

Environmental Product Declaration

Polymono® & Polyfibril®
from
polyfibers®
REINFORCEMENT SOLUTIONS

In accordance with ISO 14025 & EN 15804:2012 + A2:2019

PROGRAMME

The International EPD® System
www.environdec.com

PROGRAMME OPERATOR

EPD® International AB

LOCAL OPERATOR

EPD® Turkey

EPD REGISTRATION No

S-P-04126

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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: environdec.com

General Information

Programme Information

Programme: The International EPD® System

Address: EPD International AB Box 21060 SE-100 31 Stockholm, Sweden

Website: www.environdec.com

E-mail: info@environdec.com

Information about verification and reference PCR:

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR)

PCR 2019:14 Construction products (EN 15804:A2) Version 1.1

PCR review was conducted by

The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members.

Review chair: Claudia A. Peña, University of Concepción, Chile.

The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent verification of the declaration and data, according to ISO 14025:2006:

EPD process verification

EPD verification

Third party verifier

Vladimír Kočí, PhD

Šárecká 5, 16000 Prague 6, Czech Republic

Approved by

The International EPD® System Technical Committee, supported by the Secretariat

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes

No

LCA Study & EPD Design Conducted by

Semtrio Sustainability Consulting

BUDOTEK Teknopark, No 8/27

Umraniye / Istanbul Turkey

www.semtrio.com



Polipropilen Elyaf San. Ve Dış Tic. A.Ş. (Polyfibers®) 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

Polyfibers®

Polipropilen Elyaf San. Ve Dış Tic. A.Ş.(Polyfibers®)

Cumhuriyet Mah Yüzyıl Cad. No:64 34876
Kartal / İstanbul / Türkiye
www.polyfibers.com

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Polyfibers® established in 2001, is the first producer of micro and macro synthetic fiber concrete reinforcement products in Turkey.

Through an ongoing commitment to research and development, Polyfibers® has transformed and revolutionized its products by combining high technology synthetic materials with unique designs and manufacturing methods.

As of 2022, Polyfibers® became the largest producer in EMEA region with its new investments and acquisitions. Thanks to its experienced production team and technical sales team, Polyfibers® offer innovative solutions of concrete reinforcement with the complete range of high performance micro and macro synthetic fibers, specifically engineered to provide right solution to all kinds of industrial floor, tunnel, pavement, transportation, infrastructure, mining and precast clients.

In order to provide sustainable solutions, Polyfibers® has established state-of-the-art testing laboratory performing fiber reinforced concrete evaluations and gives design engineering consultancy to clients and tailor-made solutions for the major projects.

Polyfibers® along with ISO 9001-14001 certified manufacturing facilities is proud to serve the world market as a key global player. With offices and authorized distributors at different locations of 5 continents of the world, Polyfibers® exports to over 50 countries its high performance fiber reinforcement products.



Production Site

Polipropilen Elyaf San. Ve Dış Tic. A.Ş. (Polyfibers®)
Hürriyet 2. Osb mahallesi 18. Cadde No:7
Merkez / Bilecik

Product Information

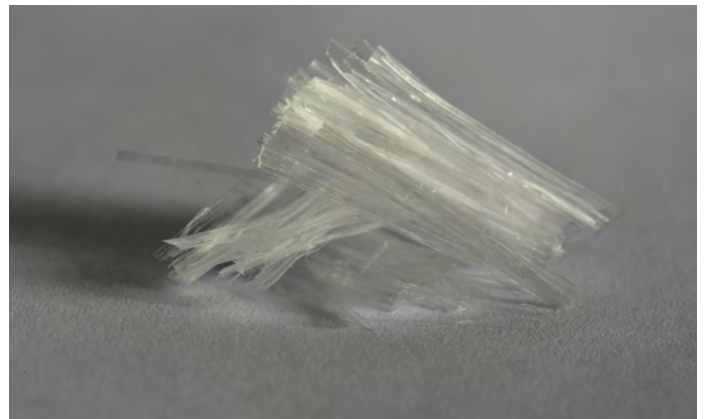
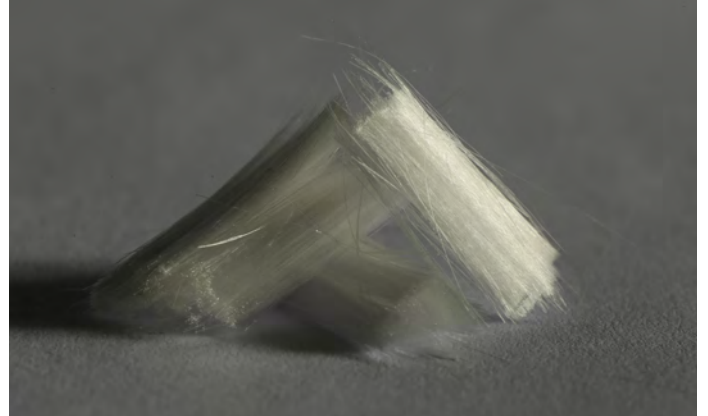
Polymono® & Polyfibril® Micro Synthetic Fiber

