Environmental Product Declaration

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

STAINLESS STEEL PIPES & TUBES

from

SeAH Changwon Integrated Special Steel

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
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Accountabilities for PCR, LCA and independent, third-party verification
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 1.3.1 and UN CPC code 412
PCR review was conducted by: The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com *Review chair - Claudia A. Peña, University of Concepción, Chile.*
Life Cycle Assessment (LCA)
LCA accountability: *Jihee Kim, Senior Researcher, SMaRT[eco] (e-mail: jihee@smart-eco.co.kr)* *Jimin Lee, Assistant Research Engineer SMaRT[eco] (e-mail: jimin@smart-eco.co.kr)*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Vijay Thakur, Intertek Assuris* 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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: SeAH Changwon Integrated Special Steel

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Description of the organisation

SeAH CSS has founded in 1966 in the city of Changwon, Gyeong-sang South Province of Korea. Since its birth, SeAH CSS has led the growth of the country's special steel sector by producing high-grade steel products and bringing the optimized steel production process to the next level. Our great product portfolio and sophisticated manufacturing techniques allow us to be responsive to rapidly changing market needs and emerging industry trends. We continue to develop innovative solutions of great customer value based on market demand and industry trend.

Stretching over an area of 670,000 square meters, the Changwon Plant produces 1.2 million tons of crude steel annually. The entire manufacturing process has an integrated system, which takes place at a single factory. Changwon Plant produces a wide variety of high- grade special steel of different applications and offers products and services that target specific customer needs with its customized post-treatment services, such as heat treatment and processing. SeAH CSS is the seamless stainless-steel pipes & tubes manufacturer in Korea that uses the integrated steel manufacturing system. The Changwon Plant produces seamless large diameter steel pipes, and this recent addition of the new plant to the company successfully brings the company a step closer to becoming a leading special steel maker in the world.

SeAH CSS is the company in Korea to produce stainless steel round bars and wire rods. With our integrated production system dedicated to high-grade specialty steel, we are able to maintain market-leading positions in multiple product categories in Korea; including stainless steel, tool steel and special alloy. Our goal is to optimize the products to fulfil customers' needs and ensure the stable availability of supply by using our innovative technology.

Our advanced technology and production are based on over 50 years of experience of innovating high-grade special steel products and developing new materials to ultimately promote customers' Value.

Product-related or management system-related certifications

ISO 9001, ISO 14001, KS Q 9100(AS 9100) certificates

Name and location of production site(s)

147 Jeokhyeon-Ro, Seongsan-Gu, Changwon, Gyeongsangnam-Do, Republic of Korea

Product information

<u>Product name</u>
STAINLESS STEEL PIPES & TUBES

<u>Product identification</u>
A312, A213, SA312, SA213, A789, A790, SA789, SA790, 10216-5, G3459, G3463 etc.

<u>Product description</u>
Seamless steel pipes are produced from round bars cut into cross sections by drilling holes through the sectional center, heating them in an induction heating furnace and then extruding them into pipes of certain inside and outside diameters.
The extruded steel pipes undergo annealing, pickling and inspected to become hot-rolled products and pull out drawing facility or pilger mill to become cold-rolled products. Each of our seamless steel pipes undergoes thorough inspection to check for any defect on the surface or in the interior.

Further information is available on http://www.seahss.co.kr/eng/pr/brochure.jsp

<u>Application & Characteristic:</u>
Boilers for thermal power generation, Piping, Heat exchangers and Mother pipes for precision steel pipes

