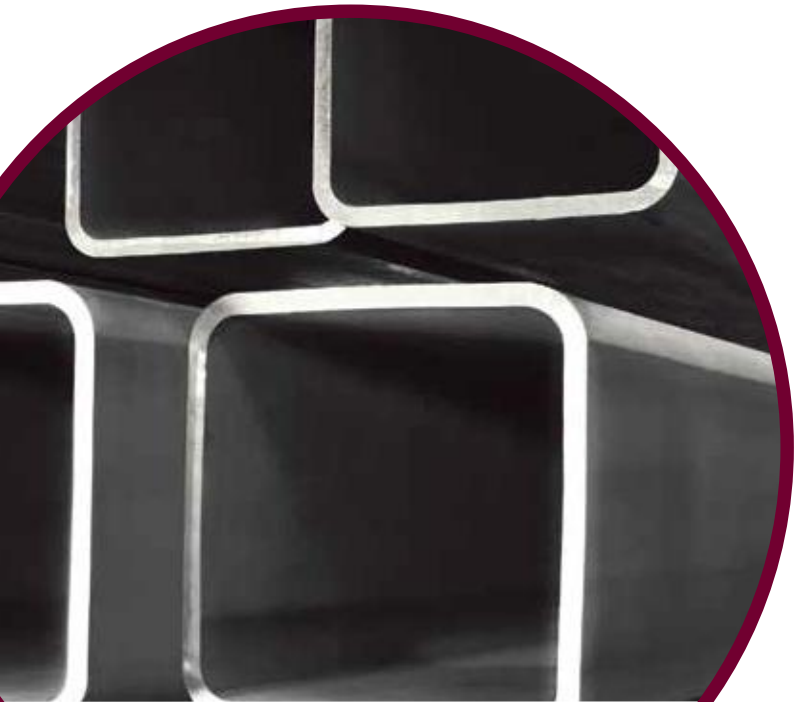
Programme	Programme operator	EPD registration No	Publication date	Revision date	Valid until
The International EPD® System, www.environdec.com	EPD International AB	S-P-06926	2022-09-23	2023-09-15	2027-09-22

Environmental Product Declaration

HFIW Hollow Sections

In accordance with ISO 14025 and EN 15804:2012+A2:2019

A note that an EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at http://www.environdec.com



CORINTH PIPEWORKS

Member of CENERGY HOLDINGS

EPD VERIFIED

EPD® THE INTERNATIONAL EPD® SYSTEM

Program related information

CPC Code:
4128 Tubes, pipes and hollow profiles, of steel

The CEN standard EN 15804
serves as the core Product Category Rules PCR 2019:14, version v.1.11 'Construction products'

PCR review was conducted by:
The Technical Committee of the International EPD System

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

☐ EPD process certification ☒ EPD verification

Procedure for follow-up during EPD validity involves third party verifier

☒ Yes ☐ No

EPD owner:

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The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.
For further information about comparability, see EN 15804 and ISO 14025.

Company Information

At a glance

Corinth Pipeworks is one of the leading manufacturers of steel pipes and hollow sections, worldwide, for the energy and construction sectors.

With a successful course and experience of over half a century, it has implemented very demanding projects with leading energy companies worldwide.

We are ready for the energy transition, we are committed to contributing positively to the energy transition and tackling climate change through new technological solutions that allow the increasing use of renewable sources in the energy mix, through the development of innovative products and reducing our carbon footprint. With over half a century of experience, Corinth Pipeworks has collaborated with major energy companies around the world, in extremely demanding projects.

The customer-centric philosophy of the Company has brought about strong, long-term and mutually beneficial relationships, strengthening its geographical presence. The plant is located in the Industrial Area of Thisvi in the Prefecture of Viotia, Greece and is considered to be one of the most modern steel pipe manufacturing mills, worldwide. For Corinth Pipeworks product quality assurance is a matter for all those involved in the process. It capitalizes the active participation of the management, the employees, the suppliers and even the customers and creates a sense of trust among shareholders. The company's Quality policy includes all those methods and practices that ensure product quality throughout the value chain from design to steel production, investment, storage and disposal. It also includes the collection and evaluation process of information on customer satisfaction in order to constantly improve the methods and practices that follow.