With the wide-spread use of ready mixed concrete in many application areas such as residences, bridges, tunnels, floors of large industrial facilities; many research and development activities are carried out in order to **make more advanced, more environmentally friendly, more economical and faster applications.** One of the innovations that have come in view as a result of these activities is concrete strengthening and service life extending micro and macro synthetic poly fiber reinforcement products that are used instead of steel reinforcements in certain concrete applications. When they are added to ready mixed concrete, synthetic fiber products developed with advanced technologies **minimize cracking, increase concrete performance and provide long-term durability** in different applications as they are brought together in unique designs and forms.

The micro synthetic fiber Polymono® & Polyfibril® has been specifically designed to improve the plastic shrinkage crack resistance of concrete and screed applications, making them safer and more durable over the entire span of service life. They create three-dimensional support network that resists downward pull of gravity, thus keeps aggregates in suspension. Polymono® & Polyfibril® is heavily used in shotcrete applications decreasing rebound substantially and saves material cost in tunnel lining and slope protection.

Polymono® & Polyfibril® fibers are easy to use and can be **directly** mixed into concrete, eliminating the time and effort needed to transport and install traditional mesh. Polymono® & Polyfibril® fibers also reduce freeze/thaw damage and penetration of water and chemicals due to three-dimensional effect of the fibers within the concrete mix.

Polymono® & Polyfibril® fibers should be added to concrete mixes at the recommended dosage for each cubic meter. Homogeneous mixture is obtained by addition to the aggregate band at the concrete batching plant or by adding in a high-speed concrete mixer truck for at least 5 minutes at the field.



Applications

- > Repair Mortars
- > Plaster Applications
- > Construction Chemicals
- > Screed Concrete
- > Shotcrete
- > Tunnel Applications
- > Residential Buildings
- > Coating Concrete
- > Industrial Floors
- > Field Concrete
- > Precast Applications

Technical Specifications

Product Group Classification

UN CPC Code: 353 - Man made fibers

Composition	100% Virgin Polypropylene
Type	Monofilament Micro and Fibril Synthetic Fiber
Impurity	Contain No Reprocessed Olefin or No Polyamide or No Recycled Materials
Cross Section	Circular
Standard	EN 14889 Part II Type 1A, ASTM C1116 Type III
Tensile Strength	467 - 548 MPa
Elastic Modulus	4048 - 5674 MPa
Elongation	12 - 20%
Specific Weight	0.91 gram / cm ³
Durability	6.5 - 7.0 gr / Denier - High Strength
Color	Transparent
Number of Fibers	120 million+ / kg for 12mm
Surface Area	140 m ² /kg
Corrosion	Non-Corrosive
Water Absorption	N/A
Chemical Resistance	Excellent Alkali Resistance
Oxidant Resistance	Excellent
Biological Resistance	Excellent
Cement Compatibility	Excellent
Magnetism	Non-Magnetic
Melting Point	165°C
Ignition Point	360°C

For the latest table, please contact the local sales executive.



