

# EPD

# Environmental Product Declaration

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

**KORDSA**

**KraTos**<sup>TM</sup>  
MACRO  
PP FIBERS

**Synthetic Fiber Concrete  
Reinforcement from Kordsa**

**Programme:**

The International EPD® System  
[www.environdec.com](http://www.environdec.com)

**S-P Code:**

S-P-03126

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EPD International AB

**Local Operator:**

EPD Turkey

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ENVIRONMENTAL PRODUCT DECLARATIONS

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EN 15804 VERIFIED





# Program Information

## Programme

EPD Turkey, managed and run by:

SÜRATAM

Turkish Centre for Sustainable Production  
Research & Design, [www.suratam.org](http://www.suratam.org)

Nef 09 B Blok No:7/15 34415  
Kağıthane/Istanbul, Turkey

[www.epdturkey.org](http://www.epdturkey.org)  
[info@epdturkey.org](mailto:info@epdturkey.org)

The International EPD® System

EPD International AB  
Box 210 60 SE-100 31  
Stockholm, Sweden

[www.environdec.com](http://www.environdec.com)  
[info@environdec.com](mailto:info@environdec.com)

Product Category Rules (PCR): 2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

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

EPD process certification

EPD verification **X**

**Third party verifier:** Professor Vladimír Kocí

**Approved by:** The International EPD® System

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

Yes

No **X**

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.



# Company Information

*We are inspired to reinforce life.*

## *Tire*

## *Composite*

## *and Construction Reinforcement Technologies*

Kordsa's success story begins in 1973 with Sabancı Holding's investment in İzmit to produce tire cord fabric for tire manufacturers.

Kordsa, primarily producing tire reinforcement technologies, has expanded its business fields to concrete reinforcement technologies and composite technologies, with its investments in 2014.

Initially positioned as the market leader in Turkey, Kordsa has achieved world market leadership through the years thanks to its deep know-how in reinforcement materials and processes, advanced R&D efforts, open innovation culture and strategic approach to the tire reinforcement sector.

Today, Kordsa reinforces every 1 in 3 automobile tires and every 2 in 3 aircraft tires in the world.

The reinforcement brand; Kordsa, aims to create sustainable value for its customers, employees, shareholders and to the community it belongs to, by delivering value added and innovative reinforcement solutions.

Kordsa, positioned as "The Reinforcer", has reshaped the industry with its strong innovation-based approach and recently has entered new business lines, transferring its tire reinforcement know-how accumulated since 1973 to the construction and composites sectors.

Reinforcement technologies leader Kordsa, inaugurated Composite Technologies Center of Excellence in 2014, in cooperation with Sabancı University. The Center will bring together Sabancı University faculty members, PhD students and Kordsa employees under the same roof. Through this industry-university cooperation model, the first of its kind in Turkey, Kordsa embraces and initiates the concept of open innovation. TL 100 million is invested in the Center.

The Company has ISO 14001 Environmental Management System Certificate and ISO 50001-2011 Energy Management Certificate.

