Environmental Product Declaration

of multiple products, based on the average results of the product group.

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

Unalloyed and low-alloyed steel pipe fittings

from

Erne Fittings GmbH

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Type of EPD:	EPD of multiple products from a company
EPD registration number:	EPD-IES-0026301:001
Version date:	2025-12-10
Validity date:	2030-12-10
	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

A detailed description of products included in this EPD can be found on page 4.

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
E-mail:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products version 2.0.1 and UN CPC code: 4129 – Tubes, pipes and hollow profiles of cast-iron and cast-steel and related fittings; tube or pipe fittings of steel other than cast
PCR review was conducted by: The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. **Chair of the PCR review:** Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/support.
c-PCR, if applicable: *not applicable*

LCA Accountability
LCA accountability: Steffen Albers, DEKRA Assurance Services GmbH, Handwerkstraße 15, 70565 Stuttgart, Germany

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: Manfred Russ (Mail: manfred@russ-lca.com). 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: Erne Fittings GmbH
Address: Hauptstraße 48, 6824 Schlins, Austria

Contact: Christopher Schragl (Christopher.Schragl@ernefittings.com)

Address and contact information of the LCA practitioner commissioned by the EPD owner, if applicable: DEKRA Assurance Services GmbH, Handwerkstraße 15, 70565 Stuttgart, Germany

Description of the organisation:
Erne Fittings GmbH, headquartered in Schlins, Austria, is a globally leading manufacturer of high-quality butt-weld fittings for piping systems. Since its founding in 1920, the company has stood for top quality, safety, and innovation in connection technology.

With over 100 years of experience, Erne Fittings produces permanently weldable pipe connections made from steel materials – including elbows, tees, and reducers – for demanding and regulated applications. These include power plants, pipelines, refineries, tankers, offshore platforms, chemical and industrial plants, as well as general mechanical engineering.

Erne Fittings positions itself as a reliable premium partner for customers worldwide. The combination of technical expertise, international presence, and a deep understanding of customer requirements makes the company a preferred supplier in both project and distribution business.

In addition to a comprehensive stock program, Erne Fittings also offers customized special solutions and manufactures over 3,000 items in various dimensions, materials, and wall thicknesses – always in accordance with international standards and with the highest quality requirements.

With production and sales locations in Europe and America, Erne Fittings pursues a global strategy based on customer proximity, reliability, and sustainable growth.

Product-related or management system-related certifications:
Erne Fittings meets the highest quality and safety standards, holding certifications for quality management (ISO 9001:2015-09, 2015), (ISO 19443:2018, 2018), laboratory and testing competence (EN ISO/IEC 17025:2017, 2017), and personnel qualification in non-destructive testing (EN ISO 9712, 2021).

PRODUCT INFORMATION

Product name: Pipe Fittings

Product identification:
The EPD covers multiple pipe fittings. It is based on 1 kg of an average product.

There are two types of pipe fittings produced by Erne Fittings: the stock program and costumer specific solutions. The materials and sizes in the stock program are highlighted in the following, while the costumer specific solutions will be not disclosed publicly, but they are also covered by this EPD.

Variant	Material group	Material	Wall thickness (mm)	Diameter (mm)	Angle (Degrees)	Weight (kg)
Bends	unalloyed	WPHY_60	3.20 - 31.83	33.4 - 1066.8	15 - 180	0.15 - 3840.9
		WPHY_65				
		WPHY_70				
		WPHY_52				
		P235GH-S	2.00 - 36.53	21.3 - 914.4	11 - 180	0.04 - 733.53
		P265GH-S				
		P235GH-W				
		P265GH-W				
		WPB				
		WPB_/_P265GH-S				
		P235GH-TC1-W				
	low-alloyed	WPL6	2.77 - 30.96	21.34 - 762	45 - 90	0.075 - 640
		WP11_Cl.1	6.02 - 28.58	114.3 - 762	45 - 90	1.95 - 364
		WP11_Cl.2	3.68 - 27.79	21.34 - 406.4	45 - 90	0.1 - 196
Tees	unalloyed	P235GH-S	21.30 - 699.00	21.30 - 609.60	2.00 - 18.26	0.08 - 2800
		WPB_/_P265GH-S				
		WPHY_60	60.30 - 1066.80	33.40 - 1066.80	3.20 - 25.40	1.4 - 1522
		WPHY_65				
		WPHY_70				
		WPHY_52				
	low-alloyed	WPL6	21.34 - 609.60	21.34 - 609.60	2.77 - 24.61	0.13 - 80
Reducers	unalloyed	WPB_/_P265GH-S	26.67 - 508.00	21.30 - 457.20	2.60 - 23.01	0.07 - 75
		P235GH-S				
		WPB				
		WPHY_60	60.32 - 609.60	33.40 - 508.00	3.91 - 18.26	0.3 - 88.41
		WPHY_65				
		WPHY_70				

