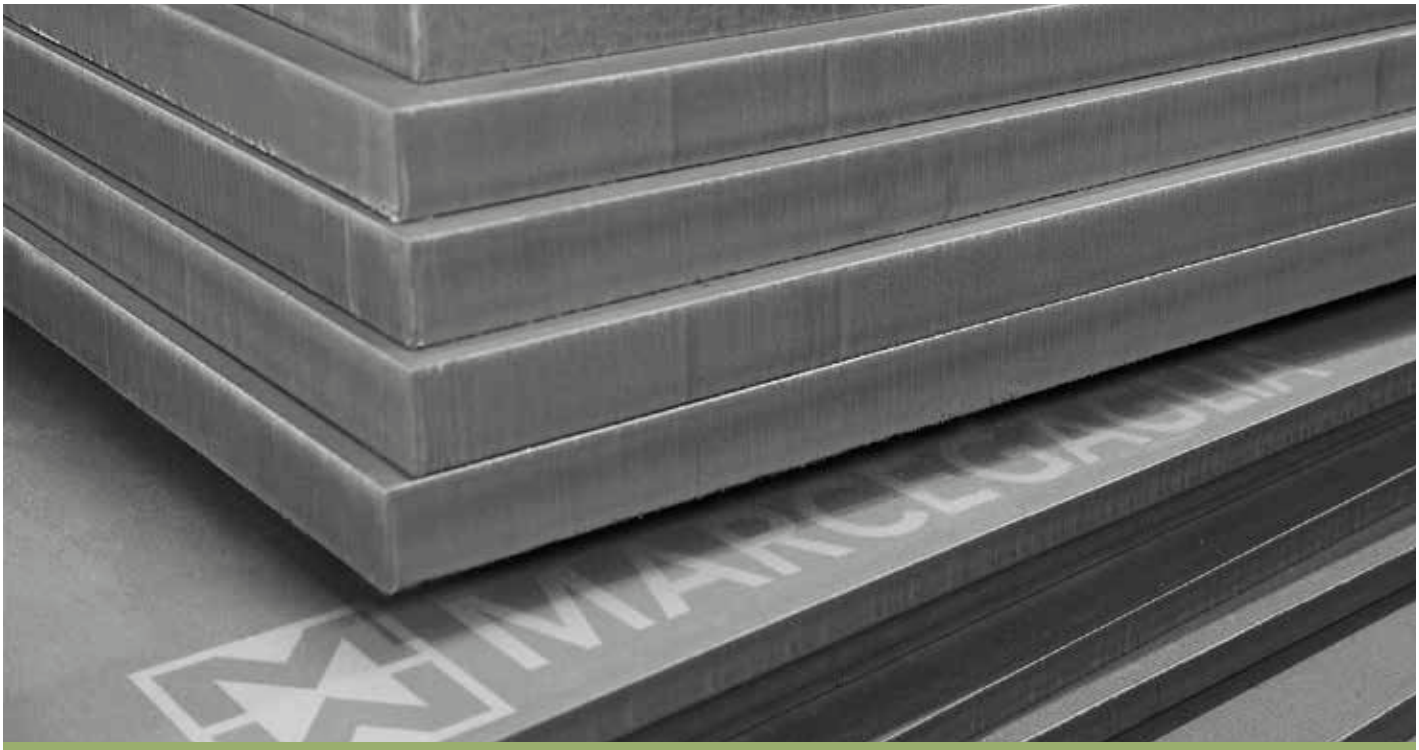


ENVIRONMENTAL PRODUCT DECLARATION

EN

Programme:
The International EPD® System
www.environdec.com

Programme operator:
EPD International AB

EPD registration number:
S-P-07882

Publication date:
23-12-2022

Valid until:
23-12-2027

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

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

HOT ROLLED STEEL PLATE

From:

Marcegaglia Palini e Bertoli S.p.A.

