

ENVIRONMENTAL PRODUCT DECLARATION (EPD®)

In accordance with ISO 14025 for: protective workwear fabrics
Tecapro® Ecogreen EG 9600 and Tecapro® BG 9600

FROM TENCATE PROTECTIVE FABRICS

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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 www.environdec.com.



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ABOUT TENCATE PROTECTIVE FABRICS

TenCate Protective Fabrics is enabling millions of people worldwide to be great at what they do. Generations of professionals in firefighting, emergency response, military, light and heavy industry, energy, oil and gas have been relying on our fabrics for safety, comfort and confidence. From the harshest working conditions to the welcoming sight of home. Because we recognize that the people we're protecting are unique individuals whose lives extend beyond work. Supporting their evolving needs, our innovations lead the way in user-centered design, technology and sustainability. At TenCate Protective Fabrics, we are proud to carry on our long-standing manufacturing tradition into the future as we continue to design, develop and produce fabrics that bring out the best in professionals. In work as well as in life.

GREATER RESPONSIBILITY FOR PEOPLE AND PLANET

It is our aim to ensure a safe working environment, minimize environmental pollution and create good social conditions for all parties involved in the production process of products supplied to TenCate Protective Fabrics.

We have developed our own independent procedures and standards for waste management, handling and disposal of chemicals and other dangerous materials, emissions and effluent treatment. The procedures and standards must meet the minimum legal requirements and are continuously in development for further improvement.

Our fabrics are fully compliant with European legislation and standards, including OEKO-TEX® and European Union REACH Regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

TenCate Protective Fabrics is certified to ISO 9001, ISO 14001 and CSR Performance Ladder (level 3) standards. We apply a strict management system for the development and monitoring of CSR (Corporate Social Responsibility) and SteP by OEKO-TEX® within our company, and maintain regular engagement with our stakeholders.

We are an active member of the European Textile Service Association (ETSA). We aim for the highest ETSA classification by developing high quality fabrics that ensure excellent washing performances and maintain great after wash appearances, even after multiple industrial washes. To further develop this quality, we work closely together with end users, test institutes, industrial laundries and garment makers.

TenCate Protect BV is certified according:



PEOPLE. PLANET. PROTECTION.

A unique outside-in perspective informs everything we do at TenCate Protective Fabrics. For us, it's not just about developing the best products. It's about looking several steps further, first to the end users who rely on our products to excel at what they do, then to the broader environment we all have in common: Earth. Because protective fabrics should protect the planet, too.

ECOGREEN: SUSTAINABLE FABRICS FOR ANY INDUSTRY

To meet the ever-growing demand for eco-friendly workwear, TenCate Protective Fabrics has developed three groundbreaking products over the past 10 years: Tecawork® Ecogreen, Tecasafe® Ecogreen, and most recently, the world's first sustainable FR-treated fabric: Tecapro® Ecogreen. The highest-quality, most comfortable protective workwear with the smallest environmental footprint possible — that's the ambitious goal we've set for ourselves with our Ecogreen portfolio.

BIG PICTURE RESPONSIBILITY

In the ever-evolving world of work, innovation is our focus. And as the market leader for sustainable protective fabric solutions, we feel responsible to help our entire industry reduce its ecological impact. We didn't develop Ecogreen products to "tick the sustainable box" for ourselves, but to enable all our value chain partners to produce environmentally-friendly workwear and PPE that truly adds value. We'll continue to proactively lead our industry ahead, because the biggest change happens when we band together.

360° SUSTAINABILITY

Sustainability deserves our full attention, so we tackle it from all angles. From building it into the core of our product development process, to carefully upgrading our materials (Ecogreen products feature recycled polyester and/or sustainably-sourced TENCEL™ Lyocell fibres). From optimising our technology to use less water and energy, to validating our positive impact (see our registered EPD®) and external certification for sustainable textile production (STeP by OEKO-TEX®). Transparency is key, and so is ownership: each TenCate Protective Fabrics employee carries a piece of our shared responsibility to make the world a safer, better, greener place.

MADE WITH THE FUTURE IN MIND

Our driving purpose "Made for Life" refers to our commitment to empower end users to feel safe, comfortable, and confident in what they do, not just in this moment, but far into the future. By providing end users with the most comfortable, most sustainable protective workwear possible, Ecogreen fabrics play an important role in improving their overall wellbeing — on and off the job. A healthier planet ensures a higher quality of life for all of us. That's why we'll never stop using our long-standing experience and expertise to propel innovation forwards, leading the way with sustainable solutions for our value chain and for the planet.



