Environmental
Product
Declaration

Plient Fibers

ASTM INTERNATIONAL

According to
ISO 21930
ISO 14025

1 General information

Manufacturer name:	Circle Concrete Tech 501 Graham Road, 77845 College station Texas, United States
Program Operator:	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA
Declaration Number:	EPD1052
Reference PCR:	ISO 21930:2017
Date of Issuance:	06-08-2025
End of Validity:	06-08-2030
Product Name:	Plient Fibers
EPD Owner:	Circle Concrete Tech
Declared Unit:	1 kg of Plient Fibers
EPD Scope	Cradle-to-gate (A1, A2, and A3)
Verification	ISO 21930 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and ISO 21930. ☐Internal ☒ External
LCA Reviewer and EPD Verifier:	Thomas P. Gloria Industrial Ecology Consultants 
LCA Practitioner:	Jonatan Hoffmann Bohr FORCE Technology
Comparison of EPDs:	**EPDs are** only comparable if they comply with this document, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

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2 Product

2.1 Product Description

The declared product is Plient Fibers. Plient Fibers are comprised of steel fibers made from recycled tires which are mechanically processed. Plient fibers increase concrete residual flexural strength, enabling Plient to replace traditional reinforcement methods, such as rebar, for select applications. Plient fibers also improve joint durability and mitigate crack deterioration due to improved concrete toughness.

2.2 Technical data

Plient fibers are backed by over 5 years of laboratory research and development. Extensive concrete material testing has been conducted to quantify the effect of Plient fibers on key concrete material properties. These results are, which are influenced by the specific concrete mixture design, are available upon request.

2.3 Base materials

Plient fibers are made entirely from recycled steel fiber stock sourced from Genan in Houston.

Figure 1 Plient Fibers

3 LCA Calculation Rules

3.1 Declared Unit

The declared unit is 1 kg of Plient Fibers produced at Circle Concrete Tech in Texas, USA.

3.2 System Boundary

The system boundary for this study is cradle-to-gate and covers the following modules:

- **A1 Raw material supply:** recycling of post-consumer used tires as Genan
- **A2 Transportation:** transportation of recycled steel from Genan to Circle Concrete Tech
- **A3 Manufacturing:** Manufacturing of Plient Fibres from recycled steel fibres. Manufacturing processes includes loading and disentanglement.

System boundary (X = included in LCA; MND = module not declared)																
Product			Construction process		Use							End of life				Beyond system boundary
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	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	MND	MND	MND	MND	MND

Figure 2 System boundary according to ISO 21930:2017

3.3 Estimates and Assumptions

All significant foreground data was collected from the manufacturer based on measured values, yearly reports, calculation and expert assessments.

3.4 Cut-off Criteria

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO 21930: 2017 Section 7.1.8. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data are available are included in the calculated effects and no collected core process data are excluded.
- All flows known to contribute a significant impact or to uncertainty are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle inventory.

No material or energy input or output was knowingly excluded from the system boundary

3.5 Data & Data quality

Primary data for 2024 and 2025 has been collected based on measured values, annual reports, calculations, and expert assessments. Background data is sourced from Managed LCA Content v2024.1 and Ecoinvent 3.10. Table 1 provides an overview of the background datasets used in the LCA, including their sources and which module they are applied to. It also includes a data quality assessment based on technological (TEC), temporal (TEM), and geographical (GEO) representativeness.

The secondary datasets used in this study are of high quality and demonstrate strong representativeness across all assessed dimensions—technological, temporal, and geographical. The data sources, primarily from Sphera and Ecoinvent, are recognized for their reliability and relevance in LCA studies. This ensures a robust foundation for the assessment, supporting the credibility and accuracy of the overall results.

