Environmental Product Declaration

In accordance with ISO 14025 and 15804:2012+A1:2013 for:

Nabla C1

from

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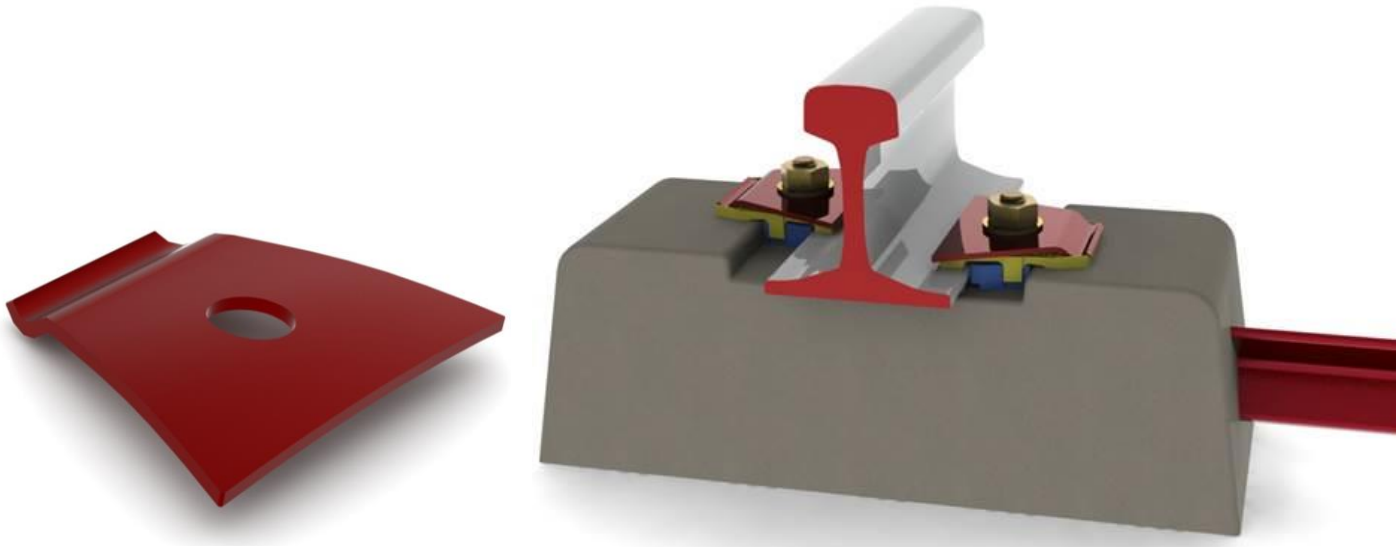
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



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): Product category rules (PCR): Product Category Rules for construction products and construction services of 2012:01, version 2.34 valid: 2022-02-28.
PCR review was conducted by: Technical Committee of the International EPD® System, A full list of members available on www.environdec.com. The review panel may be contacted 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: Damien Prunel, Bureau Veritas LCIE 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 programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Pandrol, SAS
Contact: Bruno Candel, Technical Manager, Fastening Systems, Tel: +33 (0)3 27 99 64 00
@: infos.pandrol-fr@pandrol.com
Description of the organisation: Part of the Delachaux Group, Pandrol is a business founded on a passion for innovation, and unique heritage is still at the heart of how we do business today. Over 100 years of product development, engineering know-how, acquisitions and growth has enabled us to become a world leader and global employer with over 1700 team members across 40 locations.

Pandrol defines the industry standard across rail fastening systems and aluminothermic welding. Pandrol has created rail infrastructure in more than 100 countries with products and services extending to designing, developing, and manufacturing equipment to make constructing and maintaining railways more efficient.

Pandrol Nabla C1 blade is a rail fastener, used worldwide, with many applications on all kinds of rail networks (Tramway, Metro, Conventional railways, High Speed Lines and Heavy Hauls). More than 500 million Nabla C1 blades have been supplied over last decades.

Product-related or management system-related certifications:

Quality	ISO 9001
System testing	EN 13481-2 Railway applications — Track — Performance requirements for fastening systems — Part 2: Fastening systems for concrete sleepers
	EN13481-5 Railway applications — Track — Performance requirements for fastening systems — Part 5: Fastening systems for slab track with rail on the surface or rail embedded in a channel
Material testing	NF F 50-015 Railway fixed equipment — Elastic rail fasteners.