The Company manufactures one of the most complete product ranges in the world and offers complete solutions, which are based on investments in new technologies and the continuous improvement of its production processes.

EPD
ENVIRONMENTAL PRODUCT DECLARATION

CORINTH PIPEWORKS
Member of CENERGY HOLDINGS

Product Information

This is a specific EPD and covers bare HFIW hollow sections manufactured in Corinth Pipework's plant

CPW is serving the steel construction market with its extensive range of Structural Hollow I Sections in Square, Rectangular and Round shapes, used in Architectural, Industrial and Infrastructure applications.

Structural Tubes family of products pushes the envelope in steel construction by providing high-strength & fine grain steels according to EN10219, EN10225, API and ASTM standards, in a wide range of geometries and wall thickness in HFW, HSAW and LSAW production, suitable for very demanding highly-stressed steel structures such as:

- Road and Pedestrian Bridges
- Roofs, Hangars and various Superstructures widely used in airports, stadiums, shopping malls etc.
- Long-span and slender steel structures
- Cranes, booms and masts
- Earth-moving, agricultural & machinery equipment frameworks
- Road, railway-car and trailer frames
- Lighting and traffic-poles, road-sign frameworks
- Jacket foundations for offshore OG & wind power
- Offshore platform top-sides
- Jack-up rig frameworks
- Pile foundations

Composition

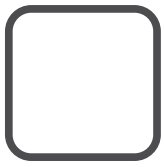
The product consists of 100% of steel plates and coils.
According to the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation, the product does not contain any substance included in the Candidate List of Substances of Very High Concern (SVHCs) for authorization with concentrations higher than 0.1% weight by weight (w/w).

Packaging

There are no packaging materials used in the final products.

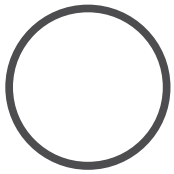
Product Information

Structural sections product-range starts from 50mm up to 500mm and 20mm WT in Square and Rectangular shapes and from 2” up to 100” in Round shapes. Additionally, our Structural tube QC processes , embodied in our production methods, include weld-seam heat treatment, on-line Ultrasonic inspection and superior tolerance control.



Square

50x50mm-500x500mm
max. WT: 20.0mm



Rounds

60.3mm-2,540mm(2”-100”)
max. WT: 39.7mm

Rectangular

60x40mm-600x400mm
max. WT: 20mm

EPD

CORINTH PIPEWORKS
Member of CENERGY HOLDINGS

LCA Information

Declared unit

1 metric ton of hollow sections.
A declared unit based on the mass of the products and not length or area is chosen, since it is the most common unit that clients of Corinth Pipeworks chose to make the orders for these products.

Goal and Scope

This EPD assesses the environmental impact of 1 ton of steel hollow sections from cradle to gate with modules C+D.

System Boundaries

Corinth Pipeworks S.A. manufacturing plant, which is placed in the Industrial Zone of Thisvi, Viotia Greece are system's boundaries. The exact geographical coordinates of the plant are 38.23463448912686, 22.954339833150314. System boundaries are set to be cradle to gate (A1-A3) with modules C+D.

Allocations

Allocation rules have been performed in accordance with the requirements of ISO 14044:2006. Wherever possible, allocation was avoided by dividing the unit process to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes. Where allocation cannot be avoided, the inputs and outputs of the system were partitioned between its different products or functions in a way that reflects the underlying physical or economic relationships between them. In this case, allocation based on the mass of final products manufactured in the plant is applied in diesel used for internal transportation, water, electricity and wastes generated through the manufacturing process, based on the mass of the final products.

Assumptions

Software used: **Software OpenLCA v.2.0.0 was used**

Scope: **Worldwide**

Time representativeness: **Data for year 2022 is used**

(2022 is the reference year, due to the need of updating the EPD, as there were significant changes in the results during the annual follow up procedure.)