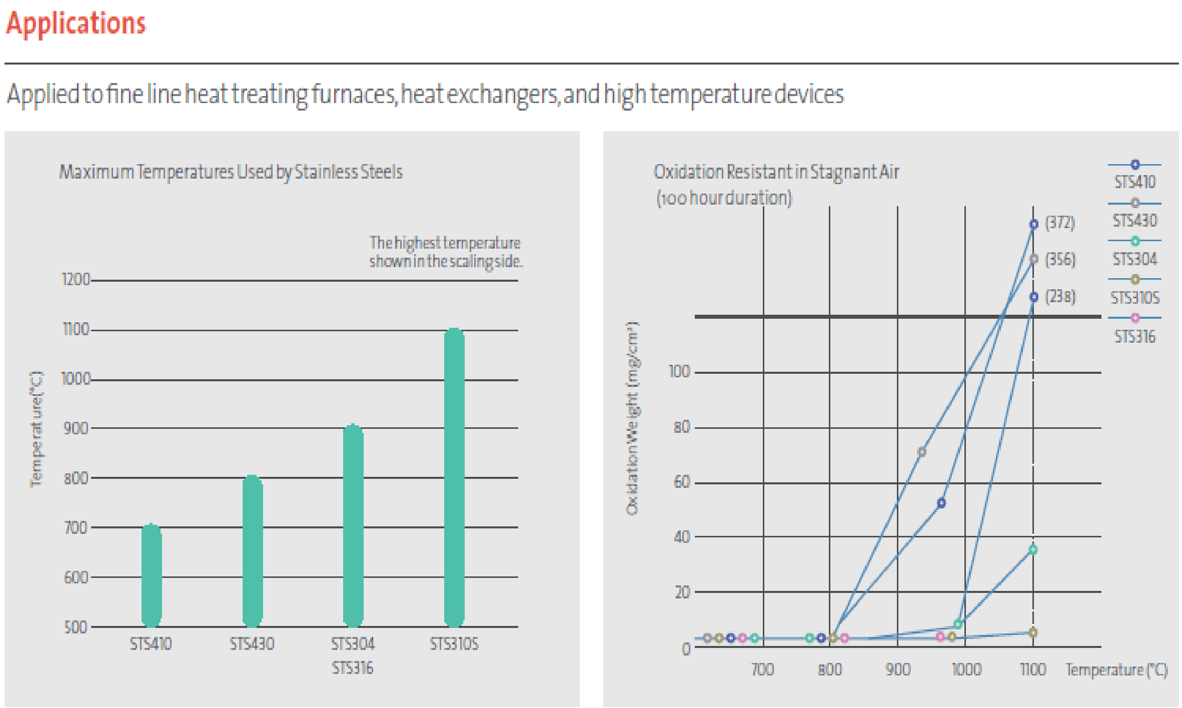

Figure 1. Applications of STAINLESS-STEEL PIPES & TUBES

Corrosion Resistance

Duplex / Austenitic STS

Corrosion Resistance
- ISO Corrosion,(0.1mm/year)

