Environmental Product Declaration

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

STAINLESS STEEL DRAWN WIRE

Marcegaglia Fagersta Stainless AB

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

Programme operator: **EPD International AB**
EPD registration number: **S-P-13610**
Publication date: **2024-05-30**
Revision date: **2025-06-16**
Valid until: **2029-04-22**

MARCEGAGLIA FAGERSTA STAINLESS

ECO PLATFORM EPD VERIFIED

EPD® THE INTERNATIONAL EPD® SYSTEM

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 (EN 15804:A2), 2019:14, UN CPC 54, version 1.3.3

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

Independent verification of the statement and data, according to the ISO 14025

☐ Process EPD certification ☒ Verification EPD

Third-party verifier:
Bureau Veritas Italia S.p.A.

The certification body is accredited by: International EPD® System Technical Committee.

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

☒ Yes ☐ No

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

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, 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 fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

COMPANY INFORMATION

Owner of the EPD:
Marcegaglia Fagersta Stainless AB - www.fagersta.marcegaglia.com

Contact:
To obtain more information about this Environment Product Declaration are available this contact:
Technical Support: Martin Hellström - Mail: martin.hellstrom@marcegaglia.com - Tel +46 223 45598

Company description:
Marcegaglia Fagersta Stainless AB is one of the first mill in the world to roll stainless wire rod, specialised in thinner dimensions of wire rod and drawn wire. Key customers are producing welding wire, spring wire, cold-heading products and wheel spokes.

Product/system certifications:
- Quality Management System ISO 9001
- Environmental Management System ISO 14001
- Energy Management ISO 50001
- Carbon footprint systemtic approach ISO 14067

Production site's Name and localization:
- P.O. box 508, SE-73725, Fagersta - Sweden

PRODUCT INFORMATION

Product name:
stainless steel drawn wire

Product identification:
stainless steel drawn wire

Product description:
Stainless steel drawn wire with different dimensions and quality properties for welding wire, spring wire, cold-heading products and wheel spokes mainly cold heading applications, spoke wire, spring wire and bright wire for different applications.

From the company web site is possible to download the catalogue whit the technical information of the product:

Geometry	Diameter [mm]
Round	From 1.5 to 16

UN CPC code: 412 - **Geographical scope:** global

LCA INFORMATION

Declared unit:
The declared unit is 1 ton of drawn wire.

Reference service life - RSL:
The RLS of the rolled products are estimate around of 50 years [Rif.: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)].

Time representativeness:
All the data used for this LCA analysis are referred to the year 2024.

Data Quality:
The primary data come from the company and the secondary data come from Ecoinvent database.

Database e software:
Ecoinvent database v.3.10 March 2024 / Software SimaPro rel. 9.6.0.1.

Description of system boundaries:
The study is referred "from cradle to gate with options (A1-A3 + C1-C4 + D)", like the follow table (rif: PCR 2019:14 "Construction products" version 1.3.3).

The modules A1-A3 describe the raw materials, the transport until the production's site and the production's process.

The modules C1-C4 describe the transport, the demolition process, and the end life of the products. These operations aren't under company's control. For this reason, was used the literature data from the building sectors. And considered an average distance of 80 km from the site and the waste disposal center.

The module D describe the benefits due the recycling of the stainless steel and the calculation of this is based on the document "Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2021 – Par. 6.3.5.6. Benefits and loads beyond the product system boundary, information Module D".

DESCRIPTION OF MAIN ACTIVITIES

The Marcegaglia Fagersta Stainless plant manufactures stainless steel drawn wires of different diameters and for many applications.

The production cycle begins with the arrival of raw materials at the plant by road transport. The transport of raw materials from the production steel mills to the ports in Sweden is intermodal, as it makes use of different means of transportation including ships, trains and trucks.

Raw materials consist of:

- Billets arriving from steel mills in Sweden by road transport;
- Billets imported by ship that reach the port of departure by road and are then loaded onto ships. The last connection from the port to the Marcegaglia Fagersta Stainless plant is by train and road transport.

Following there are the phases of the production:

BILLET PRETREATMENT
Depending on the application the billets are pre-treated in a grinding operation before entering into the rolling mill. Eventual surface defects from the casting process are removed from the surface.

