

# ENVIRONMENTAL PRODUCT DECLARATION



In accordance with ISO14025 for **D4F 95/5 Cotton Elastane Yarn**  
by using **Dye4Future™** Technology from **Bak-Ay Tekstil**



<b>Programme:</b>	EPD Turkey, a fully aligned regional programme <a href="http://www.epdturkey.org">www.epdturkey.org</a>	The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a>
<b>Programme operator:</b>	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY	EPD International AB
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<b>Geographical scope:</b>	Global	



# Programme Information

<b>Programme:</b>	EPD Turkey, a fully aligned regional programme	The International EPD® System
	SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
	<a href="http://www.epdturkey.org">www.epdturkey.org</a>	<a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a>

Product category rules (PCR): PCR 2013:12 Textile yarn and thread of natural fibres, man- made filaments or staple fibres, version 2.1. UN CPC 263 and 264.

PCR review was conducted by: The Technical Committee of the International EPD® System.  
Review chair: Barbara Nebel Contact via [info@environdec.com](mailto:info@environdec.com).

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

☐ EPD process certification      ☒ EPD verification

Third party verifier: Vladimír Kočí, PhD - LCA Studio

Approved by: The International EPD® System

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

☐ Yes      ☒ 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.

# Company Information

Owner of the EPD	Bak-Ay Tekstil Sanayi ve Ticaret Anonim Şirketi
Contact Person	Hayati BOZAL, Production Manager
Phone	+90 (282) 674 41 21
Fax	+90 (212) 674 41 24
E-mail	bakaytex@bakaytex.com
Address	Velimeşe Organize Sanayi Bölgesi Mah. Çorlu-Çerkezköy Yolu Cad. No:22 Ergene Tekirdağ TURKEY

## Description of the organisation:

The founding partners of Bak-Ay Tekstil made their debut in the textile market in 1984 as wholesale dealers. Specialized in the trade of woven and knitted fabrics, the company undertook the marketing of prominent producers in the sector. Having obtained a substantial market share in around 10 years, the company decided to extend its profile to cover manufacturing besides its marketing operations. Across this decision, the company started its jacquard warp knitting and weaving operations at its Çorlu, Velimeşe plant under the trade name Bak-Ay Tekstil. With its annual capacity of 77 million meters, the company greatly serves to the home textiles and garment industry. Bak-ay Tekstil is ranked among the leaders in its industry with its yarn and knitting lace parameters developed. The company expanded its production background since 1994 with a dye and finishing investment in 2008, culminating in a great depth of know-how in design, pattern, yarn, dyeing, finishing, weaving and warp knitting. In January 2014, the company has further expanded its current production line with a new denim yarn dyeing plant.

Bak-Ay Tekstil has been operating in an area of 16496 square meters with staff of 300 people. It has become a leading representative of the innovative and high-quality products in home textiles and clothing sector as a result of the operations on warp knitting, weaving, dyeing-finishing, denim plants. Bak-Ay has a monthly production capacity of 350.000 meters and an annual production capacity of 4.200.000 meters with its 49 jacquard warp knitting machines in the knitting facilities. Bak-Ay has an annual production capacity of 3.500.000 m with its 78 weaving machines in its weaving plants.

There are 12 High Temperature Dyeing Machines, 5 beam dyeing machines, 3 stenters in Bak-Ay's dyeing and finishing plants. In addition, there are crush machine, ironing, raising, kier-decatizing machine, calender, washing, coating, transfer printing machines in order to increase the added value of the product obtained and to implement different processes. A structure was established for the increase in production capacity with an annual capacity of about 10 million. Also, its plant has a monthly dyeing capacity of 200 tons, 800.000 m / month. The production steps in the existing plant are followed through the system and monitoring of parameters that are controlled before and after production and followed in standards-compliant physics and chemistry laboratories.