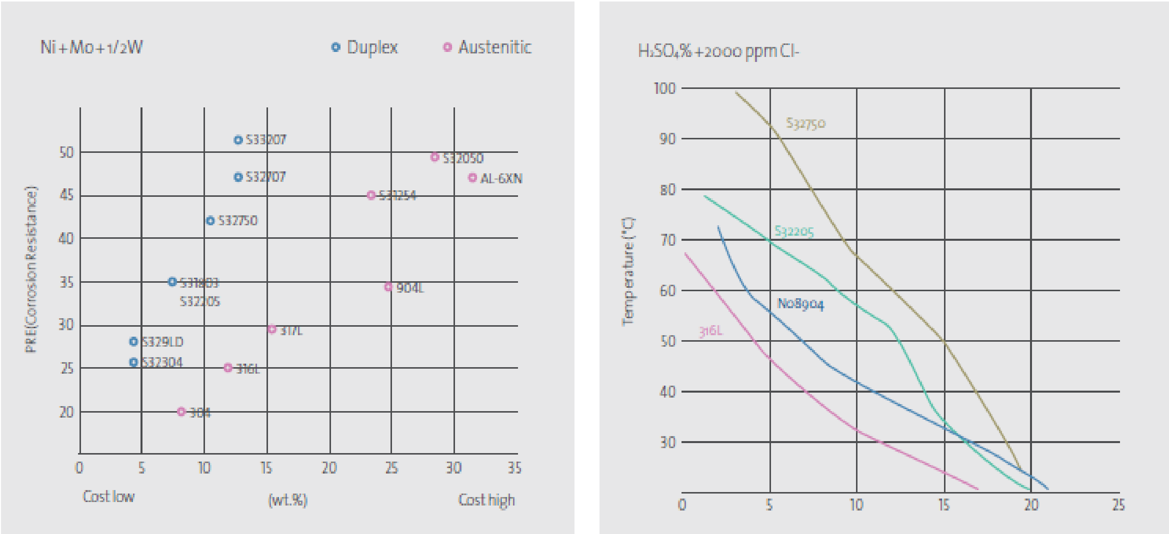

Figure 2. Corrosion Resistance of STAINLESS STEEL PIPES & TUBES

<u>Manufacturing Process</u>

SeAH CSS is the company in Korea with an integrated production system from material production to finished products, including steelmaking, rolling, extrusion, cold processing, and inspection.
The steel-making process such as melting consistency, refining and casting critically determines the quality. The melting facility is electric arc furnace for the highly clean quality steel production. Refining can take place outside a furnace using LF, VD and VOD facilities. Casting consists of continuous casting and ingot casting.
The production range of stainless steel pipes & tubes is 1/8 to 1O inches, and our materials are hot extruded using a 2000-ton or 5000-ton press, followed by heat treatment, pull-out, pilger mill, and final inspection.
We assure our product quality throughout the whole process from production to delivery by quality control and tests in each stage and have achieved global competitiveness in various industries such as semiconductors, energy and nuclear fusion power plants & etc.,

A detailed manufacturing process diagram is shown in Figure 3.

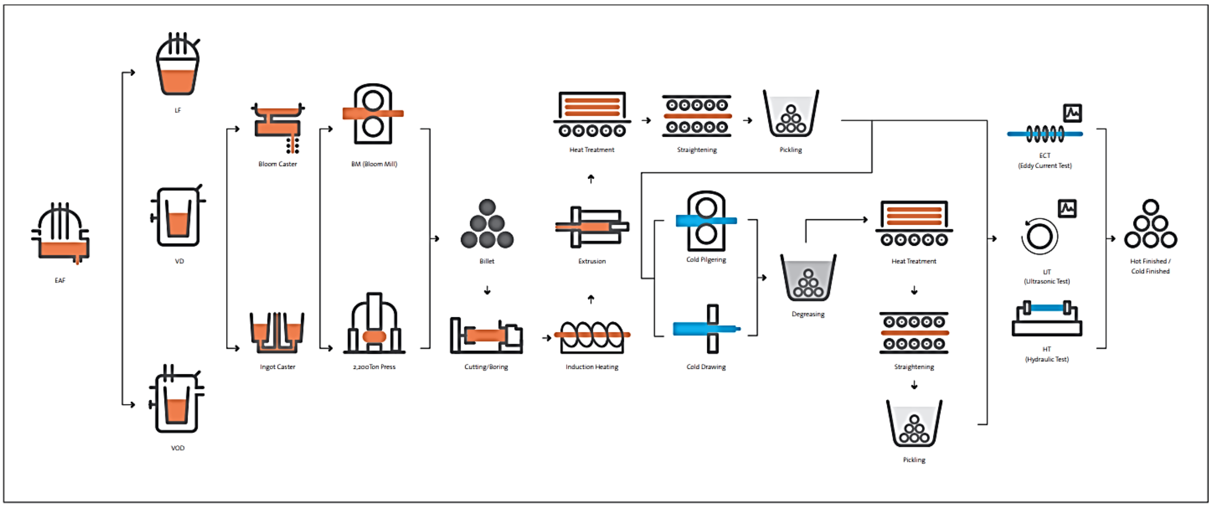

Figure 3 Manufacturing Process

<u>UN CPC code</u>
CPC412

<u>Geographical scope</u>
Global

LCA information

Declared unit

This study was used declared unit for1 ton (1,000 kg) of stainless steel pipes & tubes

Reference service life

Not applicable

Time representativeness

Primary on-site data were collected during fiscal year (FY) 2022.