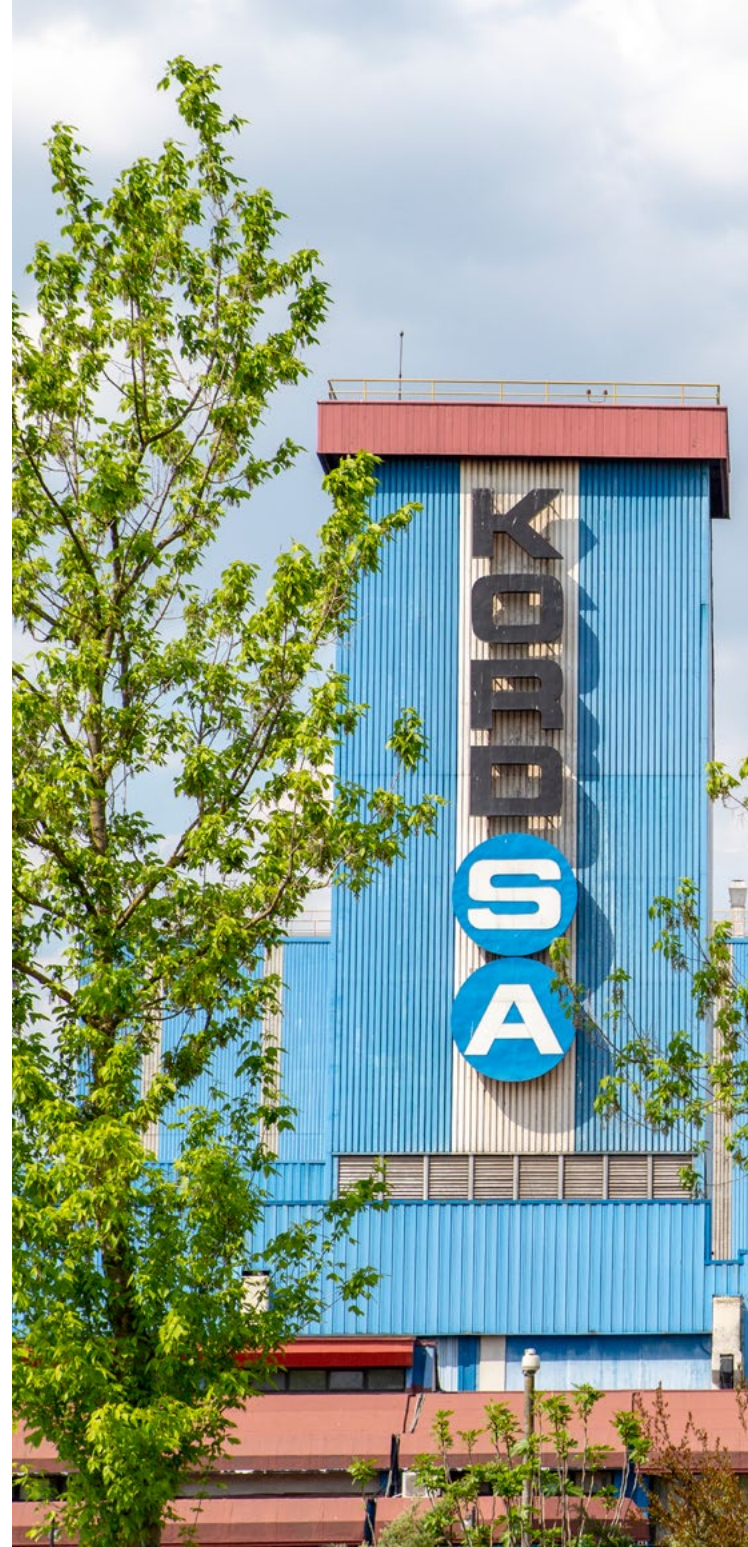
The year 2016 has been a year in which Kordsa has reinforced its global leadership with the awards received. It is selected as the export champion both in Turkey and Indonesia in 2016. Honored as the "Great Place to Work" in Brazil, Kordsa has also received the "Best Employee" award in Indonesia thanks to the project "Safety Experience Center".

According to 2015 R&D Centers Performance Index by the Science, Industry and Technology Ministry, Kordsa is among the top 3 companies having the best R&D Centers and is ranked the first R&D Center in textile category for the fourth time.

Kordsa is awarded Special Award at "Energy Efficiency in Industry" Project Competition organized annually by General Directorate of Renewable Energy, Ministry of Energy and Natural Resources with its energy efficiency practices initiated within the scope of sustainability efforts.

In addition to this capacity increase, realizing its vision of sustainability in line with its goals and strategies as well its management commitment, Kordsa issued the second sustainability report based on the "GRI4 (Global Reporting Initiative) guide of the United Nations Global Compact signed in 2014 and was added to the BIST Sustainability Index.

As Sabancı Holding offered 20% of its Kordsa shares to qualified investors, the free float ratio of Kordsa has reached 29% and Kordsa was added to the Istanbul Stock Exchange National 100 Index in the first half of 2015 and then Kordsa was added to the BIST50 Index a result of its sustainable growth in 2016.



# About the Product

KraTos Macro PP is a high-performance polymer-based monofilament synthetic fiber reinforcement that can be utilized in concrete by directly replacing steel mesh or steel wire applications in infrastructure projects requiring high structural strength in concrete.

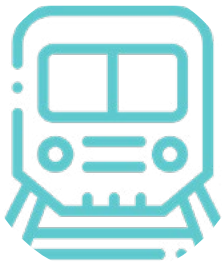
Produced in Turkey according to EN 14889-2 Class 2 and ASTM C-1116 standards with Kordsa engineering from 100% virgin polypropylene, KraTos Macro PP increases the toughness of concrete against structural design loads and provides effective crack control with its 3-dimensional homogeneous distribution property in concrete.