MARCEGAGLIA
PALINI E BERTOLI

ECO PLATFORM EPD VERIFIED

EPD®

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:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR):
Construction products, 2019:14, version 1.11, UN CPC 4123, *valid until 31-03-2023*

PCR review was conducted by:
The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña
Contact via the Secretariat www.environdec.com/contact

Independent third-party verification of the declaration and data, according to ISO 14025:2010, via:

☒ EPD verification by individual verifier

Third-party verifier:
Guido Croce

Approved by:
International EPD® System Technical Committee, supported by the Secretariat

Procedure for follow-up of data during EPD validity involves third party verifier:
☒ Si ☐ No

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 UNI EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

COMPANY INFORMATION

Owner of the EPD:
Marcegaglia Palini e Bertoli S.p.A.
lamieretreno@marcegaglia.com

Contact:
To obtain more information about this product declaration and / or its configurations, the following references are available:

Mail: info@marcegaglia.com

Tel.: +39 0376 6851

Description of the organisation:
The Marcegaglia Palini e Bertoli S.p.A company, located in San Giorgio di Nogaro, operates in the hot rolling sector and produces heavy plates using two rolling mills (duo rolling mill and quarto rolling mill). The production process is powered by a single raw material, a semi-finished steel product called slab which, thanks to integrated logistics, first arrives by ship or train and is then transported by truck or train to the factory.

Thanks to the versatility of the various production lines present, it is possible to obtain a multiple range of products, also upon customer request, by means of subsequent processing of the train plate. Products can be made with different dimensions, thermal resistance or surface finish.

Product-related or management system-related certifications:

- Quality management system compliant with the requirements of the standard UNI EN ISO 9001:2015 (certificate n° 1438/98/S – valid until 13/10/2025);
- Environmental management system compliant with the requirements of the standard UNI EN ISO 14001:2015 (certificate n° 262/S – valid until 25/07/2025);
- Health and safety management system compliant with the requirements of the standard UNI ISO 45001:2018 (certificate n° OHS-260 – valid until 25/09/2025);
- Energy management system compliant with the requirements of the standard UNI CEI EN ISO 50001:2018 (certificate n° EnergyMS-299 – valid until 14/10/2024);
- Social responsibility management system compliant with the requirements of the standard SA 8000:2014 (certificate n° SA-2040 – valid until 07/04/2025).

Name and location of production site(s):

- Plant located in Enrico Fermi street, 28 - San Giorgio di Nogaro (UD).

PRODUCT INFORMATION

Product name:
Hot rolled steel plate

Product identification:
Hot rolled steel plate

Product description:
The production cycle begins with the arrival of the slabs (raw material) at the company. The raw material is delivered to the rolling mill after undergoing an initial oxy-cutting process (slab cuts). The loading phase of the slabs consists in feeding the reheating furnaces. These furnaces are single or double row with vaulted burners (the temperature inside the oven reaches a heat of around 1250°C); the slabs travel the route to reach the optimum temperature for lamination. At the exit of the furnaces, descaling is carried out in order to remove the scale formed by oxidation during the heating of the iron and steel product.

Subsequently, the slab is subjected to rolling by making it make a series of passages between a pair of cylinders, until the moment in which the desired thickness is obtained, then the sheet is transferred through the roller conveyor for cutting to size.

Different reworkings can then be applied: trimming, milling, shot blasting with flattening, normalization heat treatment.

From the company website it is possible to consult the product catalogs within which the technical characteristics of the same are described in detail.

UN CPC CODE:
UN CPC 4123 Flat-rolled products of steel, further worked than hot -rolled or cold-rolled.

Geographical scope:
Worldwide

LCA INFORMATION

Functional unit:
The functional unit of the system considered is 1 tonne of product.

Reference service life - RSL:
For the products under study it is not possible to quantify the exact useful life as much also depends on their future use. However, it is emphasized that even when the deadline is reached, the product can be recycled and reused again to generate other raw materials.

Time representativeness:
The data used are representative of the year 2021.

Database(s) and LCA software used:
Ecoinvent database v.3.8, November 2021 / Software used SimaPro rel. 9.3.0.3.

Description of the system boundaries:
The study is “Cradle to gate with modules C1 – C4 and module D (A1 – A3 + C + D)” (reference: PCR 2019: 14 vers. 1.11 valid until 31-03-2023).

