Environmental Product Declaration

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

FTrack, *for rail 55G2 with Nabla Evolution N0 and FT ENCAPSULATION type B*

from

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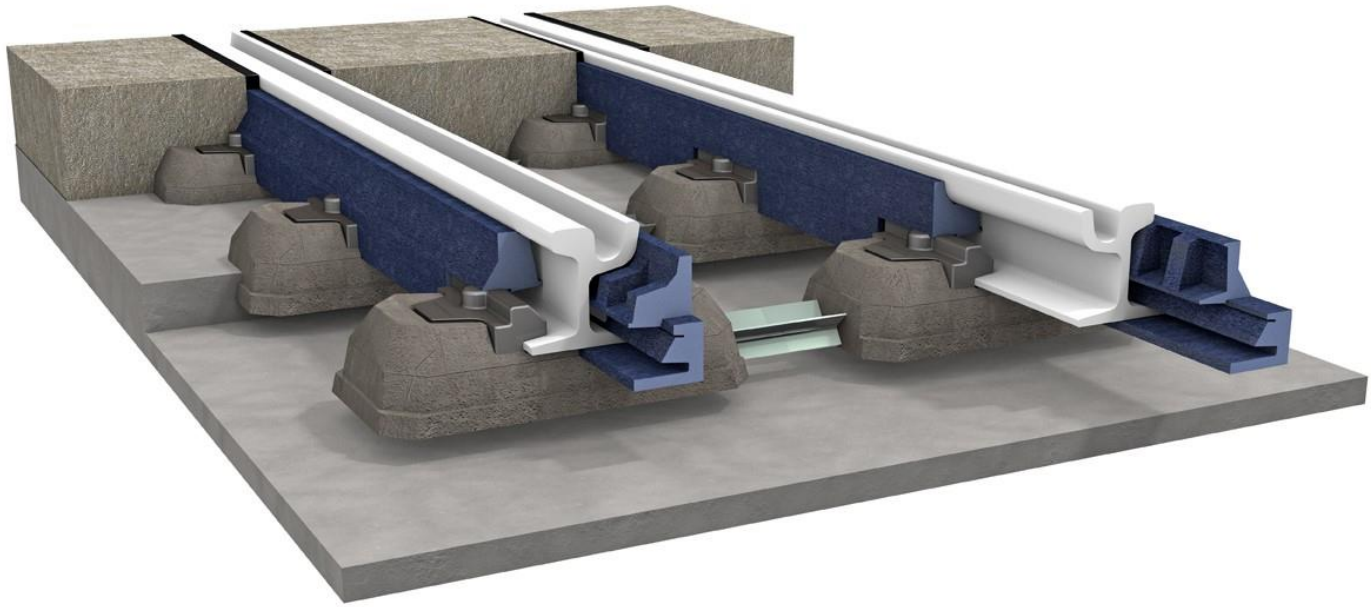

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core 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 programmes 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, Sustainable Resilient Systems
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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.

Experts in track resilience, Pandrol has developed environmentally sustainable systems to improve the life cycle of components, reduce maintenance costs and control noise and vibration for the whole spectrum of rail categories and sectors.

Product-related or management system-related certifications:

Quality	ISO 9001
System testing	For grooved rails only: EN 17319 Railway applications. Infrastructure. Performance requirements of rail fastening systems for tramways
	For vignola rails only: EN 13481-5 Railway applications. Track. Performance requirements for fastening systems: Fastening systems for slab track with rail on the surface or rail embedded in a channel
	EN 50122-2 Railway applications - Electrical safety, earthing and the return circuit: Provisions against the effects of stray currents caused by d.c. traction systems
Encaspulation material testing	ISO 37 Rubber, vulcanized or thermoplastic. Determination of tensile stress-strain properties
	ISO 1856 Flexible cellular polymeric materials. Determination of compression set
	ISO 8013 Rubber, vulcanized. Determination of creep in compression or shear
	ISO 1431-1 Rubber, vulcanized or thermoplastic. Resistance to ozone cracking. Static and dynamic strain testing
	ISO 1817 Determination of the effect of liquids
	ISO 11925-2 Reaction to fire tests-Ignitability of products subjected to direct impingement of flame
	ISO 188 Rubber, vulcanized or thermoplastic. Accelerated ageing and heat resistance tests
	ISO 4892-3 Plastics. Methods of exposure to laboratory light sources. Fluorescent UV lamps

