

Environmental Product Declaration (EPD)



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

**Water-painted, epoxy powder or polyester-coated pipes
with plain Victaulic grooved or threaded & coupled ends**

Manufactured by

**Amenduni Tubi Acciaio S.r.l. at the Zinchitalia S.p.A.
plant**



EPD of multiple products, based on the average results of the group of products.
It covers epoxy powder-coated and water-painted products

Programme:

The International EPD® System, www.environdec.com

Programme operator:

EPD International AB

Registration number:

EPD-IES-0004454

Release date:

2024-06-25

Valid until:

2029-06-25

Revision date:

2024-09-09

An Environmental Product Declaration must provide up-to-date information and it can be revised when conditions change. The declared validity is therefore subject to maintaining registration and publication at www.environdec.com



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General information

About the programme

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Responsibility for Product Category Rules (PCR), Life-Cycle Assessment (LCA) and 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 1.3.4

Review of the PCR conducted by the *technical committee of the International EPD® System*. Please log on to www.environdec.com for the list of members. Review chaired by Claudia A. Peña, Università di Concepción, Chile. The review team can be contacted via the Secretariat at www.environdec.com/contact.

Life Cycle Assessment (LCA)

LCA accountability: *Studio Fieschi & soci s.r.l., 18 C.so Vittorio Emanuele II, 10123 Turin, IT - www.studiofieschi.it*

Third-party verification

Independent third-party verification of declaration and data, according to ISO 14025:2006 via:

☒ EPD verification by an individual verifier.

Third-party verifier: *Guido Croce*.

Approved by: The International EPD® System

Data follow-up procedure during EPD validity involves a third-party verifier:

☐ Yes ☒ No

The company Amenduni Tubi Acciaio S.r.l. is the sole owner and is responsible for the EPD.

EPDs belonging to the same product category but registered under different EPD programmes, or which are not conforming to EN 15804, cannot be made comparable. In order 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 PCR versions; cover products with identical functions, technical performance and use (e.g. identical units declared/functional); have equivalent system boundaries and equivalent data descriptions; apply equivalent data quality requirements, data collection and equivalent allocation methods; apply identical *cut-off* rules and impact assessment methods (including the same version of characterisation factors); have equivalent and valid content statements at the time of comparison. For further information on comparability, please refer to EN 15804 and ISO 14025.

Product information

Product name: Water-painted, epoxy-powder or polyester-coated pipes, with smooth, Victualic grooved or screw-threaded/sleeved ends.

Company details

EPD owner:

Amenduni Tubi Acciaio S.r.l.

REGISTERED OFFICE

Corso Porta Nuova, 20 - 20121 Milan

VAT and tax ID number 06651880962

HEADQUARTERS

Via G. Mazzini 240/242

25020 Alfianello BS

www.amendunitubi.it

The product is manufactured at the Zinchitalia plant
210, Via Mazzini, 25020 Alfianello BS

Contact:

ata.srl@arubapec.it

Description of the organisation

Zinchitalia production plant is located in the province of Brescia, right at the centre of the Lombardy region. It is characterized by great production versatility.

Our product range includes galvanised, water-painted or epoxy powder-coated carbon steel welded pipes available with plain, grooved Victaulic or gas or API-threaded or coupled ends complying with EN 10255, EN 10219, EN 12899, API 5L, ASTM A 106, EN 10240 standards.

Our pipes are used in water/gas pipelines, greenhouses, fire-fighting systems, road signs, wells and/or sound tests, mechanical and hydraulic equipment, heat exchangers and much more besides. Our products are highly appreciated both in Italy and abroad, mostly in Europe.

Zinchitalia boasts TÜV ISO 9001:2015 system certification.

Product identification and description

Water-painted, epoxy-powder or polyester pipes for use in industrial constructions, fire-fighting systems, residential and industrial installations and methane supply systems.

The production process takes place in the following stages:

- ⇓ grooving, if required;
- ⇓ threading, if required (this can be done before or at the end of the entire painting process);
- ⇓ mechanical sandblasting by shot-blasting the raw tube;
- ⇓ application of paint (water-based, epoxy powder or polyester);
- ⇓ drying of the painted tube;
- ⇓ packaging in hexagonal bundles and strapping.

