

Environmental Product Declaration

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

Three Layer Polypropylene Coated Spiral Welded Steel Pipes

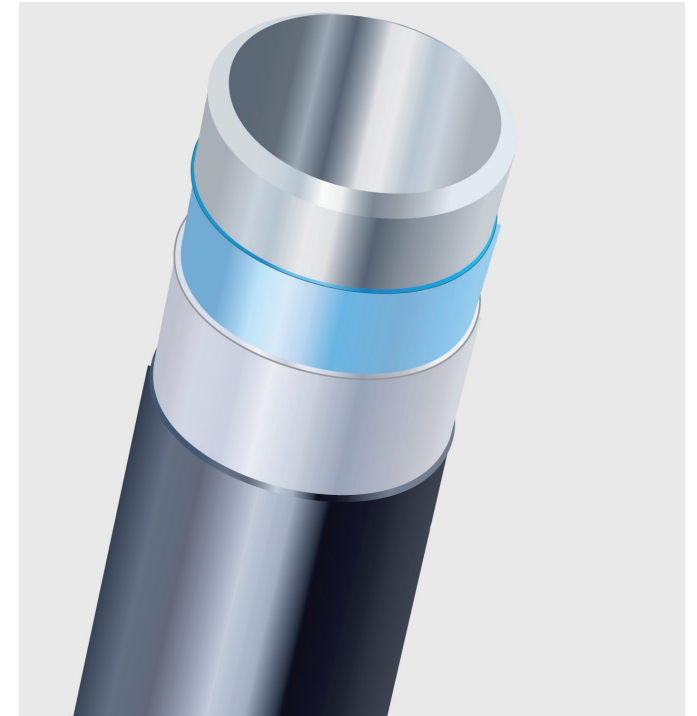
EA F Routed Steel

from

Tosçelik

| | |
|-------------------------|---|
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An EPD should provide current information and may be updated if conditions change.
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www.environdec.com



Programme Information

Programme

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LCA Study & EPD Design Conducted by

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Information about verification and reference PCR

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

Product category rules (PCR)

PCR 2019:14 Construction products (EN 15804:A2) Version 1.1

PCR review was conducted by

The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

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

☐

EPD process verification

☒

EPD verification

Third party verifier

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Approved by

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

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

☐

Yes

☒

No

Tosçelik Spiral Boru Üretim Sanayi A.Ş. 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. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Owner of the EPD

Tosçelik Spiral Boru Üretim Sanayi A.Ş.
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With the experience of 60 years in iron and steel industry, Tosyalı Holding is moving confidently towards the objectives of 2023, which marks the 100th anniversary of the republic of Turkey. Tosyalı Holding, establishing its leadership in iron and steel industry in turkey, has become an international brand with its new foreign investments.

Tosyalı Holding with its head office in Hatay Iskenderun, has many production facilities in Osmaniye, Istanbul, Izmir, Algeria, and Montenegro. For all its employees in these different points of the world, it aims to offer a transparent work environment which supports creativity and team spirit, facilitates personal development, where company goals have been internalized at every level and opinions are freely shared.

“WE SUPPLY FOR MEGA PIPELINE PROJECTS ACROSS THE WORLD”

Tosyalı Holding have great successes from the past to the present; through his technology, his corporate identity ready to integrate to the global market, his know-how and his professional staff take his place within the esteemed companies of Turkey. The group's

main philosophy is growing up together with his customers and suppliers with earning them permanent appreciations through his corporate management system, his reliability and his customer focused working principal.



Company Information

Production Ranges

Production range of outside diameter from 16" (406,4mm) up to 126" (3200mm) with wall thickness up to 26mm.

Tosçelik converts steel coils into high-strength, large diameter API-grade pipes for high pressure natural gas and oil transmission lines as well as for structural applications.

Production Standards

The company manufactures spiral welded steel pipes in compliance with API, ISO, EN and DIN standards. The pipe production is certified by several internationally well-known certification bodies.

Company's manufacturing facilities are periodically certified by third parties and have official certification such as ISO 9001 and other international and national production standards.