Name and location of production site(s): Pandrol, EU27

Product information

Product name: Pandrol FTrack

Product identification: Pandrol FTrack for rail 55G2 with Nabla Evolution N0 and FT ENCAPSULATION type B

Product description: The Pandrol FTrack is the system in which the rail is fastened by discretely supporting rail fixations every 0.6 to 0.8 m (depending on curve radius of the track) and embedded by FT ENCAPSULATION (resilient rail-web filler profiles) that are made of 93% of recycled rubber granules coming from End-of-Life tyres and are designed to improve the dissociation of the rail and its immediate environment, the transfer of loads from one medium to the other, and the quality of the road-finishing layer. The system is suitable for both grooved and vignola rails, and the fastenings can be accommodated either in direct fixations or in sleepers.
The product under the current study is developed for fastening grooved rails type 54G1, 54G2, 54G4, 54R1, 54R2, 55G2 and 55G3 by means of Nabla blades fitted into bi-block sleepers type TW120 spaced every 0.75 m in combination with FT ENCAPSULATION FT-55G2-B-TJ-BF=520mm-30.

UN CPC code:

For the fastening part: 41253 Railway or tramway track construction material of iron or steel
For the sleeper: 37550 Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone
For the rubber encapsulation: 36220 Articles of vulcanized rubber other than hard rubber
For the top joint sealing material: 35490 Other chemical products