Our Ecogreen portfolio offers the highest-quality, most comfortable protective and regular workwear with the smallest environmental footprint possible.

TECAWORK®
Ecogreen

TECAPRO®
Ecogreen

TECASAFE®
Ecogreen

[View here](#) the EPD® of Tecawork® Ecogreen

[View here](#) the EPD® of Tecasafe® Ecogreen

WHY AN EPD®?

AN ENVIRONMENTAL PRODUCT DECLARATION (EPD®) DOCUMENT FOR GREATER TRANSPARENCY ON ENVIRONMENTAL PERFORMANCES OF PROTECTIVE WORKWEAR FABRICS.

Verified LCA-based information to design environmentally friendly protective workwear with Tecapro® Ecogreen fabrics.



THE SMALLEST ENVIRONMENTAL FOOTPRINT POSSIBLE

The highest-quality, most comfortable protective workwear with the smallest environmental footprint possible: Tecapro® Ecogreen was designed to tick all these boxes while meeting the highest standards for multi-norm protection. We're proud to have innovated the world's first sustainable FR-treated solution containing 50% green fibres. Eco-friendly TENCEL™ Lyocell produced from responsibly-sourced wood and 100% recycled REPREVE® polyester make for a breathable, durable fabric that's soft on the skin and stands up to frequent industrial washing.

THE HIGHEST POSSIBLE TRANSPARENCY

It's our absolute obligation and promise to substantiate the claims we make around our products. In order to achieve the highest possible transparency we strongly believe that the environmental impact of the entire manufacturing chain needs to be thoroughly scanned and analyzed in the smallest detail. From production of raw materials to producing finished fabrics. To establish the most honest environmental impact assessment possible, we have included in the LCA study both Tecapro® Ecogreen and Tecapro® fabrics. Tecapro® are flame resistant treated protective workwear fabrics made of FR-treated cotton and virgin polyester.

SUBSTANTIATING OUR CLAIMS

To clearly and evincible substantiate our claims we created this Environmental Product Declaration document (EPD®). An EPD® – also referred to as a type III Declaration – is an independently verified and registered document which provides transparent and comparable information about the environmental performance of a product. It includes for example the impacts associated with the production, such as raw material acquisition, energy use and

efficiency, the content of materials and chemical substances, emissions to air, soil and water and waste generation.

PROACTIVELY LEADING THE WAY

This EPD® is the most transparent reporting tool that measures our products' impact and is an autonomous step forward for TenCate Protective Fabrics. The relevant standard for Environmental Product Declarations is ISO 14025. We are already certified within this same ISO-fourteen thousand series for environmental and quality management systems. Product Category Rules provide a basic structure for all EPD®s. They give exact rules, requirements, and guidelines for each specific product category. EPD® documents are also always verified by external experts. Because of this extreme scrutiny our declaration provides the trust and transparency needed by procurement professionals, product designers and others to avoid any form of greenwashing. With our EPD® we now proactively lead the way towards a clear and controllable decrease of the environmental footprint of products.

LET'S WORK TOGETHER ON A BETTER ECOLOGICAL FOOTPRINT. IF YOU CAN'T MEASURE IT, YOU CAN'T IMPROVE IT!

All registered EPD® documents in the international EPD® system are publicly available and free to download on: www.environdec.com.



Spinning



Weaving



FR-treatment & finishing



Fabric



Quality inspection

TENCATE

PRODUCT INFORMATION

TECAPRO® ECOGREEN, BEST OF BOTH WORLDS. ONE FABRIC.

Tecapro® Ecogreen EG 9600 is a ground-breaking product that brings everyone a step further: from garment makers looking to launch eco-friendly protective workwear collections; to workers who want to move more comfortably, confidently and safely throughout their day; to companies committed to reducing their environmental footprint. Tecapro® Ecogreen closes the gap and delivers the future.

The fabrics are made with 50% green materials, a blend of TENCEL™ Lyocell fibres from sustainably sourced wood and REPREVE® fibres made of mechanically recycled polyester from PET bottles.

