DAPcons®.100.216

DECLARACIÓN AMBIENTAL DE PRODUCTO
ENVIRONMENTAL PRODUCT DECLARATION

According to the standards:
ISO 14025 and UNE-EN 15804:2012+A2:2020/AC:2021

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Barcelona

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ISO 14025 and UNE-EN 15804:2012+A2:2020/AC:2021

GENERAL INFORMATION

Product

Flexofibers. High tensile Second Life Steel fibers

Company

Product description

Flexofibers are metallic fibers obtained from of end-of-life tires waste. They are characterized by high tensile strength and flexibility. Their small diameter (250 microns – 0.25 mm) allows for a high number of filaments per unit weight, making them a highly competitive product derived from circular economy processes.

Reference RCP

RCP 100 (version 3.2 - 21/12/2023) Construction products in general

Production plant

Avenida del Monte Boyal 131,
Casarrubios del Monte, 45950, Toledo, Spain

Validity

From: 20/01/2025 Until: 20/01/2030

The validity of DAPcons®.100.216 is subject to the conditions of the regulation DAPcons®. The current edition of this DAPcons® is the one that appears in the registry maintained by Cateb; for informational purposes, it is included on the Program website www.csostenible.net

EXECUTIVE SUMMARY

Flexofibers. High tensile Second Life Steel fibers

	DAPconstruction® Programme Operator Environmental Product Declarations in the Construction sector www.csostenible.net
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	Owner of the declaration Flexofibers Europa SL Calle Artesanos 29 28660 - BOADILLA DEL MONTE (España) https://flexofibers.com/
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Declared product

Flexofibers. High tensile Second Life Steel fibers

Geographic representation

Europe

Variability between different products

This document declares the results for Flexofibers, which are the same product differing only in length, while maintaining identical production processes and facilities.

Declaration number

DAPcons®.100.216

Issue date

19/12/2024

Validity

This verified declaration authorizes its holder to carry the logo of the operator of the ecolabelling program DAPconstruction®. The declaration is applicable exclusively to the mentioned product and for five years from the date of registration. The information contained in this statement was provided under the responsibility of: **Flexofibers Europa SL**

Programme Administrator Signature

Celestí Ventura Cisternas. President of Cateb

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Verifier Signature

Ferran Pérez Ibáñez. Institut de Tecnologia de la Construcció de Catalunya - ITeC. Verifier accredited by the administrator of the DAPcons® Programme

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ENVIRONMENTAL PRODUCT DECLARATION

1. PRODUCT DESCRIPTION AND USE

Flexofibers are metallic fibers obtained from end-of-life tire processing, featuring high tensile strength and flexibility. Their small diameter (250 microns – 0.25 mm) allows for a large filament count per unit weight, making them a highly competitive product from circular economy processes.

1.1 Content information

Product components

The Flexofibers production process uses waste materials from end-of-life car and truck tire shredding plants. The raw material consists of steel fibers and wires of various lengths and diameters, with rubber contamination in irregular forms and crushed nylon.

Packaging materials

The inventory includes the packaging of fibers in cardboard boxes, which, when unfolded, measure 700 x 1530 mm and hold 11.5 kg of fiber.

Residues are also considered packed in plastic bags measuring 90 x 90 x 90 cm, with a capacity of 1000 kg of waste per bag.

2. DESCRIPTION OF THE STAGES OF THE LIFE CYCLE

2.1. Manufacturing (A1, A2 y A3)

Raw Materials and transport (A1 y A2)

Raw materials, consisting of end-of-life tire waste, are obtained from tire recycling plants

These materials are transported in bulk trucks and stored in a designated area within the facility.

Manufacturing (A3)

Initial Feeding: raw materials are fed into the plant via a front loader, deposited into a hopper with a metal chain conveyor ensuring proper dosage.

Cleaning and conditioning: impurities are removed, and materials are prepared for further processing, ensuring optimal entry conditions for separation and subsequent processing.

Steel, Rubber, and Wire separation: advanced physical and mechanical systems separate the primary components efficiently.

Classification: materials are screened by diameter and length, with non-compliant items reprocessed and compliant materials advanced for quality control.