Bak-Ay's denim plant began its operations on January 2014 and has a monthly yarn dyeing capacity of 30 tons. Bak-ay believes that they will bring a new breath to the denim fabrics constituting 60% of the world textile market with the fabrics they produce by evaluating the yarns produced within their weaving and knitting plants where polyester, polyester cotton, viscose, nylon, nylon lycra and linen mix fancy fabrics are produced. It is certified that Bak-ay's products are not harmful to the environment and human health with Eco Tex100 by German Hohenstein Institute. Bak-ay exports to many countries such as the USA, the Netherlands, Italy, Spain and England with the products Bak-ay produces in home textiles and fashion and serves large wholesalers within the domestic market. Bak-Ay serves well-known companies such as ZARA, H&M, Marks&Spencer, Ann Taylor and BCBG without compromising the principles of quality and fast service thanks to the different products Bak-ay developed in clothing industry. With its strong financial structure, dynamics, the experienced staff and a rich product diversity, Bak-Ay continues its production and investment activities without compromising the principles of environmental awareness, quality, customer focus.

#### **Name and location of production site:**

Factory, Velimeşe Organize Sanayi Bölgesi Mahallesi Çorlu-Çerkezköy Yolu Cad. No:22  
Ergene/Tekirdağ TURKEY



# Product Description

<b>Product name</b>	D4F 95/5 Cotton Elastane Yarn
<b>Product identification</b>	95 % combed cotton 5% elastane ring and compact yarns, dyed with sulphur dye using Bak-Ay Tekstil's own dyeing process.
<b>Product description</b>	The product referred is dyed yarn made of 95% cotton and 5% elastane. It is dyed with Bak-Ay Tekstil's dyeing process (Dye4Future), using sulphur dyes. The dyed yarns are intended to be used for denim fabrics. Bak-Ay Tekstil's products are compliant with Global Organic Textile Standard (GOTS-TR).
<b>UN CPC code</b>	2636, Cotton yarn (other than sewing thread), containing 85% or more by weight of cotton
<b>Commercial article description</b>	
<b>Type of processing</b>	95 % combed cotton 5% elastane ring and compact yarns
<b>Geographical scope</b>	Global

## Product Content and Packaging

### Product:

Product composition by weight is presented in the table below.

Materials	% of Total weight
<b>Cotton (Aegean)</b>	87-89
<b>Elastane</b>	4-5
<b>Water</b>	7-8
<b>Dyestuff</b>	<1

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in Bak-Ay's D4F 95/5 Cotton Elastane Yarns, either above the threshold for registration with the European Chemicals Agency or above 0.1 % (wt/wt).

### Packaging

**Distribution packaging:** Cardboard bobbins, low-density polyethylene film and euro flat pallets.

### Recycled material

**Provenience of recycled materials (pre-consumer or post-consumer) in the product:** Dyed Cotton Elastane Yarns by Bak-Ay Tekstil does not contain any recycled content.



# Technical Information

## Quality Report

The table below represents the results for 2/1000 single tests with USTER TENSOJET 4 tester.

	Breaking Force (N)	Breaking Elongation (%)	Tenacity (cN/tex)	Breaking Work (N.cm)
<b>Average</b>	9.595	7.83	16.25	18.5
<b>Coefficient of Variation</b>	5.92	7.87	5.92	10.77
<b>Minimum</b>	7.471	5.42	12.65	10.65
<b>Maximum</b>	11.13	10.25	18.85	24.4

## Dye4Future™ Technology

Dye4Future™ is the future proof dyeing technology developed by Bak-Ay Tekstil for environmentally friendly and resource efficient dyeing of cotton and cotton yarn mix cellulosic fibres by indigo and sulphur dyestuff. Sulphur and indigo dyestuffs are generally used for cellulosic fibres and they are oxidized when in contact with oxygen. When dyestuff is on the fibre, non-bonding part is washed away with rinsing process, causing resource loss and environmental pollution. Performed under very low levels of oxygen provided by nitrogen harvested from air, no dye loss due to oxidation occurs and no need for washing to remove oxidised and chemically non-bonding dye to yarn. Among other things, Dye4Future™ technology increases fastness to  $\frac{3}{4}$  compared to 3 or over with that of classical dyeing techniques.