The UN CPC code of the product is 355.



## Application Areas

- Slab-on-ground Applications
- Railway Systems and Slab Track Concretes
- Tunnel Linings and Shotcrete Applications
- Mining Applications
- Prefabricated Structural Concrete Elements
- Dams and Hydroelectric Power Plants
- Concrete Roads, Highway Pavements and Bridges



## Features & Benefits

- Fully homogeneous mixture in concrete with its special surface design
- Effective crack control at every point of concrete
- Easy mixing and fast application
- Less labor and equipment costs
- High concrete toughness and impact resistance
- Increased load bearing capacity
- High durability against corrosive, alkaline and acidic environments
- Does not affect magnetic fields with its polymer structure
- Lower carbon footprint compared to steel reinforcements
- Easy to store, advantageous logistic costs
- Increased concrete resistance against freeze-thaw

## Directions for Use / Mixing

KraTos Macro PP is produced in special water-soluble packages. It provides speed and convenience by mixing with concrete together with its pack during plant and on-site mixing. KraTos Macro fibers are compatible with all types of concrete additives and classes.

KraTos Macro PP is specially produced to provide maximum homogeneity during plant mixing. The mixing is done by adding the packed fibers on to the conveyor belt during concrete production.

## Packaging

KraTos Macro PP is produced in special water-soluble packages. The standard package amount is 3.0 kgs ( $\pm 1.5\%$ ). 330 kgs of product is shipped in one palette. The packing amount can change according to customer demand.

## Shelf Life and Storage

The suitable shelf life for unopened packages is 2 years. It is recommended to store the product in its original packaging in a closed environment, protected from moisture, water and direct sunlight.



## Content Declaration

Fully homogeneous mixture in concrete with its special surface design  
Effective crack control at every point of concrete

Product	Raw Material	Weight, %
KraTos Macro	Virgin Polypropylene	100

## Technical Specifications

Property	Unit	Value	Standart
Density	g/cm <sup>3</sup>	0.91	
Length	mm	40 - 70	EN 14889-2
Filament Diameter	mm	0.65-0.95	
Tensile Strength	MPa	500 - 660	
Elastic Modulus	GPa	7.8 -10	
Acid and Alkali Resistance		HIGH	
Melting Point	°C	160	
Num. of Fibers	~#/kg	20000-65000	
Electrical Conductivity		NA	
Water Absorbtion		NA	
Fiber Surface		Embossed - Flat	
CE Certificate		2055-CPR-169	

*\*These specifications are given based on KraTos Macro PP series. For the latest table it is recommended to contact the relevant sales executive.*





# LCA

## Information

**Declared Unit** 1 kg of KraTos Synthetic Fibre Concrete Reinforcement

**Time Representativeness** 2020

**Database(s) and LCA Software Used** Ecoinvent 3.6, SimaPro 9.1

The inventory for the LCA study is based on the 2020 production figures for KraTos Synthetic Fibre Concrete Reinforcement by Kordsa production plants in Kocaeli, Turkey.

This EPD's system boundary is cradle to gate. The system boundary covers A1 - A3 product stages.

According to EN 15804+A2:2019 standard, the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life. Due to this reality, modules C1-C4 and Module D are not given in the system.

Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

X = Included in LCA, ND = Not Declared

## System Boundary Descriptions

### A1: Raw Material Supply

Korda's productions start from virgin polypropylene. The company supplies its raw materials necessary from suitable suppliers. Raw material supply includes raw material extraction/preparation and pre-treatment processes before production.

