Environmental Product Declaration

REINFORCING BARS

STRUCUTAL STEEL



Reinforcing steel bars are steel products used to reinforce concrete structures. The products include standard reinforcing bars and seismic-resistant reinforcing bars, manufactured in various steel grades and dimensions in accordance with KS standards. They are classified into grades ranging from SD300 to SD700S and are available in nominal sizes from D10 to D57, depending on the steel grade.

Korea Steel Co., Ltd., established in May 1971, has positioned itself as a leading steel manufacturer in South Korea. Through continuous technological innovation and improvements in production facilities, the company has contributed to the development of the domestic steel industry while providing a diverse range of steel products to meet customer demands using advanced steelmaking facilities.

At its Chilseo Plant, the company manufactures standard and seismic-resistant reinforcing bars through an electric arc furnace (EAF) steelmaking process, followed by refining, continuous casting, and rolling. By utilizing steel scrap as a primary raw material, the EAF process promotes resource circularity and contributes to the transition toward low-carbon steel production.

Korea Steel Co., Ltd. operates systematic quality, environmental, and occupational health and safety management systems certified under ISO 9001, ISO 14001, and ISO 45001.

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ENVIRONMENTAL PRODUCT DECLARATION
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ENVIRONMENTAL PRODUCT DECLARATION

REINFORCING BARS
Structural steel

According to ISO 14025, ISO 14040/44 and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Solutions 333 Pfingsten Rd, Northbrook, IL 60062 www.ul.com | www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	UL Solutions Program Operator Rules v.2.7 2022
MANUFACTURER NAME AND ADDRESS	Korea STEEL Co.,Ltd 98, Gongdandong-gil, Chilseo-myeon Haman-gun, Gyeongnam, Korea
DECLARATION NUMBER	4792349003.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1 metric ton of Reinforcing bar
REFERENCE PCR AND VERSION NUMBER	ISO 21930:2017: Sustainability in buildings and civil engineering works Smart EPD Part A: Product Category Rules for Building and Contruction products and services ver 1.2 (2025) Smart EPD Part B: Product Category Rules for Designated Steel Construction produts ver 3 (2025)
DESCRIPTION OF PRODUCT APPLICATION/USE	Construction, Building
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	November 9, 2026
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-Specific
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle to grave
YEAR(S) OF REPORTED PRIMARY DATA	2025
LCA SOFTWARE & VERSION NUMBER	openLCA v2.6.2 (GreenDelta GmbH)
LCI DATABASE(S) & VERSION NUMBER	ecoinvent v3.10 (ecoinvent Association, Switzerland)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.2, CML v4.8 2016

The PCR review was conducted by:	SmartEPD PCR Review Panel pcr@smartepd.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Solutions
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	GreenBridge Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Ik Kim

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Korea Steel Co., Ltd. (Korea Steel) is a South Korean steel manufacturer established on May 18, 1971. The company manufactures and supplies various steel products, including reinforcing bars, structural steel sections, and billets, which are used as essential materials in the construction, shipbuilding, automotive, and machinery industries.

Korea Steel produces steel products primarily through an electric arc furnace (EAF) steelmaking process using steel scrap as a major raw material. The manufacturing process includes steelmaking, secondary refining, continuous casting, reheating, and rolling. Through investments in production facilities and continuous technological development, the company focuses on improving product quality, production efficiency, and competitiveness.

The company's headquarters is located at 98, Gongdandong-gil, Chilseo-myeon, Haman-gun, Gyeongsangnam-do, Republic of Korea. Its manufacturing facilities are located in Haman-gun, Gyeongsangnam-do, and in the Sasang-gu and Gangseo-gu areas of Busan. The Chilseo Plant, which is the manufacturing site covered by this EPD, produces reinforcing bars, including standard and seismic-resistant grades.

The Chilseo Plant operates management systems certified in accordance with ISO 9001, ISO 14001, and ISO 45001. The reinforcing bars covered by this EPD are manufactured in accordance with KS D 3504:2021.

