Environmental Product Declaration

In accordance with ISO 14025:2006 for:

Welded Austenitic Stainless Steel Pipe

from

Pantech Stainless & Alloy Industries Sdn Bhd (Malaysia)

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD Southeast Asia, www.epd-southeastasia.com
Type of EPD:	EPD of multiple products, based on average declaration
EPD registration number:	EPD-IES-0027450:001
Version date:	2026-03-30
Validity date:	2031-03-29

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



The study adheres to ISO 14040:2006 and ISO 14044:2006 standards, with additional guidance from PCR 2015:03 version 3.0.

GENERAL INFORMATION

Programme Information	
Programme:	**The International EPD® System** EPD registered through the fully aligned regional hub: EPD Southeast Asia
Address:	**EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden **EPD Southeast Asia** Jl. Kembangan Raya No.79 - 81, RT.2/RW.2, Kembangan Sel., Kec. Kembangan, Kota Jakarta Barat, Daerah Khusus Ibukota Jakarta 11610
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Product Category Rules (PCR)
Product Category Rules (PCR): ***Basic iron or steel products & special steels, except construction steel products, 2015:03, (3.0.1) and 4112 & 412***
PCR review was conducted by: The Technical Committee of the International EPD® System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com. ***Chair of PCR Review: Claudia A. Peña***

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: *Vijay Thakur, Eco-Assure Verification & Advisory* 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 ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: Pantech Stainless & Alloy Industries Sdn Bhd (Malaysia)
Address: Pantech Stainless & Alloy Industries Sdn Bhd PTD 204334, Jalan Platinum Utama, Kawasan Perindustrian Pasir Gudang, Zon 12B, 81700 Pasir Gudang, Johor, Malaysia.
Contact: Hassanuddin Bin Ismail, hassanuddin@pantechssalloy.com.

Description of the organisation: Pantech Stainless & Alloy Industries Sdn Bhd (Malaysia) is a leading manufacturer of Stainless Steel Welded Pipes and Stainless Steel Welded & Seamless Butt-Weld Fittings. Operating from a 26-acre facility in Pasir Gudang, Johor since 2010, Pantech serves a wide range of industries including oil and gas, water treatment, pharmaceuticals, and petrochemicals.

Product-related or management system-related certifications: The company is a member of Pantech Global, a listed company on the Main Market of Bursa Malaysia. Pantech exports to over 30 countries across North and South America, Europe, and Asia, and holds numerous certifications including ISO 9001:2015, ISO 45001, PED 2014/68/EU, AD2000-Merkblatt W0, DNV Marine, CRN, SIRIM, and SPAN. With a strong focus on quality, continuous improvement, and customer satisfaction, Pantech has established itself as a key regional and international supplier in the stainless-steel piping and fittings sector.

PRODUCT INFORMATION

Product name: Welded Austenitic Stainless Steel Pipe (WASS pipe)
Product identification: ASTM/ASME A/SA 999, ASME B36.19M & ASME B36.10M
Stainless steel: ASTM/ASME A/SA 312 TP304/304L & TP316/316L



UN CPC code: 4128
Product description: Welded Austenitic Stainless Steel (WASS) pipes are tubular products manufactured from austenitic stainless steel grades such as 304/304L and 316/316L. They are produced by forming stainless steel strip or plate into a cylindrical shape and welding the longitudinal seam, followed by finishing processes to meet required dimensions and surface quality. WASS pipes are used for the conveyance of fluids and gases in piping systems. Owing to their austenitic microstructure, they provide excellent corrosion resistance, good weldability, and stable mechanical performance, making them suitable for applications in water supply, chemical processing, food and beverage, pharmaceutical, oil and gas, and HVAC systems.

Name and location of production site(s): Pantech Stainless & Alloy Industries Sdn Bhd PTD 204334, Jalan Platinum Utama, Kawasan Perindustrian Pasir Gudang, Zon 12B, 81700 Pasir Gudang, Johor, Malaysia.

References to any relevant websites for more information or explanatory materials: https://pantech-group.com/

CONTENT DECLARATION

- The mass (weight) of one unit of a product, as purchased or per declared unit: 1 tonne of Welded Austenitic Stainless Steel pipe component, manufactured at Pantech Stainless & Alloy Industries Sdn Bhd (Malaysia).