The system can handle dyeing directly from warping machine with a creel of 640 coils. It only requires about 420 L of dyeing bath volume compared to 20.000-25.000 L of classical dyeing techniques. Dyestuff is in closed-circuit operation. Dyeing process only takes place in single closed section (with four compartments) while 9 sections are required along with a rinse bath in each. All chemicals bonding after dyeing occurs as fast as in 3 minutes. The system is flexible and can handle as low as 50-100 kg bathes. With the operating speed of 30 m/min and installed power of only 10 KW, Dye4Future™ technology is the solution for environmentally friendly dyeing for future and sustainable textiles.







# LCA Information

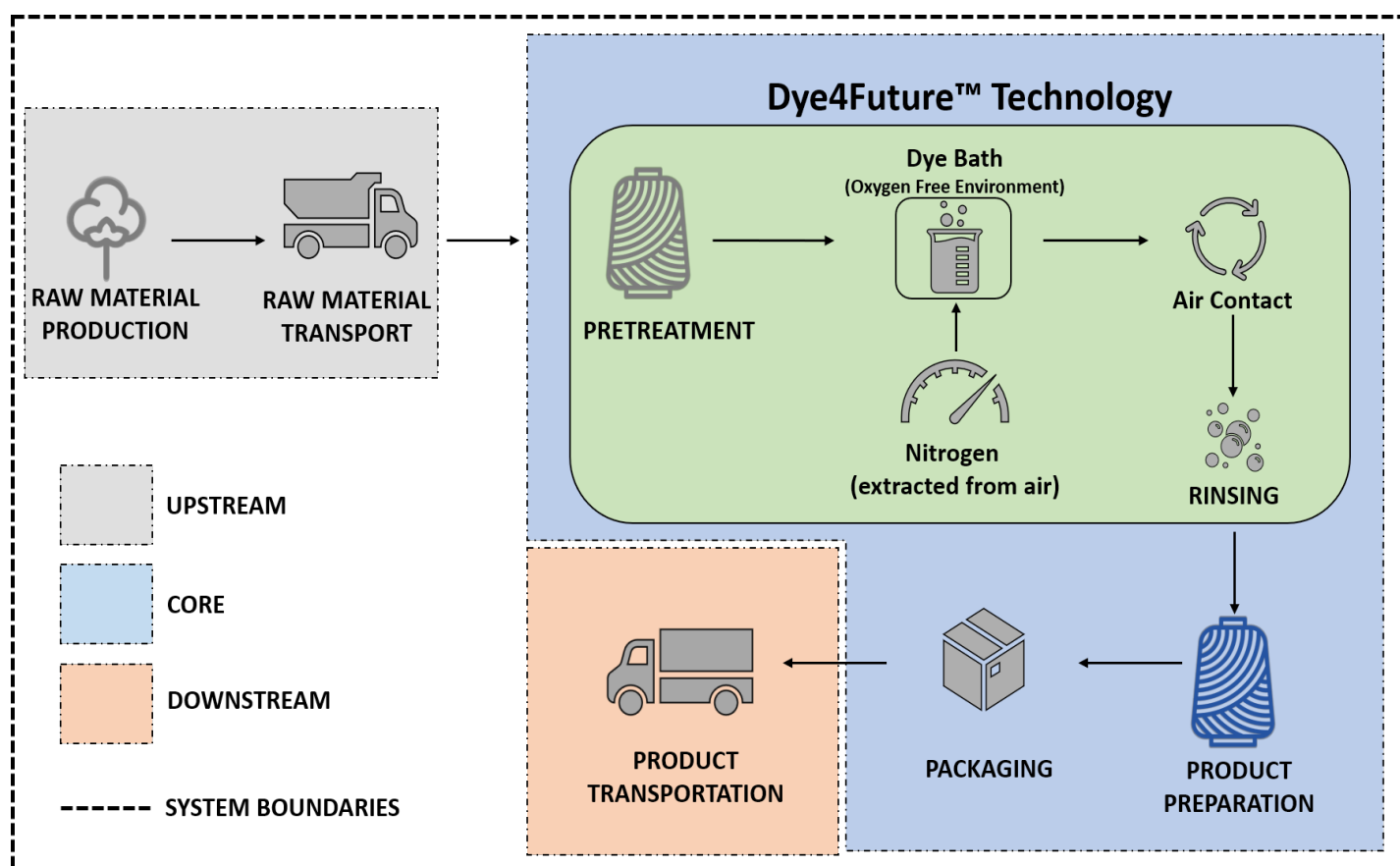
<b>Functional unit / declared unit</b>	1 kg of Dyed 95/5 Cotton Elastane Yarn
<b>Time representativeness</b>	2018
<b>Database(s) and LCA software used</b>	TLCID (Turkish Lifecycle Inventory Database), Ecoinvent 3.5, SimaPro