Raw materials are received with vendor certification demonstrating their compliance with **Tosçelik** quality requirements. In addition,

all raw materials are qualified and tested prior to their use. These tests ensure that the raw materials comply with the specifications as stated.

Quality Control/Assurance

Tosçelik Spiral Pipe Mill has been certified and fulfills all requirements of quality management systems such as ISO 9001, ISO 14001, OHSAS 18001, ISO 29001 and API Spec Q1. Tosçelik manages quality and management process from production to quality with understanding of quality management system.

Through each phase of production, starting from acceptance quality control of raw materials until the delivery of the materials to the Clients, Tosçelik Quality Department thoroughly tests, inspects and verifies the compliance of products in accordance with API 5L, ISO 3183, EN10224, EN 10217, EN 10219, ISO 21809, DIN 30670 as well as project specific technical requirements.

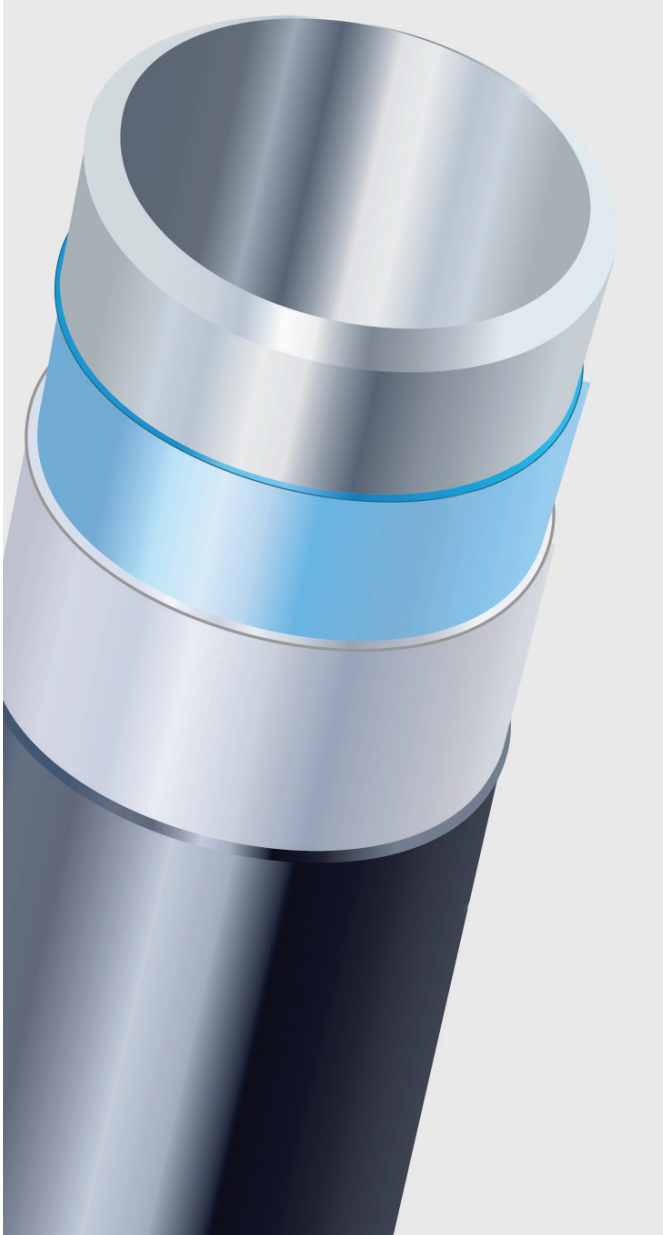
Production Sites

Osmaniye Spiral Pipe Mill and Coating Facility:

Tosçelik Spiral Boru Üretim Sanayi A.Ş.
Büyük Tüysüz Mah.Osmaniye Cad.No:2-1
Toprakkale-Osmaniye/Turkey







Product Name:

Three Layer Polypropylene Coated Spiral Welded Steel Pipes

Toscelik 3LPP System is multi-layer coating composed of three functional layers. This anti-corrosion system consists of fusion bonded epoxy (FBE) for corrosion protection followed by an adhesive and outer layer of polypropylene which provides the toughest, most durable protection with high operation temperatures and high abrasion environments. Excellent protection of buried line pipes. High mechanical strength. Toscelik 3LPP System provides excellent pipeline protection for Toscelik Spiral Pipe.