- Content of the product in the form of a list of materials and substances, and their mass, shall be declared:

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Coil	1000	0	0	0
TOTAL	1000	0	0	0

- The mass and the content of distribution and/or consumer packaging:

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Wrapping film	0.201	0.020	0
Strapping green	0.206	0.021	0
HDPE sheet roll	0.617	0.062	0
Plastic end cap	0.202	0.020	0
Strapping black	0.121	0.012	0
High-strength polyester belt	0.098	0.010	0
Canvas	0.091	0.009	0
Nylon rope	0.030	0.003	0
TOTAL	1.566	0.157	0

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.

- Other information on substances with hazardous and toxic properties: No hazardous substances from the candidate list of SVHC have been used during the product's life cycle.

- The declared share of biogenic/recycled materials: No share of biogenic/recycled materials have been used during the product's life cycle.

LCA INFORMATION

Declared unit: 1 tonne of Welded Austenitic Stainless Steel Pipe Component

Time representativeness: June 2024 to May 2025

Geographical scope: The product is manufactured in Malaysia and the finished goods are exported to other regions such as Europe.

Database(s) and LCA software used: The LCA was modelled using SimaPro software (version 10.2.0.3). Background data were sourced from the ecoinvent database (version 3.11) using the cut-off system model. Life cycle impact assessment results were calculated using the EU JRC EN 15804+A2 method based on Environmental Footprint (EF) 3.1 characterization factors.

Description of system boundaries: The life cycle stages considered in assessing the environmental impacts of the production process include only the cradle-to-gate product stage (Modules A1, A2 and A3).

Module A: Product Stage

- The product stage covers the environmental impacts from cradle to gate and is subdivided into Modules A1 - A3, covering the extraction of raw materials, transport of materials to, between and within the manufacturing site, processing of inputs, and manufacture of the product.
  - Module A1: Raw Material Supply: The production stage starts with materials supply. This stage includes the mining and processing of raw materials, the generation of electricity fuel used in upstream processes. Raw materials used include coil, steel pipe, seamless pipe, and plate and/or enhancement of the respective properties of the individual pipe components.
  - Module A2: Transport to Plant: This stage covers all relevant transport from suppliers to the factory gate. All materials are transported via sea freight and short-haul trucks. The transfer of raw materials within the factories is carried out using forklifts.
  - Module A3: Manufacturing: This stage includes the manufacturing processes to produce the products with different electricity generation, fuel/ other energy carriers used in the manufacturing process, and management of waste generated in the manufacturing process until the end-of-waste state, which also includes the waste transported to third-party treatment facilities and disposal sites via trucks.

Electricity mix: Regarding the climate impact of purchased electricity for the manufacturing process (A3) of Pantech Stainless & Alloy Industries Sdn Bhd (Malaysia), the electricity source mix has been modelled according to the residual mix of their suppliers in 2023, using data from Ecoinvent v3.11. The GWP-GHG indicator is 0.844 kg CO_2eq/kWh for the modelled electricity mix.

Cut-off criteria: Cut-off criteria were applied to exclude raw materials contributing less than 1% of total mass, as well as other inputs considered negligible in terms of environmental relevance. No hazardous substances or significant processes were omitted. All relevant and significant inputs, outputs and processes have been included in the LCI.

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

MODULE	PRODUCT STAGE		
	Raw Material Supply	Transport	Manufacturing
	A1	A2	A3
Modules Declared	**X**	**X**	**X**
Geography	**MY**	**MY**	**MY**
Specific Data Used	12.4%		

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Production of raw materials	Database	Ecoinvent 3.11	2023	Secondary data	-
Generation of electricity used in manufacturing of product	Collected data	EPD owner	2024-2025	Primary data	12.34%
Transport of WASS pipe to manufacturing site	Collected data	EPD owner	2024-2025	Primary data	0.06%
Production of WASS pipe	Database	Ecoinvent 3.11	2023	Secondary data	-
Production of packaging	Database	Ecoinvent 3.11	2023	Secondary data	-
Other processes	Database	Ecoinvent 3.11	2023	Secondary data	-
Total share of primary data, of GWP-GHG results for A1-A3					**12.4%**

The EPD covers multiple similar products within the WASS pipes group. Variation in composition between products is 0%, as all products share the same material composition.