Visual representation (e.g., an image) of the product:

UN CPC code: 4129 - Tubes, pipes and hollow profiles of cast-iron and cast-steel and related fittings; tube or pipe fittings of steel other than cast

Product description:
The products fullfill following functions: It provides a tight, leak-proof and corrosion-resistant connection in piping systems with a high resistance to pressure, temperature and chemical exposure. The products are in compliance with ED 2014/68/EU, KTA 3201, PER 2016/1105, and the AD2000 Code and hold the following Standards EN10253; DIN 2605, 2615, 2616, 2609; NF A 49-281, A 49-289; ASME SA-234, SA-403, SA-420, SA-815, SA-960; ASTM A234, A420, A403, A815, A860, A960, B366; MSS SP 75, SP 43; CSA Z245.11.

Name and location of production site(s): Erne Fittings GmbH: Hauptstraße 48, 6824 Schlins, Austria and Bleckmanngasse 20, 8680 Mürzzuschlag, Austria

References to any relevant websites for more information or explanatory materials, if applicable:
https://ernefittings.com/en/

CONTENT DECLARATION

Description of the main components and/or materials: Quantity for 1 declared unit is 1 kg of the average product.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Unalloyed steel	0.96	NA	0	0
Low-alloyed steel	0.04	NA	0	0
TOTAL	1.00	NA	0	0

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Pallet	0.09	9.0	0.04
Paperboard	0.01	1.0	3.8E-03
TOTAL	0.1	10.0%	0.04

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

Information on the environmental and hazardous/toxic properties of a substances contained in the product:
None of the substances used during production are classified as persistent, bioaccumulative and toxic (PBT) or substances of very high concern (SVHC) according to Regulation No. 1907/2006 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

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

LCA INFORMATION

Compliance with standards
The LCA and EPD have been created to comply with:

- ISO 14040:2006 and ISO 14044:2006+A1:2018 which describe the principles, framework, requirements and provides guidelines for life cycle assessment (LCA) (ISO 14040:2006-07, 2006) (ISO 14044:2006-07, 2006)
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures, which establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations (ISO 14025:2006-07, 2006)
- ISO 14020:2022 Environmental labels and declarations – General principles, which describes the guiding principles for the development and use of environmental labels and declarations (ISO 14020:2022-12, 2022)
- EN 15804+A2:2019/AC:2021: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products (DIN EN 15804:2022-03, 2022)
- EN 15941: Sustainability of construction works – Data quality for environmental assessment of products and construction works (DIN EN 15941:2024-10, 2024)
- PCR 2019:14, v2.0.1 – Construction products (Environdec, 2025a)
- GPI for the International EPD System v5.0.1 – containing instructions regarding methodology and the content that must be included in EPDs registered under the International EPD System (Environdec, 2025b)

Declared unit:
The declared unit is 1 kg of pipe fittings.

The environmental impacts are determined for an average product. I.e., the EPD includes several products of the same product group. The EPD 1 covers the following products:
Pipe fittings with the diameters 1/2″ – 42″ / 21.33 mm – 1067 mm made from unalloyed and low-alloyed steels.

The EPD does depict multiple products of the same product group which are available in different sizes and have a different material composition. For the calculation of the weighted average the production volumes of the included products are considered for the reference year 2024.

