Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

PC Strand

from

Fapricela – Indústria de Trefilaria, S.A.

ECO EPD 00001180

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Programme information

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

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PCR review was conducted by: *The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Ruben Carnerero Acosta In case of recognised individual verifiers: Ruben Carnerero Acosta Approved by: The International EPD® System
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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Company information

Owner of the EPD:
Fapricela- Indústrial de Trefilaria, S.A. – Ançã, Portugal [+351 239 960 130 | www.fapricela.pt]

Description of the organisation:
Fapricela – Indústria de Trefilaria, S.A., a family-owned company founded in 1977, began operating almost solely as a construction nail manufacturer. However, as the years passed and the company grew, new products were progressively added to the portfolio as a result of the changing market demands, such as:

- Smooth steel wires (cold drawn, galvanized, black annealed, galvanized pvc coated and barbed wire);
- Chain link fencing (galvanized, pvc coated and farm fencing);
- Electrowelded mesh.

A company with industrial tradition, a philosophy of growth and modernization and well-defined objectives, where technical and commercial innovation are fundamental to growth, the greatest and most important impulse was during an investment program which began in 1995, the manufacturing of high tensile steel products:

- Low relaxation steel wire for pre and post-tensioning;
- Low relaxation steel strand for pre and post-tensioning.

Fapricela, S.A., manufactures a range of products that can be considered unusually immense, being proud to be the first company in Portugal to produce low relaxation strand for pre and post tensioning.
Throughout its history, the company has always been committed to quality. Through continuous investment, focusing and combining innovation with high technology (equipment automation), alongside with systematic quality control, Fapricela is placed in the position of a leading wire drawing company in Europe. It produces for both the internal and foreign market.
Working for more than 35 years, Fapricela has search to live in harmony with the environment that surrounds it, continuously improving its processes and its environmental performance, either by the choice of environmentally friendly technologies and by the gradual modification of attitude and awareness of all its employees. All aspects of Environmental protection are considered.
Fapricela is committed to preventing pollution resulting from activities, controlling its environmental impact and complying with all legal requirements and other environmental requirements.
With the permanent goal to assure to all the demands, Fapricela has the environmental license required by the Integrated Law of Pollution Prevention and Control and works for the fulfilment of all the goals of environmental excellence.
In order to make the work in this area as efficient as possible, Fapricela has systematized its environmental management practices and procedures.
Product-related or management system-related certifications: ISO 9001:2015 (quality management system)
Name and location of production site:
Fapricela – Indústria de Trefilaria | Ançã | Cantanhede

Product information

Product name: PC Strand
Product identification: The product studied in this EPD is 1 kg of Prestressed steel for reinforcement of concrete, PC – strand, which can range in 2, 3 and 7 wire steel strand for prestressing and posttensioning of concrete, produced with low alloyed steel wire rods that are drawn to smaller dimensions and twisted into strands.
Product description: The product studied in this EPD is 1 kg PC strand, which can be delivered in precision-wound coils. The standard coil are 2, 3 and 7 wire steel strand for prestressing and posttensioning of

concrete, produced with low alloyed steel wire rods that are drawn to smaller dimensions and twisted into strands. For transportation and storage, the PC Strand are winded into coils.

Fapricela PC Strand product range consist of 2-, 3- and 7- wires strands made from high carbon quality wire rod.

Application

The PC Strand products are used for all kinds of pre-tensioning with wedge anchoring, such as:

- Bars;
- Plates;
- Beams;
- Tubes;
- Pillars;
- Pre-tensioned panels.

Technical information

PC strands can be 2, 3 or 7 wires strands with plain or indented surface.
Most commonly, 7 wires strands are class 1860MPa while 2 and 3 wire strands are commonly from 1860 to 2160MPa class.

All products are produced from wire rod from qualified suppliers, and in their final stage, before expedition to customers, all products are tested in our laboratory (geometrical and mechanical parameters) in order to validate the results against the applicable international standards or costumer specifications.
In order to maintain the necessary certifications, our plant is constantly audited by certification bodies from different countries according to their relevant certification scheme.

Strand is delivered in coils with weights up to 4 ton.
The PC strands are also available with protective wrapping.

All products have to be tested in quality control (accordance with the EN ISO 15630-3 standard), against the customer requirements (normally international standards) in order to confirm mechanical properties and if fulling specification are approved to be sent to final customer.

UN CPC code: 421
Geographical scope: Global

LCA information

Declared unit: 1 kg of PC Strand at the factory gate.