1.2. Product Description

Product Identification

A reinforcing bar is a steel bar used for the reinforcement of concrete structures. Korea STEEL Co., Ltd.'s reinforcing bars, including standard and seismic-resistant reinforcing bars, are manufactured exclusively at the Chilseo Plant. The products are manufactured in accordance with KS D 3504:2021.

Product Specification

- Product name : Reinforcing bars
- Production identification : Complies with Korean Industrial Standard (KS D 3504:2021)
- Standard for Major Product : KS D 3540:2021

Designation (mm)	Unit Weight (kg/m)	Norminal Diameter			Transverse rib diameter				
		Diameter (mm)	Cross-sectional area (mm^3)	Circumference (mm)	Maxium Value of mean interval Max(mm)	Mean height of transverse rib		Max value of sum of gap(mm)	Angle between axial line(°)
						Min(mm)	Max(mm)		
D10	0.56	9.53	71.33	29.9	6.7	0.4	0.8	7.5	Min. 45
D13	0.995	12.7	126.7	39.9	8.9	0.5	1	10	
D16	1.56	15.9	198.6	50	11.1	0.7	1.4	12.5	
D19	2.25	19.1	286.5	60	13.4	1	2	15	
D22	3.04	22.2	387.1	69.8	15.5	1.1	2.2	17.5	
D25	3.98	25.4	506.7	79.8	17.8	1.3	2.6	20	
D29	5.04	28.6	642.4	89.9	20	1.4	2.8	22.5	
D32	6.23	31.8	794.2	99.9	22.3	1.6	3.2	25	

Table 1 Designation of reinforcing bars

Flow Diagram

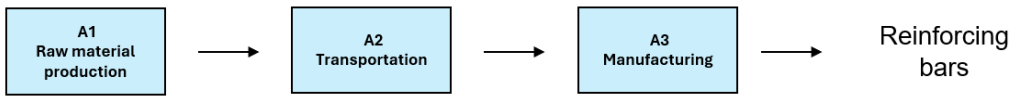


Figure 1 Flow diagram of reinforcing bars

Product Average

The declared product represents the average reinforcing bar manufactured at Korea STEEL Co., Ltd.'s Chilseo Plant, including standard and seismic-resistant reinforcing bars. The average environmental performance was determined based on actual production data collected from January to December 2025, considering the production volumes and proportions of the steel grades manufactured during the reference period. As all products were manufactured at a single production facility, no averaging across multiple manufacturing sites was applied. The declared unit is 1 metric tonne of reinforcing bar.

1.3. Application

Reinforcing bars are essential steel products widely used in building construction and civil engineering structures. Korea STEEL Co., Ltd. manufactures standard reinforcing bars and high-ductility seismic-resistant reinforcing bars in various steel grades and dimensions to meet different structural requirements. Standard reinforcing bars are used to reinforce concrete structures, while seismic-resistant reinforcing bars are designed to provide enhanced ductility and structural performance under seismic loading. These products are applicable to a wide range of construction projects, including buildings and civil infrastructure.

1.4. Declaration of Methodological Framework

This study was conducted in accordance with ISO 14040/14044, ISO 21930:2017, ISO 14025:2006, and the requirements of Smart EPD Part A: Product Category Rules for Building and Construction Products and Services and Smart EPD Part B: PCR for Designated Steel Construction Products.

All primary life cycle inventory (LCI) data were collected from this single manufacturing facility for the reference period from January to December 2025. Therefore, production-weighted averaging across multiple manufacturing sites was not applied.

The LCA was modeled using the openLCA software and the ecoinvent 3.10 database. The system boundary covers the product stage (Modules A1–A3), including raw material supply (A1), transportation (A2), and manufacturing (A3). The environmental impact assessment was conducted in accordance with the applicable PCR requirements.

Secondary data were sourced from the ecoinvent 3.10 database. South Korean datasets were prioritized where available, while Global (GLO) or Rest of World (RoW) datasets were applied where country-specific data were unavailable.