Reference service life: N/A

Time representativeness: The reference year of the study is the calendar year 2024, covering 12 months of data.

Geographical scope: The geographical scope is Europe.

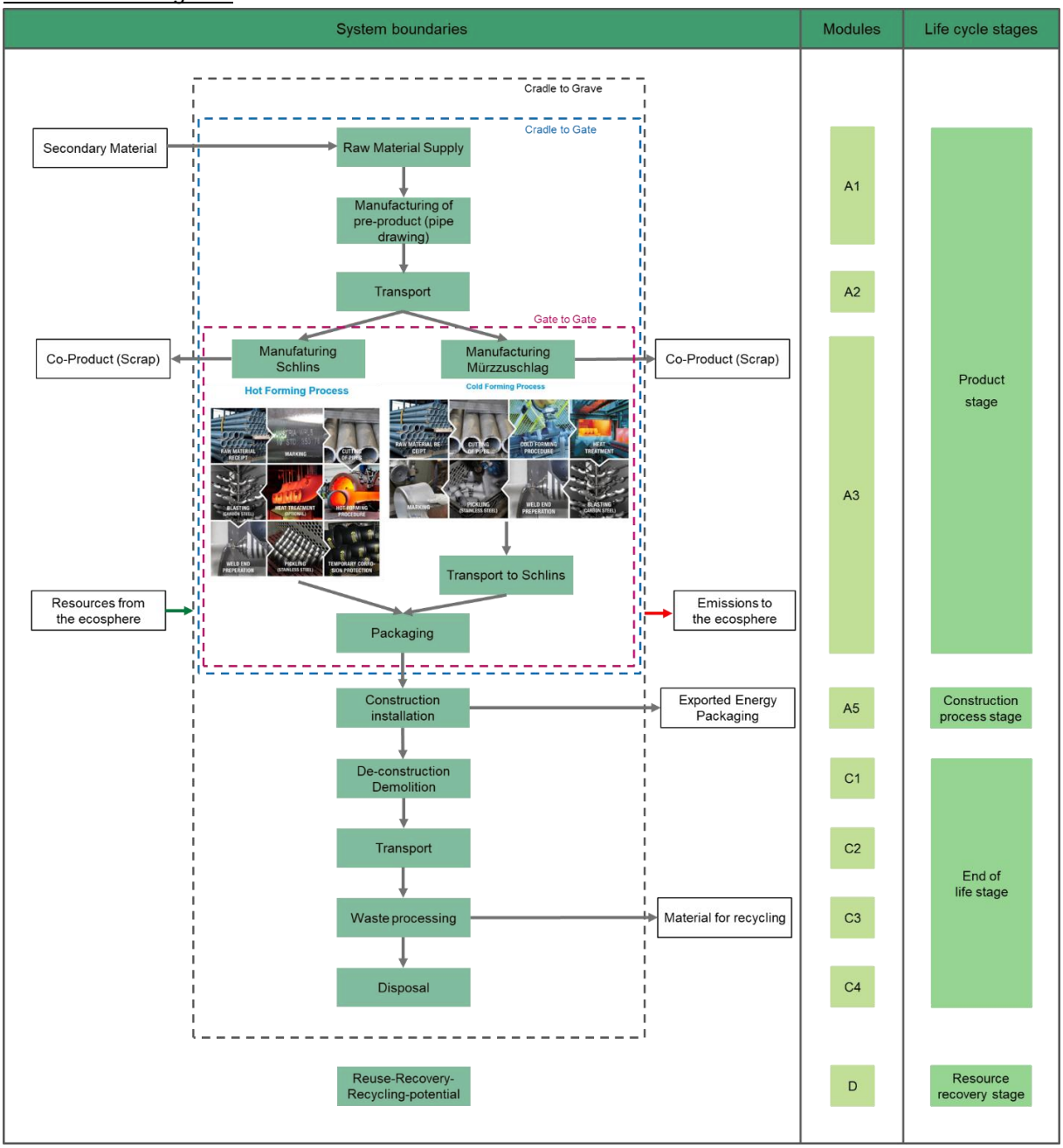
Database(s) and LCA software used: The database used is ecoinvent v3.11 (Wernet et al. 2016 and ecoinvent 2024) with the EN15804 reference package based on Environmental Footprint (EF) 3.1. The LCA software used is Umberto 11.