Reference service life: not specified

Time representativeness: Data for use in module A3 is supplied by the manufacturer and consist of energy consumption and recorded amount of material for the PC Strand regarding the year 2017. The data used in module A1 is supplied by the suppliers of the wire rod and its ingredients. A2 are representing both internal and external transport. Generic data used in the EDP are not older than 10 years and site-specific data are not older than 5 years.

Database(s) and LCA software used:
The manufacturing process was modelled based on manufacturer-specific data. However, generic background datasets were used for the upstream and downstream processes.
The LCA study was performed using SimaPro (version 8.1.0.60) and Ecoinvent (3.3).

System diagram:
The system boundaries are shown in the flowchart below.

Description of system boundaries:
Cradle-to-gate (A1-A3). The limits of the system, presented in the table below, include the extraction and production of all products and materials used as raw materials, the transport of these materials from suppliers to Fapricela and the processing of these materials to the production of the final products, including packaging.

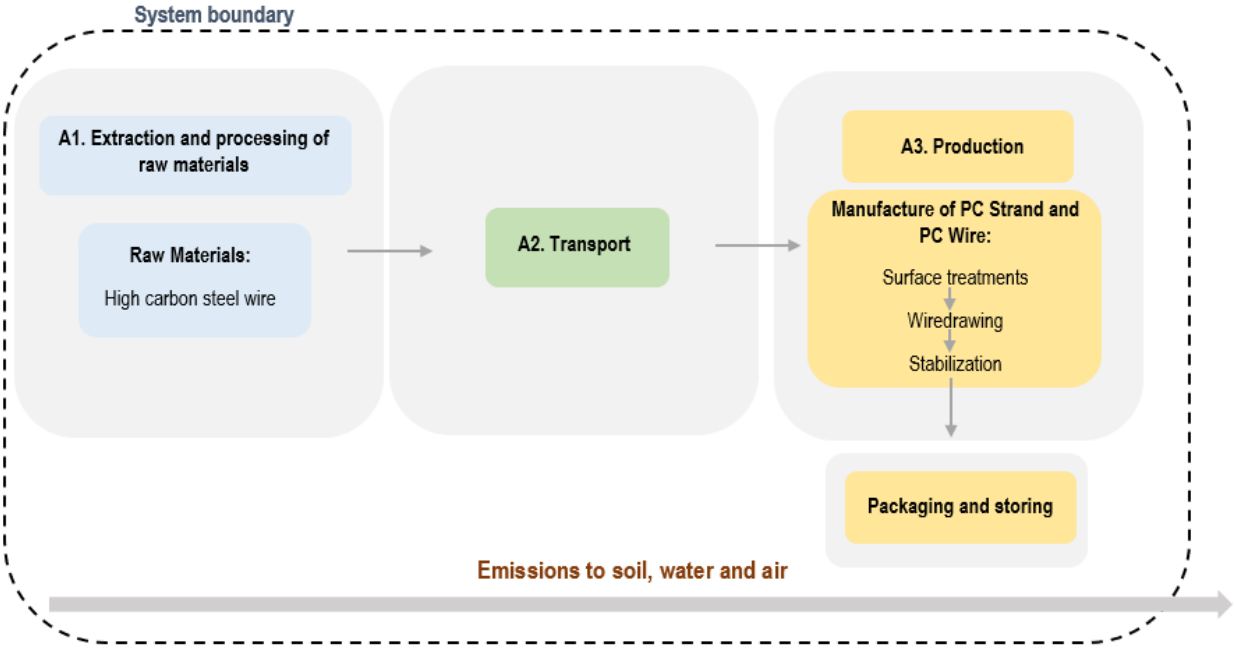
The product stage includes the following steps:
A1- Extraction and processing of raw materials: this step includes de extraction and eventual processing of raw materials.
A2- Transport: The raw materials and auxiliary material come from truck, boat or train.
A3- Manufacturing: This stage includes the design and development, storage of raw materials, surface treatments (chemical), wiredrawing and packaging and storage. Following the Surface treatment (removal of iron oxides and phosphating), the wire rod to wiredrawing, stranding and finally stabilization of the wire in electric furnaces or stranding and stabilization of strand.
In the Wiredrawing step, the section of the wire is reduced in order to increase tensile strength, by successive steps of drawing.
Stranding consists in the conformation of drawn wires to form strands of 2, 3 or 7 wire strand. The conformed strand is then submitted to Stabilization corresponding to a thermomechanical treatment in order to relieve internal stresses resulting from the wiredrawing stage.