Module A2:	a EURO 5 lorry 16-32 metric ton was utilized for road transportation and a bulk carrier for dry goods for sea transportation
Module C1:	the specific diesel consumption for a building demolition is considered as 0,239 MJ/ kg product of material according to JRC TECHNICAL REPORT "Model for Life Cycle Assessment (LCA) of buildings".
Module C2:	a conservative assumption of 100 km by lorry 16-32 metric ton was used.
Module C3 &C4:	For end-of-life stage, the most representative scenarios based on the characteristics of the final products and current bibliography are used. - According to "Seventh global LCI study for steel products" published in Worldsteel Association, an average of 85% of all steel is recycled at the end of a product's life. - 85% of final steel product is recycled and 15% of the final product is transported for final disposal (landfill).
Cut-off Rules:	The cut-off criteria adopted is as stated in "EN 15804:2012+A2:2019". Where there is insufficient data for a unit process, the cut-off criteria are 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass. The cut-off rules were applied for some wastes generated from steel treatment, since they contribute less than 1% by mass.

Data quality

ISO 14044 was applied in terms of data collection and quality requirements. The impact of the production of raw materials recovered from Ecoinvent database v 3.9.1. The data concerning the modules A2 (Transportation) and A3 (Product manufacturing) were provided by CPW and concerns the full year 2022.

These data were the quantities of all input and output materials extracted from the company's ERP system. Energy, water and fuels consumptions are extracted from company's energy KPI's for 2022 and invoices, while quantities of waste produced in the manufacturing process are obtained from electronic waste register. Regarding electricity mix, the latest (2022) national residual electricity mix as published in DAPEEP SA was utilized. Emission factors and net calorific values of fuels (diesel) were obtained from National Inventory Report (NIR) of 2022 for Greece. The end-of-life scenarios are based on the most representative scenarios for this product. Background data for this stage are retrieved from Ecoinvent v 3.9.1. There are no data gaps observed in the acquisition of data.

System Boundaries

The scope of the study is set to be Cradle-to-gate with modules C+D. The systems boundaries are strictly referred to the manufacturing plant of Thisvi and described in more detail below:

	X= Included, MND= Module Not Declared																
	Product stage			Construction stage		Use stage							End of life stage				Resource recovery stage
	Raw Materials Supply	**Transport**	**Manufacturing**	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	**De-construction and demolition**	**Transport**	**Waste processing for reuse, recovery and/or recycling**	**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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	GLO	GLO	GR										EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	Not relevant				-	-	-	-	-	-	-	-	-	-	-	-	-

Modules of analysis: X=Module declared, MND=Module Not Declared

System Boundaries

A1: Raw Material Supply

The production starts with the material supply. This stage includes the mining and processing of raw materials, the generation of electricity and fuels required for the manufacturing stage. Steel is the only raw material for the manufacturing of hollow sections since they are not coated, as other products of CPW, such as steel pipes.

A2: Transportation of raw materials to manufacturer

Transportation is relevant to delivery of raw materials from the supplier to the gate of manufacturing plant. Raw materials for the production are transported by trucks and vessels from different regions all over the world.

A3: Manufacturing

Manufacturing stage includes the production of bare hollow sections. This is accomplished through induction welding (with use of electricity) of steel coils that are raw materials.

C1: De-construction and demolition

This module includes the deconstruction and demolition of hollow sections. The necessary energy consumption was considered equal to 0,239 MJ/kg or 239 MJ/ton of product deconstructed, in accordance with the ''JRC Technical Report "Model for Life Cycle Assessment (LCA) of buildings".

C2: Transport to waste processing

Transportation of the discarded product either to the recycling site or to landfills for final disposal. A distance of 100 km by lorry 16-32 tonnes from construction/demolition sites to disposal sites has been chosen as a conservative assumption.