EPD/LCA Tool used: N/A

Description of system boundaries:

The system boundary is cradle to gate with options, modules C1–C4, module D. The optional module included is A5, so in total modules A1–A3 + C + D and A5 are included. Module A4 is not included because not enough data could be provided to achieve an informative result. The use stage B ist not included because they are highly dependent on the particular application. In addition, the environmental impact of the use phase is considered negligible because it is a passive product that is not removed over an extended period.

Process flow diagram:



Product stage

The manufacturing of the pipe fittings takes place at the construction facility in Mürzzuschlag and Schlins. There are two different processes, the hot forming process in Schlins and the cold forming process in Mürzzuschlag.

The hot forming process in Schlins includes the following steps:

1. Cutting of the steel pipe: Steel pipes are cut to the required length using saws to prepare the raw material for forming.
2. Hot forming: The cut pipe sections are heated to forming temperature and shaped into elbows, tees, or reducers using hydraulic presses and dies. This ensures the required geometry and wall thickness distribution.
3. Heat treatment: After forming, the fittings undergo heat treatment (e.g., normalizing or quenching and tempering) to restore material properties, relieve stresses, and achieve the specified mechanical characteristics.
4. Blasting: The fittings are shot-blasted to clean the surface, remove scale and residues from hot forming and heat treatment, and prepare the material for further processing.
5. Weld end preparation: The ends of the fittings are machined (typically beveled) to ensure precise weldability and compliance with international welding standards.
6. Apply corrosion protection: Depending on customer and application requirements, surface coatings (e.g., varnish, epoxy, or other protective layers) are applied to prevent corrosion during transport, storage, and installation.
7. Packaging: Finally, the finished fittings are packaged securely, often on pallets and paperboard, ensuring safe delivery to the customer while preventing damage and contamination.

The cold forming process in Mürzzuschlag includes the following steps:

1. Cutting of the steel pipe: Steel pipes are cut to the required lengths using saws to provide the raw material for further processing.
2. Cold forming: At room temperature, the pipe sections are mechanically formed into the desired shapes (e.g., elbows, tees, reducers) using presses and dies. This process allows precise dimensional control without heating.
3. Heat treatment: Following cold forming, the fittings are heat-treated to relieve internal stresses caused by the forming process and to restore the required mechanical properties of the material.
4. Blasting: The surface of the fittings is cleaned through shot blasting to remove scale, oxide layers, and any surface impurities, creating a clean base for subsequent treatment.
5. Pickle/Stain: The fittings undergo pickling or staining, where chemical solutions are applied to remove remaining oxides and contaminants. This improves corrosion resistance and ensures a uniform surface finish.
6. Transport to Schlins: The final packaging is done in Schlins therefore the finished product gets delivered to Schlins.
7. Packaging: Finally, the finished fittings are packaged securely, often on pallets and paperboard, ensuring safe delivery to the customer while preventing damage and contamination.

The modules A1-A3 include the production of raw and auxiliary materials that enter the production processes, as detailed below:

A1: Raw material supply

- Modul A1 includes the extraction and processing of raw materials (high yield steel grade, carbon steel and low alloy steel and the manufacturing of the pre-products (seamless and longitudinally welded pipes or forged sleeves made from the listed raw materials) that serve as

input for the manufacturing process taking place at the production facilities in Mürzzuschlag and Schlins

A2: Transport to manufacturer

- Modul A2 includes the transportation of the pre-product, i.e., seamless and longitudinally welded pipes or forged sleeves, to Mürzzuschlag and Schlins. The components are delivered by multiple suppliers via truck. The distances for the different suppliers were provided by Erne Fittings GmbH and weighted according to the delivered mass per location.