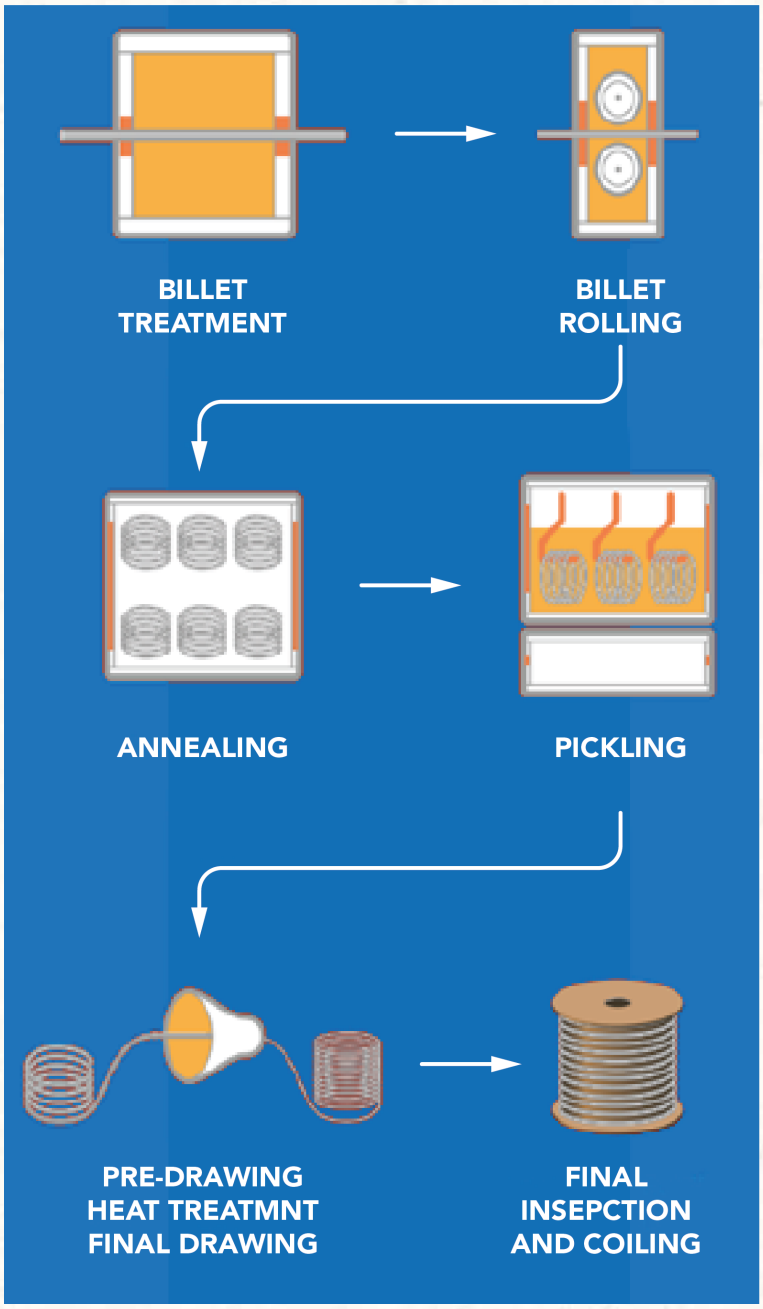
HOT ROLLING OF BILLET
The stainless steel billet is heated by a LPG-fuelled reheating furnace and in an electrical furnace to a predetermined temperature. The wire rod rolling mill reduces the billet's cross-sectional area by passing it through a number of rolling cages. The wire rod formed by hot rolling of the billet is wound into wire rod coils.

ANNEALING
Wire rods are subjected to annealing in line with the rolling mill or in a separate batch annealing operation. This process relieves any internal stresses and reduces the hardness of the alloy, thus enhancing its ductility in preparation for subsequent processing steps. After the scheduled annealing time, the wire rod coil is quenched with water.

PICKLING
The pickling process removes surface oxidation from the wire rods. The wire rod is immersed in an acid bath, and after the scheduled immersion time, it is rinsed out to remove the last remaining sticky scales and excess acid.

