	4,88E+00	1,65E+02	8,42E+01	2,09E+00	-1,52E+03
WDP	m^3 world equiv.	1,81E+02	3,86E-03	1,52E-01	6,73E-01	1,86E-03	-2,66E+02
Acronyms	**Caption:** GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP- terrestric = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element); ADPF = abiotic depletion potential (fossil); WDP = water scarcity.						

** Disclaimer:*
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.

Additional mandatory and voluntary impact category indicators

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO_2 eq.	7,14E+02	3,72E-01	1,23E+01	6,60E+00	1,63E-01	-1,71E+02
Acronyms	GWP-GHG*= global warming potential (greenhouse gases) This indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product with characterization factors (CFs) based on IPCC (2013)						

Resource use indicators

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,33E+03	1,07E-03	2,18E-02	2,43E-01	3,40E-03	-2,23E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2,33E+03	1,07E-03	2,18E-02	2,43E-01	3,40E-03	-2,23E+01
PENRE	MJ	7,71E+03	4,90E+00	1,65E+02	8,47E+01	2,10E+00	-1,80E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	7,71E+03	4,90E+00	1,65E+02	8,47E+01	2,10E+00	-1,80E+03
SM	kg	8,92E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2,32E+01	0,000154	0,005542	0,014633	7,16E-05	-6,57E+00
Acronyms	**Caption:** PERE = Use of renewable primary energy excluding the renewable primary energy resource used as raw materials; PERM = Use of renewable primary energy as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding the non- renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste indicators

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	1,51E+01	3,65E-05	1,34E-03	1,29E-03	1,67E-05	-2,91E-02
NHWD	kg	1,94E+01	1,40E-04	6,85E-03	1,74E-02	5,00E+01	-4,15E-01
RWD	kg	7,52E-04	2,50E-07	5,93E-06	7,40E-06	1,25E-07	-4,21E-03
MFR	kg	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
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acronyms	**Caption:** HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy						

Output flow indicators

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**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
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.95E+03	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental performance indicators according to EN 15804+A2:2019

Results per 1 Tonne of Spiral Welded Steel Pipe							
Impact indicators	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidences	3,04E-05	9,98E-08	8,24E-07	1,07E-06	4,20E-08	-1,09E-05
IR	kBq U235 eq.	9,64E+00	1,04E-03	2,51E-02	3,07E-02	5,20E-04	-1,65E+01
ETF	CTUe	5,95E+03	1,69E-01	1,09E+01	1,46E+01	9,43E-02	-5,22E+02
HTP-c	CTUh	2,04E-06	2,59E-11	1,04E-09	7,55E-10	3,15E-11	-1,12E-07
HTP-nc	CTUh	4,01E-06	3,69E-10	8,14E-08	2,83E-08	2,09E-10	-1,24E-06
SQP	Pt	1,45E+04	1,04E-02	6,74E-01	1,55E+00	2,06E+00	-1,36E+02
Acronyms	**Caption:** PM = Particulate matter emissions; IR = Ionising radiation, human health; ETF= Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects; SQP = Soil quality potential/Land use related impacts						

Additional environmental impact score used for MKI Calculation according to Environmental Prices

The total MKI (Monetary Key Performance Indicator) score, covering life cycle stages (A1–A3) and (C1–C4), is calculated as 97,85 EURO per 1 ton of product.

Results per 1 Tonne of Spiral Welded Steel Pipe									
Impact indicators	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**Total (A1–A3 + C1–C4)**
Resources	EUR2021	82,50	1,24	11,55	0,04	1,63	0,87	0,02	97,85
Acronyms	Environmental Prices is a method developed by CE Delft for expressing environmental impacts in monetary unit. This implementation is based on midpoint-level environmental prices, meaning that the values of environmental themes are used as weighting set (as opposed to implementing the factors for individual substances). Dutch Environmental Prices are average prices for average emissions in the Netherlands in 2021 and European Environmental Prices are based on EU27 emissions in 2021. They should not be used in other contexts.								

Only Modules A1-A3 and C1-C4 are considered in the MKI calculation, Module D is excluded as it is outside the system boundary. This approach is in line with EN 15804+A2:2019 and CE Delft methodology. The MKI (Environmental Prices) results are not part of the mandatory EN 15804+A2 indicators and shall not be used for comparative assertions unless all compared products apply the same method and assumptions.

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

Results for additional scenarios for modules C and D:

100% landfill scenario

Impact indicators		Unit	C3	C4	D
GWP	GWP-luluc	kg CO2 eq.	0.00E+00	1,30E-04	0.00E+00
	GWP-fossil	kg CO2 eq.	0.00E+00	3,26E+00	0.00E+00
	GWP-biogenic	kg CO2 eq.	0.00E+00	2,22E-04	0.00E+00
	GWP-total	kg CO2 eq.	0.00E+00	3,26E+00	0.00E+00
ODP		kg CFC -11 eq.	0.00E+00	3,85E-08	0.00E+00
AP		Mole of H^+ eq.	0.00E+00	2,97E-02	0.00E+00
EP- freshwater		kg P eq.	0.00E+00	1,03E-05	0.00E+00
EP- marine		kg N eq.	0.00E+00	1,36E-02	0.00E+00
EP- terrestrial		Mole of N eq.	0.00E+00	1,49E-01	0.00E+00
POCP		kg NMVOC eq.	0.00E+00	4,49E-02	0.00E+00
ADPE		kg Sb eq.	0.00E+00	1,30E-07	0.00E+00
ADPF		MJ	0.00E+00	4,19E+01	0.00E+00
WDP		m^3 world equiv.	0.00E+00	3,72E-02	0.00E+00

100% recyling scenario

Impact indicators		Unit	C3	C4	D
GWP	GWP-luluc	kg CO2 eq.	2,23E-02	0.00E+00	-3,67E-01
	GWP-fossil	kg CO2 eq.	6,95E+00	0.00E+00	-8,77E+02
	GWP-biogenic	kg CO2 eq.	3,11E-03	0.00E+00	-6,28E-01
	GWP-total	kg CO2 eq.	6,99E+00	0.00E+00	-8,80E+02
ODP		kg CFC -11 eq.	7,71E-08	0.00E+00	-2,59E-06
AP		Mole of H^+ eq.	5,05E-02	0.00E+00	-2,96E+00
EP- freshwater		kg P eq.	1,49E-04	0.00E+00	-6,82E-02
EP- marine		kg N eq.	2,06E-02	0.00E+00	-7,38E-01
EP- terrestrial		Mole of N eq.	2,25E-01	0.00E+00	-7,45E+00
POCP		kg NMVOC eq.	6,76E-02	0.00E+00	-2,30E+00
ADPE		kg Sb eq.	3,59E-07	0.00E+00	-8,70E-04
ADPF		MJ	8,87E+01	0.00E+00	-8,04E+03
WDP		m^3 world equiv.	7,08E-01	0.00E+00	-2,43E+01

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
GPI	General Programme Instructions
ISO	International Organization for Standardization
CPC	Central Product Classification
GRI	Global Reporting Initiative
SVHC	Substances of Very High Concern
ND	Not Declared
EPD	Environmental Product Declaration
PCR	Product Category Rules
RSL	Reference Service Life
EAF	Electric Arc Furnace
GLO	Global geographical scope
RoW	Rest of World
TR	Türkiye
SAW	Submerged Arc Welding
HRC	Hot Rolled Coil
API	American Petroleum Institute
DIN	German Institute for Standardization
AWWA	American Water Works Association
UNI	Italian National Standards Body
ASTM	American Society for Testing and Materialls

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VERSION HISTORY

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