A3: Manufacturing

- The manufacturing stage includes all the process steps, material, and energy inputs to produce the Pipe fittings. The product is packaged prior to delivery using wooden pallets and cardboard boxes, in order to ensure protection during transportation and handling. The packaging materials of pre-products are included in the life cycle assessment and their transport to a waste treatment facility is considered. End-of-life treatment of the packaging, such as recycling or thermal recovery, is accounted for according to applicable waste management practices.
- During production, a co-product is generated that meets all PCR criteria; therefore, co-product allocation has been applied in accordance with the PCR.

During production, waste is generated and treated according to the waste allocation procedure.

Construction process stage

Module A5 covers the manual installation of the product, with no material losses taken into account. The disposal of packaging materials is assumed to occur via thermal waste treatment.

End of life stage

C1: Demolition

- This module covers the dismantling of the product. It is assumed, that 100% of the product can be recovered during dismantling.

C2: Transport

- Module C2 covers the transport to the waste processing facility. The distance is estimated to be 77 km and the transport is assumed to be done via truck.

C3: Waste processing

- Waste processing include material flows to either Module C4 or Module D. It encompasses sorting and compressing of scrap materials. 100% of the material is designated for recycling in Module D.

C4: Disposal

- This module is zero, because all pipe fittings are assumed to be recycled.

Resource recovery stage

In Module D credits were given for the avoidance of the primary production of unalloyed steel and loads for the production process of new material. The substitution effects for recycling and the avoided primary steel production are calculated in Module D for output net flows of 0.76 kg.

Estimation and assumptions:

The scrap amount for the steel is derived from the secondary material value provided in the datasets and amounts to 21% for unalloyed steel and 18.65% for low-alloyed steel. The scrap enters the system boundary burden-free.

During production, waste is generated in the form of steel scrap. Specific data for this process step were not available; only aggregated data at the factory level could be used. Consequently, the

assumed waste amount is likely overestimated. This is reflected in the results, as a higher input of raw material is required.

For Primary Energy Use indicators, option A of PCR 2019:14 v.2.0.1 has been followed.

Cut-off rules:
The cut-off criteria follow EN15804:2012+A2:2019 and the PCR 2019:14 Construction products version 2.0.1. The product system covers a minimum of 95 % of total inflows (mass and energy) and environmental impacts per module.
Infrastructure/ capital goods are not included in the core processes. They are considered in generic datasets from the LCI-database used for upstream and downstream processes. The results of the environmental performance indicators were issued with a disclaimer.

Allocation:
For the impacts of recycling and energy recovery of wastes in module A3 the waste allocation procedure according to PCR 2019:14 v2.0.1 has been applied.

A physical allocation was performed taking into account the annual quantity of all produced pipe fittings in kg at the production sites in the reference year. The annual consumption of electricity and auxiliary materials at the productions site were allocated to one kg of the average product.

The manufacturing of the average product generates steel scrap as a co-product which has a commercial application in recycling. In Schlins 1.06% of the impacts are allocated to the pre-consumer scrap while 98.94% are allocated to the product system. In Mürzzuschlag 1.73% of the impacts are allocated to the pre-consumer scrap while 98.27% are allocated to the product system.

Steel leaving the product system in C3 is allocated as waste and categorized as “Material for Recycling”. To ensure consistency and avoid double counting a net scrap calculation is performed which accounts for both the input of recycled material and the output of recyclable scrap.

Electricity mix (A1-A3):
The electricity consumption is collected on machine level for each site and mass allocated to 1 kg of pipe fittings. The energy mix sourced from VKW is certified renewable electricity sourced to 100% in Austria. The reference year for the datasets used is 2024.

The emission factor for the GWP-GHG indicator is 0.06 kg CO2 eq/kWh for the purchased electricity mix. 100% of the electricity is sourced externally.

