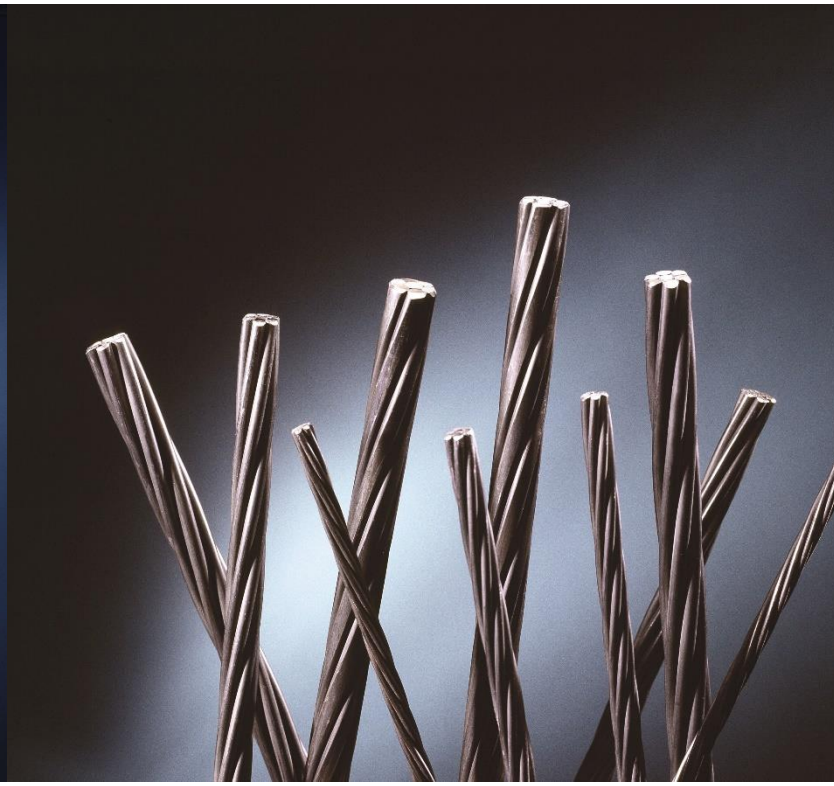
Environmental Product Declaration

as per ISO 14025 and EN 15804 +A1

Owner of the declaration:	Siderurgica Latina Martin S.p.A.
Publisher:	Kiwa BCS Öko-Garantie GmbH - Ecobility Experts
Programme holder:	Kiwa BCS Öko-Garantie GmbH - Ecobility Experts
Declaration number:	EPD-SLM-081-EN
Issue date:	04.05.2020
Valid to:	04.05.2025

PC Strand

Construction steel products



1. General information

Siderurgica Latina Martin S.p.A.

Programme holder
Kiwa BCS Öko-Garantie GmbH
- Ecobility Experts
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90402 Nürnberg
Germany

Declaration number
EPD-SLM-081-EN

This declaration is based on the Product Category Rules
PCR B - Requirements on the Environmental Product Declarations for steel construction products, Edition 2020-03-13 (draft)

Issue date
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Valid to
04.05.2025

Signature
Frank Huppertz
(President of Kiwa BCS Öko-Garantie GmbH – Ecobility Experts GmbH)

Signature
Prof. Dr. Frank Heimbecher
(Chairman of the independent expert committee BCS Öko-Garantie GmbH – Ecobility Experts GmbH)

PC Strand

Owner of the declaration
Siderurgica Latina Martin S.p.A.
Via Oger Martin, 21
Ceprano (Fr)
Italy

Declared product / declared unit
1kg PC Wire

Scope
PC Strand is a twisted steel cable composed of 2, 3 or 7 high strength steel wires represents the product "2 & 3 Wire Strand" and "P.C. Strand – 7 wire" (average product). Both products are manufactured in Ceprano, Italy. Kiwa BCS Öko-Garantie GmbH – Ecobility Experts shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification
The CEN Norm EN 15804:2012+A1:2013 serves as the core PCR

Independent verification of the declaration and data according to ISO 14025:2011-10

☐internally ☒externally

Signature
Name of external verifier / company
(External verifier of Green Delta GmbH)

2. Product

2.1 Product description

PC Strand is a twisted steel cable composed of 2, 3 or 7 high strength steel wires, high-strength steel, which is mainly used for prestressing in prestressed concrete construction. This kind of steel usually belongs to the group of unalloyed steels. Its high strength values allow high elastic elongation during prestressing. In prestressed concrete construction, this reduces the loss of prestressing force due to creep and shrinkage of the concrete, which re-duces the prestressing and thus the initially applied prestressing force. The declared product is an average product of the construction steel product. The declared product is an average product of the types 2 & 3 Wire Strand and 7 Wire Strand. PC Strand is supplied either smooth or indented and it is packed and delivered either in coils or in bundle of straight cut-to-length bars.