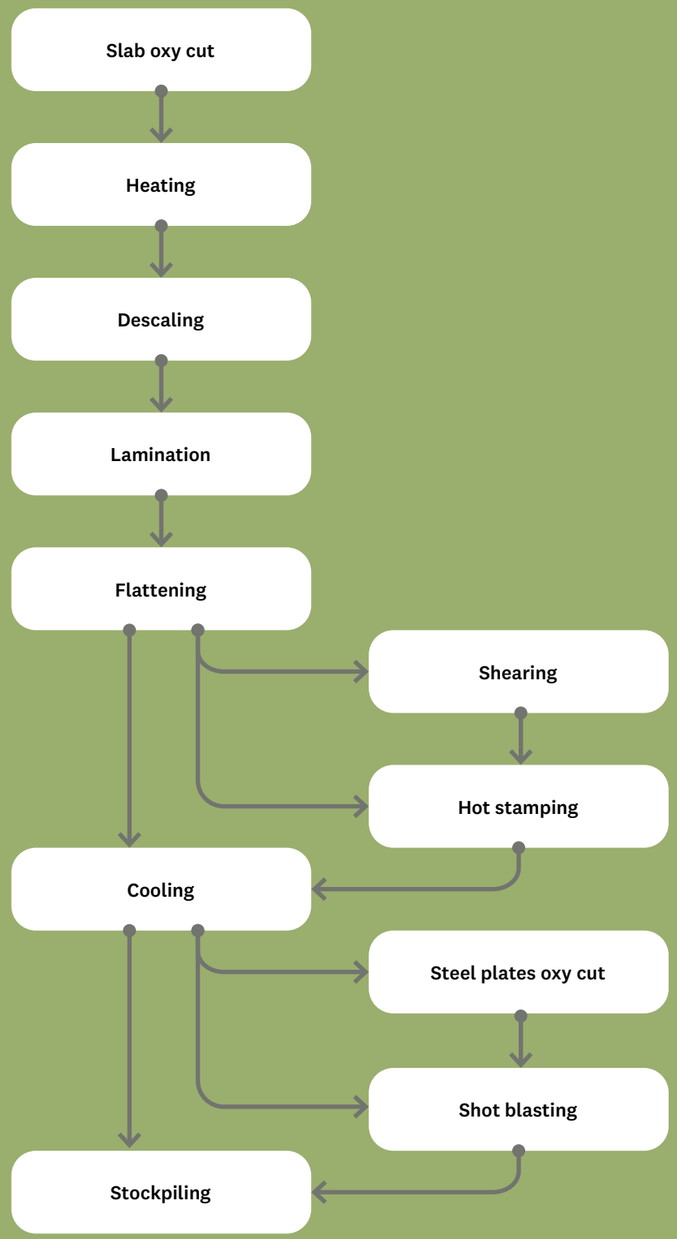
Modules A1-A3 include material procurement processes (raw and auxiliary materials) as well as manufacturing processes.

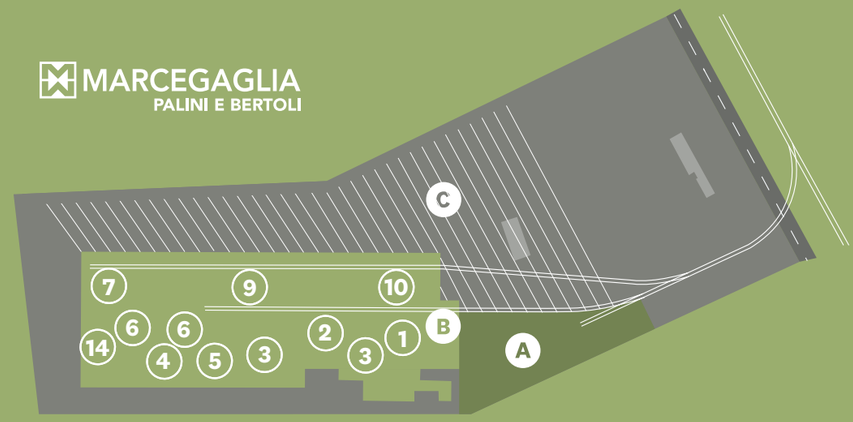
Modules C1-C4 consider the uninstallation, transport, sorting and disposal of components deriving from the end-of-life operations of road barriers. These operations are not directly controllable by the company: in this regard, literature data relating to the construction sector are therefore used. It is considered:

- an average consumption of diesel fuel equivalent to 239 MJ as well as 28 kWh of electricity for each ton of demolished material;
- an average distance of 80 km to transport the material to the recovery center;
- the same energy consumption already mentioned for the demolition activity also for the waste treatment activity.