AI-Assisted Quality Control: ensures compliance with quality standards before packaging.

Packaging: approved materials are carefully packaged for storage or distribution.

2.2. Construction process stage (A4 y A5)

Transport to the building site (A4)

Undeclared

Product installation process and construction (A5)

Undeclared

2.3. Product use (B1-B7)

Use (B1)

Undeclared

Maintenance (B2)

Undeclared

Repair (B3)

Undeclared

Replacement (B4)

Undeclared

Refurbishment (B5)

Undeclared

Operational energy use (B6)

Undeclared

Operational water use (B7)

Undeclared

2.4. End of life (C1-C4)

Deconstruction and demolition (C1)

The demolition process is considered for this phase.

Transport to waste processing (C2)

Transport from the site to the waste treatment plant is included.

Waste processing for reuse, recovery and/or recycling (C3)

It is assumed that waste is separated at the waste treatment plant.

Disposal (C4)

90% of the material is recycled, while 10% is landfilled. This calculation corresponds to phases C4 and D. It is considered that the fibers represent 1.1% by mass of the total volume of the structure.

2.5. Reuse/recovery/recycling potential (D)

The benefits of recycling second-life fibers outweigh the environmental loads. In terms of Global Warming Potential (GWP), module D demonstrates a significant benefit of -3.89E-02 kg CO_2 eq per kg of recycled fibers.

These results highlight that the production and recovery of second life fibers contribute positively to the circular economy by minimizing the global environmental impact.

3. LIFE CYCLE ASSESSMENT

The objective of the analysis is to determine the EPD of the second life fibers within an A1-A3 framework with options. The purpose of the EPDs for the fibers is primarily B2B communication.

The declaration has been prepared in accordance with ISO 14025:2010 and UNE-EN 15804:2012+A2:2020/AC:2021 standards.

The data used to characterize the production processes is based on the Ecoinvent 3.9.1 life cycle inventories, accessed through SimaPro 9.5.0.0.

3.1. Declared Unit

The declared unit is 1 kg of second life steel fibers, with a reference service life of 50 years.

Additional comments

3.2. Scope and modules that are declared

Table 2. Declared modules

Product stage			Construction Process Stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw materials supply	Transport	Manufacturing	Transport	Construction - Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	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	X	X	X	X	X

X = Declared module **MND** = Undeclared module

3.3. LCA results of potential environmental impact referred to the declared unit (ACV)

Table 3. Parameters of environmental impact

Parameter	Unit	Life cycle stage														Module D
		Product stage	Construction Process Stage		Use stage							End of life stage				
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
Climate change - total (GWP-total)	kg CO2 eq	4.36E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.34E-05	9.43E-03	1.82E-05	3.46E-04	-3.89E-02
Climate change - fossil (GWP-fossil)	kg CO2 eq	7.73E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.05E-05	9.42E-03	1.75E-05	3.46E-04	-6.92E-02
Climate change - biogenic (GWP-biogenic)	kg CO2 eq	-3.40E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.99E-07	8.51E-06	9.93E-08	1.08E-08	3.06E-02
Climate change - land use and changes in land use (GWP-luluc)	kg CO2 eq	3.25E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.44E-06	4.57E-06	6.08E-07	4.69E-08	-2.93E-04
Ozone layer depletion (ODP)	kg CFC 11 eq	2.20E-09	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.75E-12	2.05E-10	4.35E-13	4.46E-12	-1.98E-09
Acidification (AP)	mol H+ eq	3.05E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.60E-07	3.07E-05	6.47E-08	2.91E-06	-2.72E-04
Eutrophication of fresh water (EP-freshwater)	kg P eq	1.99E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.21E-08	6.59E-07	5.49E-09	3.48E-08	-1.79E-05
Eutrophication of sea water (EP-marine)	kg N eq.	9.61E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.49E-08	1.06E-05	1.36E-08	1.19E-06	-8.53E-05
Terrestrial eutrophication (EP-terrestrial)	mol N eq.	9.40E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.13E-07	1.11E-04	1.28E-07	1.29E-05	-8.33E-04
Photochemical ozone formation (POCP)	kg NMVOC eq	3.53E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.10E-07	4.59E-05	5.22E-08	4.08E-06	-3.13E-04
Depletion of abiotic resources - minerals and metals (ADP-minerals&metals)	kg Sb eq	2.34E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.08E-10	3.02E-08	2.67E-11	1.31E-10	-2.10E-07
Depletion of abiotic resources - fossil fuels (ADP-fossil)	MJ, net calorific value	1.09E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.29E-03	1.33E-01	5.69E-04	4.16E-03	-9.80E-01
Water consumption (WDP)	m3 worldwide eq. private	5.62E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.53E-04	5.44E-04	3.81E-05	1.01E-05	-5.06E-02
The Indicador includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This Indicador is thus equal to the GWP Indicador originally defined in EN 15804:2012+A1:2013. Can be obtained from IPCC characterization factors.																
Global Warming Potential (GHG)	kg CO2 eq	7.76E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.30E-05	9.42E-03	1.81E-05	3.46E-04	-6.95E-02