ASTM INTERNATIONAL

LCA Information

Declared Unit:

1 kg of Polymono® / Polyfibril® Micro Synthetic Fiber Concrete Reinforcement

Time representativeness:

The production data in this LCA study represents the period of 1st April 2021 and 30th September 2021.

Database(s) and LCA software used:

SimaPro v9.2 and Ecoinvent v3.7.1

Description of system boundaries:

Cradle to gate (A1–A3).

Data quality and data collection:

According to EN 15804:2012+A2:2019, specific data was used for module A3 (Processes the manufacturer has influence over) and was gathered from Polyfibers® production plant. Specific data includes actual product weights, amounts of raw materials used, product content, energy and water consumption, transport figures, and amounts of wastes and wastewater. According to EN 15804:2012+A2:2019, generic data was applied and was obtained from Ecoinvent v3.7.1

Allocation:

Mass allocation has not been applied in this study

Waste:

The “*polluter pays principle*” is followed. Processes of waste processing was assigned to the product system that generates the waste until the end-of-waste state is reached. Therefore, system boundary of this study includes disposal of waste arising from module A3, only including those reached the end-of-waste stage.

Cut-off rules:

Life Cycle Inventory data for a minimum of 99% of total inflows to the life cycle assessment have been included and a cut-off rule of 1% regarding energy, mass and environmental relevance was applied. Impacts caused by treatment operations, impacts caused by producing packaging materials both meant for product and incoming raw materials, upstream transport of product packaging materials, ink used for printing on packaging materials have been calculated lower than 1% environmental relevance.

Electricity consumption in the project has been modelled using the Turkey mix data have been obtained from Ecoinvent v3.7 as secondary data.

Turkey electricity mix was 2% deep geothermal, 17% hard coal, 10% hydro, 15% lignite, 31% natural gas, 2.7% natural gas (conventional) 0.2% oil, 0.4% wind (<1MW), 0.9% wind (>3MW), 5.2% wind (1-3 MW), 0.8% import from BG, 0.2% import from GE, 0.01% import from IR, 0.6% heat and power cogeneration biogas, 0.2% heat and power cogeneration natural gas (combined cycled power plant), 0.8% heat and power co-generation natural gas (conventional power plant), 0.1% heat and power co-generation wood chips, 4.8% market with a carbon intensity of 0.575 kg CO₂eq for Microfiber Product.

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR 2019:14 Section 4.3.1.



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 from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse - Recovery - Recycling Potential
MODULES	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	GLO	GLO	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	>99.5%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

System Diagram

A1 - Raw Materials Supply

This stage takes into account raw material extraction, processing and energy used in the production process. Polymono® & Polyfibril® consists of %100 virgin polypropylene, UV absorber and dye, processed with tubular weaving machine oils; analysed thoroughly to endow with Polyfibers® supplier appraisalment, assessing environmental, social, and economic praxis of the source.