Module D considers the recovery and recycling potential of steel deriving from end-of-life processes: the calculation of the environmental benefits deriving from the recovery of steel is based on the indications provided by the document “Product Category Rules for Type III environmental product declaration of construction products to EN 15804: 2012 - Par. 6.3.4.6. Benefits and loads beyond the product system boundary, information Module D “.

BLOCK DIAGRAM OF THE SHEET METAL PRODUCTION PROCESS





- A Reception and vehicle check zone
- B Covered area
- C Raw material inventory area
- 1 Slab oxy cut
- 2 Slab pre-heating furnace
- 3 Rolling mill
- 4 Shearer
- 5 Hot leveller
- 6 Cooling area
- 7 Plasma cut
- 8 Normalizing furnace
- 9 Indoor inventory area
- 10 Shot blasting
- 11 Service center
- 12 Mechanical trimmer
- 13 Flattening machine
- 14 Plate butting

Other informations:

DESCRIPTION OF THE MAIN ACTIVITIES

The Marcegaglia Palini e Bertoli rolling process begins with the marking of the slabs (for full product traceability) and continues with their cutting and preheating. The rolling mill processes about 400.000 tons/year of heavy plates which partly supply the service centre, and in part they are subjected to the normalization process.

The production cycle begins with the arrival at the company of the steel slabs transported by road and delivered to the factory. The raw materials consist of:

- Slabs arriving from third party companies

In detail, the processing cycle takes place through the phases described below:

Slab cutting
The raw material arrives at the rolling mill after undergoing an initial oxy-cutting process (slab cuts). The slabs, in order to obtain dimensions compatible with the subsequent rolling phase, are transferred from the storage area to the cutting line. Oxy-cutting takes place via two cutting benches, the first (main) equipped with 3 portals while the second equipped with two portals and acts as a back-up, powered by oxygen and methane.

Heating furnace
The loading phase of the slabs consists in feeding the reheating furnaces by means of a bridge crane equipped with an electromagnet. In the factory there are 3 “push” type reheating furnaces shown below:

- Furnace 1 ‘green’: Year of activation 1991,
- Furnace 2 ‘red’: Year of activation 1992,
- Furnace 3 ‘yellow’: Year of activation 1998, not active until November 2021.

The slabs positioned on the loading surface of the furnace are moved by special pushers which insert them into the furnaces so that in correspondence with a slab leaving the furnace, there is one entering.

The temperature inside the furnace reaches a value of about 1250°C. Once the rolling temperature is reached, the material is extracted through a chute. After a short run, the slabs are intercepted by a slab lander which stops them and deposits them on the transfer roller path for transport to the rolling area.

At the exit of the furnace, a chute conveys the slabs onto the roller conveyor of the rolling mill; from the pulpit, positioned above the rolling mill, the operators start the cycle which initially involves descaling in order to remove the scale formed by oxidation during the heating of the iron and steel product. This process is performed by spraying a high pressure jet of water on the surface of the slab itself, causing the detachment of the surface layer of incandescent material.

Quarto rolling mill
After descaling, the semi-finished product passes to the “Quarter” rolling stand, consisting of four superimposed cylinders, of which two central ones (with a diameter of 750 mm) have the function of rolling and the external ones absorb the bending due to the internal efforts of the first two. The rolling process takes place by lowering the slab thickness several times and is managed by the factory automation system, regulated by the reset rolling tables generated by the system itself.

Duo rolling mill
In support of the main “Quarto” rolling mill there is a “Duo” rolling mill which allows the quantity of rolled material to be increased but once the rolling is finished, the material must be repositioned downstream of the Quarto rolling stand for subsequent processing.