UN CPC Coding

41285 - Line pipe of a kind used for oil or gas pipelines, welded, of steel

41286 - Casing and tubing, of a kind used in the drilling for oil or gas, welded, of steel

41287 - Other tubes and pipes, of circular cross-section, welded, of steel

Geographical scope: European

LCA information

Declared unit: 1 tonne of packed painted steel tube, ready for shipment (average profile calculated as the arithmetic mean between the most and least impactful profile of the different configurations. Namely, the highest profile is given by the liquid paint product with the lowest paint-to-steel ratio; the lowest profile is given by the powder paint-coated product with the lowest paint-to-steel ratio)

Reference service life: NA

Time representativeness: all data on product composition, production and distribution refer to the year 2023. Secondary data are the most recent available at the time of the study and are representative for the period 2018-2023.

Database(s) and LCA software used: Ecoinvent v.3.9.1, SimaPro v.9.6.0.1

Mandatory environmental impact indicators method EN 15804+A2 based on EF 3.1 characterisation factors.

System boundaries

For the products subject to study, the boundaries defined as '*cradle-to-gate*' with modules C1-C4 and D are adopted, i.e. including modules A1-A3 + C + D.

Modules A4-A5 and modules B1-B7 are excluded.

System boundaries include:

- **A1**: production of raw materials and semi-finished steel products and other components required to manufacture the product (e.g. paints);
- **A2**: transport of raw materials (semi-finished products, purchase components) to the company's production site;
- **A3**: manufacture of products at the company's production site. Production and consumption of electricity used in production processes. Production and consumption of fossil fuels used for in-house product handling, disposal of waste (including packaging) produced by the factory. The processes covered by this module include:
 - grooving, if required;
 - threading, if required (this can be done before or at the end of the entire painting process);
 - mechanical sandblasting by shot-blasting the raw tube;
 - application of paint (water-based, epoxy powder or polyester);
 - drying of the painted tube;
 - packaging in hexagonal bundles and strapping;
- **C1**: dismantling and demolition process;
- **C2**: waste transfer to processing/disposal points;
- **C3**: waste processing prior to recovery/recycling;
- **C4**: final disposal.

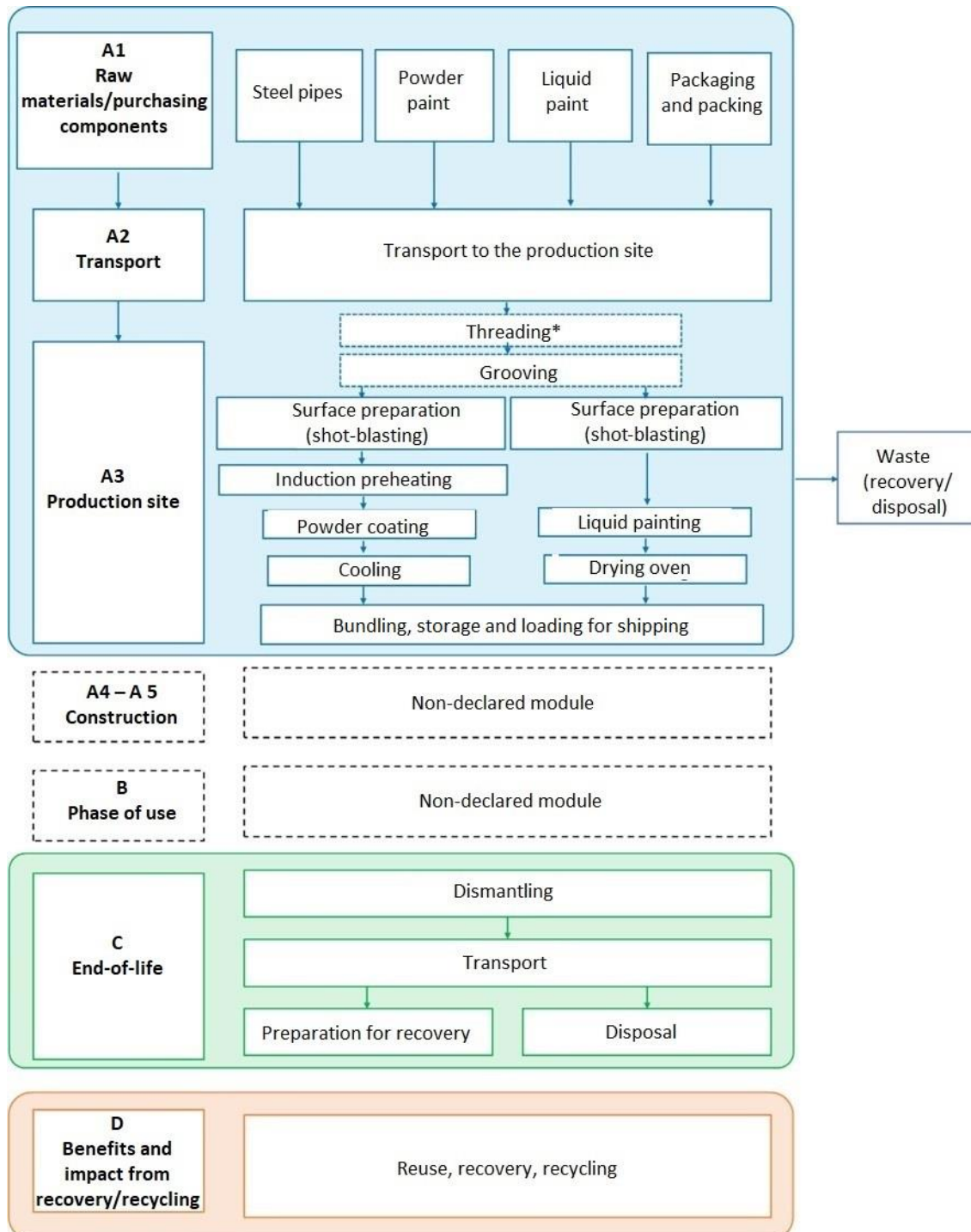
Module D: potential benefits and impact related to recovery-reuse-recycling of materials and energy throughout their life-cycle. In this module an assessment is made of the benefits and/or impact related to the potential recycling of end-life materials making up the products under study. The modelling of recovery-reuse-recycling benefits is carried out according to EN 15804:2012 + A2:2019 § 6.4.3.3 requirements.