Database(s) and LCA software used

Gabi LCA software (Version 10.6.1.35) was used to measure the lifecycle inventory profile and lifecycle impact results. All the background data relevant for modelling were taken from the Gabi professional database (version 2022) with DB extension by Sphera and Ecoinvent database (version 3.8) The database used for the infrastructure/capital goods in upstream, core, and downstream processes has included infrastructure/capital goods.

Electricity Mix

The dataset for Korean national grid mix (reference year 2018) in this EPD study has GWP-GHG value, 0.69kg CO2/kWh.

Description of system boundaries:

The system boundary on the products adapted Cradle to gate with modules C1–C4 and module D according to EN 15804 Section 5.2. The detailed information for manufacturing process from Module A3 is described in the product information above.

1. Raw material supply (Module A1)
   a. Steel Scrap collection & processing
   b. Production of raw materials
   c. Production of auxiliary materials in the form of solid, liquid or gas (e.g., Argon, Nitrogen, Oxygen, LNG, etc.)
   d. Production of electricity from electricity mix in Korea from Ecoinvent Database

2. Transport (Module A2)
   a. Transportation of raw/auxiliary materials from the supplier to manufacturing plant

3. Manufacturing (Module A3)
   a. Manufacturing of steel products and co-products
   b. Treatment of process wastes and emissions
   c. Direct emission to the environment

4. End-of-Life and Resource recovery (Module C1-C4, D)
   a. Deconstruction & Demolition
   b. Transport to waste processing unit
   c. Disposal
   d. Reuse/Recovery/Recycling of the end of life of the products

System diagram

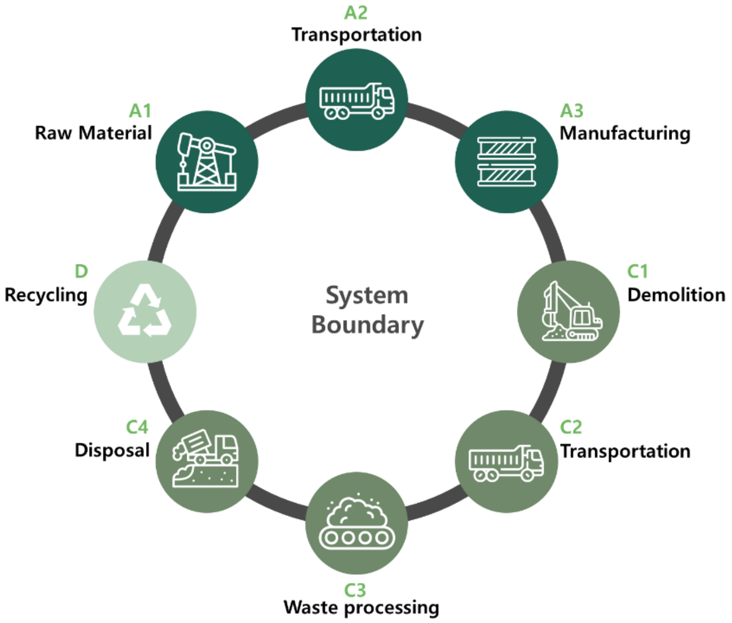

Figure 4 System boundary

Excluded life cycle stages

Consideration was not given to module A4 and A5 (i.e., transportation to the building site and the construction process, respectively), module B1-B7 (i.e., use stages following the PCR).

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

	Product stage			**Construction process stage**		**Use stage**							**End of life stage**				**Resource recovery stage**
	Raw material supply	**Transport**	**Manufacturing**	**Transport**	**Construction installation**	**Use**	**Maintenance**	**Repair**	**Replacement**	**Refurbishment**	**Operational energy use**	**Operational water use**	**De-construction demolition**	**Transport**	**Waste processing**	**Disposal**	**Reuse-Recovery-Recycling-potential**
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	KR	KR	KR	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	44%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Module declared

ND: Module not declared (such a declaration shall not be regarded as an indicator of a zero result).

