

# Environmental Product Declaration



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

## Under Ballast Mat, *type UBM-H35-C*

from



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## General information

### Programme information

<b>Programme:</b>	The International EPD® System
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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 <a href="http://www.environdec.com">www.environdec.com</a> . The review panel may be contacted via <a href="mailto:info@environdec.com">info@environdec.com</a> .
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 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	DIN 45673-5 Mechanical vibration. Resilient elements used in railways tracks. Laboratory test procedures for under-ballast mats
	EN 17282 Railway applications. Infrastructure. Under ballast mat
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 Under Ballast Mat

Product identification: Pandrol UBM-H35-C

Product description: The Pandrol UBM are a family of continuous resilient solutions used in Ballasted Track vibration insulation systems. The Pandrol UBM-H35-C 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 UBM-H35-C has a total weight of 11 kg/m<sup>2</sup> 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 Under Ballast Mat (type UBM-H35-C) commercialized by Pandrol and designed to be installed directly beneath the ballast bed, offering vibration isolation and protection of the track components.

Reference service life: Pandrol UBM-H35-C is intended to last at least the same time as the ballast lifetime. A minimal service reference lifetime of 30 years could be assumed.

Time representativeness: Data collected covers the year 2019.

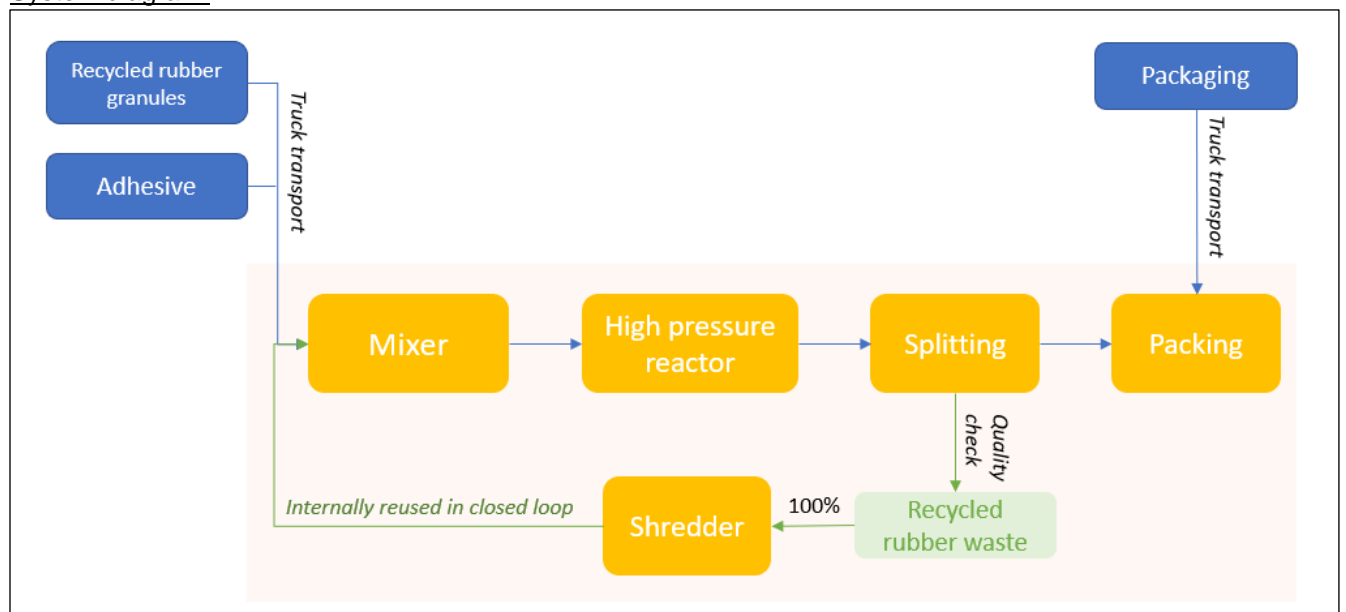
Database(s) and LCA software used: GaBi ts, Service Pack 40

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 track design
- ✓ Water permeable and maintenance free, Pandrol UBM solutions are designed to reduce the life cycle costs of the railway
- ✓ Isolation performance is completely tuneable
- ✓ Excellent mechanical and chemical resistance properties, and is compatible to special track works such as manholes, pipes and electrical boxes
- ✓ Contingency solution of track stiffening by sand ingress
- ✓ Increased protection of track foundation structures (e.g. bridges and viaducts)

Technical specifications	Standard	Pandrol UBM-H35-C
Resilient layer		1 layer of 20 mm
Total surface (m <sup>2</sup> )		1
Total weight (kg)		11
Stiffness:	DIN 45673-5	
Static		32 MN/m <sup>3</sup>
Dynamic, 10 Hz		56 MN/m <sup>3</sup>
Declaration of Performance		Improve load distribution in the ballast, reduction of ballast height, improves track quality & track lifetime, high vibration isolation, low resonance frequency

This EPD summarizes the results for one square meter of UBM-H35-C, 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). Under Ballast Mats commercialized by Pandrol in Portugal are shipped directly from the manufacturing site to the client. The A4 scenario is of a road transport by 24-ton truck Euro 5 to Poland (3046 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	PL													
Specific data						-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

