Environmental Product Declaration

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

Lead Alloys of Brass

EPD of multiple products, based on the average results of the product group (see page 3)

Trafilerie Carlo Gnutti S.p.A.

Program:	The International EPD® System, www.environdec.com
Programme operator:	EPD Internazional AB
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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 www.environdec.com

About the program

EPD Program:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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Liability for PCR, LCA, and independent third-party verification
Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 - Construction products (EN 15804+A2) (1.3.4) CPC Code: 415 *""Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys".*
The PCR review was conducted by: *The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact*
Life Cycle Assessment (LCA)
LCA accountability: *Ollum S.r.l. – Via Fratelli Lumiere 19, 52100 (AR)*
Third-Party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, by: ☒ EPD verification by accredited certification body Third-party verification: SGS ICS Italia srl, Via Caldera 21, Milan, is an approved certification body responsible for third-party verification. The certification body is accredited by: Accredia with accreditation number – 0005VV
The procedure for data follow-up during the validity of the EPD involves the third-party verifier: ☐ Yes ☒ No

The owner of the EPD has sole ownership, responsibility, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programs may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on PCR or fully aligned versions of PCR; cover products with identical functions, technical performance and use (e.g. identical declared/functional units); have equivalent system boundaries and data descriptions; apply equivalent requirements on data quality, data collection methods and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have statements of equivalent content; and be valid at the time of comparison. For more information on comparability, see ISO 14025.

Company Information

EPD holder:

Trafilerie Carlo Gnutti S.p.A.

Via S. Bernardino, 23/A, 25032 Chiari BS

Contact:

gestione@gnuttichiari.it

Description of the organization:

Trafilerie Carlo Gnutti S.p.A., founded in 1947, has been operating for over 70 years in the field of drawing and extrusion of metal alloys. Located in Chiari (BS), the company has grown progressively both in terms of production capacity and technological innovation. Originally specialized in copper alloys, it later diversified its production to include semi-finished aluminum products.

Today, the production facility is equipped with advanced facilities, including powerful extrusion presses and modern foundries. Trafilerie Carlo Gnutti has also implemented systems for environmental protection, keeping up with the evolution of regulations. Currently, the company is engaged in expanding towards the production of semi-finished aluminum products, a project for which new skills and operational structures are planned.

This path testifies to the company's ability to renew itself and adapt to the needs of the market, while preserving the tradition and expertise acquired in the metalworking sector.

Product or management system certifications:

- **UNI EN ISO 14001:2015** for environmental management;
- **UNI EN ISO 45001:2018** for the protection of health and safety at work;
- **UNI EN ISO 9001:2015** for quality;
- **UNI CEI EN ISO 50001:2018** for energy efficiency.

Name and location of the production site:

Via S. Bernardino, 23/A, 25032 Chiari BS

Product information

Product Family Name:

Lead Alloys

Included product codes:

Lead Alloys

CW602N	CW603N	CW605N	CW606N	CW608N	CW610N	CW611N	CW612N
CW614N	CW616N	CW617N	CW625N	CW626N	CW720R	CW713R	-

Product Description:

Lead brass alloy is a type of brass characterized by the addition of lead to improve machinability and wear resistance. Due to these properties, it is particularly suitable for precision mechanical components, such as valves and taps, where ease of processing and durability are essential.

UN CPC Code:

415 *"Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys".*

Geographical scope: Global

LCA Information

Declared Unit:

1 kg of lead alloy

Reference Useful Life (RSL):

Not applicable

Time representativeness:

Year 2023

LCA databases and software used:

SimaPro v. 9.6.0.1.; Ecoinvent 3.9.1.

Objectives of the LCA study:

The objective of the LCA study was to analyze a family of brass alloys produced by Trafilerie Gnutti Chiari S.p.A., in particular the family of lead alloys, to understand their environmental impacts throughout their entire life cycle. The study aims to identify the main stages of the production process that influence the environmental performance of the alloy, from the initial melting of raw materials to the final processing into semi-finished products such as bars and wires.

System Boundaries:

Cradle to gate with options, modules C1–C4, and module D (A1–A3, C, D and additional modules (A4)).