Name and location of production site(s): Pandrol Douai (France)

Product information

Product name: Pandrol Nabla
Product identification: Pandrol Nabla C1
Product description: Pandrol Nabla C1 is made of spring steel hot formed, quenched, tempered, and protected against corrosion. Pandrol Nabla C1 is designed to be used in combination with other components for clamping the rail to the sleeper.

UN CPC code: 41253 Railway or tramway track construction material of iron or steel

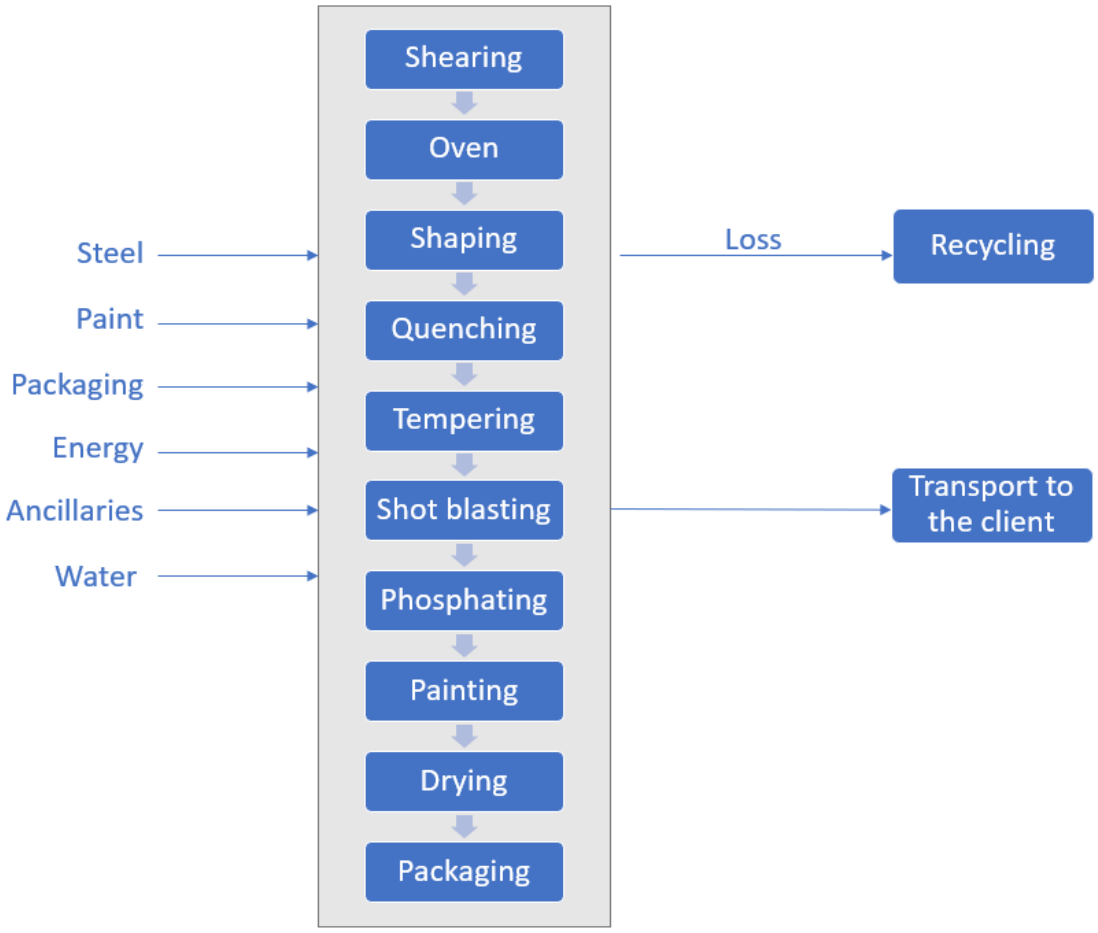
LCA information

Functional unit / declared unit: 1 piece of Pandrol Nabla C1 with a total weight of 0.495 kg (including the steel, the paint and the packaging) and designed to be part of the Nabla Evolution rail fastening system.
Reference service life: Pandrol Nabla C1 is intended to last at least the same time as the concrete sleeper lifetime. A minimal service reference lifetime of 30 years could be assumed.
Time representativeness: Data collected covers the year 2020.
Geographical representativeness: EU-27.
Database(s) and LCA software used: GaBi ts, Service Pack 40
Description of system boundaries: Cradle to gate with options (A1–A3 +A4)

This EPD is “cradle to gate”, considering the modules A1, A2, A3 and A4.