Table 1 Data quality assessment

Dataset	Source	Geography	Reference period	Representativeness			Application
				GEO	TEC	TEM	
A1							
Electricity grid mix (Texas)	Sphera	Texas	2022-2027	VG	VG	VG	Electricity consumption (from grid) at Genan's production site.
diesel, burned in building machine	Ecoinvent	GLO	2020	F	G	G	Incineration of diesel (combustion)
Truck-trailer, Diesel, Euro IV, 34 - 40t gross weight	Sphera	US	2023-2026	VG	VG	VG	Use of truck trailer at Genan's production site.
Diesel mix at refinery	Sphera	US	2021-2027	VG	VG	VG	Production of diesel for the truck trailer
Inert matter (Glass) on landfill	Sphera	US	2024-2027	VG	VG	VG	Waste treatment for production waste (sand and gravel) from Genan.
A2							
Truck, Diesel, Euro mix, more than 32t gross weight	Sphera	US	2023-2027	VG	VG	VG	Transport of steel fibers to Circle Concrete Tech
A3							
diesel, burned in building machine	Ecoinvent	GLO	2020	F	G	G	Incineration of diesel (combustion)
Diesel mix at refinery	Sphera	US	2021-2027	VG	VG	VG	Production of diesel for the truck trailer

3.6 Allocation

Economic allocation has been applied to A1 activities at Genan. This is deemed to be a conservative approach and in line with the guidelines and requirements in ISO21930:2017. No allocation has been made in any A3 activities, as there are no other products being produced.

4 LCA results

Table 2 Results following ISO21930:2017

ENVIRONMENTAL IMPACTS PER KG PLIENT FIBERS					
Core Mandatory Impact Indicator					
Environmental Indicator	**Abbreviation**	**Unit**	**A1**	**A2**	**A3**
Global warming potential, incl. biogenic CO2	GWP100	kg CO2 eq.	2.23E-02	2.82E-02	1.05E-02
Global warming potential, excl. biogenic CO2	GWP100	kg CO2 eq.	2.23E-02	2.82E-02	1.05E-02
Ozone depletion potential	ODP	kg CFC 11 eq.	3.19E-10	8.08E-15	2.41E-09
Eutrophication potential, freshwater	EP-freshwater	kg P eq.	2.00E-08	2.33E-08	1.43E-07
Eutrophication potential, marine	EP-marine	kg N eq.	2.09E-05	2.91E-05	8.56E-05
Acidification potential	AP	kg SO2 eq.	3.33E-05	3.57E-05	1.02E-04
Photochemical oxidation creation potential	POCP	kg O3 eq.	7.67E-04	7.59E-04	3.18E-03
Resource use, mineral and metals	ADPm	kg Sb eq.	3.93E-09	4.39E-09	4.29E-09
Resource use, fossils	APDf	MJ	3.32E-01	3.68E-01	1.45E-01
Use of Primary Resources					
Renewable primary resources used as energy carrier	RPRE	MJ	1.45E-01	1.53E-02	7.56E-04
Renewable primary energy carrier	RPRM	MJ	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources used as	NRPRE	MJ	3.32E-01	3.68E-01	1.45E-01
Non-renewable primary resources used as	NRPRM	MJ	0.00E+00	0.00E+00	0.00E+00
Secondary Material, Secondary Fuel and Recovered Energy					
Secondary materials	SM	kg	1.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
Recovered energy	RE	MJ	0.00E+00	0.00E+00	0.00E+00
Mandatory Inventory Parameters					
Use of net freshwater resources	FW	m3	2.44E-04	1.65E-05	8.11E-06
Indicators Describing Waste					
Hazardous waste disposed	HWD	kg	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	NHWD	kg	0.00E+00	0.00E+00	0.00E+00
High-level radioactive waste,	HLRW	kg	2.09E-08	1.50E-09	0.00E+00
Intermediate- and low-level radioactive waste	ILLRW	kg	1.75E-05	1.26E-06	0.00E+00

5 Interpretation

For GWP and ADP-f, transportation is the largest contributor, followed by the production of steel fiber feedstock at Genan. For the remaining impact categories, manufacturing at Circle Concrete Tech represents the most significant contribution.