A1 Supply of raw materials. **A2** Transport to waste processing. **A3** Manufacturing. **A4** Transport to waste processing. **A5** Installation and construction processes. **B1** Use. **B2** Maintenance. **B3** Repair. **B4** Replacement. **B5** Refurbishment. **B6** Operational energy use. **B7** Operational water use. **C1** Deconstruction and demolition. **C2** Transport to waste processing. **C3** Waste management for reuse, recovery and recycling. **C4** Fine removal. **D** Environmental benefits and burdens beyond the system boundary. **MND** Undeclared module.

Table 4. Parameters for the use of resources, waste and output material flows

Parameter	Unit	Life cycle stage														Module D
		Product stage	Construction Process Stage		Use stage							End of life stage				
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
Use of renewable primary energy excluding renewable primary energy resources used as feedstock	MJ, net calorific value	9.60E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.74E-04	9.40E-04	1.18E-04	6.34E-05	-8.64E-01
Use of renewable primary energy used as raw material	MJ, net calorific value	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	9.60E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.60E-01	9.60E-01	9.60E-01	9.60E-01	9.60E-01
Non-renewable primary energy use, excluding non-renewable primary energy resources used as feedstock	MJ, net calorific value	1.16E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.39E-03	1.42E-01	5.94E-04	4.42E-03	-1.04E+00
Use of non-renewable primary energy used as raw material	MJ, net calorific value	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy (primary energy and renewable primary energy resources used as feedstock)	MJ, net calorific value	1.16E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.39E-03	1.42E-01	5.94E-04	4.42E-03	-1.04E+00
Use of secondary materials	kg	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ, net calorific value	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ, net calorific value	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of freshwater resources	m3	1.41E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.03E-06	1.90E-05	5.04E-07	3.53E-07	-1.27E-03
Hazardous waste removed	kg	5.65E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.98E-09	8.50E-07	9.88E-10	2.45E-08	-5.06E-06
Non-hazardous waste eliminated	kg	4.78E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.34E-06	6.52E-03	1.82E-06	1.00E-01	5.70E-02
Radioactive waste disposed of	kg	2.08E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.71E-08	4.34E-08	4.25E-09	5.46E-10	-1.87E-06
Components for reuse	kg	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (energy recovery)	kg	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ by energy vector	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

A1 Supply of raw materials. **A2** Transport to waste processing. **A3** Manufacturing. **A4** Transport to waste processing. **A5** Installation and construction processes. **B1** Use. **B2** Maintenance. **B3** Repair. **B4** Replacement. **B5** Refurbishment. **B6** Operational energy use. **B7** Operational water use. **C1** Deconstruction and demolition. **C2** Transport to waste processing. **C3** Waste management for reuse, recovery and recycling. **C4** Fine removal. **D** Environmental benefits and burdens beyond the system boundary. **MND** Undeclared module.

Table 5. Kg of biogenic carbon

Carbon content (biogenic) - packaging	2.87E-02 kg
Carbon content (biogenic) - product	0.00E+00

3.4. Recommendations of this EPD

Environmental product declarations from different Type III eco-labeling systems may not be directly comparable, as calculation rules can differ. This declaration represents the environmental performance of Flexofibers recycled steel fibers, manufactured from end-of-life tires.