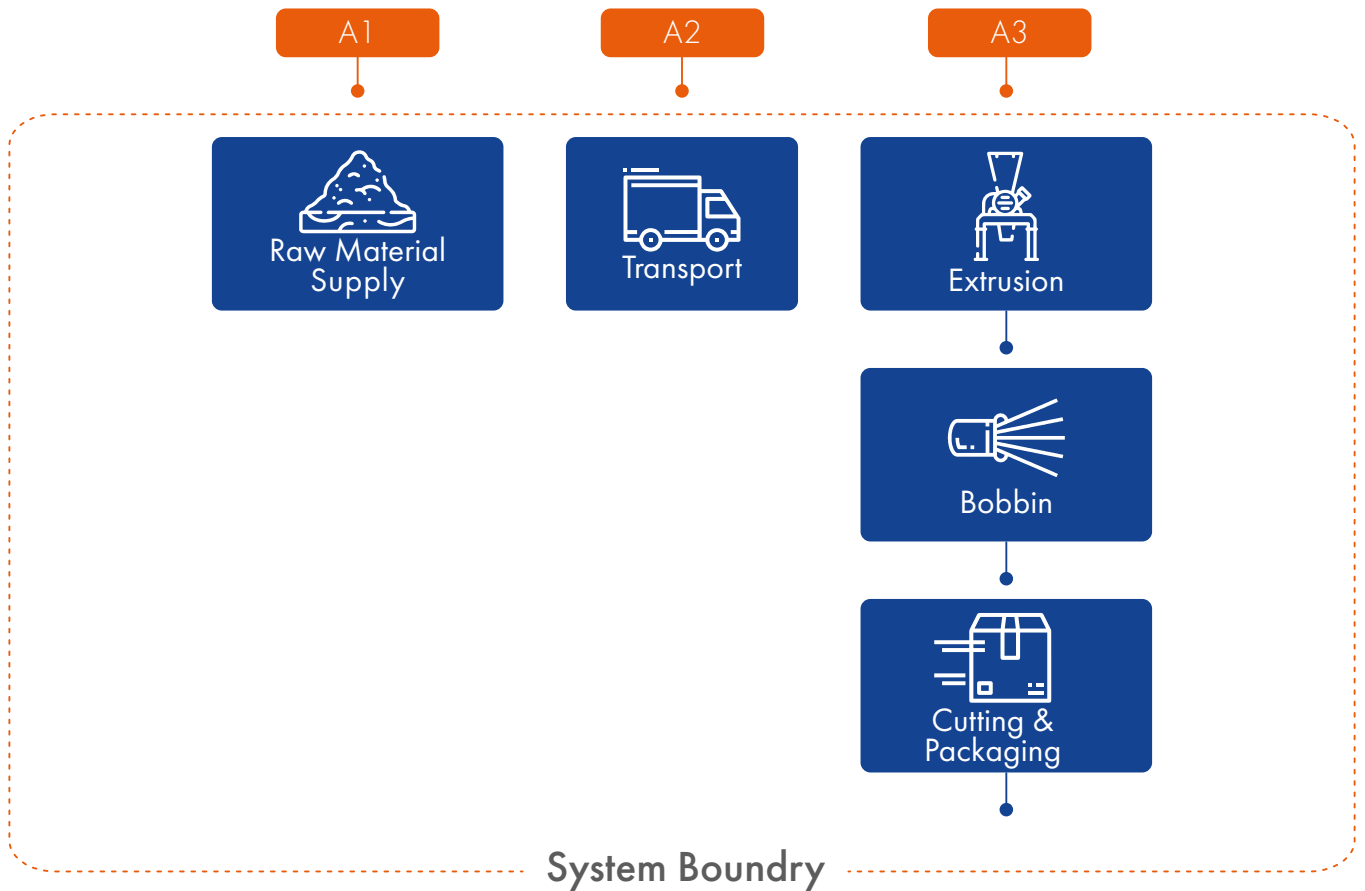
A2 - Transport to the Manufacturer

This stages include transportation of the raw materials from supplier to factory gate. Transportation types are considered asseaway, road, railroad, etc.

A3 - Manufacturing

This stage includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered by this stage.

The raw materials are subjected to extrusion, cooling, stretching, embossing, and oven-drying, winding and lastly, fibers are cut into the appropriate lengths and packaged ready for distribution.



Description of Declared Modules

Content Declaration

Content Declaration by mass%

Content declaration of 1 kg of Polymono® / Polyfibril®	
Product components	Mass Composition
Virgin Polypropylene	>%97
Dye	<%1
Oil	<%1
UV Absorber	<%1
Renewable Material	0

BigBag Packaging

Content declaration of 1 kg of Polymono® / Polyfibril®	
Packaging materials	Weight-% (versus the product)
Wooden Pallet	%1.70
Big Bag	%0.45
TOTAL	%2.16

The product does not content "Candidate List of Substances of Very High Concern (SVHC)" compounds.