The system boundaries do not include:

- A4-A5 relating to the distribution and installation of the product;
- Staff-related impact (e.g. commuting to and from work, electricity and water consumption in offices, etc.);
- Impact related to the production and transport of incoming semi-finished packaging materials;
- Input and output flows related to the implementation of end-of-life of capital goods and infrastructure¹, in accordance with PCR 2019:14 (§4.3.2) requirements.

¹ The exclusion of capital goods and infrastructure is limited to core processes (foreground processes, modelled directly in the study). Impact related to these processes could still be included in the background data (e.g. Ecoinvent data).

System boundaries



*Can also be performed at the end of the entire painting process

Additional information: modules C and D are tailored on the basis of product distribution volumes.

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	EU	EU	IT	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products ²	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-

² In a multi-product EPD, the difference (in %) between the declared GWP-GHG result and the product with the GWP-GHG results furthest from the declared results shall be reported in the EPD for modules A1-A3. Variations greater than 10% are allowed if supported in the LCA report and if the EPD states the variation in results for each impact indicator for which the variation is greater than 10%.

Cut-off rules

The cut-off rules in EN 15804:2012 + A2:2019 §6.3.6 and PCR 2019:14 §4.4 apply.

No contributions were voluntarily excluded from the study.

Allocation rules

In the case of multi-function situations, i.e. where there are systems producing multiple products, the allocation rules set out in PCR 2019:14 apply.

A mass allocation was made to the entire production (in terms of tonnes) for general plant consumption - electricity, fuels, auxiliary materials, water - that could not be attributed to specific product categories; company outputs - waste, emissions - were also allocated to the entire production of the reference year. Where it was possible to associate energy or material consumption quotas with a specific product, these were allocated entirely to the product itself.

Rules for materials recycling/recovery

In case of material flows that leave the system boundaries, the 'polluter pays' principle applies, according to which impact related to the production of recycling flows is charged to the system that produced them until they reach *end-of-waste* status (PCR 2019:14 §4.5.2). Downstream impact (e.g. impact of secondary raw material preparation processes) is charged to the system using secondary material.

Therefore, depending on the material's intended use, the following types of impact have been identified:

- Recycling: impacts of transport to and preparation for recycling;
- Landfilling: impact of transport to landfill and disposal thereof.

Consequently, recycled materials enter the system associated with the recycling impact but not of the recycling preparation stage.

As required by EN 15804 §6.3.5.2, waste leaving the system to reach *end-of-waste* state in the A1-A3 phase must be allocated as co-products. In this declaration and in accordance with PCR 2019:14 §4.5.1, a conservative approach is taken and no allocation of environmental flows to these co-products is applied, and they are allocated entirely to the main products.