- **A1, Raw Material Procurement:** This module considers the extraction and processing of all necessary raw materials, energy, and transportation that occur upstream of the production process under study. Since the input scrap contributes more than 10% to the GWP-GHG category in modules A1-A3, the related environmental impacts of the different types of scrap have been calculated and reported below as well as their contribute in percentage:
  - **Post-consumer (19%):** 1,00 E+01 kg CO_2-eq/ton
  - **Pre-consumer - waste (55%):** 4,97 E+01 kg CO_2-eq/ton
  - **Pre-consumer - by-product (10%):** 5,21 E+01 kg CO_2-eq/ton
- **A2, Transport to the manufacturer:** This module includes the transport of raw materials to the production site.
- **A3, Production:** this module includes all the primary and auxiliary resources used during the production of the lead brass alloys of Trafilerie Carlo Gnutti S.p.A., as well as the waste generated. For the production of electricity used in the process, the Italian residual mix was adopted, which represents the combination of energy sources actually used in the national electricity system, net of certified renewable energy. The Global Warming Potential Indicator (GWP - GHG) associated with electricity was calculated using the GWP-GHG emission factor, equal to 0,631 kg CO_2-eq for each kilowatt-hour (kWh) of electricity produced.
- **A4, Transportation:** transportation from the production site to the place of use is included.
- **A5, Installation:** This step is not stated.
- **B1-B7 Use phase:** This phase is not declared.
- **C1 Deconstruction/Demolition:** This module includes deconstruction and/or demolition, which is not relevant as the product is presumably dismantled manually by an operator.

- **C2 Transport:** this module represents the transport distance to the waste treatment plant.
- **C3 Waste Treatment:** This module includes any necessary waste treatment.
- **C4 Final disposal:** This form includes any material destined for landfill.
- **D Benefits and loads outside the system boundaries:** this module includes emission credits obtained from any energy recovery and/or recycling of materials.

Phases A5 (Construction and Installation) and B1-B7 (Use) are excluded from the study because, since it is a static product for the construction sector, no significant environmental impacts are expected either during installation, in the absence of material losses or significant energy consumption, or during use, which does not require maintenance or operational resources. The incidence of proxy data is less than 10% within this study.

	Product stage			Construction stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Rapair	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	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	IT	GLO	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Share of specific data	64,7%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	0%[1]			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 Declared modules, geographical scope, share of specific data, and variation in products and sites

Cut-offs and exclusions:

In the present study, a cut-off rule of 5% was applied, including at least 95% of the significant data, but excluding the impacts related to the transformation of electricity from low voltage, generated by the photovoltaic system, to medium voltage from the use of inverters and transformers. Certain unitary processes, aspects related to downstream processes, infrastructure, capital goods, construction, maintenance and disposal of service facilities, as well as business travel, employee travel and research and development activities, as required by the PCR, have also been excluded.

Allocation:

Data allocation for raw materials, transportation, manufacturing waste, consumables, and other carriers was made on a per unit of mass. For post-industrial and post-consumer waste, a mass-based criterion was adopted, preferred to the economic allocation suggested by PCR due to fluctuations in the price of brass.

[1] The study covered multi brass alloy products with different sizes, however, the impact was assessed per kilogram of product, as the production process is identical for all brass alloy product, and the variation is 0%.

Content Declaration

Lead Alloys Family

Material types	Weight, kg	Post-consumer material, weight%	Biogenic material, weight-% and kg C/kg
Brass	**1,00**	**19,1%**	**0,0 % - 0 kg C/kg**

Table 2 Type of material contained in the products and relative percentage

Alloys containing metallic lead in a concentration greater than 0.1% - Disclosure as per Regulation (EC) No. 1907/2006 (REACH) - Substances of Very High Concern for Authorisation (https://echa.europa.eu/it/candidate-list-table).

Additional environmental information

In addition to the raw material and post-consumer material, the family of lead alloys includes, also scraps delivered to the company as waste and by-product, accounting for **7,9%** and **70,5%**, respectively.

Environmental performance

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.