C3: Waste processing for reuse, recovery and/or recycling

This module includes waste processing of the product after its life cycle in order to be recycled and reused in another product system. End-of waste state of the product is reached when steel scrap is collected from the scrap yard by other manufacturers in order to be reused for another product system (steel industries). According to ''Seventh global LCI study for steel products'' published in Worldsteel Association, an average of 85% of all steel is recycled at the end of a product's life. It is assumed that there is no sorting or processing required for steel pipes, thus the environmental impact for this module is set to be zero.

C4: Disposal

This module includes the final disposal of the discarded product. As it is said above, 85% of final steel product is recycled and 15% of the final product is transported for final disposal (landfill).

D: Reuse-Recovery-Recycling-potential

Module D consists of avoided burdens related to the potential reuse and/or recycling of the product after its end-of-life stage.

Environmental Perfomance

Bare HFIW Hollow Sections

Environmental impacts

	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	2,50E+03	9,86E+01	5,37E+01	2,66E+03	2,43E+01	1,93E+01	0,00E+00	9,52E-01	-1,04E+03
GWP-fossil	kg CO2 eq	2,50E+03	9,85E+01	5,05E+01	2,65E+03	2,43E+01	1,93E+01	0,00E+00	9,51E-01	-1,04E+03
GWP-biogenic	kg CO2 eq	2,28E+00	3,13E-02	1,54E-01	2,46E+00	3,76E-03	6,83E-03	0,00E+00	4,54E-04	-1,37E+00
GWP-luluc	kg CO2 eq	1,28E+00	6,45E-02	6,17E-02	1,40E+00	2,68E-03	9,21E-03	0,00E+00	5,59E-04	-7,01E-01
GWP-GHG[1]	kg CO2 eq	2,39E+03	4,85E+01	5,26E+01	2,49E+03	2,36E+01	3,69E+00	0,00E+00	9,04E-01	-1,05E+03
ODP	kg CFC-11 eq	4,54E-05	1,85E-06	9,89E-07	4,82E-05	3,77E-07	4,10E-07	0,00E+00	2,64E-08	3,80E-05
AP	mol H+ eq	1,02E+01	1,18E+00	2,90E-01	1,17E+01	2,20E-01	6,14E-02	0,00E+00	6,87E-03	-4,27E+00
EP-freshwater	kg PO4-3 eq	3,54E+00	1,72E-02	2,14E-01	3,78E+00	2,23E-03	4,04E-03	0,00E+00	2,33E-04	-2,53E+00
EP-freshwater[2]	kg P eq	1,16E+00	5,60E-03	6,98E-02	1,23E+00	7,28E-04	1,32E-03	0,00E+00	7,59E-05	-8,24E-01
EP-marine	kg N eq	2,26E+00	2,92E-01	5,76E-02	2,60E+00	1,02E-01	2,11E-02	0,00E+00	2,64E-03	-1,01E+00
EP-terrestrial	mol N eq	2,40E+01	3,20E+00	4,76E-01	2,76E+01	1,11E+00	2,23E-01	0,00E+00	2,83E-02	-1,19E+01
POCP	kg NMVOC eq	1,15E+01	9,81E-01	1,62E-01	1,27E+01	3,28E-01	9,17E-02	0,00E+00	9,84E-03	-1,89E+00
ADPe	kg Sb eq	2,03E-02	2,33E-04	6,69E-05	2,06E-02	8,28E-06	6,04E-05	0,00E+00	1,27E-06	-1,50E-02
ADPf	MJ	2,58E+04	1,29E+03	8,32E+02	2,79E+04	3,11E+02	2,67E+02	0,00E+00	2,27E+01	2,52E+04
WDP[3]	m3 eq	9,56E+02	5,86E+00	2,01E+01	9,82E+02	8,06E-01	1,42E+00	0,00E+00	1,02E+00	-6,79E+02

Environmental impacts for 1 ton of bare HFIW hollow sections

(1) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).
(2) Eutrophication aquatic freshwater shall be given in both kg PO4 eq and kg P eq.
(3) The results of WDP,ADPe and ADPf shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Bare HFIW Hollow Sections