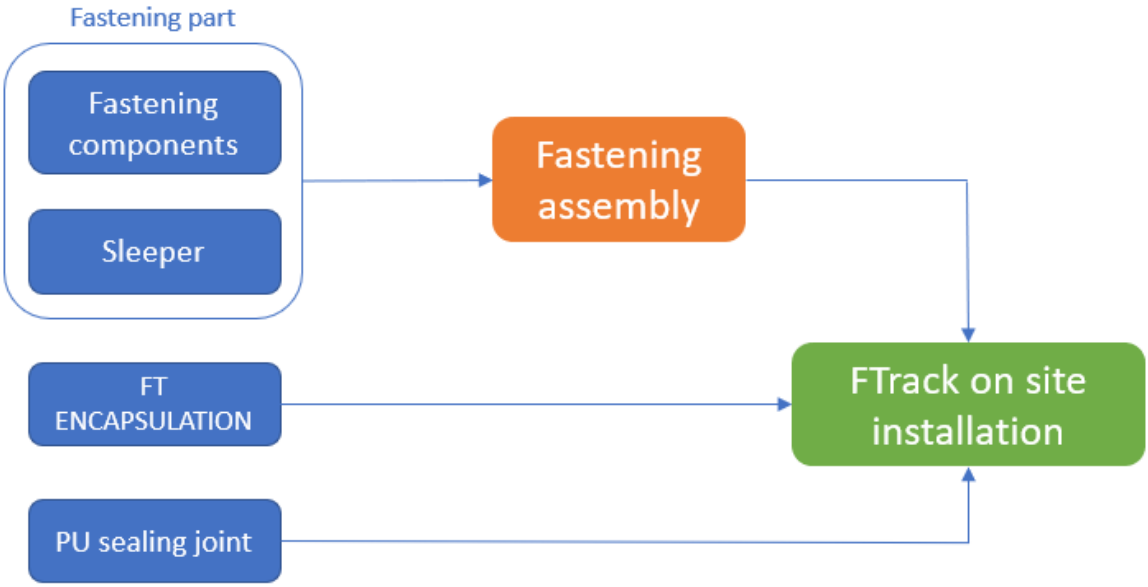
LCA information

Functional unit / declared unit: 1 linear meter of single rail of the Pandrol FTrack for rail 55G2 with Nabla Evolution N0 equipped with encapsulation type FT-55G2-B-TJ-BF=520mm-30 (for support spacing of 0.75 m) with weight of 92.712 kg (including the fastener, steel, rubber and joint) and designed to fasten the rail, control noise and vibration, as well as improve electrical rail insulation.
Reference service life: Pandrol FTrack for rail 55G2 with Nabla Evolution N0 and FT ENCAPSULATION type B is intended to last at least the same time as the rail lifetime. A minimal service reference lifetime of 30 years could be assumed
Time representativeness: Data collected covers the year 2021.
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:

Technical Features:

- ✓ Strong and reliable rail fastening compatible with thick track/road finishing layers
- ✓ Innovative “click” design of FT ENCAPSULATION for a non-adhesive installation technique
- ✓ Reduced interference of the rubber encapsulation on the vertical rail movement
- ✓ Does not interfere with any other typical embedded track maintenance activity, such as grinding and gauge corner restoration

Technical specifications	Standard	Nabla Evolution N0 for rail type 55G2 into bi-block sleepers type TW120
Length (linear meter of rail)		1
Weight (kg/piece)		80.848
Stiffness:	EN 17319	
Static	Category A	100 kN/mm per support point
Dynamic, 5 Hz	Category A	150 kN/mm per support point
Declaration of Performance		Rail fastening, noise and vibration control

Technical specifications	Standard	FT-55G2-B-TJ-BF=520mm-30
Length (linear meter of rail)		1
Weight (kg/lmr)		10.713
Stray current protection	EN 50122-2	<2.5 S/km (if all conditions are met)
Declaration of Performance		Rail dissociation, limited stray current insulation

Technical specifications	Standard	Top sealing joint
Length (linear meter of rail)		1
Weight (kg/lmr)		1.151
Declaration of Performance		Water tightness

This EPD summarizes the results for one linear meter of single rail of Pandrol FTrack for rail 55G2 with Nabla Evolution N0 and FT ENCAPSULATION type B. Fastening components are manufactured

in EU27; encapsulation profiles are manufactured in Czech Republic; sealing material for top joint is produced in EU27. 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 some raw materials 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 location and the plant. The data is accurate and consistent.

Transport scenario (A4)
The study includes transportation to customer (A4 module). The fastening part is sent from the fastening assembly site (France) to the installation site located in Charleroi (Belgium). In this modelling, transport is assumed to be made by road, on a distance of 357 km. The rubber encapsulation is sent from the Czech Republic to the same installation site (1120 km). The PU joint is provided by an unknown supplier (EU27) and is also sent to the same location site (average distance of 581 km). This scenario has been selected as the most representative based on sales for the year 2012.

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

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

Comparability
Results presented this EPD is 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	EU27	EU27	EU27	BE													
Specific data						-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

Content declaration

Product

Materials / chemical substances	kg per piece	%	Environmental / hazardous properties
Rubber	0.347	0.37%	Na.
PA	0.877	0.95%	Na.
Steel	2.949	3.18%	Na.
Paint	0.008	0.01%	Na.
Reinforced concrete	76.667	82.69%	Na.
Recycled rubber	10.177	10.98%	Na.
PU	1.687	1.82%	Na.
	92.712	**100%**	

Packaging

Distribution packaging: None
Consumer packaging: None

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: The FT ENCAPSULATION type B is made of recycled rubber granulates coming from End-of-Life tyres recycling process (post-consumer waste).

