

Environmental Product Declaration



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

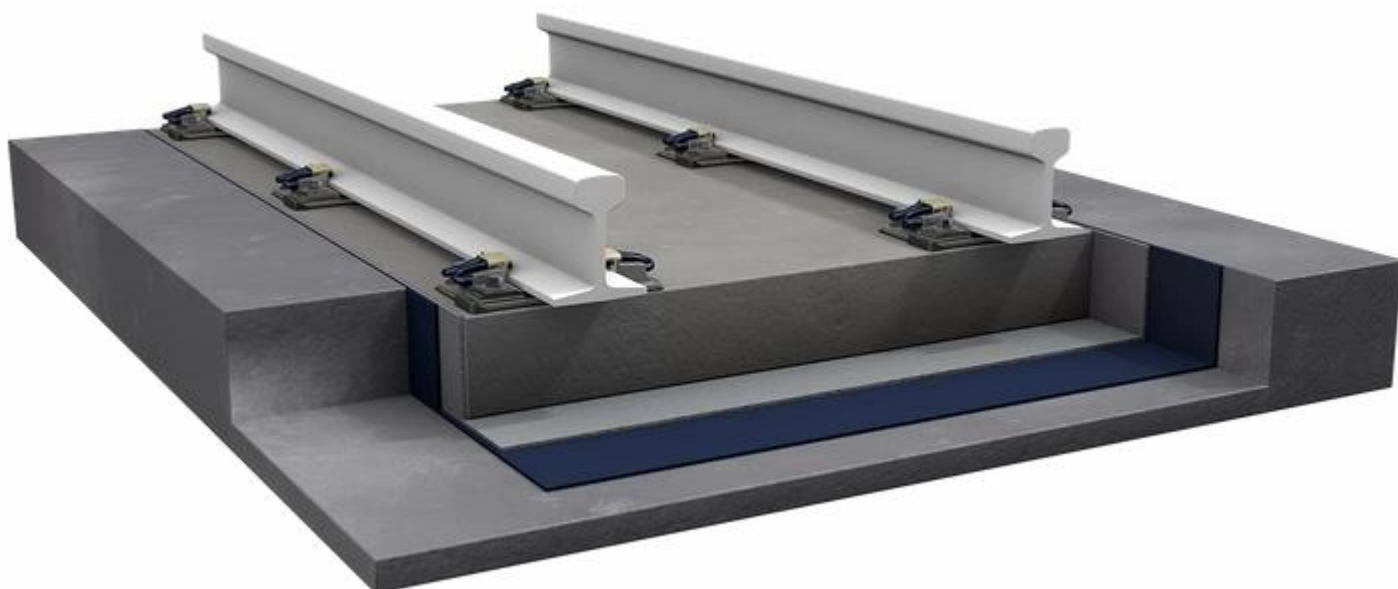
Floating Slab Mat, *type FSM-L13*

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
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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 2.33 valid: 2021-12-31
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: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third party verifier: Damien Prunel from Bureau Veritas LCIE Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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, 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	DIN 45673-7 Mechanical vibration. Resilient elements used in railways tracks. Laboratory test procedures for resilient elements of floating slab track systems
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
	EN 13250 Geotextiles and geotextile-related products. Characteristics required for use in the construction of railways

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

Product information

Product name: Pandrol Floating Slab Mat

Product identification: Pandrol FSM-L13

Product description: The Pandrol FSM are a family of continuous resilient solutions used in Floating Slab Track vibration insulation systems. The Pandrol FSM-L13 solution is composed of 2 elements: an active resilient layer made of high-quality resin-bonded recycled rubber defining the static and dynamic stiffness, and a separate top protection layer made of non-woven geotextile. The Pandrol FSM-L13 has a total weight of 16 kg/m² using more than 90% of recycled rubber granules coming from End-of-Life tyres.

UN CPC code: 36220 Articles of vulcanized rubber other than hard rubber

LCA information

Functional unit / declared unit: 1 square meter of Floating Slab Mat (type FSM-L13) commercialized by Pandrol and designed to be installed directly beneath the concrete slab which offers vibration and noise attenuation.

Reference service life: Pandrol FSM-L13 is intended to last at least the same time as the concrete slab lifetime. A minimal service reference lifetime of 30 years could be assumed.

Time representativeness: Data collected covers the year 2020.