COLD DRAWING
Wire rods are passed through a series of dies under tension; these dies simultaneously increase the wire's length while reducing its diameter. Each die is smaller than the one before it, and the process continues until the desired diameter is reached. To get the correct properties of the drawn wire the wire is normally predrawn, intermediate annealed and final drawn as per the schedule above.

System Diagram



CONTENT INFORMATION

Product content	Weight, kg	Post-consumer material weight	Post-consumer material weight-% and kg C/kg
Stainless Steel	1,000	76 %	0

Packaging materials	Weight, kg	Weight -% (versus the producc)	Weight biogenic carbon kg C/kg
Plastic	9.37	0.94%	0
Wood	19.93	1.99%	0.04
Carbon Steel	4.27	0.43%	0

Electricity information:
The electricity used in the manufacturing process of module A3 accounts less than 30% of the GWP-GHG results of modules A1-A3 and the impact of electricity use in the manufactory phases is 0.0109 kg CO2 eq/kWh.

Allocation's rules:
A mass allocation of the energy consumption and waste is used. Also, a mass allocation of steel scrap is used because Marcegaglia Fagersta Stainless sells scrap to the nearby meltshop, so in LCA study steel scrap is considered as co-product.

MODULES DECLARED

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

	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	Disposal	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	SE	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data	> 60%					-	-	-	-	-	-	-	-	-	-	-	-
Variations product	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variations site	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

X = Module considered | **ND** = Module not declared | **GLO** = Global | **SE** = Sweden

ENVIRONMENTAL INFORMATION

All the performance indicators are referred of 1 ton of drawn wire.

Environmental impact

IMPACT CATEGORY	ABB.	UNIT
Climate change - total	GWP1	kg CO_2 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	GWP - GHG
Ozone depletion	ODP	kg CFC11 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

* The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

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	SRF	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	HV	kg
Non-hazardous waste disposed	NHV	kg
Radioactive waste disposed	RW	kg

Output flows

IMPACT CATEGORY	ABB.	UNIT
Use of non-renewable primary energy resources used as raw materials	REUSE	kg
Use of secondary material	RECYCLE	kg
Use of renewable secondary fuels	EN-REC	kg
Use of non-renewable secondary fuels	EE-E	MJ
Use of net fresh water	EE-T	MJ

STAINLESS STEEL DRAWN WIRE

ABB.	UNIT	A1-A3	C1	C2	C3	C4	D
GWP - t	kg CO2 eq	3.32E+03	5.12E+00	9.97E+00	1.69E+00	3.16E+00	-5.65E+02
GWP - fossil	kg CO2 eq	3.33E+03	5.12E+00	9.96E+00	1.65E+00	3.15E+00	-5.58E+02
GWP - biogenic	kg CO2 eq	-1.19E+01	5.59E-04	5.14E-03	2.94E-02	1.41E-03	-6.24E+00
GWP - luluc	kg CO2 eq	2.64E+00	4.44E-04	3.41E-03	1.26E-02	1.26E-03	-4.48E-01
GWP - GHG	kg CO2 eq	3.34E+03	5.12E+00	9.96E+00	1.66E+00	3.16E+00	-5.59E+02
ODP	kg CFC-11 eq	6.02E-05	7.83E-08	2.00E-07	7.26E-08	7.29E-08	-4.19E-06
POCP	kg NMVOC eq	1.31E+01	6.99E-02	5.24E-02	9.02E-03	2.57E-02	-1.83E+00
AP	mol H+ eq	1.77E+01	4.62E-02	3.22E-02	1.13E-02	1.70E-02	-3.11E+00
EP - freshwater	kg P eq	1.00E+00	1.49E-04	6.77E-04	2.94E-04	2.45E-04	-1.91E-01
EP - marine	kg N eq	3.60E+00	2.14E-02	1.09E-02	3.84E-03	6.58E-03	-5.48E-01
EP - terrestrial	mol N eq	3.81E+01	2.35E-01	1.19E-01	3.96E-02	7.18E-02	-5.82E+00
WDP	m3 depriv.	5.12E+03	1.45E-01	6.87E-01	3.92E+00	1.30E+00	-1.30E+02
ADP - F	MJ	5.72E+04	6.69E+01	1.44E+02	3.73E+02	5.62E+01	-6.38E+03
ADP - MM	kg Sb eq	8.37E-02	1.83E-06	2.69E-05	1.84E-05	8.12E-06	-1.48E-02
PERE	MJ	7.79E+03	4.99E-01	2.83E+00	7.23E+01	9.61E-01	-1.91E+03
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.79E+03	4.99E-01	2.83E+00	7.23E+01	9.61E-01	-1.91E+03
PENRE	MJ	3.46E+04	3.33E+00	1.37E+01	2.76E+00	4.86E+00	-4.61E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.46E+04	3.33E+00	1.37E+01	2.76E+00	4.86E+00	-4.61E+03
SM	kg	4.27E+02	2.81E-02	5.89E-02	5.89E-03	-4.93E-01	-6.57E+01
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	m3	1.20E+01	4.82E-03	2.74E-02	9.26E-02	3.30E-02	-3.00E+00
HW	Kg	1.29E+02	4.63E-04	9.48E-04	9.10E-05	3.65E-04	-1.49E-02
NHW	Kg	1.73E+02	4.11E-02	1.23E+01	2.10E-01	1.76E+02	-4.93E+01
RW	kg	2.99E-01	7.36E-06	4.34E-05	5.82E-03	1.39E-05	-1.18E-02
REUSE	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RECYCLE	Kg	1.27E+01	4.64E-02	6.77E-02	1.24E-02	2.44E-02	-1.98E+00
EN-REC	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE-E	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE-T	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ADDITIONAL ENVIRONMENTAL INFORMATION