- A1 Production of preliminary products
- A2 Transport to the plant
- A3 Production including provision of energy, production of packaging as well as auxiliaries and consumables and waste treatment
- A4 Transport to construction site (scenario)

System diagram:



More information:

This elastic fastener is dedicated to:

- Maintaining the rail on the support
- Keeping the track gauge
- Keeping the track geometry
- All kind of track categories (Tramway, Metro, Railway, High speed line, Heavy Haul)

Technical specifications	Standard	Pandrol Nabla C1
Unit		1 piece
Weight (kg)		0.484
Clamping force	EN 13146-7	12 – 20 kN

This EPD summarizes the results for one piece of Pandrol Nabla C1. It is manufactured in Douai (France). All production losses are sent to the nearby recycling facility.

Cut-off criteria

All raw materials and production data have been taken into consideration. Capital goods (machinery, plant and other infrastructure) were not taken into consideration in the LCA, in accordance with the PCR.

Data quality
Specific data has been used for the manufacturing processes (A3) while life cycle modelling relies on GaBi datasets for raw materials stage (A1). Transport of raw materials to manufacturing site (A2) relies on calculated distances between supplier locations and the plant. The data is accurate and consistent.

Transport scenario (A4)
The study includes transportation to customer (A4 module). Pandrol Nabla C1 are sent directly from the manufacturing site to the client. In this modelling, transport is assumed to be made by road to a client located in France on a distance of 269 km. This scenario has been selected as the most representative based on sales for the year 2021.

Period under review
Representative data was compiled in 2021/2022 and represents the reference year 2020.

Allocation
For electricity and water use, production mass allocation has been used.

Comparability
Results presented this EPD are only comparable if they are carried out in accordance with the same product category rules, in this case EN 15804:2012+A1:2013, and if the context presented above is taken into account.

LCA practitioner: Virginie Terlinden, CO2logic sa/nv, @: info@co2logic.com

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	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	MND	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND
Geography	FR	FR	FR	FR													
Specific data						-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

Content declaration

Product

Materials / chemical substances	kg per piece	%	Environmental / hazardous properties
Steel	0.481	99.4%	Na.
Paint	0.003	0.6%	Na.
	0.484	**100%**	

Packaging

Distribution packaging: EU flat pallet and wrapping film
Consumer packaging: None

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: Pandrol Nabla C1 does not contain recycled materials.

Environmental performance

Potential environmental impact

PARAMETER	UNIT	TOTAL A1-A3	A4
Global warming potential (GWP)	kg CO_2 eq.	1.48E+00	5.58E-03
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	3.37E-11	1.50E-18
Acidification potential (AP)	kg SO_2 eq.	2.99E-03	6.90E-06
Eutrophication potential (EP)	kg PO_4^{3-} eq.	2.74E-04	1.52E-06
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	5.10E-04	-1.33E-06
Abiotic depletion potential – Elements	kg Sb eq.	5.95E-07	5.06E-10
Abiotic depletion potential – Fossil resources	MJ. net calorific value	1.66E+01	7.51E-02

Use of resources

PARAMETER		UNIT	TOTAL A1-A3	A4
Primary energy resources – Renewable	Use as energy carrier	MJ. net calorific value	8.15E-01	4.36E-03
	Used as raw materials	MJ. net calorific value	0.00E+00	0.00E+00
	TOTAL	MJ. net calorific value	8.15E-01	4.36E-03
Primary energy resources – Non-renewable	Use as energy carrier	MJ. net calorific value	1.83E+01	7.61E-02
	Used as raw materials	MJ. net calorific value	6.67E+02	0.00E+00
	TOTAL	MJ. net calorific value	6.85E+02	7.61E-02
Secondary material		kg	0.00E+00	0.00E+00
Renewable secondary fuels		MJ. net calorific value	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ. net calorific value	0.00E+00	0.00E+00
Net use of fresh water		m^3	1.13E-02	5.00E-06