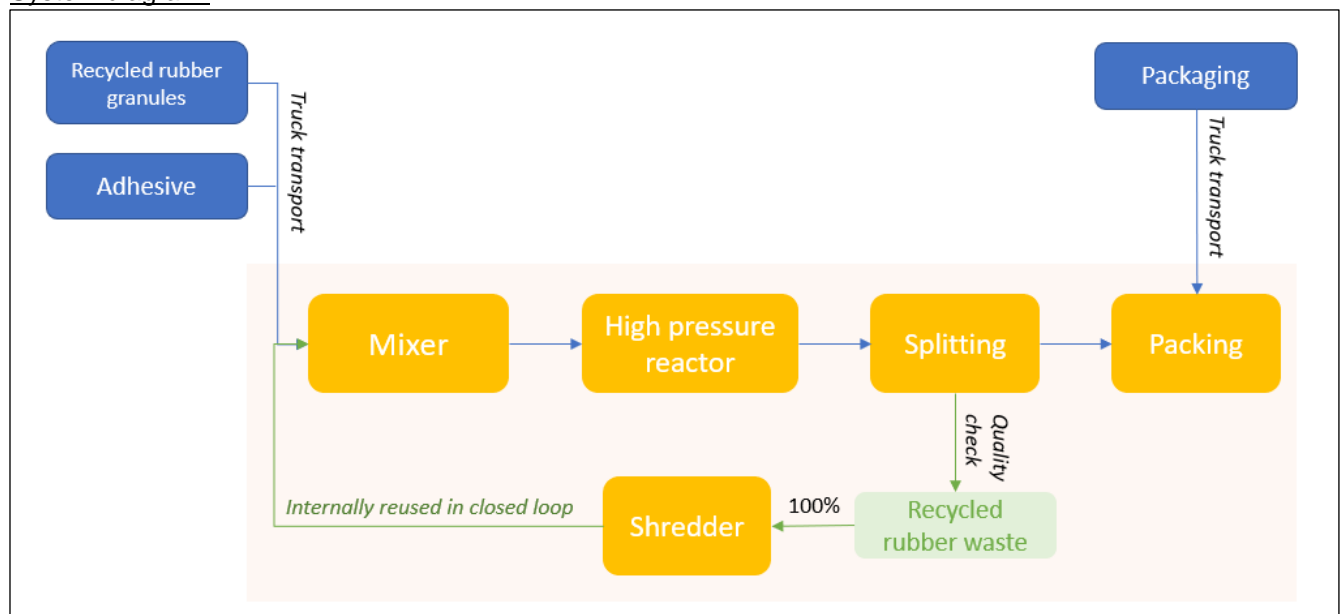
Database(s) and LCA software used: GaBi ts, Service Pack 40

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:

The elastic properties of the mat solution are defined by the following parameters:

- ✓ Track and train design
- ✓ Chosen material type
- ✓ Defined thickness and number of layers
- ✓ Determined shape factor

Other properties:

- ✓ Can be supplied in rolls or sheets, both options easy to install and compatible with all types of rail and track systems
- ✓ Water permeable and maintenance free, the Pandrol FSM solutions are designed to reduce the life cycle costs of the railway
- ✓ Insulation performance can be tuned by either modifying the stiffness of the mat or the properties of the slab
- ✓ Each mat has excellent mechanical and chemical properties and is compatible to special track works such as manholes, pipes and electrical boxes

Technical specifications	Standard	Pandrol FSM-L13
Resilient layer		2 stacked layers of 15 mm
Total surface (m ²)		1
Total weight (kg)		16
Stiffness:	DIN 45673-7	
Static		9.6 MN/m ³ (between 0.013 and 0.028 MPa)
Dynamic, 10Hz		23.6 MN/m ³ (around 0.020 MPa)
Declaration of Performance		Noise and vibration control and/or for transition stiffness

This EPD summarizes the results for one square meter of FSM-L13, manufactured for Pandrol in Portugal. The manufacture is powered with grid electricity and 100% renewable thermal energy (solid biomass). 100% recycled rubber production losses are being shredded and reinjected in production minimising furthermore the environmental impact of Pandrol products.

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 location and the plant. Comparison and accuracy of the data has been verified and compared with Pandrol own data for 2019, 2018 and 2017. The data is accurate and consistent.

Transport scenario (A4)

The study includes transportation to customer (A4 module). Floating Slab Mats commercialized by Pandrol from Portugal are shipped directly from the manufacturing site to the client. The transport distance scenario is Pandrol FSM-L13 transported to Australia made by combination of truck for first mile (25 km) and sea freight to destination (21883 km). This scenario has been selected as the most representative based on sales for the year 2020.

Period under review

Representative data were compiled in 2021 and represents the reference year 2020.

Allocation

For heat and electricity 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.

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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	PT	AU													
Specific data						-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

Content declaration

Product

Materials / chemical substances	g per m ²	%	Environmental / hazardous properties
Recycled rubber granules	14,662	92%	Na.
Adhesive	936	6%	Na.
Geotextile	325	2%	Na.
	15,923	100%	

Packaging

Distribution packaging: EU flat pallet, cardboard plate and wrapping film

Consumer packaging: Cardboard tube and wrapping film

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: Pandrol FSM-L13 are 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.	1.56E+01	3.01E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	2.38E-09	4.19E-16
Acidification potential (AP)	kg SO ₂ eq.	2.69E-02	8.88E-02
Eutrophication potential (EP)	kg PO ₄ ³⁻ eq.	4.72E-03	9.89E-03
Formation potential of tropospheric ozone (POCP)	kg C ₂ H ₄ eq.	3.59E-03	4.79E-03
Abiotic depletion potential – Elements	kg Sb eq.	1.05E-06	9.16E-08
Abiotic depletion potential – Fossil resources	MJ, net calorific value	1.90E+02	3.62E+01