## Description of system boundaries:

Cradle-to-grave, end of life is excluded as per Product Category Rules for Textile Yarn and Thread.

## Excluded life cycle stages:

Use phase is not included following the PCR. Voluntary reporting stages of recycling or handling packaging and waste materials after use are excluded. Product end of life is excluded following the PCR.



(System Diagram)



**More information:**

Life cycle assessment calculations required for this EPD were done using SimaPro, a life cycle assessment program. Energy calculations were obtained using Cumulative Energy Demand (LHV) v 1.00, which is present in SimaPro's latest version. Global Warming Potential was calculated using IPCC 2013 method with a timeframe of 100 years. Eutrophication, Abiotic Depletion Fossil Fuels and Abiotic Depletion Elements were calculated with CML 2001 baseline method. Acidification was calculated using fate not included version in CML 2001 non-baseline method. Photochemical Oxidant Formation potential was calculated with POFP, LOTOS-EUROS as applied in ReCiPe 2008. Water Scarcity was calculated with AWARE method. Net freshwater used was calculated from the life cycle inventory results. Lastly, toxicity impacts were calculated using USEtox v 2.02 recommended + interim. No cut-off rule was applied within the LCA study underlying this EPD.

It should be noted that Bak-Ay does not produce its own yarns. Yarns are purchased from another supplier in Denizli. The yarns are made out of Aeagen cotton and elastane. Bak-Ay uses its own technology to transform these yarns into dyed, ready to be used yarns. Due to this fact, yarn raw materials are included in the Upstream processes phase within the LCA study underlying this EPD.

Hazardous and Non-Hazardous waste amounts are allocated from yearly total waste amounts.



# Environmental Performance

POTENTIAL ENVIRONMENTAL IMPACT						
Parameter		Unit	Upstream	Core	Downstream	TOTAL
GWP	Fossil	[kg CO <sub>2</sub> eq.]	6.84	0.79	8.99E-04	7.63
	Biogenic	[kg CO <sub>2</sub> eq.]	1.74E-02	2.28E-03	1.99E-07	1.96E-02
	Land use and land transformation	[kg CO <sub>2</sub> eq.]	0.188	5.76E-03	2.45E-07	0.194
	TOTAL	[kg CO <sub>2</sub> eq.]	7.05	0.800	8.99E-04	7.85
Depletion potential of the stratospheric ozone layer (ODP)		[kg CFC11 eq.]	9.21E-07	4.08E-08	1.73E-10	9.62E-07
Acidification potential (AP)		[kg SO <sub>2</sub> eq.]	4.60E-02	3.89E-03	4.07E-06	4.99E-02
Eutrophication potential (EP)		[kg PO <sub>4</sub> <sup>3-</sup> eq.]	2.48E-02	2.15E-03	8.11E-07	2.70E-02
Formation potential of tropospheric ozone (POCP)		[kg C <sub>2</sub> H <sub>4</sub> eq.]	2.25E-02	2.77E-03	5.04E-06	2.53E-02
Abiotic depletion potential – Elements		[kg Sb eq.]	2.08E-05	8.90E-07	1.60E-09	2.17E-05
Abiotic depletion potential – Fossil resources		[MJ], net calorific value	78.7	10.3	1.41E-02	89.0
Water scarcity potential		m3 eq.	85.0	0.425	1.08E-04	85.4
USE OF RESOURCES						
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	11.3	1.19	1.47E-04	12.5
	Used as raw materials	MJ, net calorific value	0	11.9	0	11.9
	TOTAL	MJ, net calorific value	11.3	13.1	1.47E-04	24.4
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	84.0	6.68	1.435E-02	90.7
	Used as raw materials	MJ, net calorific value	0	4.14	0	4.14
	TOTAL	MJ, net calorific value	84.0	10.8	1.435E-02	94.9
Secondary material		kg	0	0	0	0
Renewable secondary fuels		MJ, net calorific value	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0
Net use of fresh water		m3	1.51	6.30E-03	3.11E-06	1.51