Table 2. Description of the system boundary

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy	Operational water use	De-Construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

(X= included in LCA; MND= module not declared)

The system boundaries are shown in the flowchart below:



Excluded lifecycle stages:
The LCA presented in this EPD only considers the product stage (A1-A3). All major raw materials and the energy are included.

More information:
The factory produces other steel products (wire), but it is possible to quantify the all the inputs and outputs for PC Strand. A mass allocation was made between wire and PC Strand.
www.fapricela.pt

Social denomination	FAPRICELA- Indústria de Trefilaria, S.A.
Corporate headquarters and factory	Ançã, Portugal 3060-905 ANÇÃ
Phone number	+351 239 960 130
Contact on Fapricela	Eng. Nelson Batista / Engª Ana Rebola
Contact of LCA practioner – Contact on CTCV	Eng.ª Marisa Almeida marisa@ctcv.pt

The following processes were not considered in this study:

- Environmental loads associated with the construction of industrial infrastructure and the manufacture of machinery and equipment;

- Environmental loads for pre-product transport infrastructure (production and maintenance of vehicles, production and maintenance of roads).

Content declaration

Product.

The typical product composition of PC Strand is presented in the table below:

Materials / chemical substances	%	Environmental / hazardous properties
Fe	97,27	Non hazardous
C	0,85	Non hazardous
Mn	0,8	Non hazardous
Si	0,3	Non hazardous
P	0,02	Non hazardous
S	0,025	Non hazardous
Cu	0,2	Non hazardous
V	0,1	Non hazardous
Cr	0,3	Non hazardous
Ni	0,012	Non hazardous
Mo	0,03	Non hazardous

For construction product EPDs compliant with EN 15804, the content declaration shall list, as a minimum, substances contained in the products that are listed in the "Candidate List of Substances of Very High Concern for Authorisation" when their content exceeds the limits for registration with the European Chemicals Agency.
Fapricela does not use any substance listed in the "Candidate List of Substances of Very High Concern for Authorisation".

Packaging

Distribution packaging:
For the store of the wire rod minimal packing is required. For the transportation and storage, the low relaxation, smooth surface (crude or oiled) steel strand is supplied in suitably labelled coils, with a hard nucleus on which a label identifying the end to be used is placed.

All products packing consists of:

- Steel straps;
- Steel joins;
- Wood boards.

And in some cases: wrapping with protection paper.

Recycled material

The recycled content of post-consumer steel scrap is 53%

Environmental performance

Potential environmental impact

PARAMETER	UNIT	TOTAL A1-A3
Global warming potential (GWP)	kg CO_2 eq.	2,25E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1,46E-07
Acidification potential (AP)	kg SO_2 eq.	1,23E-02
Eutrophication potential (EP)	kg PO_4^{3-} eq.	1,12E-03
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	1,52E-03
Abiotic depletion potential – Elements	kg Sb eq.	1,01E-06
Abiotic depletion potential – Fossil resources	MJ, net calorific value	2,47E+01

Use of resources

PARAMETER		UNIT	TOTAL A1-A3
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,24E+00
	Used as raw materials	MJ, net calorific value	1,30E+00
	TOTAL	MJ, net calorific value	2,54E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2,54E+01
	Used as raw materials	MJ, net calorific value	0
	TOTAL	MJ, net calorific value	2,54E+00
Secondary material		kg	0
Renewable secondary fuels		MJ, net calorific value	0
Non-renewable secondary fuels		MJ, net calorific value	0
Net use of fresh water		m^3	1,58E-02

Waste production and output flows

Waste production

PARAMETER	UNIT	TOTAL A1-A3
Hazardous waste disposed	kg	1,65E-05
Non-hazardous waste disposed	kg	1,32E-02
Radioactive waste disposed	kg	5,13E-05

Output flows

PARAMETER	UNIT	TOTAL A1-A3
Components for reuse	kg	0
Material for recycling	kg	1,50E-02
Materials for energy recovery	kg	0
Exported energy, electricity	MJ	0
Exported energy, thermal	MJ	0

References

General Programme Instructions of the International EPD® System. Version 3.0.
PCR 2012:01. Product Category Rules (PCR) for construction products and construction services of the Environdec System. Version
EN 15804:2012+A1:2013: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 14025:2006 – Environmental labels and declarations – type III environmental declarations principles and procedures
ISO 14020:2000 - Environmental labels and declarations — General principles

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