Intended use of Spiral Welded Steel Pipes:

Spiral Welded Steel Pipes can be used for the transportation of many liquids such as water, wastewater, oil, natural gas, also as pile pipes in constructions and advertising signage. It can also be used as the foot of many heavy metals such as billboards and totems.

Technical Specifications

| Property | Typical Value | Value |
|--|-----------------------|----------------------|
| Density (Compound) | 916 kg/m ³ | ISO 1183-1, Method A |
| Melt Flow Rate (230 °C/2.16 kg) | 0,9 g/10min | ISO 1133 |
| Tensile Modulus (1 mm/min) (23 °C) | 1.100 MPa | ISO 527-2 |
| Tensile Strain at Yield (50 mm/min) (23 °C) | 8 % | ISO 527-2 |
| Tensile Strain at Break (50 mm/min) (23 °C) | >= 400 % | ISO 527-2 |
| Tensile Stress at Yield (50 mm/min) (23 °C) | 26 MPa | ISO 527-2 |
| Melting temperature (DSC) | 162 °C | ISO 11357-3 |
| Oxidation Induction Time (220 °C) | >= 40 min | ISO 11357-6 |
| Vicat softening temperature A50 (10 N) | 145 °C | ISO 306 |
| Environmental Stress Crack Resistance (50 °C, Igepal 10 %) | > 5.000 h | ASTM D 1693-A |
| Charpy Impact Strength, notched (23 °C) | 25 kJ/m ² | ISO 179-1 |
| Charpy Impact Strength, notched (-20 °C) | 3 kJ/m ² | ISO 179-1 |
| Hardness, Shore D (1 s) | 65 | ISO 868 |
| Moisture | < 500 ppm | ISO 15512 |

Content Declaration

| Content declaration of 1000 kg of steel pipe | |
|--|------------|
| Material | Share |
| Post-consumer steel scrap | 99.0-99.9% |
| Alliage | 0.1-1% |
| Renewable material | 0% |
| Biogenic carbon | 0% |

UN CPC Code: 41287 Other tubes and pipes of circular cross-section, welded, of steel

LCA Information

Declared unit

1 tonne (1000kg) of Three Layer Polypropylene Coated Spiral Welded Steel Pipes manufactured in Osmaniye facility (TR).

Reference service life

Not applicable.

Time representativeness

The production data in this LCA study represents the period of 1st January 2020 and 31st December 2020.

Database(s) and LCA software used

SimaPro v9.1 and Ecoinvent v3.6.

Description of system boundaries

Cradle to gate (A1-3) with options, modules C1-C4, module D.

Data quality and data collection

According to EN 15804:2012+A2:2019 specific data was used for module A3 (Processes the manufacturer has influence over) and was gathered from the Tosçelik Spiral Pipe Mill, Osmaniye Facility. Specific data includes actual product weights, amounts of raw materials used, product content,

energy consumption, transport figures, water consumption and amounts of wastes. For A1 and A2 modules, according to EN 15804:2012+A2:2019, generic data was applied and was obtained from Ecoinvent v3.6.

Allocation

Mass allocation has been applied for pre-consumer recycled materials according to EN 15804:2012+A2:2019.

Cut-off rules

Life Cycle Inventory data for a minimum of 99 % of total inflows to the three life cycle stages have been included and a cut-off rule of 1% regarding energy, mass and environmental relevance was applied. Impacts caused by treatment operations have been calculated lower than 1% environmental relevance.