Since second life steel fibers originate from waste not directly linked to the construction sector, comparisons with traditional materials should be made cautiously and using specific criteria. The performance assessment should consider the same functional unit and the overall impact of the product throughout its life cycle.

3.5. Cut-off rules

The consideration of constituents, energy, waste, and other parameters in the life cycle analysis (LCA) has not included simplifications or cut-off criteria. All relevant elements have been considered without exception, ensuring a complete and representative analysis.

For the allocation of inputs and outputs within the production system, a physical criterion based on mass has been applied. This criterion is used to distribute the flows associated with the production process, such as energy consumption and waste generation, among the products. Additionally, a sensitivity analysis is included to evaluate how an economic allocation (based on the costs of co-products) might affect the results.

3.6. Additional environmental information

Impact of Material Recycling
The Flexofibers production process utilizes recycled steel from end-of-life tires, significantly contributing to the circular economy. This approach reduces the demand for virgin raw material extraction and lowers greenhouse gas (GHG) emissions associated with the production of new steel.

End-of-Life Contribution and Air Quality
The suction and filtration system implemented in the facilities ensures that dust and particle emissions meet the strictest environmental standards. At the end of their useful life, 90% of the recycled fibers are recovered, reducing environmental impacts associated with disposal and promoting their reintegration into new production cycles. Only 10% of the fibers are sent to landfills.

Efficient Resource Use
- Renewable Energy: The electricity mix used in production includes a high percentage of renewable sources (hydropower, wind, and solar), minimizing the environmental impact associated with energy consumption.
- Freshwater Use: Freshwater consumption during the production process is low, with a net negative impact in module D due to recycling.

Air Quality

The suction and filtration system implemented in the facilities ensures that dust and particle emissions comply with the strictest environmental standards.

3.7. Other data

The production process generates a minimal amount of hazardous waste (6.12E-03 kg/kg of co-product) and non-hazardous waste (1.43E-02 kg/kg of co-product), which are managed safely and in compliance with current regulations.

4. ADDITIONAL TECHNICAL INFORMATION AND SCENARIOS

4.1. Transport to the building site (A4)

Undeclared

4.2. Installation processes (A5)

Undeclared

4.3. Reference life (B1)

Undeclared

4.4. Maintenance (B2), Repair (B3), Replacement (B4), or Refurbishment (B5)

Maintenance (B2)

Undeclared

Repair (B3)

Undeclared

Replacement (B4)

Undeclared

Refurbishment (B5)

Undeclared

4.6. Operational energy use (B6) and operational water use (B7)

Undeclared

4.7. End of life (C1-C4)

	Process		
	Collection processes (specified by types)	Recovery systems (specified by type)	Elimination
	kg collected with mixed construction waste	kg	kg for final disposal
	1	0.9	0.1
Assumptions for scenario development	It is assumed that 90% of the recycled fibers are recovered for recycling at the end of their useful life, while the remaining 10% is sent to landfills. These proportions are based on current recycling and disposal practices for similar products.		

5. ADDITIONAL INFORMATION

Certified with CE Marking No. 1220-CPR-2484, in compliance with ETA 23/0933 issued on March 18, 2024, and EAD 260010-00-0301, as established by Regulation (EU) 305/2011 for Construction Products. Complies with UNE-EN 14651 and ASTM C-1581 standards.

6. PCR AND VERIFICATION

This statement is based on Document

RCP 100 (version 3.2 - 21/12/2023) Construction products in general

Independent verification of the declaration and data, in accordance with ISO 14025 and IN RCP 100 (version 3.2 - 21/12/2023)

☑ External

Third party Verifier

Ferran Pérez Ibáñez
Accredited by the administrator of the DAPcons® Programme

Verification date:

20/01/2025

References

- ISO 14025:2010 y UNE-EN 15804:2012+A2:2020/AC:2021 norms
- LCA Project Report. Environmental Declarations of Recycled Fibers. FlexoFibers

Programme Manager

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