Cutting and flattening
Subsequently, the laminate passes through the leveler with 9 rollers, which gives the laminate the flatness characteristics necessary for the finished product. At the end of the process, the material can be transported to the next shearing phase or directly to the cooling plate.

At the end of the flattening, the laminate can pass to the in-line cutting phase using the guillotine cutter, used to cut low-thickness laminate products (less than 50 mm), according to the lengths requested by the customer in the order.

Discharging
The material, downstream of the rolling and/or shearing processes, is transferred to the cooling plate and then transported to the quality control area through magnets hooked to the bridge crane. Subsequently they can be transferred to the subsequent oxy-cutting and shot blasting phases or directly to the final storage.

Oxy-cutting
Plates thicker than 50 mm, which have not been butted directly in line using the shear, can be transported to the oxy-cutting table for butting operations upon customer request.

The oxyfuel system consists of a suction table on which the plates are placed. This table is sectioned into modules, each of which is equipped with lateral suction channels; above the table a cutting portal is installed equipped with a trolley and equipped with 3 oxyfuel torches and 2 plasma torches.

Shot blasting
At the customer’s request, the plates can be treated with the shot blasting machine, whose function is to remove any residual oxide from the surface of the laminate. The shot blasting machine is a tunnel machine, which throws steel particles (called ‘grit’) against the surface of the laminate, generating a surface cleaning treatment, much deeper than simple descaling.

Normalization
Normalization is a heat treatment which consists in heating the pieces coming from the rolling plant to a certain temperature in order to obtain a chemical, structural and mechanical balance of the material. The loading phase takes place via a roller way. Inside the heating chamber, the plates undergo heating that varies from about 800°C to about 950°C depending on the type of steel treated. Once out of the furnace, the plates are then cooled to room temperature.

Raw material storage and shipping
The finished products are then stored in special areas, concluding with the handling of the products that leave the factory, it is reported that the most used means of transport is represented by vehicles that leave daily, which reach the final destination or transport the product up to the nearby logistic point for subsequent transport by train or ship.

ALLOCATION RULES

An allocation was made on a mass basis for energy consumption, water discharges, atmospheric emissions and waste.

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

	A1-A3 Product stage			A4-A5 Construction process stage		B1-B7 Use stage							C1-C4 End of life stage				D Benefits and loads beyond the system boundary
	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	GLO	GLO	IT	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	IT
Specific data	> 90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variations-product	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variaition-site	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = Module considered
ND = Module not declared
GLO = Global
IT = Italy

Additional information

The materials used for the packaging of the final products consist of plastic and / or metal straps, wooden saddles and polyester bands. The quantities of these packaging compared to one ton of final product identify a value of less than 1%.

The products do not contain hazardous substances from the SVHC Candidate List for Authorization in quantities greater than 0,1%.

Environmental information

The environmental performance indicators refer to 1 tonne of tube product.

POTENTIALL ENVIRONMENTAL IMPACTS

Impact category	Abb.	Unit
Climate change - total	GWP - t	kg CO_2 eq
Ozone depletion	ODP	kg CFC11 eq
Climate change - Fossil	GWP - fossil	kg CO_2 eq
Climate change - Biogenic	GWP - biogenic	kg CO_2 eq
Climate change - Land use and LU change	GWP - luluc	kg CO_2 eq
Climate change – Greenhouse Gases	GWP - GHG	kg CO_2 eq
Photochemical ozone formation	POCP	kg NMVOC eq
Acidification of land and water	AP	mol H+ eq
Eutrophication	EP - freshwater	kg P eq
	EP - marine	kg N eq
	EP - terrestrial	mol N eq
Water use	WDP	m^3 depriv.
Resource use, fossils	ADP - F	MJ
Resource use, minerals and metals	ADP - MM	kg Sb eq

RESOURCE USE

Impact category	Abb.	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Use of net fresh water	FW	m^3

WASTE PRODUCTION

Impact category	Abb.	Unit
Hazardous waste disposed	HW	kg
Non-hazardous waste disposed	NHW	kg
Radioactive waste disposed	RW	kg