The impact of the raw material input accounts for 88.2% of the total impacts of drawn wires. The hot rolling process contributes 6.8% of the impacts, pickling accounts for 1.98%, cold drawing for 1.94%, while other processes impact is less than 1%.

Marcegaglia Fagersta Stainless is connected to the district heating network of the city of Fagersta from which it receives hot water for heating and hot rolling. Heat, in the form of flue gas, is recovered from the two gas furnaces via two dedicated flue gas boilers. The recovered heat is used to heat water, which is then delivered to the municipal district heating network. Because industrial heat recovery is prioritized in district heating, all heat generated is supplied directly to the grid, regardless of the plant's current heat demand. The local energy company then adjusts the output of its biomass boilers based on the heat supplied by the plant and other companies connected to the grid.

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 85% in line with what is indicated in the "Life cycle inventory (LCI) study, Worldsteel Association, 2021 data".

The stainless steel drawn wire is characterized by a recycled content of 76 %. This percentage is calculated as average of the value associated with the incoming raw material and derived from both Type III environmental declarations as well as self-declarations in accordance with ISO 14021.

The products do not contain hazardous substances from the SVHC Candidate List for Authorization in quantities greater than 0.1%.

DIFFERENCES FROM THE PREVIOUS EPD VERSION

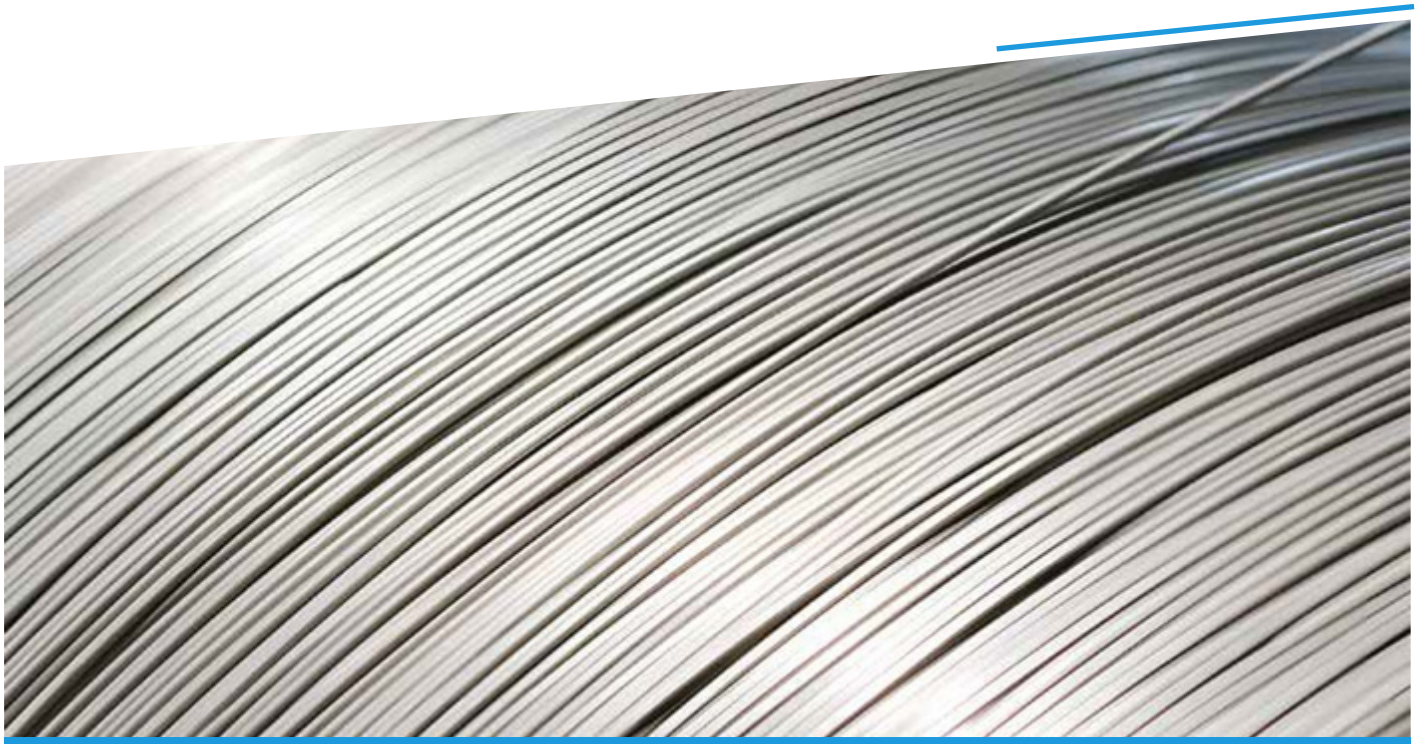
For the product under study, between the year 2022 (the year for which data was used to develop and publish the first EPD Declaration) and the year 2024, variations of more than 10% were observed in the indicators. The final results are influenced by the types of raw materials arriving at the plant.

The main changes are listed below:

- The most up-to-date energy mix has been considered (ref.: energy supply contract for the plant updated to 2024);