1.5. Technical Requirements

The reinforcing bars manufactured by Korea STEEL Co., Ltd. at the Chilseo Plant conform to KS D 3504:2021 (Steel Bars for Concrete Reinforcement). The products are classified into steel grades ranging from SD300 to SD700S, with nominal sizes ranging from D10 to D57. Product dimensions, mechanical properties, and dimensional tolerances are specified in accordance with KS D 3504:2021.

1.6. Properties of Declared Product as Delivered

The declared product is reinforcing steel bar manufactured at Korea STEEL Co., Ltd.'s Chilseo Plant, including standard and high-ductility seismic-resistant reinforcing bars. The products are available in various steel grades ranging from SD300 to SD700S and nominal sizes ranging from D10 to D57 in accordance with KS D 3504. Product characteristics, including nominal diameter, cross-sectional area, unit weight, and nominal perimeter, vary depending on the nominal size. The permissible weight tolerance ranges from 4% to 6%, depending on the bar size. Product lengths may be determined through consultation with the purchaser.

1.7. Material Composition

The reinforcing bars manufactured by Korea STEEL Co., Ltd. consist primarily of iron (Fe), with small amounts of alloying elements including carbon (C), silicon (Si), manganese (Mn), phosphorus (P), and sulfur (S). The chemical composition varies depending on the steel grade and product specifications. According to the product information provided, the declared reinforcing bars contain no substances listed on the REACH Candidate List. The material composition of the declared reinforcing bars is presented in Table 2.

MATERIALS	CAS NO.	CONCENTRATION	
		Min	Max
Fe (Iron)	7439-89-6	98.33	98.80
C (Carbon)	7440-44-0	0.21	0.25
Si (Silicon)	7440-21-3	0.08	0.36
Mn (Manganese)	7439-96-5	0.91	0.97
P (Phophrous)	7723-14-0	-	0.041
S (Sulfur)	7704-34-9	-	0.04

Table 2 Material concentration of reinforcing bars

1.8. Manufacturing

Korea STEEL Co., Ltd. manufactures reinforcing bars at its Chilseo Plant through electric arc furnace (EAF) steelmaking and rolling processes. Steel scrap is used as a primary raw material in the steelmaking process, where it is melted in an electric arc furnace and refined using a ladle furnace (LF). The resulting steel is processed into semi-finished products for subsequent rolling.

In the rolling process, semi-finished steel products, including billets, are processed into reinforcing bars of various grades and dimensions. Purchased billets are also used as input materials in the manufacturing process. Electricity, fuels, and auxiliary materials are consumed during steelmaking and rolling, while co-products such as steel slag and steel dust are generated. The finished reinforcing bars include standard and seismic-resistant reinforcing bars.