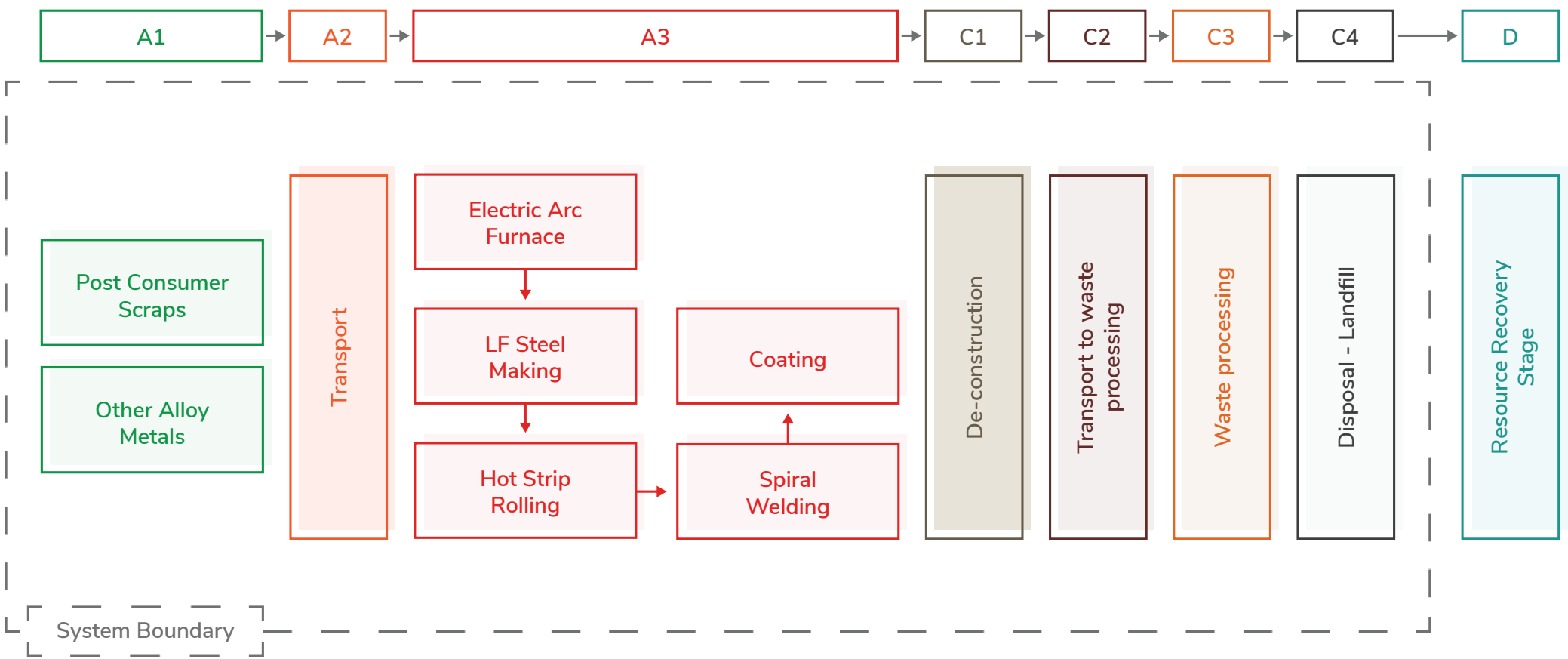


Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

| | Product Stage | | | Construction Process Stage | | Use Stage | | | | | | | End Of Life Stage | | | | Resource Recovery Stage |
|--------------------|---------------------|-----------|---------------|-------------------------------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-------------------|-----------|------------------|----------|--|
| | Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction | Transport | Waste processing | Disposal | Reuse - Recovery - Recycling Potential |
| MODULES | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Module declared | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | GLO | GLO | TR | - | - | - | - | - | - | - | - | - | GLO | GLO | GLO | GLO | GLO |
| Specific data used | >99.5% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation-products | Not Relevant | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation-sites | Not Relevant | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

X: Declared; ND: Not Declared

System Diagram



Description of declared modules

A1 - Raw Material Supply

This stage takes into account raw material extraction, processing and energy used in the production process.