- The demolition process model has been set by considering the average diesel consumption of machinery used for demolition, attributing 0.044 MJ per kilogram of demolished material (ref.: I rifiuti da costruzione e demolizione, Michele Paleari and Andrea Campioli, 2015);
- The disposal process model has been set by considering typical energy consumption data for the various stages of metal scrap sorting (ref.: Metal recycling: The need for a life cycle approach, Terry Norgate, May 2013);
- For the modelling of module D, the post-consumption recycled steel data from the Worldsteel Association for the year 2021 has been considered;
- In 2024, in addition to the usual energy consumption of the plant, those related to district heating have been added;
- The EDIP 2003 method was used to calculate hazardous, non-hazardous, and radioactive waste.

REFERENCES

- General Programme Instructions of the International EPD® System. Version 4.0;
- PCR 2019:14 - Version 1.3.3 "CONSTRUCTION PRODUCTS";
- BRE Global Product Category Rules (PCR) for Type III EPD of construction products to EN 15804+A2;
- Ecoinvent database v.3.10 March 2024;
- ISO 14025:2010 "Environmental labels and declarations - Type III environmental declarations - Principles and procedures";
- ISO 14040: 2021 "Environmental management - Life cycle assessment - Principles and framework";
- ISO 14044:2021 "Environmental management - Life cycle assessment - Requirements and guidelines";
- ISO 15804:2021 "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products";
- "Life cycle inventory (LCI) study, Worldsteel Association, 2021 data";
- Construction and demolition waste, Michele Paleari and Andrea Campioli, 2015;
- Metal recycling: The need for a life cycle approach, Terry Norgate, 2013;
- Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR).



MARCEGAGLIA

P.O. box 508
SE-73725, Fagersta
Sweden
Phone +46 223 45598
info@marcegaglia.com
www.marcegaglia.com

ECO PLATFORM EPD VERIFIED

EPD®
THE INTERNATIONAL EPD® SYSTEM

www.evirondec.com