Data Quality and Completeness:

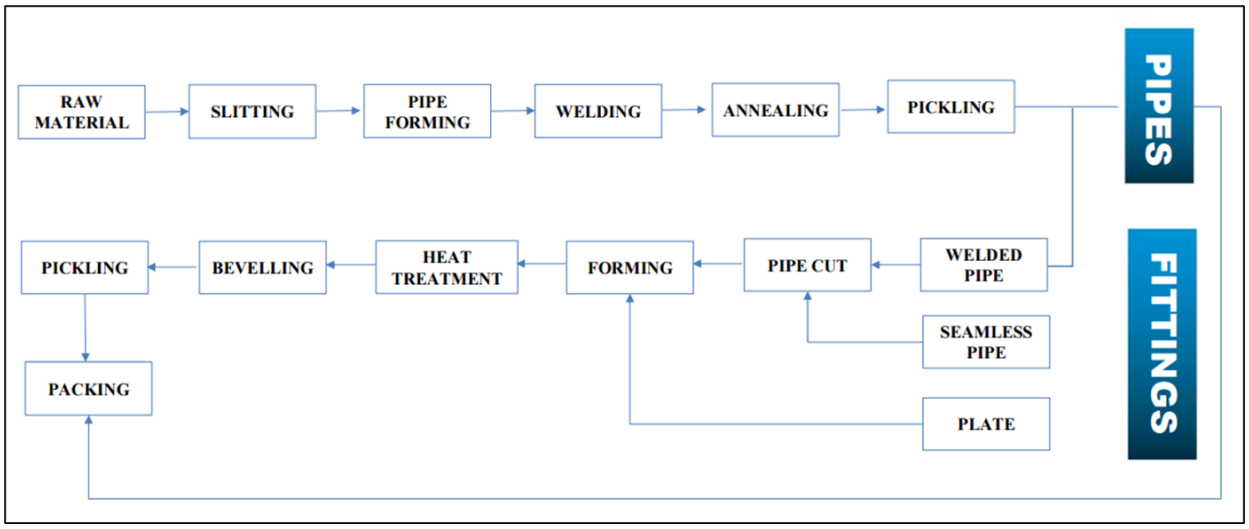
This assessment is mainly based on site-specific activity data (inputs and outputs) collected from the manufacturer. The data is representative of site activities for the period June 2024 to May 2025, covering raw materials supply, energy supply and consumption, production volumes, waste management and transport of materials and wastes. Data reliability was assured through PSA's implementation of an ISO-certified Quality Management System, which provides a well-established mechanism for consistent data collection and documentation. Therefore, the primary data collected for the assessment was considered reliable and precise.

Secondary data was used for upstream and downstream processes where primary data was not available, particularly for background processes such as raw material extraction and processing, electricity generation, fuel production, and waste treatment. Secondary datasets were sourced from internationally recognised LCA databases (e.g., Ecoinvent) and were selected based on their technological, geographical, and temporal representativeness. Preference was given to datasets that

reflect regional or global averages consistent with the study scope. Where exact matches were unavailable, the most representative proxy datasets were applied, and conservative assumptions were adopted to avoid underestimation of impacts.

The data quality assessment was conducted in accordance with EN 15941, applying the qualitative Data Quality Indicator (DQI) Scheme 2 as defined in Annex E. This scheme evaluates data reliability and representativeness (temporal, geographical, and technological), as well as the nature of the data source (measured, calculated, or assumed). Primary, site-specific data was assessed as Very good, while secondary data derived from established LCA databases was generally assessed as Good due to minor limitations in geographical or technological representativeness. Data incorporating proxy assumptions, such as transport distances and vehicle technologies, was also assessed as Good.

Process flow diagram:



The production of WASS pipes involves forming, welding, and finishing operations carried out under controlled manufacturing conditions. Stainless steel coils are slit into narrow strips and formed into circular pipe shapes before being welded longitudinally using TIG and plasma welding techniques. The welded pipes are subjected to heat treatment and water quenching to relieve stress and improve ductility. Pipes then undergo straightening, sizing, and non-destructive eddy current testing to ensure weld integrity. After cutting to a specific length, the pipes are pickled, hydrostatically tested (if required), and visually inspected in accordance with ASTM standards.