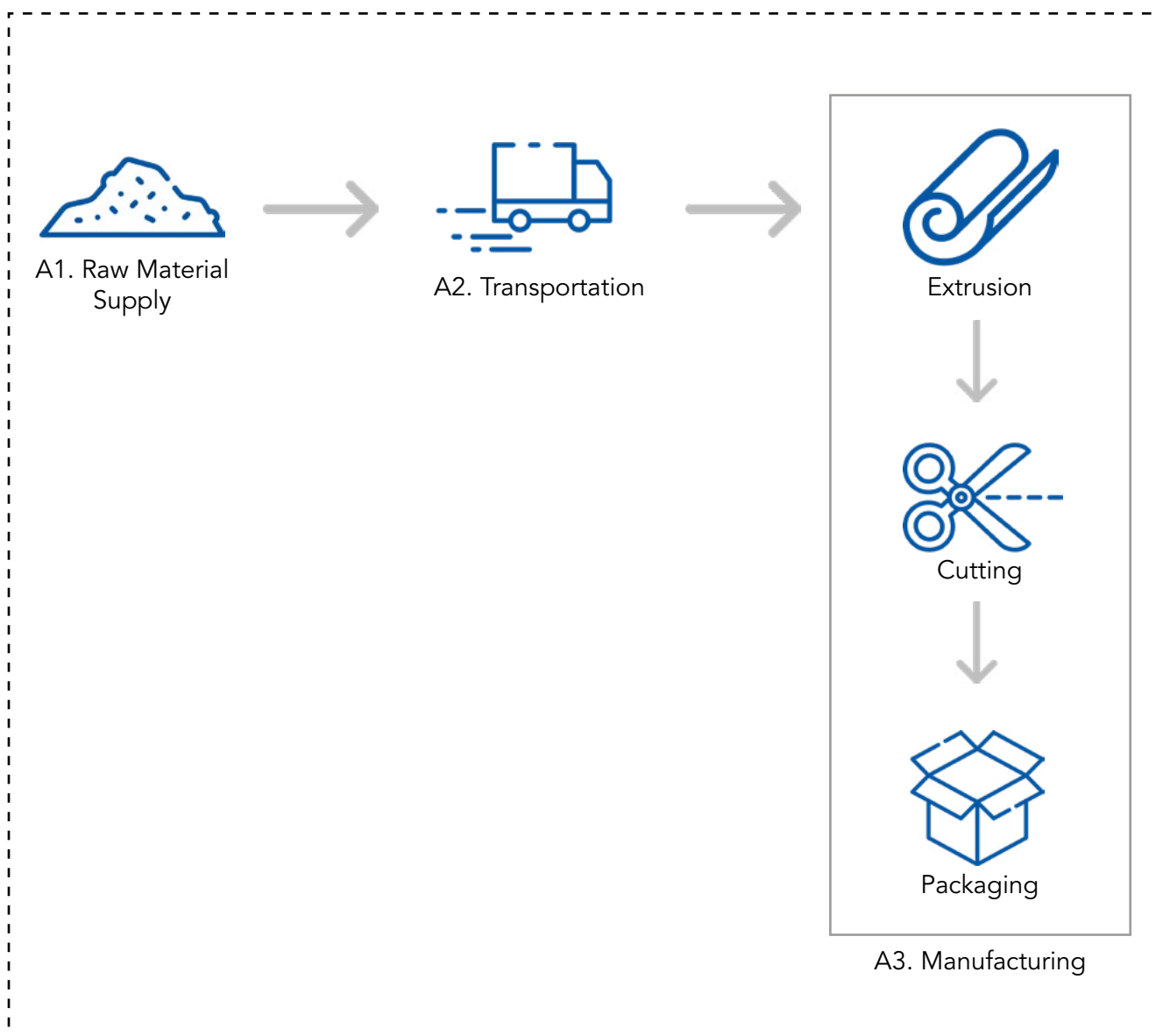
### A2: Transportation

Transport is relevant for delivery of raw materials and other materials to the plant

and the transport of materials within the plant. Transport of raw materials to production sites is taken as the weight average values for transport from raw materials supplier in 2020.

### A3 : Manufacturing

This stage starts with extrusion. Production continues with sizing and cutting. Completed products are packaged and shipped to the customer.



## More Information

### Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2020 production figures.

In addition, hazardous and non-hazardous waste amounts were also allocated from the 2020 total waste generation.

### Cut-Off Criteria

%1 cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

### REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1 % (wt/wt).

### LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

There are no co-product allocations within the LCA study underlying this EPD.

The SimaPro 9.1 LCA software and the Ecoinvent 3.6 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

### Geographical Scope

The geographical scope of this EPD is global.