Electricity mix

The electricity supplied by the grid during production was modelled using the supplier's billed data. The GWP-GHG of the electricity mix used by Alessio Tubi is 0.408 kg CO₂ eq./kWh.

Assumptions for end-of-life scenarios (modules C1-C4)

Module C1: the demolition process requires energy to operate the excavators and other machinery needed for the process. It is assumed that the energy source used for this purpose is diesel oil and the average energy consumption at this stage is 0.07 MJ/kg³.

Module C2: includes the transport of end-of-life materials to processing facilities for recovery or landfilling. For the transport of materials to processing facilities for recovery or to the landfill, an average distance of 50 km travelled by land is assumed. Transport has been modelled on the basis of the geographical reference area, assuming that it is done by means of a 16-32 tonne truck (Euro 6 standard).

Modules C3 - C4: includes all operations necessary to process the product until the end-of-waste state is reached.

The following considerations apply:

- The product is made of steel only; specific end-of-life scenarios separating between recycling and landfilling are applied for this material. No energy recovery is envisaged;
- The amount of material sent for recycling comes from the Product Environmental Footprint (PEF);
- The amount of material sent for disposal is taken from the PEF data on recycling; it is assumed that the same breakdown also applies to scenarios abroad.

³ JRC, 2018, Model for LCA of buildings.

Product content declaration

The content declaration refers to the averaged painted product.

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Carbon steel	994	1.41%	0.0%
Paint	6	0%	0.0%
Total	1000	1.40%	0.0%
Packaging materials	Weight, kg	Weight - % (on product)	Biogenic carbon weight, kg C/kg
Galvanized steel	1.07	0.11%	0.0
LDPE	0.03	0.003%	0.0
Total	1.09	0.11%	0.0

The minimum content of *total* (pre- and post-consumer) recycled material is 42%. It is calculated as the weighted average over the supply mix of semi-processed pipes. In particular, for the calculation of the environmental profiles of the above-mentioned products, reference is made to the supply from Alessio Tubi S.p.A. and Tecnotubi S.p.A.

In accordance with the CAM⁴ requirements, the table below details the recovered, recycled or by-product material content, calculated as above, subdivided into integral-cycle steel and EAF steel.

	Integral-cycle steel	EAF steel
Total content of recycled material (pre- and post-consumer)	13.1%	87.3%
Total content of recovered material	0%	0%
Total by-product content	0%	0%

The product declared does not contain substances listed in the Candidate List of Substances of Very High Concern (SVHC) for authorisation in a concentration $\geq 0.1\%$.

⁴ CAM – Italian acronym for *Minimum Environmental Criteria* as stated by the Ministry of Ecological Transition, 2022, Legislative Decree of 23 June 2022: 'Minimum Environmental Criteria' for awarding design services for construction works, their execution and the joint awarding of design and execution of construction works'. Criterion 2.5.4. Steel

Results of environmental performance indicators

Results per 1 tonne of average packed product

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

It is not recommended to use the results of modules A1-A3 without taking modules C1-C4 into account as well.

Mandatory impact indicators according to EN 15804

Results by unit declared							
Indicator	Unit of measurement	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	1.92E+03	6.54E+00	7.57E+00	1.52E+01	8.37E-01	-7.61E+02
GWP-biogenic	kg CO ₂ eq.	5.90E+00	4.30E-04	4.98E-04	1.32E+01	4.22E-03	1.39E-01
GWP-luluc	kg CO ₂ eq.	1.81E+00	2.67E-04	1.49E-04	7.90E-03	3.33E-04	-4.93E-02
GWP-total	kg CO ₂ eq.	1.93E+03	6.54E+00	7.57E+00	2.84E+01	8.42E-01	-7.61E+02
ODP	kg CFC 11 eq.	3.91E-05	1.03E-07	1.65E-07	1.05E-07	1.13E-08	-1.63E-05
AP	mol H ⁺ eq.	8.34E+00	6.26E-02	2.79E-02	3.85E-02	7.12E-03	-3.09E+00
EP-freshwater	kg P eq.	1.06E-01	5.59E-06	5.99E-06	4.74E-04	9.24E-06	-3.37E-02
EP-marine	kg N eq.	1.76E+00	2.94E-02	1.20E-02	2.85E-02	3.08E-03	-6.31E-01
EP-terrestrial	mol N eq.	1.95E+01	3.20E-01	1.28E-01	1.37E-01	3.35E-02	-7.28E+00
POCP	kg NMVOC eq.	9.37E+00	9.41E-02	4.29E-02	4.58E-02	9.97E-03	-3.97E+00
ADP-minerals&metals*	kg Sb eq.	1.40E-03	2.75E-07	2.62E-07	4.04E-07	3.19E-08	-7.33E-03
ADP-fossil*	MJ	2.17E+04	8.60E+01	1.01E+02	9.92E+01	1.08E+01	-6.78E+03
WDP*	m ³	5.67E+02	1.10E-01	9.29E-02	1.23E+00	3.60E-02	-4.52E+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 Impact Indicator should be used with caution as uncertainties about the results are high or experience in using the indicator is limited.