Electricity mix

Type	Total share [%]
Hydro	81.15
Solar	10.24
Wind	6.94
Biomass	0.99
Renewable gas	0.68
Total	100.00

Data quality:
The EPD is based on data collected by Erne Fittings from two sites over one year from January 2024. The EPD is representative of the production of pipe fittings at the production sites in Schlins and

Mürzzuschlag. The installation and end-of-life stage of the EPD covers Europe, since the pipes are mostly sold in Europe. Erne Fittings uses the same technology to produce the pipe fittings, that included in this EPD with only slight differences between the two production sites. The difference between the pipe fittings is the used raw material, ranging from unalloyed steel to low-alloyed steel. These material differences, along with different production sites cause up to 36% variation in GWP-GHG in modules A1 – A3. The EPD uses background data from the ecoinvent database v3.11, 2024. No EPD data for the specific primary input materials was available. The quality of the relevant data used for the EPD in terms of its time, geography and technology representativeness using EN 15804:2012+A2:2019, Annex E, Table E.2 is mostly very good for foreground data and good for background data. The relevant data assessed included no poor or very poor data.

Additional information on processes contributing more than 10% to the GWP-GHG results of modules A1-A3

Process	Source Type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Generation of electricity and natural gas used in manufacturing of product	EPD Owner, Database	EPD Owner, Ecoinvent v3.11	2024	Primary data, Representative secondary data	8.0%
Transport of raw materials to manufacturing site	EPD Owner, Database	EPD Owner, Ecoinvent v3.11	2024	Primary data, Representative secondary data	6.2%
Production of raw materials	EPD Owner, Database	EPD Owner, Ecoinvent v3.11	2024	Primary data, Representative secondary data	0%
Other processes	EPD Owner, Databases	EPD Owner, Ecoinvent v3.11	2024	Primary data, Representative secondary data	0%

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.

Averages and variability

The variation in GWP-GHG was computed in relation to the average product. The variation in the results is related to the manufacturing site, as the energy consumption depends on the production process and as the packaging requires an additional transportation, and to the raw material used.

Modules declared, geographical scope, share of primary 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	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	AT	-	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Primary data used	14.2 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-7 %/+36 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	-7 %/+21 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-

* The variation range represents the respective difference between the results of the average product and the lowest and highest result of all the products covered in the EPD.

ENVIRONMENTAL PERFORMANCE

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

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.
The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	3.05E+00	ND	1.65E-01	3.99E-04	1.16E-02	2.26E-02	0.00E+00	-1.21E+00
GWP-fossil	kg CO_2 eq.	3.20E+00	ND	1.71E-03	3.99E-04	1.16E-02	2.25E-02	0.00E+00	-1.21E+00
GWP-biogenic	kg CO_2 eq.	-1.62E-01	ND	1.64E-01	3.97E-08	2.30E-06	4.76E-05	0.00E+00	2.28E-04
GWP-luluc	kg CO_2 eq.	1.09E-02	ND	4.85E-07	4.08E-08	4.03E-06	2.78E-05	0.00E+00	1.25E-04
ODP	kg CFC 11 eq.	4.04E-08	ND	1.99E-11	5.92E-12	2.54E-10	2.99E-10	0.00E+00	-1.84E-09
AP	mol H^+ eq.	1.01E-02	ND	1.73E-05	3.56E-06	5.33E-05	2.68E-04	0.00E+00	-3.91E-03
EP-freshwater	kg P eq.	1.29E-03	ND	6.74E-07	1.28E-08	8.19E-07	1.50E-05	0.00E+00	-5.19E-04
EP-marine	kg N eq.	2.47E-03	ND	9.17E-06	1.66E-06	2.09E-05	5.96E-05	0.00E+00	-9.87E-04
EP-terrestrial	mol N eq.	2.52E-02	ND	8.69E-05	1.82E-05	2.28E-04	6.73E-04	0.00E+00	-1.09E-02
POCP	kg NMVOC eq.	9.21E-03	ND	2.18E-05	5.43E-06	8.00E-05	1.99E-04	0.00E+00	-3.85E-03
ADP-minerals& metals*	kg Sb eq.	1.04E-05	ND	3.76E-09	1.43E-10	3.88E-08	1.59E-06	0.00E+00	-3.08E-08
ADP-fossil*	MJ	3.39E+01	ND	1.48E-02	5.19E-03	1.67E-01	3.04E-01	0.00E+00	-1.05E+01
WDP*	m^3	1.75E+00	ND	3.75E-03	1.34E-05	9.24E-04	5.92E-03	0.00E+00	-1.46E-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.