OUTPUT FLOWS

Impact category	Abb.	Unit
Reuse	REUSE	kg
Materials for recycling	RECYCLE	kg
Materials for energy recovery	EN - REC	kg
Exported energy-electricity	EE - E	MJ
Exported energy-thermal energy	EE - T	MJ

HEAVY PLATE

Abb.	U.d.m.	A1-A3	C1+C4	D
GWP - t	kg CO_2 eq	2,218E+03	4,297E+01	-9,014E+02
GWP - fossil	kg CO_2 eq	2,216E+03	4,295E+01	-8,988E+02
GWP - biogenic	kg CO_2 eq	4,967E-01	1,168E-02	-1,665E+00
GWP - luluc	kg CO_2 eq	1,159E+00	6,276E-03	-7,071E-01
GWP - GHG	kg CO_2 eq	2,138E+03	4,245E+01	-8,683E+02
ODP	kg CFC-11 eq	1,227E-04	8,496E-06	-4,359E-05
POCP	kg NMVOC eq	9,950E+00	3,745E-01	-3,995E+00
AP	mol H+ eq	1,003E+01	3,209E-01	-4,039E+00
EP - freshwater	kg P eq	1,074E+00	3,394E-03	-4,206E-01
EP - marine	kg N eq	2,234E+00	1,229E-01	-9,668E-01
EP - terrestrial	mol N eq	2,271E+01	1,344E+00	-9,176E+00
WDP	m³ depriv.	5,158E+02	2,721E+00	-2,221E+02
ADP - F	MJ	2,421E+04	6,249E+02	-9,358E+03
ADP - MM	kg Sb eq	2,816E-02	4,080E-05	-1,147E-02
PERE	MJ	2,54E+03	3,08E+01	-1,06E+03
PERM	MJ	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,54E+03	3,08E+01	-1,06E+03
PENRE	MJ	2,93E+04	6,19E+02	-1,15E+04
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,93E+04	6,19E+02	-1,15E+04
SM	kg	3,17E+02	1,31E-01	-1,65E+02
RSF	MJ	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00
FW	m³	1,53E+01	1,04E-01	-1,04E+01
HW	kg	1,182E+02	2,56E-01	-5,17E+01
NHW	kg	7,292E+02	1,23E+00	-3,64E+02
RW	kg	6,479E-01	3,91E-02	-2,85E-01
REUSE	kg	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	5,47E+00	2,17E-01	-4,54E+02
EN - REC	kg	0,00E+00	0,00E+00	0,00E+00
EE - E	MJ	0,00E+00	0,00E+00	0,00E+00
EE - T	MJ	0,00E+00	0,00E+00	0,00E+00

“REWORKED” HEAVY PLATE

Abb.	U.d.m.	A1-A3	C1+C4	D
GWP - t	kg CO_2 eq	2,538E+03	4,297E+01	-8,521E+02
GWP - fossil	kg CO_2 eq	2,535E+03	4,295E+01	-8,496E+02
GWP - biogenic	kg CO_2 eq	8,830E-01	1,168E-02	-1,574E+00
GWP - luluc	kg CO_2 eq	1,265E+00	6,276E-03	-6,683E-01
GWP - GHG	kg CO_2 eq	2,449E+03	4,245E+01	-8,208E+02
ODP	kg CFC-11 eq	1,537E-04	8,496E-06	-4,121E-05
POCP	kg NMVOC eq	1,115E+01	3,745E-01	-3,777E+00
AP	mol H+ eq	1,103E+01	3,209E-01	-3,818E+00
EP - freshwater	kg P eq	1,167E+00	3,394E-03	-3,976E-01
EP - marine	kg N eq	2,554E+00	1,229E-01	-9,139E-01
EP - terrestrial	mol N eq	2,529E+01	1,344E+00	-8,674E+00
WDP	m³ depriv.	5,825E+02	2,721E+00	-2,100E+02
ADP - F	MJ	2,853E+04	6,249E+02	-8,845E+03
ADP - MM	kg Sb eq	3,044E-02	4,080E-05	-1,085E-02
PERE	MJ	2,81E+03	3,08E+01	-1,00E+03
PERM	MJ	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,81E+03	3,08E+01	-1,00E+03
PENRE	MJ	3,41E+04	6,19E+02	-1,08E+04
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	3,41E+04	6,19E+02	-1,08E+04
SM	kg	3,43E+02	1,31E-01	-1,56E+02
RSF	MJ	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00
FW	m³	1,70E+01	1,04E-01	-9,79E+00
HW	kg	1,305E+02	2,56E-01	-4,89E+01
NHW	kg	7,910E+02	1,23E+00	-3,44E+02
RW	kg	7,291E-01	3,91E-02	-2,70E-01
REUSE	kg	0,00E+00	0,00E+00	0,00E+00
RECYCLE	kg	6,26E+00	2,17E-01	-4,29E+02
EN - REC	kg	0,00E+00	0,00E+00	0,00E+00
EE - E	MJ	0,00E+00	0,00E+00	0,00E+00
EE - T	MJ	0,00E+00	0,00E+00	0,00E+00