Additional impact indicators

Results by unit declared							
Indicator	Unit of measurement	A1-A3	C1	C2	C3	C4	D
GWP-GHG ⁵	kg CO ₂ eq.	1.93E+03	6.54E+00	7.57E+00	2.84E+01	8.42E-01	-7.61E+02

Resource use indicators

Results by unit declared							
Indicator	Unit of measurement	A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.92E+03	1.68E-01	2.67E-01	1.35E+01	2.64E-01	-4.82E+02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.92E+03	1.68E-01	2.67E-01	1.35E+01	2.64E-01	-4.82E+02
PENRE ⁶	MJ	2.17E+04	8.60E+01	1.01E+02	9.92E+01	1.08E+01	-6.78E+03
PENRM ⁶	MJ	2.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.17E+04	8.60E+01	1.01E+02	9.92E+01	1.08E+01	-6.78E+03
SM	kg	4.20E+02	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	1.44E+01	4.27E-03	4.24E-03	7.36E-02	1.49E-03	-1.23E+00
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						

⁵ This indicator takes into account all greenhouse gases, except the absorption and emission of biogenic carbon dioxide and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total, except for the fact that the CF for biogenic CO₂ is set to zero.

⁶ The primary energy contained in the packaging is not taken into account and is considered lost.

Waste production indicators

Results by unit declared							
Indicator	Unit of measurement	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed**	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*The Hazardous Waste Disposed and Non-Hazardous Waste Disposed indicators are set to 0 because all relevant waste treatment processes are included in the system boundaries.

**Radioactive waste is not considered relevant within the value chains included in the study.

Output indicators

Results by unit declared							
Indicator	Unit of measurement	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	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional social and economic indicators

The company has achieved gender equality management system certification in accordance with UNI/PdR 125.

Changes compared to previous versions

Revision 2024-09-09: the recycled material content has been expressed in such a way as to highlight the product's compliance with the Legislative Decree of 23 June 2022: 'Minimum Environmental Criteria' for awarding design services for construction works, their execution and the joint awarding of design and execution of construction works'. Criterion 2.5.4. Steel.

References

- EN 15804:2012 + A2:2019 + AC, Sustainability of construction works – Environmental Product Declaration – Core rules for the product category of construction products.
- International EPD System, General Programme Instructions, version 4.0
- International EPD System, PCR 2019:14 – Construction products – version 1.3.4.
- ISO 14025:2010 *Environmental labels and declarations - Type III environmental statements - Principles and reporting frameworks*.
- ISO 14040:2021 *Environmental management - Life cycle assessment - Principles and reporting framework*.
- ISO 14044:2021 *Environmental management - Life cycle assessment - Principles and requirements and guidelines*.
- Association of Issuing Bodies, European Residual Mixes 2021.
- Plastics Europe, Eco-profiles and Environmental Product Declarations of the European Plastics Manufacturers, April 2014, December 2016: update water balance.
- European Commission, 2021, *Recommendation 2021/2279 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations* Studio Fieschi & soci, 2022, *Carbon Footprint of copper-nickel surface treatment process*.
- International Copper Study Group, *The World Copper Factbook 2022*.
- International Zinc Association, 2022, *ZINC RECYCLING Stocks + Flows*.
- Gervasio, H., Dimova, S., 2018, *Model for Life Cycle Assessment (LCA) of buildings*, EC JRC technical reports.
- Eurostat waste database <https://ec.europa.eu/eurostat/web/waste/data/database>.
- What a waste database: <https://datacatalog.worldbank.org/search/dataset/0039597/What-a-Waste-Global-Database>.