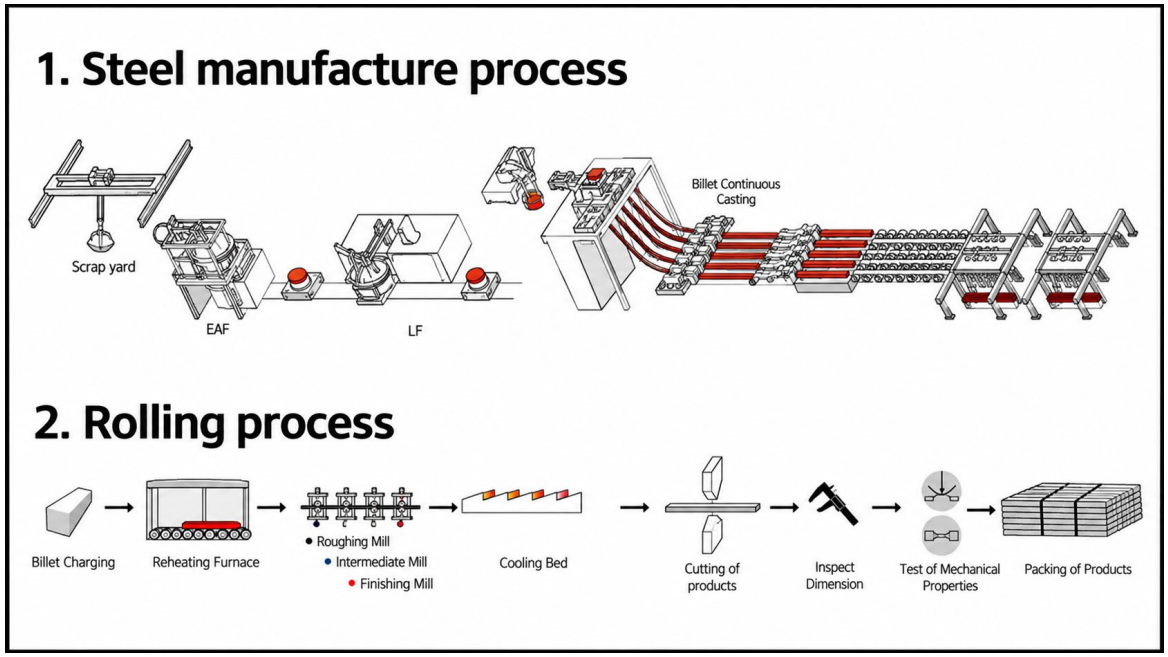


Figure 2 Manufacturing Processes of Reinforcing Bars at the Chilseo Plant

1.9. Packaging

After the manufacturing and inspection processes, the reinforcing bars are sorted according to their diameter and length. The bars are then bundled and securely tied with steel straps to facilitate handling, storage, and transportation. Each bundle is labeled with product information for identification and traceability before shipment.

2. Life Cycle Assessment Background Information

2.1. Declared Unit

In accordance with the applicable PCR requirements, the declared unit for this study is 1 metric tonne (1,000 kg) of reinforcing bar manufactured at Korea STEEL Co., Ltd.'s Chilseo Plant. The declared product includes standard and seismic-resistant reinforcing bars and represents the average reinforcing bar produced during the 2025 reference year. All life cycle inventory (LCI) data and environmental impact assessment results are calculated and reported per declared unit.

2.2. System Boundary

The system boundary of this study was established in accordance with ISO 21930 and the applicable Smart EPD Part A and Part B requirements. The assessment covers the cradle-to-gate life cycle stages (Modules A1–A3) of reinforcing bars manufactured at Korea STEEL Co., Ltd.

PRODUCT STAGE (A1-A3)			CONSTRUCTION (A4-A5)		USE (B1-B7)							END OF LIFE STAGE (C1-C4)				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transportation	Assembly / Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse / recovery / recycling potential
Mandatory			MND													

Table 3 Types of EPD with respect to life cycle stages covered and modules for the assessment

A1. Raw material supply

- Extraction and processing of raw mateirals and auxiliary materials
- Upstream production of energy and materials used in manfacturing

A2. Transport

- Transportation of raw materials and auxiliary materiasl to the manufaturing plant

A3. Manfuacturing

- Energy and utilies consumed during steelmaking and rolling processes
- Direct emissions generated during manufacturing
- Generation and transportation of waste materials to treatment facilies

2.3. Estimates and Assumptions

For domestic transportation, transportation distances were calculated based on 100% of the raw material suppliers, as raw materials are purchased from various suppliers. For overseas transportation, transportation distances from the export ports to the manufacturing plant were considered, as detailed information on inland transportation in the exporting countries was difficult to obtain. Internal scrap recycling was also considered to avoid double counting of material inputs.Economic allocation was applied to the main product and co-products based on a three-year rolling average of market prices. In addition, output quantities were adjusted by approximately 3.85% to maintain consistency in the material balance.

2.4. Cut-off Criteria

All significant material and energy inputs were included in the life cycle assessment. In accordance with the applicable PCR requirements, a 1% cut-off criterion was applied to minor inputs with negligible environmental impacts. Only insignificant quantities of maintenance consumables were excluded from the assessment. The total excluded inputs were below 1% of the total mass and energy inputs, and no critical inventory data were omitted.