Additional information

HEAVY PLATE

The most impacting element in the production of heavy plate is the slab entering the plant, whose construction and subsequent procurement account for approximately 93%. The processing of the rolling with the fourth rolling mill technology accounts for the remaining 7%, mainly due to the natural gas used during the hot process (5,3%% of the impact).

“REWORKED” HEAVY PLATE

Analyzing the reworked heavy plate, sold after processing through specific treatments, it can be observed that the assumptions regarding the impact indicated above remain valid. Although the sheet metal marketed can undergo multiple processes, both heat treatment and mechanical treatment, the impact of the same is equal to 4,4% for the heat treatment process while 1,1 % for mechanical processes while the greater weight is due to the production of train plate.

SUSTAINABILITY

It should be noted that at the end of its useful life, the product is destined for recycling. In particular, the amount of steel destined for recycling is 88% in line with what is indicated in the “Special waste report” of ISPRA - No. 367/2022.

MANAGEMENT SYSTEM

With reference to the management systems used by the company, it is emphasized that the presence of an environmental management system (certified pursuant to UNI EN ISO 14001: 2015) and safety (certified pursuant to UNI ISO 45001: 2018) testify to the company’s commitment to pursue the continuous improvement of its environmental and safety performance, for example by properly managing the hazardous substances, the waste produced by its business as well as maintaining the pollutants emitted into the atmosphere as well as water discharges. Within the environmental management system there is also a specific data management procedure for the study of the product life cycle. Year after year, the company plans new improvement objectives aimed at increasing its performance.

The company has implemented an energy management system certified in accordance with the UNI CEI EN ISO 50001: 2018 standard to identify the most relevant plants in terms of energy as well as define opportunities for improvement in order to reduce the energy consumption determined by the carrying out its business.

References

General Programme Instructions of the International EPD® System. Version 3.01.

PCR 2019:14 - Version 1.11 “CONSTRUCTION PRODUCTS” – Date 2021-02-05;

Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012;

Ecoinvent database v.3.8 – Novembre 2021;

UNI EN ISO 14025: 2010 “Environmental labels and declarations - Type III environmental declarations - Principles and procedures”;

UNI EN ISO 14040: 2021 “Environmental management - Life cycle assessment - Principles and framework”;

UNI EN ISO 14044:2021 “ Environmental management - Life cycle assessment - Requirements and guidelines”;