Resource Use

	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	2,68E+03	1,69E+01	1,23E+02	2,82E+03	1,77E+00	4,14E+00	0,00E+00	1,92E-01	-1,89E+03
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,68E+03	1,69E+01	1,23E+02	2,82E+03	1,77E+00	4,14E+00	0,00E+00	1,92E-01	-1,89E+03
PENRE	MJ	2,58E+04	1,29E+03	8,32E+02	2,79E+04	3,11E+02	2,67E+02	0,00E+00	2,27E+01	2,52E+04
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,58E+04	1,29E+03	8,32E+02	2,79E+04	3,11E+02	2,67E+02	0,00E+00	2,27E+01	2,52E+04
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	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	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,23E+01	1,36E-01	4,69E-01	2,29E+01	1,88E-02	3,32E-02	0,00E+00	2,37E-02	3,88E+01

Resource use for 1 ton of bare HFIW hollow sections

Output flows and waste categories

	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	2,00E-01	7,59E-03	1,68E-03	2,09E-01	2,09E-03	1,70E-03	0,00E+00	1,20E-04	1,46E-01
NHWD	kg	1,07E+03	4,23E+01	2,05E+00	1,12E+03	4,45E-01	1,30E+01	0,00E+00	1,50E+02	-7,84E+02
RWD	kg	2,73E-02	3,32E-04	2,96E-03	3,06E-02	3,40E-05	8,67E-05	0,00E+00	3,36E-06	-1,81E-02
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Output flows and waste categories for 1 ton of bare HFIW hollow sections

Additional Information

The EPD does not give information on release of dangerous substances to soil, water and indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not available.

List of abbreviations

LCA	Life Cycle assessment
EPD	Environmental Product Declaration
PCR	Product category rules
GLO	Global
RER	Europe
RoW	Rest of the world
GWP-total	Global Warming Potential total
GWP-fossil	Global Warming Potential fossil
GWP-biogenic	Global Warming Potential biogenic
GWP-luluc	Global Warming Potential land use and land use change
ODP	Ozone Depletion Potential
AP	Acidification Potential
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 photochemical oxidants
ADPe	Abiotic depletion potential for non-fossil resources
ADPf	Abiotic depletion potential for fossil resources

WDP	Water use
PERE	Use of renewable primary energy excluding 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 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 resources
SM	Use of secondary material
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water
HWD	Hazardous waste disposed
NHWD	Non-hazardous waste disposed
RWD	Radioactive waste disposed
CRU	Components for re-use
MFR	Materials for recycling
MER	Materials for energy recovery
EE	Exported Energy

Differences from previous versions

Date of revision 2023-09-15: EPD update due to significant changes to the results using the data of 2022 during the annual follow up procedure and using the new version (3.9.1) of Ecoinvent

References

- **General Programme Instructions**
  of the International EPD® System. Version 3.01, 2019-09-18
- **PCR 2019:14**
  v.1.11 Construction products. EPD® System. Date 2021-02-05. Valid until 2024-12-20
- **EN 15804:2012+A2:2019**
  Sustainability of construction works - Environmental Product Declarations – Core rules for the product category of construction products
- **ISO 14020:2000**
  Environmental labels and declarations – General principles
- **ISO 14025:2006**
  Environmental labels and declarations - Type III environmental declarations – Principles and procedures
- **ISO 14040:2006**
  Environmental management - Life cycle assessment-Principles and framework
- **ISO 14044:2006**
  Environmental management - Life cycle assessment - Requirements and guidelines
- **Ecoinvent / Ecoinvent Centre,** www.Eco-invent.org
- **Residual Energy Mix 2022**
  from Renewable Energy Sources Operator & Guarantees of Origin (DAPEEP SA)
- **TACKLING RECYCLING ASPECTS IN EN15804**
  Christian Leroy, Jean-Sebastien Thomas, Nick Avery, Jan Bollen, Ladji Tikana
- **Seventh global LCI study for steel product**
  Worldsteel Association
- **Model for Life Cycle Assessment (LCA) of buildings**
  European Commission, Joint Research Centre