English summary

Description of the organisation

Zinchitalia production plant is located in the province of Brescia, right at the centre of the Lombardy region. It is characterized by great production versatility.

Our product range includes galvanised, water-painted or epoxy powder-coated carbon steel welded pipes available with plain, grooved Victaulic or gas or API-threaded or coupled ends complying with EN 10255, EN 10219, EN 12899, API 5L, ASTM A 106, EN 10240 standards.

Our pipes are used in water/gas pipelines, greenhouses, fire-fighting systems, road signs, wells and/or sound tests, mechanical and hydraulic equipment, heat exchangers and much more besides. Our products are highly appreciated both in Italy and abroad, mostly in Europe.

Product name

Water-painted pipes, epoxy or polyester coated pipes with plain, Victaulic grooved or threaded & coupled ends.

Product identification and description

Water painted pipes, epoxy- or polyester-coated pipes with plain, Victaulic grooved or threaded & coupled ends to be used in constructions, fire-fighting, civil and industrial installations, methane gas distribution network.

The production process takes place in the following stages:

- ↓ grooving, if required;
- ↓ threading, if required (this can be done before or at the end of the entire painting process);
- ↓ mechanical sandblasting by shot-blasting the raw tube;
- ↓ application of paint (water-based, epoxy powder or polyester);
- ↓ drying of the painted tube;
- packaging in hexagonal bundles and strapping.

UN CPC Coding:

41285 - Line pipe of a kind used for oil or gas pipelines, welded, of steel.

41286 - Casing and tubing, of a kind used in the drilling for oil or gas, welded, of steel.

41287 - Other tubes and pipes, of circular cross-section, welded, of steel.

Geographical scope: Europe

LCA information

Declared unit: 1 tonne of packed painted steel tube, ready for shipment (average profile calculated as the arithmetic mean between the most and least impactful profile of the different configurations. In particular, the highest profile is given by the product painted with liquid paint with the lowest paint/steel ratio; the lowest profile is given by the product painted with powder paint with the lowest paint/steel ratio).

Reference service life: NA

Time representativeness: all data on product composition, production and distribution refer to the year 2023. Secondary data are the most recent available at the time of the study and are representative for the period 2018-2023.

Database(s) and LCA software used: Ecoinvent v.3.9.1, SimaPro v.9.6.0.1

Mandatory environmental impact indicators method EN 15804+A2 based on EF 3.1 characterisation factors.

System boundaries

Cradle-to-gate with modules C1–C4 and module D (A1–A3 + C + D).

Module A4-A5 and modules B1-B7 are excluded.

Cut-off rules

The cut-off rules in EN 15804:2012 + A2:2019 §6.3.6 and PCR 2019:14 §4.4 apply.

No contributions were voluntarily excluded from the study.

Allocation rules

The system under study produces only one product, so there is no multi-function situation.

A mass allocation was made to the entire production (in terms of tonnes) for general plant consumption - electricity, fuels, auxiliary materials, water - that could not be attributed to specific product categories; company outputs - waste, emissions - were also allocated to the entire production of the reference year. Where it was possible to associate energy or material consumption quotas with a specific product, these were allocated entirely to the product itself.

Electricity mix

The electricity supplied by the grid during production was modelled using the supplier's billed data.

The GWP-GHG of the electricity mix used by Alessio Tubi is 0.408 kg CO₂ eq./kWh.

Assumptions for end-of-life scenarios (modules C1-C4)

Module C1: the demolition process requires energy to operate the excavators and other machinery needed for the process. It is assumed that the energy source used for this purpose is diesel oil and the average energy consumption at this stage is 0.07 MJ/kg.

Module C2: includes the transport of end-of-life materials to processing facilities for recovery or landfilling. For the transport of materials to processing facilities for recovery or to the landfill, an average distance of 50 km travelled by land is assumed. Transport has been modelled on the basis of the geographical reference area, assuming that it is done by means of a 16-32 tonne (Euro 6 standard truck).

Modules C3 - C4: includes all operations necessary to process the product until the end-of-waste state is reached.

The following considerations apply:

- The product is made of steel only; specific end-of-life scenarios separating between recycling and landfilling are applied for this material. No energy recovery is envisaged;
- The amount of material sent for recycling comes from the Product Environmental Footprint (PEF);
- The amount of material sent for disposal is taken from the PEF data on recycling; it is assumed that the same breakdown also applies to scenarios abroad.