ENVIRONMENTAL PERFORMANCE

Impact category indicators

The environmental performance results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

IMPACT INDICATOR	UNIT	RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TOTAL
		A1	A2	A3	
GWP-Total	kg CO_2-eq	2.44E+03	1.91E+01	4.81E+02	2.94E+03
GWP-Fossil	kg CO_2-eq	2.43E+03	1.91E+01	4.77E+02	2.93E+03
GWP-Biogenic	kg CO_2-eq	1.69E+00	1.72E-06	1.81E+00	3.50E+00
GWP-LULUC	kg CO_2-eq	1.31E+00	1.00E-02	2.03E+00	3.35E+00
ODP	kg CF-11-eq	1.59E-05	2.74E-07	8.98E-06	2.52E-05
AP	mol H^+-eq	1.02E+01	5.58E-01	2.00E+00	1.28E+01
EP – Freshwater	kg P-eq	9.69E-01	6.09E-04	1.95E-01	1.16E+00
EP – Marine	kg N-eq	2.28E+00	1.39E-01	3.36E-01	2.76E+00
EP – Terrestrial	mol N-eq	2.36E+01	1.54E+00	3.27E+00	2.84E+01
POCP	kg NMVOC-eq	8.22E+00	4.18E-01	1.01E+00	9.65E+00
ADP_e*	kg Sb-eq	1.54E-02	1.86E-05	5.94E-04	1.60E-02
$AhDP_f$*	MJ	2.56E+04	2.34E+02	4.89E+03	3.07E+04
WDP*	m^3-eq	7.79E+02	5.43E-01	9.55E+01	8.75E+02
Acronyms	GWP – Global warming potential; LULUC – Land use and land use change; GHG – Greenhouse Gas; ODP – Ozone depletion potential; AP – Acidification potential; EP – Eutrophication potential; POCP – Photochemical ozone creation potential; ADP_e – Abiotic depletion potential for non-fossil resources; ADP_f – Abiotic depletion potential for fossil resources, WDP – Water deprivation potential				

** 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.*

Resource use indicators

PARAMETER		UNIT	RAW MATERIAL SUPPLY (A1)	TRANSPORT (A2)	MANUFACTURING (A3)	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2.14E+03	1.67E+00	5.73E+02	2.71E+03
	Used as raw materials	MJ, net calorific value	1.55E+00	0.00E+00	0.00E+00	1.55E+00
	TOTAL	MJ, net calorific value	2.14E+03	1.67E+00	5.73E+02	2.71E+03
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2.55E+04	2.34E+02	4.88E+03	3.06E+04
	Used as raw materials	MJ, net calorific value	5.69E+01	0.00E+00	0.00E+00	5.69E+01
	TOTAL	MJ, net calorific value	2.55E+04	2.34E+02	4.88E+03	3.07E+04

PARAMETER	UNIT	RAW MATERIAL SUPPLY (A1)	TRANSPORT (A2)	MANUFACTURING (A3)	TOTAL
Secondary material (optional)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (optional)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (optional)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (optional)	m^3	2.45E+01	1.73E-02	3.99E+00	2.85E+01

Waste indicators (optional)

PARAMETER	UNIT	RAW MATERIAL SUPPLY (A1)	TRANSPORT (A2)	MANUFACTURING (A3)	TOTAL
Hazardous waste disposed	kg	0.00E+00	0.00E+00	4.13E+01	4.13E+01
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	4.89E-01	4.89E-01
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators (optional)

PARAMETER	UNIT	RAW MATERIAL SUPPLY (A1)	TRANSPORT (A2)	MANUFACTURING (A3)	TOTAL
Components for reuse	kg	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	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00

VERSION HISTORY

Original Version of the EPD, 2026-03-30

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
SVHC	Substances of Very High Concern
ND	Not Declared
PSA	Pantech Stainless & Alloy Industries Sdn Bhd
LCA	Life Cycle Assessment
WASS	Welded Austenitic Stainless Steel

REFERENCES

a) Environdec, 2025b. General Programme Instructions for the International EPD System, version 5.0.1, Stockholm: EPD International AB.
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c) ISO - International Organization for Standardization. (2020). ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework. ISO - International Organization for Standardization.
d) ISO - International Organization for Standardization. (2020). ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines. ISO - International Organization for Standardization.
e) PRé Sustainability. (2024). SimaPro Version 10.2.0.3. PRé Sustainability.
f) Swiss Centre for Life Cycle Inventories. (2024). Ecoinvent Database, Version 3.11.
g) The International EPD System. (2015). Product Category Rules Basic iron or steel products & special steels, except construction steel products, PCR 2015:03, Version 3.0.0, CPC 4112 & 412. EPD International AB.
h) U.S. Environmental Protection Agency. (2016). Guidance on Data Quality Assessment for Life Cycle Inventory Data. U.S. Environmental Protection Agency.

Contact Information

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