Use of resources

PARAMETER		UNIT	TOTAL A1-A3	A4
Primary energy resources – Renewable	Use as energy carrier	MJ. net calorific value	9.41E+01	1.41E-01
	Used as raw materials	MJ. net calorific value	0.00E+00	0.00E+00
	TOTAL	MJ. net calorific value	9.41E+01	1.41E-01
Primary energy resources – Non-renewable	Use as energy carrier	MJ. net calorific value	2.03E+02	3.64E+01
	Used as raw materials	MJ. net calorific value	4.06E+02	0.00E+00
	TOTAL	MJ. net calorific value	6.09E+02	3.64E+01
Secondary material		kg	1.95E+01	0.00E+00
Renewable secondary fuels		MJ. net calorific value	3.65E+01	0.00E+00
Non-renewable secondary fuels		MJ. net calorific value	0.00E+00	0.00E+00
Net use of fresh water		m³	2.72E-01	2.35E-04

Waste production and output flows

Waste production

PARAMETER	UNIT	TOTAL A1-A3	A4
Hazardous waste disposed	kg	4.21E-06	1.62E-08
Non-hazardous waste disposed	kg	2.60E-01	3.74E-03
Radioactive waste disposed	kg	3.65E-03	4.11E-05

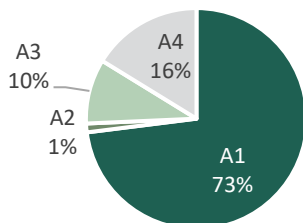
Output flows

PARAMETER	UNIT	TOTAL A1-A3	A4
Components for reuse	kg	5.14E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00
Exported energy. electricity	MJ	0.00E+00	0.00E+00
Exported energy. thermal	MJ	0.00E+00	0.00E+00

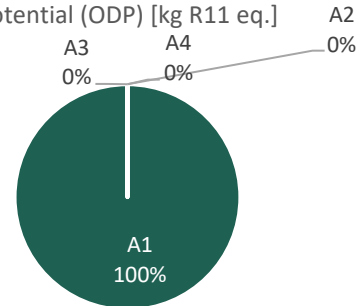
Additional information

Indicators for Pandrol FSM-L13 are influenced by A4 scenario where Pandrol FSM-L13 are transported to Australia. If the A4 scenario changes the results are likely to be significantly lowered.

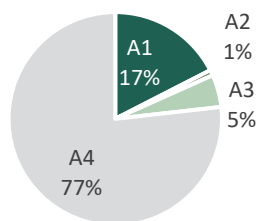
01 EN15804+A1 Global warming potential (GWP) [kg CO₂ eq.]



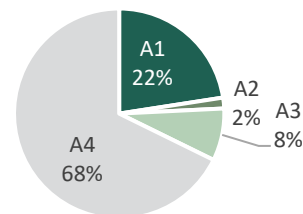
02 EN15804+A1 Ozone Depletion Potential (ODP) [kg R11 eq.]



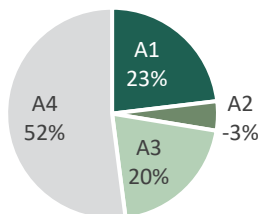
03 EN15804+A1 Acidification potential (AP) [kg SO₂ eq.]



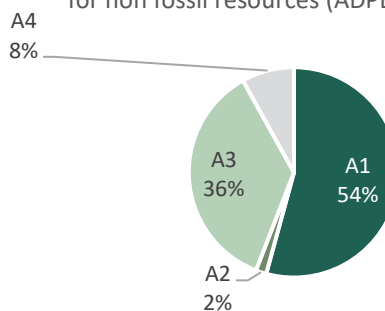
04 EN15804+A1 Eutrophication potential (EP) [kg Phosphate eq.]



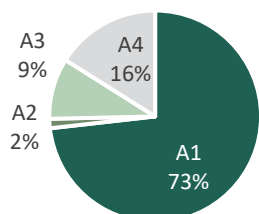
05 EN15804+A1 Photochemical Ozone Creation Potential (POCP) [kg Ethene eq.]



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]



Differences versus the previous version

Since the first publication of the EPD, amendments have been made which have led to changes in the environmental performance of the FSM, type FSM-L13. These amendments relate to the electricity consumption for the cutting of the cylinders, to the scrap rate that has been reduced from 30 % to 16% and to the composition of the glue used in the product.

References

General Programme Instructions of the International EPD[®] System. Version 3.0.

Product Category Rules for construction products and construction services of 2012:01, version 2.33 valid: 2021-12-31

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

Life cycle assessment of waste tyre treatments: Material recycling vs. co-incineration in cement kilns, Project no. 118-31036, May 2020, Genan Holding A/S"