Cut-Off Rule

The sum of the excluded material in the system did not exceed 5% of the total mass of inputs, in accordance with the Product Category Rules (PCR), Section 4.4. The details of the cut-off criteria application are as below.

According to EN15804, a minimum of 95% of the total inflows (mass and energy) per module (A1-A3, C1-C4, and D) shall be included. Additionally, this PCR applies the expanded cut-off rule, requiring that a minimum of 95% of the environmental impact per module shall be also be included.

According to the cutoff rules, small amounts of metals (Co, Zr, W etc.), diesel, and the like have been excluded.

Assumptions and Limitations

1) Raw material and transportation (A1-A2)

a. Steels input

Steel scrap input is divided into purchased scrap and internally recycled scrap. The usage of each scrap is managed through the system at the plant, and the environmental impact of internally recycled scrap is not considered.

b. Transport

The transportation distance of domestic scrap was applied to the actual address of the scrap collecting company and the shortest distance to our plant site. The transportation distance of overseas scrap was applied as the shortest distance from the actual address of the scrap collection company to our factory site. For land transportation, the distance between the business site and the port was applied, and for sea transportation, the distance between the port of the country and Busan port was applied.

The transportation distance was calculated based on the addresses of the companies corresponding to each item. In cases where there are multiple suppliers for a single item, a weighted average was taken based on the amount of goods received to determine the distance. The transportation distance for each item was calculated by multiplying the corresponding distance by the inventory data value, and the sum of these values was indicated as the total in the inventory data.

2) Product stage (A3)

a. Waste

In module A3, the manufacturing phase, spills do not include wastes not directly related to production (e.g., packaging materials for raw materials, dust cloths for machine maintenance). The secondary database for waste treatment was classified into household waste and hazardous waste.

b. Waste Transportation

The distance from the manufacturing plant to the waste disposal site is set at 30 km taking site-specific data into account.

c. Wastewater

The plant operates an on-site wastewater treatment plant. A total of five wastewater treatment plants are in operation, and in this study, the data of one wastewater treatment plant was created by integrating the data.

Scenarios (C1~C4, D Module)

Scenarios included are currently in use and are representative for one of the most probable alternatives.

a. De-construction demolition (C1)
Energy consumption of a demolition process is on average 10kWh/m2 (Bozdag, Ö & Seçer, M. 2007). The average mass of a reinforced concrete building is about 1000 kg/m2. Therefore, energy consumption during demolition is 10kWh per declared unit, 1 metric ton. A conservative assumption has been made that the energy consumed during demolition of a steel building is the same as that of a concrete building. The source of energy is diesel fuel used by industrial equipments.

b. Transport to the waste processing site (C2)
It is assumed that 100% of the waste is collected and transported to the waste treatment center. Transportation distance to the waste treatment center is assumed as 300 km and the transportation method is assumed to be lorry, Euro 0-6 mix

c. Waste processing (C3 & C4)
Approximately 85% of steel is assumed to be recycled based on World Steel Association, 2020. And the remaining 15% is disposed of in landfills.

d. Reuse-Recovery-Recycling-potential (D)
For the recycling process, we have assumed a material loss rate of 2%, as 98% of structural steel is recycled without losing its physical properties. This loss rate was referenced from the American Institute of Steel Construction website, available at https://www.aisc.org/why-steel/sustainability/recycling/.

Table 1 End of Life & benefits and loads beyond the system boundary (C1-C4)

Name		Value	Unit
Assumptions for scenario	Energy consumption during the demolition	10	kWh
Collection process specified by type	Collected separately	-	kg
	Collected with mixed construction waste	1.00E+03	kg
Recovery system specified by type Deposition	Re-use	-	kg
	Recycling	8.50E+02	kg
	Incineration	-	kg
	Landfill	1.50E+02	kg
Assumptions	For waste transport	300	km

Table 2 Benefits and loads beyond the system boundary (D)

Output to recycling	Assumed fate	M_{MRout} - M_{MRin} (kg)	Quality factor	Material loss rate
Ferrous metals	recycling	312	1	2%

Allocation Rules

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. The allocation rule follows the PCR 2019:14 and Section 6.4.3.2 in EN15804 in the following order;

1. Allocation should be avoided.
2. Allocation shall be based on physical properties (e.g. mass, volume) when (i) there is a relevant underlying physical relationship between the products and co-products, and (ii) the difference in revenue per mass (or per energy unit in case of electricity, heat or similar) from the products and co-products is low.
3. Allocation shall be based on economic values.