# Content declaration

## Product

Materials / chemical substances	g per m <sup>2</sup>	%	Environmental / hazardous properties
Recycled rubber granules	10,057	91%	Na.
Adhesive	643	6%	Na.
Geotextile	325	3%	Na.
	<b>11,025</b>	<b>100%</b>	

## 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 UBM-H35-C are with 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 <sub>2</sub> eq.	1.10E+01	1.70E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.75E-09	4.56E-16
Acidification potential (AP)	kg SO <sub>2</sub> eq.	2.04E-02	3.51E-03
Eutrophication potential (EP)	kg PO <sub>4</sub> <sup>3-</sup> eq.	3.39E-03	8.33E-04
Formation potential of tropospheric ozone (POCP)	kg C <sub>2</sub> H <sub>4</sub> eq.	2.67E-03	-1.15E-03
Abiotic depletion potential – Elements	kg Sb eq.	7.34E-07	1.54E-07
Abiotic depletion potential – Fossil resources	MJ. net calorific value	1.40E+02	2.28E+01

### Use of resources

PARAMETER	UNIT	TOTAL A1-A3	A4	
Primary energy resources – Renewable	Use as energy carrier	MJ. net calorific value	6.63E+01	1.33E+00
	Used as raw materials	MJ. net calorific value	0.00E+00	0.00E+00
	TOTAL	MJ. net calorific value	6.63E+01	1.33E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ. net calorific value	1.50E+02	2.31E+01
	Used as raw materials	MJ. net calorific value	2.79E+02	0.00E+00
	TOTAL	MJ. net calorific value	4.29E+02	2.31E+01
Secondary material	kg	1.24E+01	0.00E+00	
Renewable secondary fuels	MJ. net calorific value	2.50E+01	0.00E+00	
Non-renewable secondary fuels	MJ. net calorific value	0.00E+00	0.00E+00	
Net use of fresh water	m <sup>3</sup>	1.49E-01	1.52E-03	

## Waste production and output flows

### Waste production

PARAMETER	UNIT	TOTAL A1-A3	A4
Hazardous waste disposed	kg	2.58E-06	1.22E-09
Non-hazardous waste disposed	kg	1.76E-01	3.63E-03
Radioactive waste disposed	kg	2.47E-03	4.20E-05

### Output flows

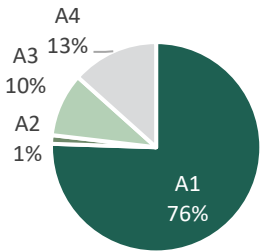
PARAMETER	UNIT	TOTAL A1-A3	A4
Components for reuse	kg	2.51E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00
Exported energy. electricity	MJ	0.00E+00	0.00E+00
Exported energy. thermal	MJ	0.00E+00	0.00E+00



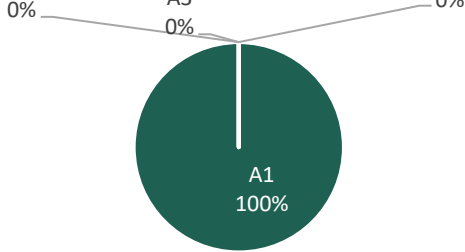
## Additional information

Indicators for Pandrol UBM-H35-C are influenced by A4 scenario where they are transported to Poland. If the A4 scenario changes the results are likely to be significantly lowered.

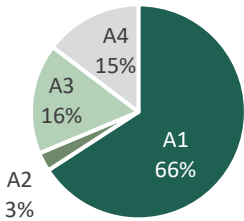
01 EN15804+A1 Global warming potential (GWP) [kg CO2 eq.]



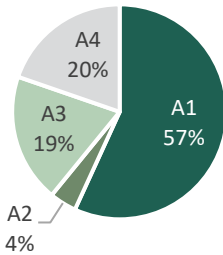
02 EN15804+A1 Ozone Depletion Potential (ODP) [kg R11 eq.]



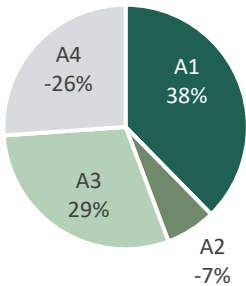
03 EN15804+A1 Acidification potential (AP) [kg SO2 eq.]



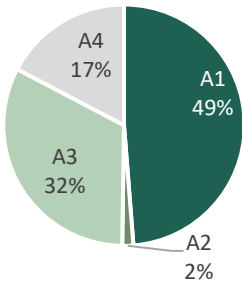
04 EN15804+A1 Eutrophication potential (EP) [kg Phosphate eq.]



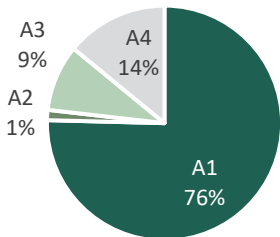
05 EN15804+A1 Photochemical Ozone Creation Potential (POCP) [kg Ethene eq.]



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 UBM, type type UBM-H35-C. 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

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