A2 - Transport to the Manufacturer

This stages include transportation of the raw materials from supplier to factory gate. Transportation types are considered as seaway, road, railroad, etc.

A3 - Manufacturing

This stage includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered by this stage. Followed production processes are as;

- Electric Arc Furnace
- LF Steel Making
- Hot Strip Rolling
- Spiral Welding
- Coating

C1 - De-construction

The dismantling of steel pipe has a very low

impact considering the impact throughout the life of the installation. It is assumed that, in C1 module, same electricity and diesel is consumed as during the construction installation of steel pipe.

C2 - Transport to Waste Processing

An average distance of 100 km has been assumed for the transport to recycling facility. Transport is calculated on the basis of a scenario with the parameters described in the

| Parameters C2 Module | |
|----------------------|----------------------|
| Transport by road* | Lorry >32 metric ton |
| Distance (km) | 100 |
| Database | Ecoinvent v3.6 |

*Technology is Euro 5

C3 - Waste processing for reuse, recovery and/or recycling

The material and energy expenses required for Module C3 are negligible. It is assumed that there is no sorting or processing required for steel pipes.

C4 - Final disposal

100% of used product after the lifetime will be collected and recycled into the manufacturing system. It is assumed that 5% of the product is lost during de-construction and recycling, and, 95% is reached to recycling system.

D - Reuse, Recovery or Recycling Potential

Scrap inputs to the production stage are subtracted from scrap to be recycled at end of life in order to obtain the net scrap output from the product system. This remaining net scrap is then delivered to recycling process. Module D reports the environmental aspects of recycled scrap generated at the end of life minus that used at the production stage.

Information on which life cycle stages are not considered

This EPD only cover the Cradle to Gate A1-3, C1-4 and D stages because other stages are

Potential Environmental Impact - Mandatory Indicators According to EN 15804

| Results for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
|---|-------------------------------------|----------|----------|----------|----|----------|-----------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| GWP-fossil | kg CO ₂ eq | 737 | 1.45 | 9.38 | 0 | 0.270 | -13.8 |
| GWP-biogenic | kg CO ₂ eq | 3.64 | 0.014 | 0.005 | 0 | 0.001 | -0.225 |
| GWP-luluc | kg CO ₂ eq | 3.61 | 0.002 | 0.003 | 0 | 7.34E-05 | -0.043 |
| GWP-total | kg CO ₂ eq | 745 | 1.47 | 9.38 | 0 | 0.270 | -14.05 |
| ODP | kg CFC 11eq | 3.65E-05 | 9.73E-08 | 2.13E-06 | 0 | 1.08E-07 | -1.27E-06 |
| AP | mol H ⁺ eq | 4.23 | 0.008 | 0.04 | 0 | 0.003 | -0.103 |
| EP-Freshwater | kg PO ₄ ³⁻ eq | 0.398 | 0.001 | 0.005 | 0 | 3.34E-04 | -0.013 |
| | kg P eq | 0.044 | 1.06E-04 | 8.37E-05 | 0 | 2.95E-06 | -0.001 |
| EP-Marine | kg N eq | 0.738 | 0.001 | 0.012 | 0 | 8.62E-04 | -0.025 |
| EP-Terrestrial | kg N eq | 8.28 | 0.015 | 0.131 | 0 | 0.009 | -0.284 |
| POCP | kg NMVOC eq | 2.30 | 5.77E-03 | 0.042 | 0 | 0.003 | -0.097 |
| ADP-minerals & metals* | kg Sb eq | 0.002 | 1.91E-05 | 1.57E-04 | 0 | 2.41E-06 | -1.07E-04 |
| ADP-fossil* | MJ | 7095 | 20.5 | 143 | 0 | 7.36 | -246 |
| WDP | m ³ | 181 | 0.92 | 0.522 | 0 | 0.330 | -5.17 |

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

* Disclaimer: 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.