2.2 Application

PC Strand in coils is mostly used as reinforcement in concrete prestressing elements, but it is used in most of the post-tensioned project. In straight cut-to-length bar it is used to produce railroad sleepers whereas PC Strand in coils is mostly used as reinforcement in concrete pre-stressed elements.

Standards:

- 2 & 3 Wire Strand: prEN 10138 - UNI 7676
- 7 Wires Strand: prEN 10138-3- ASTM A-416; BS5896; NF A35045-3; NEN 3868; BS 4258; UNI 7676; UNE 36094.

For the use and application of the product the respective national provisions at the place of use apply

2.3 Technical Data

2 & 3 Wire Strand:

Characteristic	Value	Unit
Diameter range	4,70 – 6,50	mm
Steel grade range	1.570 – 1.860	MPa

7 Wires Strand:

Characteristic	Value	Unit
Diameter range	6.85 ÷ 18.00	mm
Steel grade range (MPa)	1700 – 1770 – 1860 –1960 – 2060 – 2160	MPa

2.4 Base materials / Ancillary materials

Base Materials:

Raw material	Value	Unit
Wire Rod	100	M.-%

Ancillary Materials in the production process are water, sulfuric acid, phosphoric acid, activation salt, Lime, powder lubricant.

2.5 Manufacture

Siderurgica Latina Martin turns high carbon wire rod into PC Strand through an integrated manufacturing process starting from in-house acid pickling & pre-coating, cold wire drawing, thermo-mechanical process to packaging in coil.

2.6 Reference Service Life (RSL)

PC Strand is used in concrete structures to give additional mechanical resistance. The lifetime of PC Strand therefore will be limited by the service life of the construction. Under these circumstances, no RSL according to the relevant ISO standards and EN 15804 can be declared.

3. LCA: Calculation rules

3.1 Declared unit

The EPD refers to the declared unit of 1 kg PC Strand excl. packaging.

	Value	Unit
Declared Unit	1	kg

3.2 System boundary

This EPD monitors the production stage (EPD type: “Cradle to factory gate”). The following production steps are considered during the production phase: Raw material supply (A1); Energy supply (A3); Manufacture of precursors (A1); Production of the packaging (A3); Transport of raw materials (A2); Manufacturing process (A3); Transport of production waste to the place of disposal (A3); Disposal of production waste (A3).

3.3 Estimates and assumptions

The infrastructure of the production facilities is not considered due to the high mass flow. In addition, only the production-related energy consumption (excluding the administration and social areas) is considered and the energy consumption was averaged over the annual pro-duction volume. All specific transport distances of the input materials were recorded and considered accordingly. The transport distances can be found in the life cycle inventory. For all journeys, a truck with a payload of 28-30 t and emission standard EURO 5 was assumed (diesel vehicle). For the utilization, a flat rate of 85% was assumed. The losses during the production phase are less than 3 wt% and thus fall below the cut-off criteria.

3.4 Cut-off criteria

All material flows that contribute to more than 1% of the total mass, energy or environmental impact of the system have been considered in the LCA. It can be assumed that the neglected processes in total contributed less than 5% to the considered impact categories. The production of the machines, plants and other infrastructure required for the production of the products was not taken into account in the LCA. The production emissions BORAX and Carbonates were not included in the LCA because no suitable data sets could be found for them.

3.5 Period under review

All process-specific data was collected for the operating year 2018.

3.6 Comparability

In principle, a comparison or evaluation of EPD data is only possible if all data sets to be compared have been created in accordance with EN 15804 and the building context or the product-specific performance characteristics have been taken into account.

In this case, 1 kg PC Strand was selected as the declared unit. To be able to compare the EPD data, the declared products need the same declared units, or the declared unit must be converted with the proper conversion factors to make it comparable. The secondary data for the production phase were taken exclusively from the EcoInvent 3.4 database.

4. LCA: Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared average product.

Description of the system boundary (X = Included in LCA; MND = Module not declared)															
Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from manufacturer to place of use	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishmen	Operational energy use	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