At SeAH CSS, semi-finished products or products other than STS steel pipes are produced in each unit process. At SeAH CSS, utilities, packaging, and waste data are managed for each unit process. Therefore, physical allocation coefficients were derived based on the total production quantity (mass) and the product production quantity (mass) for each unit process. The derived allocation coefficients were then applied to the utilities, packaging, and waste for each unit process.

Balancing out reporting of the biogenic CO_2 –
A1-A3 results includes the “balancing-out reporting” of the biogenic CO_2 of packaging released in module A5.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Steel	1.00E+03	63.30%	0%
Chemical Composition			
Fe	5.70E+02		0%
Ni	1,20E+02		0%
Cr	1.80E+02		0%
Mo	2.00E+01		0%
Other	1.10E+02		0%
TOTAL	1.00E+03	63.30%	0%
Packaging materials	**Weight, kg**	**Weight-% (versus the product) ***	**Weight biogenic carbon, kg C/kg**
PP ROPE	1.27E-01	0.01%	0
RESINOID CALSS(ORDER)	1.69E-02	0.00%	0
Steel band	4.41E-01	0.04%	0
Tag	1.20E-01	0.01%	0
Lumber	8.44E-03	0.00%	0
Other wood	2.87E+00	0.29%	0.050
Lacquer spray	2.61E-02	0.00%	0
Wooden box	4.50E-03	0.00%	0.050
Waterproofing material	2.53E-03	0.00%	0
Corrosion Preventive lubricant	1.15E-01	0.01%	0
Plastic tape	3.00E-03	0.00%	0
Sticker	8.86E-03	0.00%	0
Steel wire	2.63E-01	0.03%	0
Miscellaneous materials	5.08E-01	0.05%	0
Paint	2.21E-02	0.00%	0
Paint thinner	6.20E-04	0.00%	0
TOTAL	4.54E+00	0.45%	3.17E-02

* Based on 1 ton of product

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per declared unit
None			

*Upon thorough review for the SVHC substance declaration, it has been confirmed that none of the substances listed as SVHCs are present in stainless steel pipe & tube.

Results of the environmental performance indicators

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

Environmental indicator results for all declared modules are shown in tables on the following pages for the declared unit of 1,000kg of stainless-steel pipe & tube.
the A1 - A3 modules are shown on an aggregated basis as mandated by PCR 2019:14§5.4.5. the results of modules A1-A3 should not be used without considering the results of module C.

Mandatory impact category indicators according to EN 15804

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	7.05E+03	3.67E+00	8.20E+01	7.07E+00	7.75E-01	-5.31E+02
GWP-biogenic	kg CO_2 eq.	2.73E+01	0.00E+00	1.34E+00	7.96E-02	7.28E-04	3.13E+00
GWP-luluc	kg CO_2 eq.	8.64E+00	0.00E+00	4.74E-01	2.14E-02	7.30E-04	-7.07E-02
GWP-total	kg CO_2 eq.	7.09E+03	3.67E+00	8.38E+01	7.17E+00	7.76E-01	-5.28E+02
ODP	kg CFC 11 eq.	5.42E-04	2.05E-10	5.09E-12	2.33E-06	3.20E-07	7.13E-10
AP	mol H^+ eq.	1.02E+02	5.52E-02	5.82E-01	5.89E-02	7.43E-03	-1.30E+00
EP-freshwater	kg P eq.	3.45E+00	2.26E-06	2.54E-04	7.52E-04	7.23E-05	-1.24E-04
EP-marine	kg N eq.	8.86E+00	2.22E-02	2.88E-01	2.08E-02	2.58E-03	-2.09E-01
EP-terrestrial	mol N eq.	8.96E+01	2.43E-01	3.19E+00	2.26E-01	2.83E-02	-1.87E+00
POCP	kg NMVOC eq.	2.87E+01	6.47E-02	5.42E-01	6.53E-02	8.23E-03	-8.47E-01
ADP-minerals&metals*	kg Sb eq.	4.04E-01	0.00E+00	7.13E-06	1.99E-05	1.80E-06	-3.01E-03
ADP-fossil*	MJ	1.26E+05	1.02E+02	1.14E+03	1.66E+02	2.22E+01	-5.28E+03
WDP*	m^3	4.08E+03	0.00E+00	7.62E-01	5.92E+00	1.02E+00	-3.58E+01
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.*