***Core environmental impact indicators*[2]**	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential - total	GWP-Total	kg CO2 eq.	2,77E+00	4,34E-01	0,00E+00	1,89E-02	0,00E+00	2,37E-05	-1,01E+00
Global warming potential - fossil fuels	GWP-Fossil	kg CO2 eq.	2,71E+00	4,34E-01	0,00E+00	1,89E-02	0,00E+00	2,37E-05	-1,02E+00
Global warming potential - biogenic	GWP-Biogenic	kg CO2 eq.	5,11E-02	1,44E-04	0,00E+00	1,60E-05	0,00E+00	1,36E-08	1,76E-02
Global warming potential - land use and land use change	GWP-Luluc	kg CO2 eq.	2,34E-03	2,22E-04	0,00E+00	9,22E-06	0,00E+00	1,43E-08	-1,52E-03
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11 eq.	5,55E-08	6,89E-09	0,00E+00	3,98E-10	0,00E+00	6,86E-13	-1,06E-08
Acidification potential, accumulated exceedance	AP	mol H+ eq.	5,97E-02	2,43E-03	0,00E+00	6,20E-05	0,00E+00	1,79E-07	-2,55E-02
Eutrophication potential - freshwater	EP - freshwater	kg P eq.	3,48E-04	3,86E-06	0,00E+00	1,54E-07	0,00E+00	2,31E-10	-9,30E-04
Eutrophication potential - marine	EP - marine	kg N eq.	4,38E-03	7,21E-04	0,00E+00	2,10E-05	0,00E+00	6,82E-08	-7,02E-03
Eutrophication potential - terrestrial	EP-terrestrial	mol N eq.	5,99E-02	7,82E-03	0,00E+00	2,24E-04	0,00E+00	7,35E-07	-1,07E-01
Photochemical ozone creation potential	POCP	kg NMVOC eq.	1,80E-02	2,79E-03	0,00E+00	9,17E-05	0,00E+00	2,56E-07	-2,11E-02
Abiotic depletion potential - non-fossil resources[3]	ADPE	kg Sb eq.	7,68E-04	1,11E-06	0,00E+00	6,05E-08	0,00E+00	3,29E-11	-3,29E-04
Abiotic depletion potential - fossil resources[3]	ADPF	MJ, net calorific value	3,86E+01	6,24E+00	0,00E+00	2,67E-01	0,00E+00	5,91E-04	-1,16E+01
Water (user) deprivation potential[3]	WDP	M3 World EQ. deprived	1,50E+00	3,06E-02	0,00E+00	1,10E-03	0,00E+00	2,61E-05	-2,20E-01
Additional mandatory environmental impact indicators	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP-GHG)[4]	GWP-GHG	kg CO2 eq.	2,63E+00	4,32E-01	0,00E+00	1,88E-02	0,00E+00	2,36E-05	-9,66E-01
Additional voluntary environmental impact indicators	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter emissions	PM	Disease incidence	1,74E-07	4,12E-08	0,00E+00	1,50E-09	0,00E+00	3,91E-12	-2,18E-07
Ionizing radiation, human health[5]	IRP	kBq U235 eq.	9,97E-02	2,31E-03	0,00E+00	1,30E-04	0,00E+00	1,56E-07	-2,81E-02

[2] JRC characterization factors (EF3.1) were used.

[3] The results of this environmental impact indicator should be used with caution as uncertainties about these results are high or as experience with the indicator is limited.

[4] The indicator includes all greenhouse gases included in the total GWP, but excludes the absorption and emissions of biogenic carbon dioxide and biogenic carbon stored in the product. This indicator is therefore almost the same as the GWP indicator originally defined in EN 15804:2012+A2:2019/AC:2021.

[5] This impact category mainly concerns the possible impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not take into account the effects of possible nuclear accidents, occupational exposure or the disposal of radioactive waste in underground installations. Potential ionizing radiation from the ground, radon, and some building materials is also not measured by this indicator.

Eco-toxicity - freshwater[3]	ETP-fw	CTUe	1,04E+02	3,33E+00	0,00E+00	1,34E-01	0,00E+00	7,04E-05	-1,98E+02
Human toxicity, cancer effect[3]	HTP-c	CTUh	9,15E-09	1,88E-10	0,00E+00	8,56E-12	0,00E+00	1,01E-14	-2,14E-09
Human toxicity, non-cancer effects[3]	HTP-nc	CTUh	7,12E-07	4,37E-09	0,00E+00	1,89E-10	0,00E+00	1,26E-13	-4,91E-08
Land use related impacts/Soil quality[3]	SQP	dimensionless	2,52E+01	5,94E+00	0,00E+00	1,59E-01	0,00E+00	1,17E-03	-1,92E+01
Indicators describing resource use[6]	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy as energy carrier	PERE	MJ, net calorific value	4,43E+00	7,74E-02	0,00E+00	4,08E-03	0,00E+00	5,05E-06	-4,79E+00
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy	PERT	MJ, net calorific value	4,43E+00	7,74E-02	0,00E+00	4,08E-03	0,00E+00	5,05E-06	-4,79E+00
Use of non-renewable primary energy as energy carrier	PENRE	MJ, net calorific value	3,86E+01	6,24E+00	0,00E+00	2,67E-01	0,00E+00	5,91E-04	-1,16E+01
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resource	PENRT	MJ, net calorific value	3,86E+01	6,24E+00	0,00E+00	2,67E-01	0,00E+00	5,91E-04	-1,16E+01
Use of secondary material	SM	Kg	2,95E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	RSF	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	FW	m3	3,98E-02	9,48E-04	0,00E+00	3,80E-05	0,00E+00	6,27E-07	-1,13E-02
Environmental information describing waste categories	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	HWD	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	NHWD	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed	RWD	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Environmental information describing output flows	**Abbreviation**	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	CRU	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	MFR	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,94E-01	0,00E+00	0,00E+00
Materials for energy recovery	MER	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy	EEE	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy	EET	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

The results of phases A1-A3 (from "cradle to gate") should not be used in isolation for comparisons or purchasing decisions. It is recommended to consider the entire life cycle of the product for a complete assessment of environmental impacts.

[6] In particular, option B was adopted in this study, which considers the energy used as a feedstock as an input into the module in which it enters the product system (module A1) and as an output from the product system if it is transferred as useful energy (module C3).

References

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2. EN 15804:2021, Sustainability of Buildings - Environmental Product Declarations - Framework Development Rules by Product Category
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