# Waste Production and Output Flows

POTENTIAL ENVIRONMENTAL IMPACT					
Parameter	Unit	Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	0	3.86E-04	0	3.86E-04
Non-hazardous waste disposed	kg	0	7.63E-02	0	7.63E-02
Radioactive waste disposed	kg	0	0	0	0
OUTPUT FLOWS					
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0

## Other Environmental Indicators






TOXICITY IMPACTS					
Human toxicity, cancer	cases	4.13E-07	6.22E-08	2.23E-11	4.76E-07
Human toxicity, non-cancer	cases	1.49E-06	1.55E-07	1.33E-10	1.65E-06
Freshwater ecotoxicity	PAF.m3.day	4.86E+04	6.26E+03	1.43	5.49E+04



# References

/GPI/ General Programme Instructions of the International EPD® System. Version 3.0.  
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/Hohenstein/ Hohenstein Institute - <https://www.hohenstein.com/en/about-hohenstein/>  
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/ISO 14025/ ISO 14025:2009-11: Environmental labels and declarations - Type III  
environmental declarations — Principles and procedures  
/ISO 14040 and ISO 14044/ EN ISO 14040:2006-10, Environmental management - Life cycle assessment  
- Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)  
/TLCID/ - Turkish Life Cycle Inventory Database, SURATAM - <https://suratam.org/>  
/GOTS-TR/ - Global Organic Textile Standard - <https://www.global-standard.org/>  
/USTER/ - Uster Technologies - <https://www.uster.com>

# Contact Information

<b>Programme</b>	<p>EPD registered through fully aligned regional programme: EPD Turkey: <a href="http://www.epdturkey.org">www.epdturkey.org</a></p>	<p>The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a></p>
	 <p>ENVIRONMENTAL PRODUCT DECLARATIONS</p>	 <p>THE INTERNATIONAL EPD® SYSTEM</p>
<b>Programme operator</b>	<p>EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research &amp; Design Nef 09 B Blok No:7/15, 34415 Kağıthane / Istanbul, TURKEY <a href="http://www.suratam.org">www.suratam.org</a></p>	<p>EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden  <a href="mailto:info@environdec.com">info@environdec.com</a></p>
<b>Owner of the declaration</b>	 <p>Velimeşe Organize Sanayi Bölgesi Mah. Çorlu-Çerkezköy Yolu Cad. No:22 Ergene Tekirdağ TURKEY</p>	<p>Contact: Hayati BOZAL Production Manager Phone: +90 (282) 674 41 21 Fax: +90 (212) 674 41 24  <a href="http://www.bakaytex.com">http://www.bakaytex.com</a> <a href="mailto:bakaytex@bakaytex.com">bakaytex@bakaytex.com</a></p>
<b>LCA author</b>	 <p>Turkey Lalegül Sok. No:7/18 34415 4. Levent – Istanbul, Turkey +90 212 281 13 33</p>	<p>United Kingdom 4 Clear Water Place Oxford OX2 7NL, UK 0 800 772 0185  <a href="http://www.metsims.com">www.metsims.com</a> <a href="mailto:info@metsims.com">info@metsims.com</a></p>
<b>3rd party verifier</b>		<p>LCA Studio Vladimír Kočí, PhD Šárecká 5, 16000 Prague 6 - Czech Republic <a href="http://www.lcastudio.cz">www.lcastudio.cz</a></p>



Bak-Ay Tekstil

[www.bakaytex.com](http://www.bakaytex.com)