Waste production and output flows

Waste production

PARAMETER	UNIT	TOTAL A1-A3	A4
Hazardous waste disposed	kg	9.03E-09	4.01E-12
Non-hazardous waste disposed	kg	4.74E-02	1.19E-05
Radioactive waste disposed	kg	6.44E-04	1.38E-07

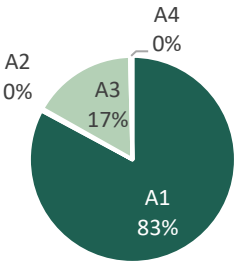
Output flows

PARAMETER	UNIT	TOTAL A1-A3	A4
Components for reuse	kg	6.51E-02	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00
Materials for energy recovery	kg	3.90E-01	0.00E+00
Exported energy. electricity	MJ	0.00E+00	0.00E+00
Exported energy. thermal	MJ	0.00E+00	0.00E+00

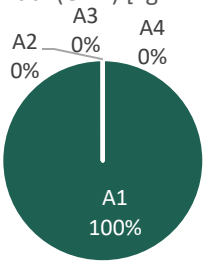
Additional information

Indicators for Pandrol Nabla C1 are influenced by A1, and more precisely by the production of the steel.

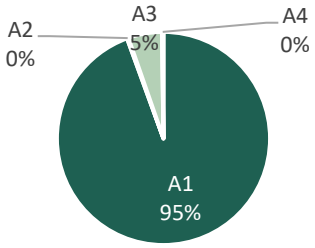
01 EN15804+A1 Global warming potential (GWP) [kg CO2 eq.]



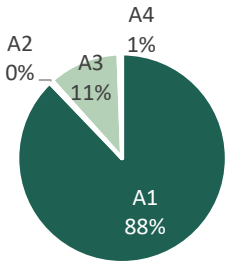
02 EN15804+A1 Ozone Depletion Potential (ODP) [kg R11 eq.]



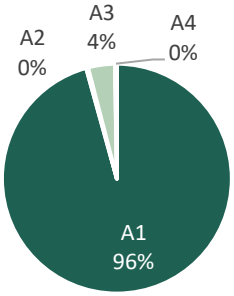
03 EN15804+A1 Acidification potential (AP) [kg SO2 eq.]



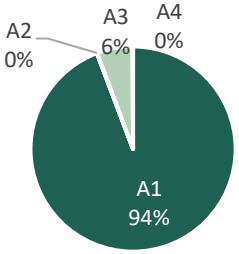
04 EN15804+A1 Eutrophication potential (EP) [kg Phosphate eq.]



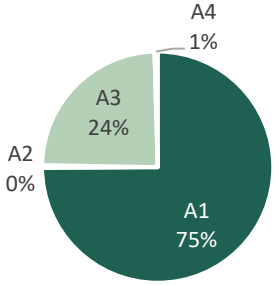
05 EN15804+A1 Photochemical Ozone Creation Potential (POCP) [kg Ethene eq.]



06 EN15804+A1 Abiotic depletion potential for non fossil resources (ADPE) [kg Sb eq.]



07 EN15804+A1 Abiotic depletion potential for fossil resources (ADPF) [MJ]



References

General Programme Instructions of the International EPD® System. Version 3.0
Product category rules (PCR): Product Category Rules for construction products and construction services of 2012:01, version 2.34 valid: 2022-02-28
Product Category Rules for railways of 2013:19. version 2.11 valid: 2022-01-10
EN 15804:2012+A1:2013 (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products)
ISO 21930 Environmental declaration of building products
ISO 14025:2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
ISO/TS 14067:2013 Greenhouse gases -- Carbon footprint of products -- Requirements and guidelines for quantification and communication
ISO 14040:2006 Environmental management -- Life cycle assessment -- Principles and framework
ISO 14044:2006 Environmental management -- Life cycle assessment -- Requirements and guidelines

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