Degradable Paper Packaging

Content declaration of 1 kg of Polymono® / Polyfibril®	
Packaging materials	Weight-% (versus the product)
Sulphite Paper	%2.02
Parcel	%7.27
Bracket	%0.76
Wooden Pallet	%3.16
Pallet Cover	%0.21
Strech Film	%0.23
TOTAL	%13.65

PE Packaging

Content declaration of 1 kg of Polymono® / Polyfibril®	
Packaging materials	Weight-% (versus the product)
PE Bag	%1.24
Wooden Pallet	%2.91
Pallet Cover	%0.19
Strech Film	%0.39
TOTAL	%4.73

Environmental Performance

Potential Environmental Impact

Mandatory Indicators According to EN 15804

Results for 1 kg of Polymono® / Polyfibril®

Indicator	Unit	A1:A3
GWP-fossil	kg CO ₂ eq	2.82
GWP-biogenic	kg CO ₂ eq	-0.11
GWP-luluc	kg CO ₂ eq	0.01
GWP-total	kg CO ₂ eq	2.71
ODP	kg CFC 11 eq	7.49E-08
AP	mol H ⁺ eq	0.01
EP-Freshwater	kg PO ₄ ³⁻ eq	1.09E-03
	kg P eq	9.31E-05
EP-Marine	kg N eq	2.24E-03
EP-Terrestrial	kg N eq	0.02
POCP	kg NMVOC eq	0.01
ADP-minerals & metals*	kg Sb eq	1.61E-05
ADP-fossil*	MJ	84.3
WDP	m ³	1.73

GWP-fossil = Global Warming Potential fossil fuels;
 GWP-biogenic = Global Warming Potential biogenic;
 GWP-luluc = Global Warming Potential land use and land use change;
 ODP = Depletion potential of the stratospheric ozone layer;
 AP = Acidification potential, Accumulated Exceedance;
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
 EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;

EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
 ADP-fossil = Abiotic depletion for fossil resources potential;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption

Environmental Performance

Potential Environmental Impact

Additional Mandatory and Voluntary Indicators

Results according to PCR2019:14 for 1kg of Polymono® / Polyfibril®

Indicator	Unit	A1:A3
GWP-GHG ¹	kg CO ₂ eq	2.47

Results according to EN 15804+A2 for 1kg of Polymono® / Polyfibril®

PM	[disease inc.]	8.77E-08
IRP	[kBq U235 eq]	0.06
ET-freshwater	[CTUe]	17.3
HT-cancer	[CTUh]	8.05E-10
HT-non-cancer	[CTUh]	1.61E-08
SQP	[pt]	17.3

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology;
 IRP = Ionizing radiation, human health;

ET-freshwater = Eco-toxicity (freshwater);
 HT-cancer = Human toxicity, cancer effects;
 HT-non-cancer = Human toxicity, non-cancer effects;
 SQP = Potential soil quality index (SQP)



Environmental Performance

Potential Environmental Impact

Use of Resources

Results according to EN 15804+A2 for 1kg of Polymono® / Polyfibril®

Indicator	Unit	A1:A3
PERE		5.14
PERM	MJ, net calorific value	0
PERT		1.99
PENRE		90.6
PENRM	MJ, net calorific value	0
PENRT		161
SM	kg	0
RSF	MJ, net calorific value	0
NRSF		0
FW		m ³

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
 PERM = Use of renewable primary energy resources used as raw materials;
 PERT = Total use of renewable primary energy resources;
 PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;

PENRM = Use of non-renewable primary energy resources used as raw materials;
 PENRT = Total use of non-renewable primary energy resources;
 SM = Use of secondary material;
 RSF = Use of renewable secondary fuels;
 NRSF = Use of non-renewable secondary fuels;
 FW = Use of net fresh water

Information on biogenic carbon content according to EN 15804+A2

Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	2.56E-05
Biogenic carbon content in packaging	kg C	2.34E-04