2.5. Data Sources

Input/output data for reinforcing bar production were collected directly from Korea STEEL Co., Ltd.'s Chilseo Plant for the period from January to December 2025. The primary data include raw material consumption, energy and utility use, production quantities, and waste generation. Upstream data for raw materials, energy, transportation, and waste treatment were obtained from the ecoinvent 3.10 LCI database using representative datasets.

2.6. Data Quality

Time Representative

- Primary data were collected from Korea STEEL's Chilseo Plant for the full calender year pf 2025
- Secondary data were obtained from the ecoinvent 3.10 LCI DB to ensure temporal representativeness
- The data satisfy the temporal representativeness requirements of ISO 21930, which specify a maximum age of 5 years for primary data and 10 years for secondary data

Technological Representative

- Primary data reflect the actual electric arc furnace (EAF) steelmaking and rolling processes at the Chilseo Plant.
- The most technologically representative datasets were selected for secondary data.

Geographical Representative

- Primary data were collected from the Chilseo Plant in South Korea.
- South Korean (KR) datasets were prioritized, while Global (GLO) or Rest of World (RoW) datasets were applied where local datasets were unavailable.

Completeness

- The study covers the reinforcing bar production activities at Korea STEEL's Chilseo Plant.
- All significant material and energy inputs and outputs were included, except for minor maintenance consumables excluded under the 1% cut-off criterion.

2.7. Period under Review

The period under review covers the full calendar year from January 1, 2025, to December 31, 2025. Primary data related to raw material consumption, energy use, production quantities, and waste generation were collected from Korea STEEL Co., Ltd.'s Chilseo Plant during this 12-month period.

2.8. Allocation

Allocation procedures for co-products were established in accordance with ISO 21930 and the applicable PCR requirements. Physical allocation methods, such as mass-based allocation, were considered inappropriate due to the significant difference in economic value between reinforcing bars and co-products. As the revenue difference exceeds 25%, economic allocation was applied to distribute environmental burdens between the main product and co-products.

3. Life Cycle Assessment Results

3.1. Life Cycle Impact Assessment Results

IMPACT CATEGORY	A1	A2	A3	TOTAL	METHOLOGY
GWP 100 [kg CO_2 eq]	3.23E+02	3.49E+01	4.35E+02	7.93E+02	TRACI 2.2
ODP [kg CFC-11 eq]	2.19E-06	5.42E-07	1.44E-06	4.17E-06	TRACI 2.2
AP [kg SO_2 eq]	1.47E+00	6.81E-01	2.26E-01	2.37E+00	TRACI 2.2
EP [kg N eq]	8.98E-01	5.18E-01	2.60E-01	1.68E+00	TRACI 2.2
POCP [kg O_3 eq]	2.07E+01	1.26E+01	7.30E+00	4.06E+01	TRACI 2.2
$ADP_{element}$ [kg Sb-eq]	3.87E+03	3.51E+01	6.59E+03	1.05E+04	CML v4.8 2016
ADP_{fossil} [MJ, LHV]	4.70E-03	6.41E-01	2.27E-04	6.45E-01	CML v4.8 2016

Table 4 Life Cycle Impact Assessment (LCIA) results

3.2. Life Cycle Inventory Results

PARAMETER	A1	A2	A3	TOTAL
RPR_E [MJ, LHV]	3.49E+02	4.13E+00	5.90E+01	4.12E+02
RPR_M [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPR_T [MJ, LHV]	3.49E+02	4.13E+00	5.90E+01	4.12E+02
$NRPR_E$ [MJ, LHV]	4.12E+03	4.51E+02	1.02E+03	5.58E+03
$NRPR_M$ [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_T$ [MJ, LHV]	4.12E+03	4.51E+02	1.02E+03	5.58E+03

SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m^3]	-9.03E-01	-9.03E-01	1.07E+00	-7.40E-01

Table 5 Resource Use

PARAMETER	A1	A2	A3	TOTAL
HWD [kg]	6.50E+01	4.93E-01	2.11E+00	6.76E+01
NHWD [kg]	1.71E+03	3.64E+00	3.62E+00	1.71E+03
HLRW [kg] or [m^3]	1.16E-03	1.85E-05	3.44E-04	1.53E-03
ILLRW [kg] or [m^3]	2.65E-03	4.43E-05	7.35E-04	3.43E-03
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
R [kg]	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
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 6 Output Flows and Waste Categories

4. LCA Interpretation

The life cycle assessment (LCA) results for reinforcing bars manufactured by Korea STEEL Co., Ltd. were summarized by life cycle stage, based on a cradle-to-gate (A1–A3) system boundary.