# LCA Results

Environmental Impacts for 1 kg KraTos PP		
Impact Category	Unit	A1-A2-A3
GWP - Fossil	kg CO <sub>2</sub> eq	2.90
GWP - Biogenic	kg CO <sub>2</sub> eq	-301E-6
GWP - Luluc	kg CO <sub>2</sub> eq	0.006
GWP - Total	kg CO <sub>2</sub> eq	2.90
ODP	kg CFC-11 eq	72.7E-9
AP	mol H <sup>+</sup> eq	0.012
EP - Freshwater	kg P eq	8.22E-3
*EP - Freshwater	kg PO <sub>4</sub> eq	0.003
EP - Marine	kg N eq	0.002
EP - Terrestrial	mol N eq	0.022
POCP	kg NMVOC	0.009
ADPE	kg Sb eq	4.19E-6
ADPF	MJ	90.3
WDP	m <sup>3</sup> depriv.	1.92
PM	disease inc.	88.5E-9
IR	kBq U-235 eq	0.128
ETP - FW	CTUe	11.4
HTTP - C	CTUh	308E-12
HTTP - NC	CTUh	13.1E-9
SQP	Pt	3.61
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.	
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing.	

*\*Disclaimer: EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model. (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developEF.html>)*

Resource Use for 1 kg KraTos PP		
Impact Category	Unit	A1-A2-A3
PERE	MJ	3.07
PERM	MJ	0
PERT	MJ	3.07
PENRE	MJ	90.3
PENRM	MJ	0
PENRT	MJ	90.3
SM	kg	0
RSF	MJ	0
NRSF	MJ	0
FW	m <sup>3</sup>	0.008
Waste & Output Flows for 1 kg KraTos PP		
Impact Category	Unit	A1-A2-A3
HWD	kg	271E-6
NHWD	kg	325E-6
RWD	MJ	0
CRU	MJ	0
MFR	MJ	0
MER	MJ	0
EE (Electrical)	kg	0
EE (Thermal)	MJ	0
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.	



# References

/GPI/ General Programme Instructions of the International EPD® System. Version 3.01

/ISO 9001/ Quality management systems – Requirements

/ISO 14001/ Environment Management System- Requirements

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14020:2000/ Environmental labels and declarations — General principles

/ISO 14025/ ISO 14025:2006 Preview Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

/ISO 14040-44/ ISO 14040:2006-10, Environmental management - Life cycle assessment -Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

/ISO 50001-2011/ Energy Management Certificate - Requirements

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL  
IVL Swedish Environmental Research Institute Secretariat of the International EPD® System, 2019:14  
Version 1.11, DATE 2021-02-05

/Ecoinvent/ Ecoinvent Centre, [www.ecoinvent.org](http://www.ecoinvent.org)

/SimaPro/ SimaPro LCA Package, Pré Consultants, the Netherlands, [www.pre-sustainability.com](http://www.pre-sustainability.com)

# Contact Informations

Programme	<p>EPD registered through fully aligned regional programme: EPD Turkey: <a href="http://www.epdturkey.org">www.epdturkey.org</a></p>  <p>ENVIRONMENTAL PRODUCT DECLARATIONS</p>	<p>The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a></p>  <p>THE INTERNATIONAL EPD® SYSTEM</p>
Programme operator	<p>EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research &amp; Design Nef 09 B Blok No:7/15, 34415 Kagithane / Istanbul, TURKEY</p> <p><a href="http://www.epdturkey.org">www.epdturkey.org</a> <a href="mailto:info@epdturkey.org">info@epdturkey.org</a></p>	<p>EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden</p> <p><a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a></p>
Owner of the declaration	 <p>KORDSA TEKNİK TEKSTİL A.Ş. Alikahya Fatih Mahallesi Sanayici Caddesi No: 90 41310</p> <p>KOCAELİ, Turkey</p>	<p>Contact: Burak Erdal Project Leader Phone: +90 262 316 77 39</p> <p><a href="http://www.kordsa.com">www.kordsa.com</a> <a href="http://www.kratosfiber.com">www.kratosfiber.com</a> <a href="mailto:construction@kordsa.com.tr">construction@kordsa.com.tr</a></p>
LCA practitioner	 <p>Turkey: Lalegül Sok. No:7/18 Kagithane 34415 4. Levent – Istanbul, Turkey +90 212 281 13 33</p>	<p>United Kingdom: 4 Clear Water Place Oxford OX2 7NL, UK 0 800 722 0185</p> <p><a href="http://www.metsims.com">www.metsims.com</a> <a href="mailto:info@metsims.com">info@metsims.com</a></p>
3rd party verifier		<p>Professor Vladimír Kocí LCA Studio Šárcká 5, 16000 Prague 6 - Czech Republic <a href="http://www.lcastudio.cz">www.lcastudio.cz</a></p>



For more information about KraTos,  
please click or scan QR code