The results of the impact categories abiotic depletion of minerals and metals, and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	3.21E+00	ND	1.71E-03	3.99E-04	1.16E-02	2.26E-02	0.00E+00	-1.21E+00

As module C is included in the EPD, the use of the results of modules A1-A3, and A4-A5 is discouraged without considering the results of module C.

Resource use indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5.03E+00	ND	1.38E+00	3.26E-05	2.78E-03	5.56E-02	0.00E+00	4.24E-01
PERM	MJ	1.38E+00	ND	-1.38E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	6.41E+00	ND	4.21E-04	3.26E-05	2.78E-03	5.56E-02	0.00E+00	4.24E-01
PENRE	MJ	3.40E+01	ND	9.78E-02	5.19E-03	1.67E-01	3.04E-01	0.00E+00	-1.05E+01
PENRM	MJ	8.30E-02	ND	-8.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.41E+01	ND	1.48E-02	5.19E-03	1.67E-01	3.04E-01	0.00E+00	-1.05E+01
SM	kg	2.36E-01	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.64 E-01
RSF	MJ	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.90E-02	ND	2.89E-05	3.32E-07	2.14E-05	1.36E-04	0.00E+00	-1.60E-03
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 functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	6.02E-01	ND	7.70E-04	5.82E-06	2.41E-04	2.00E-03	0.00E+00	2.48E-02
Non-hazardous waste disposed	kg	9.71E+00	ND	1.04E-01	8.48E-05	5.18E-03	7.88E-02	0.00E+00	-3.05E+00
Radioactive waste disposed	kg	3.25E-05	ND	4.65E-09	5.42E-10	5.10E-08	6.67E-07	0.00E+00	1.91E-05

Output flow indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.0E+00	ND	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Material for recycling	kg	0.0E+00	ND	0.0E+00	0.0E+00	0.0E+00	1.00E+00	0.0E+00	0.0E+00
Materials for energy recovery	kg	0.0E+00	ND	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported energy, electricity	MJ	0.0E+00	ND	1.8E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported energy, thermal	MJ	0.0E+00	ND	3.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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

Variation:
The best-case result was identified as an unalloyed steel pipe fitting produced in Schlins, while the worst-case product is a low-alloyed steel pipe fitting produced in Mürzzuschlag. These two scenarios were used to calculate the variation in GWP-GHG in modules A1 – A3 as well as the variation in all core environmental indicators in modules A – C

Product variation A1 – A3		
Case	**GWP-GHG module A1 – A3 [kg CO_2eq]**	**Variation compared to weighted average**
Best case	3.00	-6.8 %
Worst case	4.38	+36.4 %
Weighted average	3.21	-

Core environmental indicator variation A-C		
Indicator	**Variation of best case compared to weighted average**	**Variation of worst case compared to weighted average**
GWP-total	-6.7%	36%
GWP-fossil	-6.7%	36%
GWP- biogenic	-30.3%	142%
GWP-luluc	-2.7%	13%
ODP	-17.0%	61%
AP	-7.5%	55%
EP-freshwater	-6.1%	79%
EP- marine	-8.0%	48%
EP-terrestrial	-6.7%	45%
POCP	-6.4%	40%
ADP-minerals&metals*	-19.7%	241%
ADP-fossil*	-7.8%	41%
WDP*	-9.1%	41%

ADDITIONAL ENVIRONMENTAL INFORMATION

Not applicable

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
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
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO_2 eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO_2 eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO_2 eq.)

GWP-luluc	Global Warming Potential from land use and land use change (kg CO_2 eq.)
GWP-total	Total Global Warming Potential (kg CO_2 eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO_2 eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H^+ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m^3)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m^3)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	

SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m^3	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO_2 eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO_2 eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

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VERSION HISTORY

Original Version of the EPD, 2025-12-10

EPD
INTERNATIONAL EPD SYSTEM
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