Potential Environmental Impact - Additional Mandatory and Voluntary Indicators

| Results according to PCR2019:14 for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
|--|-----------------------|----------|----------|----------|----|----------|-----------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| GWP-GHG ¹ | kg CO ₂ eq | 735 | 1.41 | 9.30 | 0 | 0.264 | -13.5 |
| Results according to EN 15804+A2 for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
| PM | [disease inc.] | 2.73E-05 | 4.12E-07 | 8.32E-07 | 0 | 4.85E-08 | -1.25E-05 |
| IRP | [kBq U235 eq] | 8.22 | 0.108 | 0.604 | 0 | 0.030 | -1.47 |
| ET-freshwater | [CTUe] | 6943 | 48.2 | 122.8 | 0 | 4.783 | -566 |
| HT-cancer | [CTUh] | 1.08E-05 | 3.09E-08 | 2.84E-09 | 0 | 1.10E-10 | -5.21E-07 |
| HT-non-cancer | [CTUh] | 5.06E-06 | 1.03E-07 | 1.31E-07 | 0 | 3.42E-09 | -1.90E-07 |
| SQP | [pt] | 726 | 5.64 | 162 | 0 | 15 | -104 |

Acronyms

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology;

IRP = Ionizing radiation, human health;

ET-freshwater = Eco-toxicity (freshwater);

HT-cancer = Human toxicity, cancer effects;

HT-non-cancer = Human toxicity, non-cancer effects;

SQP = Potential soil quality index (SQP)

¹ The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of Resources

| Results for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
|---|----------------|-------|------|-------|----|-------|-------|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| PERE | MJ | 1071 | 2.56 | 1.54 | 0 | 0.060 | -59.4 |
| PERM | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| PERT | MJ | 1071 | 2.56 | 1.54 | 0 | 0.060 | -59.4 |
| PENRE | MJ | 7741 | 21.7 | 152 | 0 | 7.82 | -260 |
| PENRM | MJ | 0.00 | 0 | 0 | 0 | 0 | 0 |
| PENRT | MJ | 7741 | 21.7 | 152 | 0 | 7.82 | -260 |
| SM | kg | 1047 | 0.00 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0.00 | 0.00 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0.00 | 0.00 | 0 | 0 | 0 | 0 |
| FW | m ³ | 27.64 | 0.16 | 0.124 | 0 | 0.012 | -1.46 |

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

Waste Production

| Results for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
|---|------|-------|----|----|----|----|---|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | kg | 15.8 | 0 | 0 | 0 | 0 | 0 |
| Non-hazardous waste disposed | kg | 3.11 | 0 | 0 | 0 | 50 | 0 |
| Radioactive waste disposed | kg | 0 | 0 | 0 | 0 | 0 | 0 |

Output Flows

| Results for 1000 kg of Spiral Welded Steel Pipe | | | | | | | |
|---|------|-------|----|----|----|-----|---|
| Indicator | Unit | A1:A3 | C1 | C2 | C3 | C4 | D |
| Components for re-use | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for recycling | kg | 143 | 0 | 0 | 0 | 950 | 0 |
| Materials for energy recycling | kg | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy, electricity | MJ | 0 | 0 | 0 | 0 | 0 | 0 |
| Radioactive waste disposed | MJ | 0 | 0 | 0 | 0 | 0 | 0 |

References

ISO 14040

2006 Environmental management
Life cycle assessment
Principles and framework

ISO 14044

2006 Environmental management
Life cycle assessment
Requirements and guidelines

ISO 14025

2006 Environmental labels and declarations
Type III environmental declarations
Principles and procedures

EN 15804:2012+A2:2019

Sustainability of construction works
Environmental product declarations
Core rules for the product category of
construction products

The International EPD® System

www.environdec.com

The International EPD® System

The General Programme Instructions v3.01

The International EPD® System

PCR 2029:14 Construction products v1.1
(EN 15804:A2)

Ecoinvent 3.6

www.ecoinvent.org

SimaPro LCA Software

www.simapro.com

Tosçelik Spiral Boru

www.toscelikspiral.com.tr

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Owner of Declaration

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