Additional mandatory and voluntary impact category indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	7.07E+03	3.67E+00	8.26E+01	7.09E+00	7.76E-01	-5.31E+02
contribution of scrap input with respect to total GWP-GHG of Module A1-A3		0.12%					

Resource use indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2.08E+04	0.00E+00	6.45E+01	2.05E+00	1.92E-01	2.08E+02
PERM	MJ	4.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.09E+04	0.00E+00	6.45E+01	2.05E+00	1.92E-01	2.08E+02
PENRE	MJ	1.27E+05	1.02E+02	1.14E+03	1.66E+02	2.22E+01	-5.28E+03
PENRM	MJ	2.40E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.27E+05	1.02E+02	1.14E+03	1.66E+02	2.22E+01	-5.28E+03
SM	kg	1.30E+03	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	9.51E+01	0.00E+00	7.30E-02	1.38E-01	2.36E-02	-5.37E+01
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						

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Waste indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	5.72E-08	0.00E+00	0.00E+00	5.45E-09	0.00E+00	-3.95E-05
Non-hazardous waste disposed	kg	5.90E+00	0.00E+00	0.00E+00	1.63E-01	0.00E+00	6.39E+01
Radioactive waste disposed	kg	3.22E-02	0.00E+00	0.00E+00	1.40E-03	0.00E+00	5.78E-04

Output flow indicators

Results per declared unit							
Indicator	**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	8.50E+02	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 impact indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter emissions (PM)	Disease incidence	4.29E-04	2.08E-07	3.16E-06	1.09E-06	1.45E-07	-1.22E-05
Ionizing radiation, human health (IRP)	kBq U235 eq.	1.19E+03	1.78E-18	2.05E-01	7.44E-01	9.80E-02	1.19E+01
Eco-toxicity - freshwater (ETP-fw)	CTUe	4.58E+04	1.47E+02	7.96E+02	4.82E+01	5.83E+00	-2.77E+02
Human toxicity, cancer effect (HTP-c)	CTUh	3.01E-05	2.39E-09	1.59E-08	3.67E-09	3.54E-10	2.17E-07
Human toxicity, non-cancer effects (HTP-nc)	CTUh	9.91E-05	1.46E-07	6.88E-07	4.85E-08	3.90E-09	1.04E-06
Land use related impacts/Soil quality (SQP)	Pt	2.21E+04	0.00E+00	3.91E+02	2.96E+02	4.63E+01	-6.85E+01

Information on biogenic carbon content

Results per declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**Quantity**
Biogenic carbon content in product	kg	0.00E+00
Biogenic carbon content in packaging	kg	3.17E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

References

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

Product Category Rules (PCR): Construction products 2019:14, version 1.3.1

General Programme Instructions of the International EPD® System. Version 4.0

ISO 14020:2000 Environmental labels and declarations - General principles

ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures

ISO 14040:2006 Environmental management- Life cycle assessment - Principles and framework

ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines

O. Bozdag and M. Secer, “Energy Consumption of RC Buildings during Their Life Cycle,” Sustainable Construction, Materials and Practices: Challenge of the Industry for the New Millennium, Minho, 12-14 September 2007