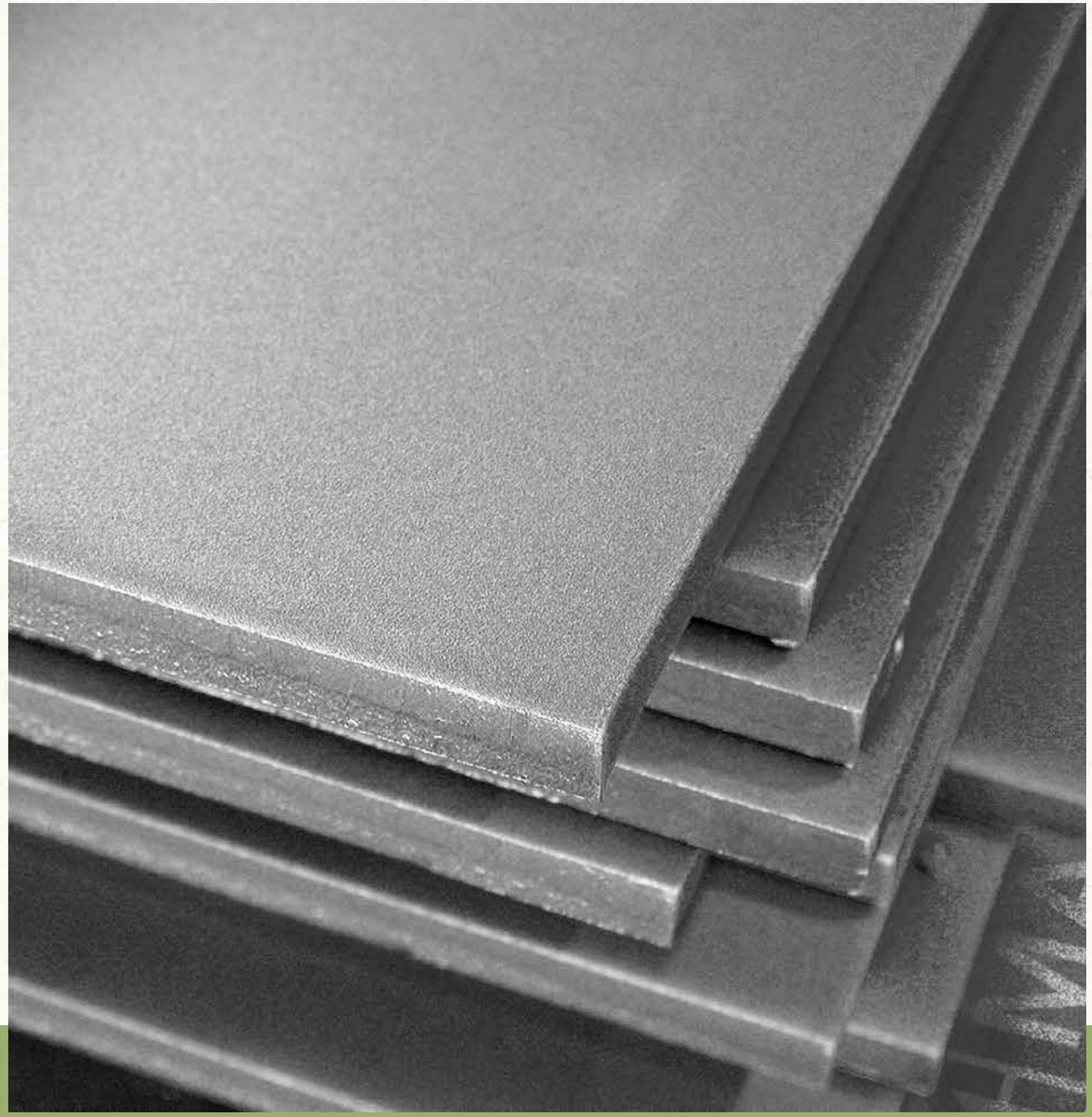
UNI EN ISO 15804:2021 “Sustainability of buildings - Environmental product declarations - Development framework rules by product category”;

European Residual Mixes 2021 Association of Issuing Bodies “European Residual Mixes - Results of the calculation of Residual Mixes for the calendar year 2021” – version 1.1, 2022-05-31;

CSIRO “Metal recycling: The need for a life cycle approach” – May 2013;

Environmental engineering “WASTE FROM CONSTRUCTION AND LCA DEMOLITION FROM THE DEMOLITION OF 51 RESIDENTIAL BUILDINGS” - Michele Paleari, Politecnico di Milano – 26-11-2015;

ISPRA “ Special waste report” – n° 367/2022 – Ed. June 2022.



MARCEGAGLIA
PALINI E BERTOLI

Via Enrico Fermi 28
San Giorgio di Nogaro (UD) - Italy
Phone +39 0376 6851
info@marcegaglia.com
www.marcegaglia.com

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EPD
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www.evirondec.com