Environmental performance

Potential environmental impact

PARAMETER	UNIT	TOTAL A1-A3	A4
Global warming potential (GWP)	kg CO_2 eq.	4.04E+01	2.12E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	4.82E-08	5.70E-16
Acidification potential (AP)	kg SO_2 eq.	6.99E-02	2.61E-03
Eutrophication potential (EP)	kg PO_4^{3-} eq.	1.02E-02	5.74E-04
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 eq.	7.81E-03	-4.99E-04
Abiotic depletion potential – Elements	kg Sb eq.	2.96E-05	1.92E-07
Abiotic depletion potential – Fossil resources	MJ. net calorific value	4.71E+02	2.86E+01

Use of resources

PARAMETER		UNIT	TOTAL A1-A3	A4
Primary energy resources – Renewable	Use as energy carrier	MJ. net calorific value	4.34E+01	1.66E+00
	Used as raw materials	MJ. net calorific value	0.00E+00	0.00E+00
	TOTAL	MJ. net calorific value	4.34E+01	1.66E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ. net calorific value	1.68E+02	2.89E+01
	Used as raw materials	MJ. net calorific value	3.48E+02	0.00E+00
	TOTAL	MJ. net calorific value	5.16E+02	2.89E+01
Secondary material		kg	1.00E+01	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	1.23E+00	1.90E-03

Waste production and output flows

Waste production

PARAMETER	UNIT	TOTAL A1-A3	A4
Hazardous waste disposed	kg	4.37E-06	1.53E-09
Non-hazardous waste disposed	kg	3.14E+00	4.54E-03
Radioactive waste disposed	kg	1.41E-02	5.25E-05

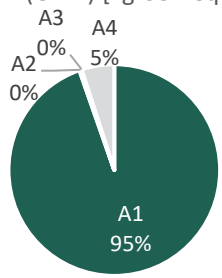
Output flows

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

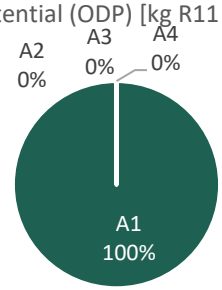
Additional information

Indicators for Pandrol FTrack for rail 55G2 with Nabla Evolution N0 and FT ENCAPSULATION type B are influenced by A1, and more precisely by the production of the reinforced concrete and the FT ENCAPSULATION made of recycled rubber.

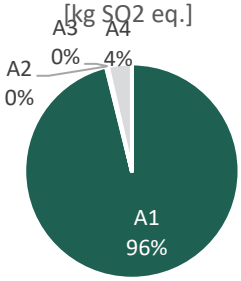
01 EN15804+A1 Global warming potential (GWP) [kg CO2 eq.]



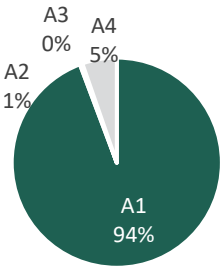
02 EN15804+A1 Ozone Depletion Potential (ODP) [kg R11 eq.]



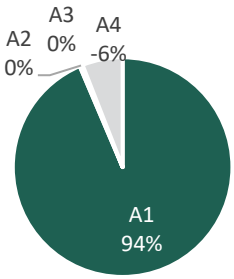
03 EN15804+A1 Acidification potential (AP) [kg SO2 eq.]



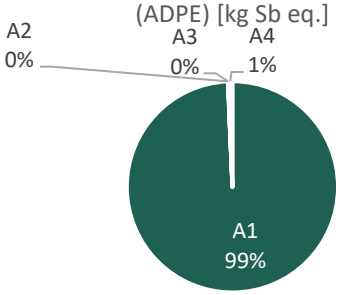
04 EN15804+A1 Eutrophication potential (EP) [kg Phosphate eq.]



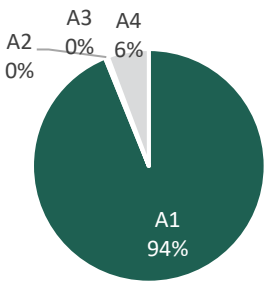
05 EN15804+A1 Photochemical Ozone Creation Potential (POCP) [kg Ethene eq.]



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 for construction products and construction services of 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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