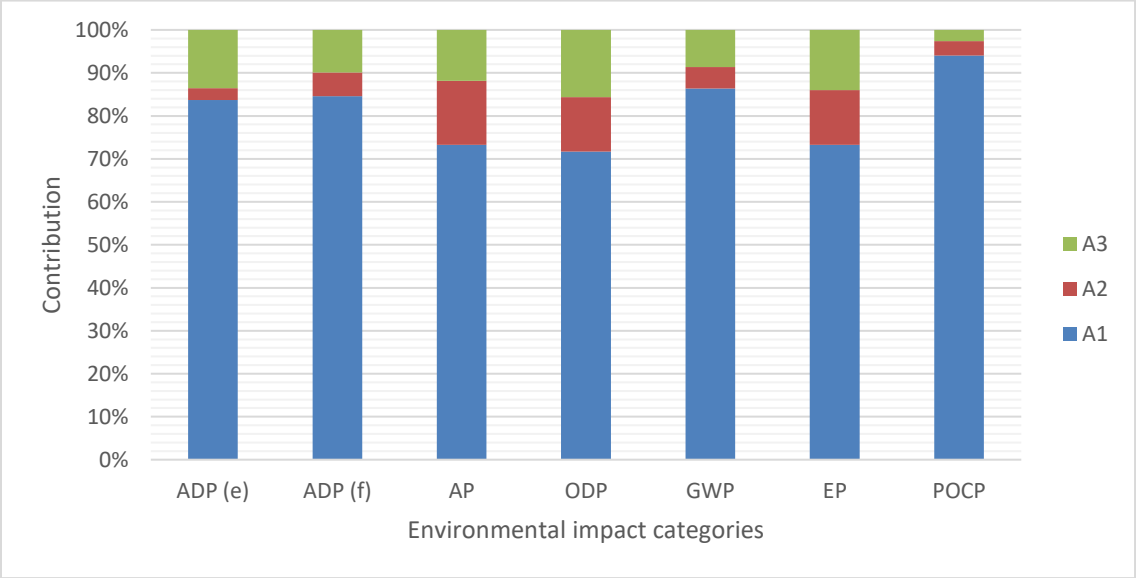
Results of the LCA –Environmental impact: 1 kg PC Strand				
Parameter	**Unit**	**A1**	**A2**	**A3**
Global warming potential	[kg CO_2-Eq.]	2,35E+00	1,35E-01	2,34E-01
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1,28E-07	2,25E-08	2,79E-08
Acidification potential of land and water	[kg SO_2-Eq.]	9,20E-03	1,87E-03	1,49E-03
Eutrophication potential	[kg $(PO_4)^3$-Eq.]	1,06E-03	1,84E-04	2,02E-04
Formation potential of tropospheric ozone photchemical oxidants	[kg Ethen-Eq.]	3,26E-03	1,15E-04	9,12E-05
Abiotic depletion potential for non fossil resources	[kg Sb-Eq.]	5,46E-06	1,77E-07	8,86E-07
Abiotic depletion potential for fossil resources	[MJ]	3,03E+01	1,97E+00	3,55E+00

Results of the LCA –Resource use: 1 kg PC Strand				
Parameter	**Unit**	**A1**	**A2**	**A3**
Renewable primary energy as energy carrier	[MJ]	IND	IND	IND
Renewable primary energy resources as material utilization	[MJ]	IND	IND	IND
Total use of renewable primary energy resources	[MJ]	1,11E+00	3,72E-02	9,34E-01
Non renewable primary energy as energy carrier	[MJ]	IND	IND	IND
Non renewable primary energy as material utilization	[MJ]	IND	IND	IND
Total use of non renewable primary energy resources	[MJ]	2,44E+01	2,10E+00	3,89E+00
Use of secondary material	[kg]	1,86E-01	0,00E+00	2,61E-03
Use of renewable secondary fuels	[MJ]	IND	IND	IND
Use of non renewable secondary fuels	[MJ]	IND	IND	IND
Use of net fresh water	[m^3]	2,70E-02	2,81E-04	9,10E-04

esults of the LCA –Output flows and waste categories: 1 kg PC Strand				
Parameter	**Unit**	**A1**	**A2**	**A3**
Hazardous waste disposed	[kg]	2,16E-04	1,42E-05	2,42E-05
Non hazardous waste disposed	[kg]	3,69E-01	4,01E-02	2,87E-02
Radioactive waste disposed	[kg]	4,70E-05	1,30E-05	1,26E-05
Building materials for re-use	[kg]	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND
Exported energy	[MJ]	IND	IND	IND

5. LCA: Interpretation

This is a Cradle to gate EPD, which means that the EPD is based on production phase A with the modules A1 Raw material supply, A2 Transport and A3 Production. The Raw Material supply is the module with the greatest influence on the LCA results for almost all impact categories (between 72 - 94 % of the respective impact category). Module A3 has the 2nd highest share in each impact category. Transport contributes to environmental impacts with the least amount of impact.



6. References

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[5] BS5896, NBN I 10-003: Norme belge, Deformation of structures - Deformation limit values Buildings (2002), BE

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[9] EN 15804:2012+A1:2013: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction

[10] NEN 3868:2001 nl: Prestressing steel, NL

[11] PrEN 10138/3:2000: Prestressing steels - Part 3: Strand

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