Environmental Performance

Potential Environmental Impact

Waste Production

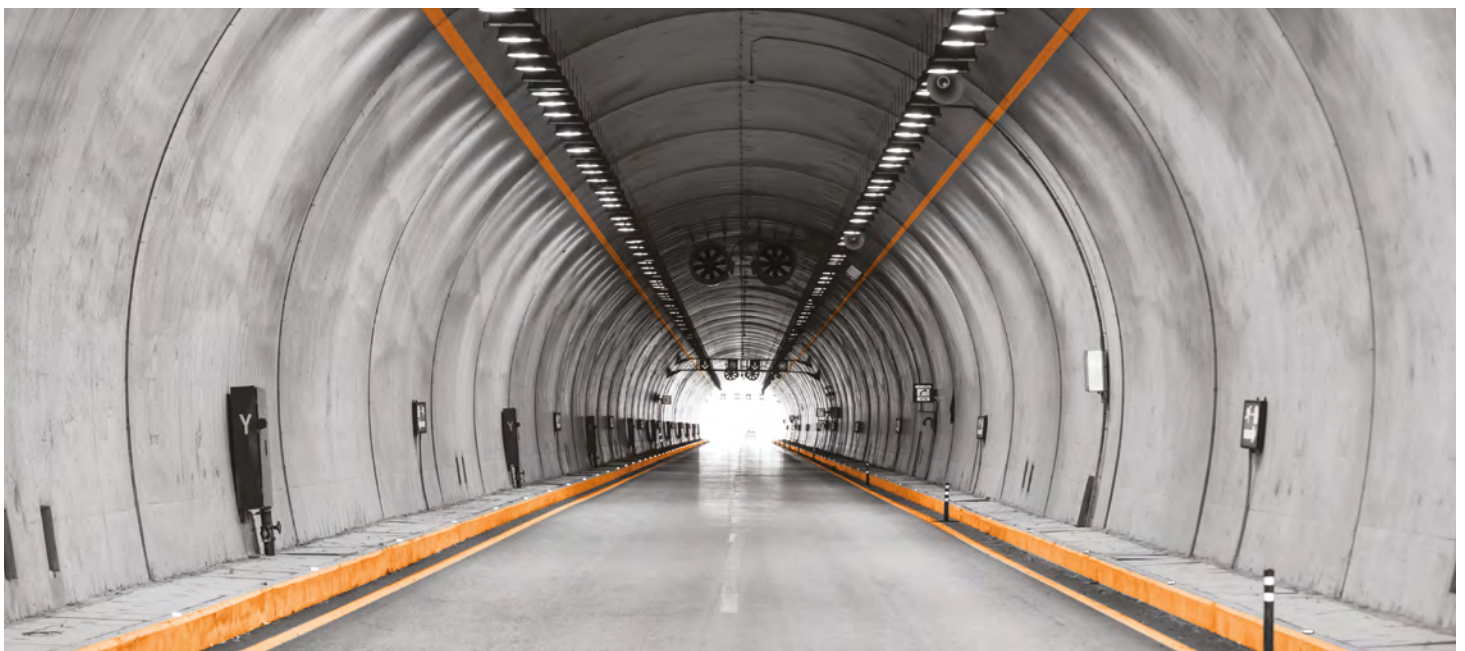
Results according to EN 15804+A2 for 1kg of Polymono® / Polyfibril®

Indicator	Unit	A1:A3
Hazardous waste disposed	kg	4.69E-06
Non-hazardous waste disposed	kg	0
Radioactive waste disposed	kg	0

Output Flows

Results according to EN 15804+A2 for 1kg of Polymono® / Polyfibril®

Indicator	Unit	A1:A3
Components for re-use	kg	0
Materials for recycling	kg	0
Materials for energy recycling	kg	0
Exported energy, electricity	MJ	0
Radioactive waste disposed	MJ	0



// References

- **ISO 14040** 2006 Environmental management - Life cycle assessment - Principles and framework
- **ISO 14044** 2006 Environmental management - Life cycle assessment - Requirements and guidelines
- **ISO 14025** 2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- **ISO 14020** 2000 Environmental labels and declarations - General principles
- **EN 15804:2012+A2:2019** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- **The International EPD® System** www.environdec.com
- **The International EPD® System** The General Programme Instructions v3.01
- **The International EPD® System** PCR 2019:14 Construction products v1.1 (EN 15804:A2)
- **Ecoinvent 3.7** www.ecoinvent.org
- **Simapro LCA Software** www.simapro.com
- **Polipropilen Elyaf San. Ve Dış Tic. A.Ş. (Polyfibers®)** www.polyfibers.com

// Contact

Third party verifier

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Owner of Declaration

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More information about POLYFIBERS® approach to sustainability and its corporate social responsibility initiatives are available via faraz@polyfibers.com