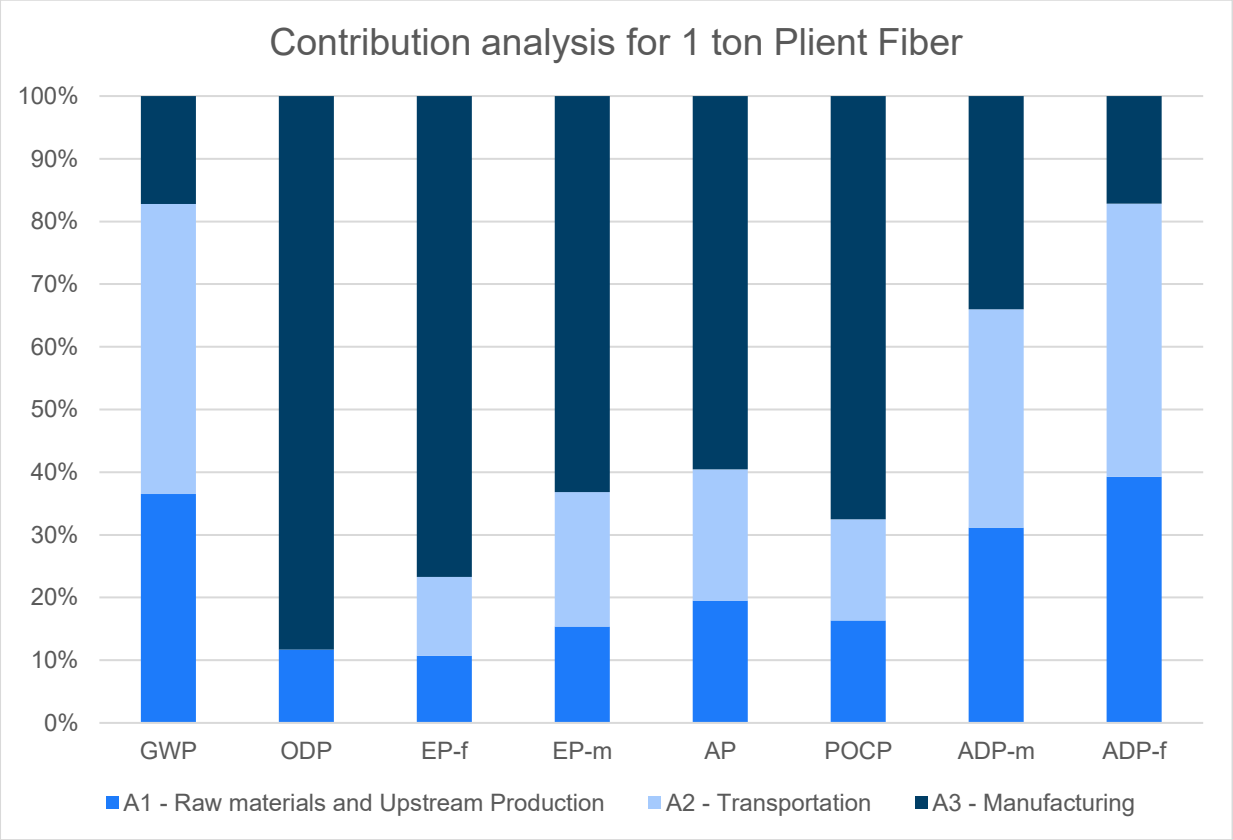

Figure 3 Contribution analysis for Plient fibers

5.1 Hazardous substances

Plient Fibers does not contain substances listed on the ”Candidate List of Substances of Very High Concern for authorisation” (http://echa.europa.eu/candidate-list-table)

6 References

1. ASTM 2020
ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs) General Program Instructions v.8.0, April 29th

2. ISO 21930: 2017
Building construction – Sustainability in building construction – Environmental declaration of building products.

3. ISO 14025: 2006
Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.

4. ISO 14044:2006/AMD 1:2017/ AMD 2:2020
Environmental management - Life cycle assessment - Requirements and guidelines.

5. 14040:2006/AMD 1:2020
Environmental management - Life cycle assessment - Principles and framework.