The life cycle impact assessment (LCIA) was conducted in accordance with ISO 21930:2017 and the applicable PCR requirements. The environmental impacts were evaluated using the relevant impact category indicators.

For the Global Warming Potential (GWP100) and Abiotic Depletion Potential for Fossil Resources (ADP fossil) impact categories, the manufacturing stage (A3) showed the highest contribution. These impacts were mainly associated with manufacturing activities and energy consumption, including the electric arc furnace (EAF) steelmaking process.

In contrast, the raw material supply and upstream production stage (A1) showed the highest contribution to the Acidification Potential (AP), Smog Formation Potential (SFP), Ozone Depletion Potential (ODP), and Eutrophication Potential (EP) impact categories. For the Abiotic Depletion Potential for Non-Fossil Resources (ADP non-fossil) impact category, the transportation stage (A2) showed the highest contribution.

5. Additional Environmental Information

5.1. Environment and Health During Manufacturing

During the steelmaking and rolling processes, particulate matter, gaseous emissions, steel slag, and other process residues may be generated, potentially contributing to air pollution and waste-related environmental impacts. In addition, dust, fumes, noise, and high temperatures generated during these processes may affect workers' health and safety. Appropriate environmental management and occupational health and safety measures are implemented to minimize these impacts.

5.2. Environment and Health During Installation

Korea STEEL reinforcing bars are intended for use as reinforcement in concrete structures. During installation, the bars may undergo cutting, bending, and assembly according to construction requirements. These activities may generate noise, dust, and metal offcuts, which should be managed in accordance with applicable construction-site environmental and occupational safety requirements.

5.3. Extraordinary Effects

Reinforcing bars are non-combustible steel products; however, exposure to high temperatures during a fire may reduce their mechanical strength. Prolonged exposure to water or moisture may cause surface corrosion, while excessive mechanical stress or impact may affect their structural performance.

5.4. Delayed Emissions

No product-specific delayed emission measurements were provided in the LCA documentation. Reinforcing bars are intended for use within concrete structures, and potential long-term environmental interactions depend on the conditions of use, including exposure to moisture and corrosive substances. No quantitative assessment of delayed emissions is presented in this declaration.

5.5. Environmental Activities and Certifications

Korea STEEL Co., Ltd.'s Chilseo Plant is certified to ISO 14001:2015 (Environmental Management Systems), ISO 45001:2018 (Occupational Health and Safety Management Systems), and ISO 9001:2015 (Quality Management Systems). The reinforcing bars are manufactured in accordance with KS D 3504:2021.

5.6. Further Information

Hazardous Substances

- The reinforcing bar product does not contain any substances included in the REACH Candidate List of Substances of Very High Concern (SVHC).

Indoor environment

- No tests have been carried out on the product concerning indoor climate - not relevant

Further information regarding the reinforcing bar products, including technical specifications and environmental performance, can be obtained from Korea STEEL Co., Ltd. The environmental impact results presented in this declaration are based on the 2025 production data collected at the Chilseo Plant.

6. References

- ISO 14040:2006 – Environmental management — Life cycle assessment — Principles and framework.
- ISO 14044:2006 – Environmental management — Life cycle assessment — Requirements and guidelines.
- ISO 21930:2017 – Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.
- Smart EPD® Program – Part A Product Category Rules For Building and Construction Products and Services (Version 1.2, Issue date: 03-21-2025).
- Smart EPD® Program – Part B PCR for Designated Steel Construction Products (Standard 1000-008, Version 3, Issue date: 04-03-2025).

7. Contact Information

7.1. Study Commissioner

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7.2. LCA Practitioner

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