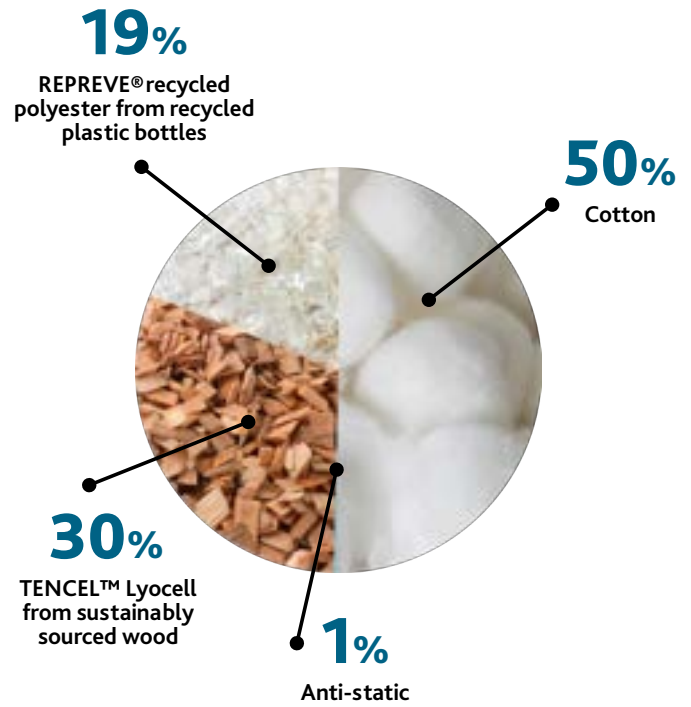


Illustration: Blend of Tecapro® Ecogreen EG 9600

THE BEST ALTERNATIVE TO COTTON EXPLAINED: TENCEL™ LYOCELL



TENCEL™ Lyocell fibres are the best fibres in moisture management; it not only absorbs up to 50% more than cotton fibres but moreover it dissipates much quicker making it cooler and drier. The fibre is also silky smooth to the skin compared to cotton.

We see TENCEL™ Lyocell fibres as the best ecological alternative to conventional cotton. TENCEL™ Lyocell is produced in a closed loop process where more than 99% of the solvent is recovered and reused. All TENCEL™ Lyocell fibres are harvested from natural forests and sustainably sourced plantations without the use of chemical pesticides.



TENCEL™ LYOCELL REDUCES WATER USAGE

The water scarcity impact of TENCEL™ Lyocell fibres is 46 L/kg and far lower than that of conventional cotton, which is 994 L/kg. Replacing cotton with TENCEL™ Lyocell reduces the water scarcity impact.

BEST OF BOTH WORLDS. ONE FABRIC.



MULTI-RISK PROTECTION WITH ZERO COMPROMISE

Guarantee exceptional FR performance for the full spectrum of major industrial risks.



ULTIMATE SOFTNESS AND BREATHABILITY

Enjoy freedom to move comfortably all day long, thanks to smooth, lightweight natural fibres with excellent moisture management.



FIRST-EVER FR-TREATED FABRIC WITH 50% GREEN MATERIALS

Maximise your sustainable impact with eco-friendly TENCEL™ Lyocell and 100% recycled REPREVE® polyester, complete with EPD® for a measurable footprint.

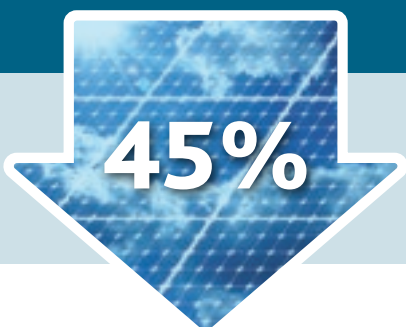
THE BEST ALTERNATIVE TO VIRGIN-POLYESTER: REPREVE® RECYCLED POLYESTER



REPREVE® keeps bottles out of our landfills and oceans, conserves electricity and water and reduces greenhouse emissions and petroleum use. The world's leading brands choose REPREVE® to drive product innovation by combining uncompromised performance with trusted sustainability.

POLYESTER UPCYCLING

With Tecapro® Ecogreen, TenCate Protective Fabrics has achieved 100% polyester upcycling while creating fabrics that equal traditional FR-treated cotton and virgin polyester blends in withstanding heavy usage and industrial laundering. Each strand of recycled polyester used in Tecapro® Ecogreen can be traced back to its PET bottle origins, 100% guaranteed and certified by the Global Recycling Standard (GRS).



RECYCLED POLYESTER REDUCES ENERGY CONSUMPTION

Mechanically recycled polyester reduces energy consumption by 45%, water consumption by nearly 20% and greenhouse gas emissions by over 30% in comparison to virgin polyester.

PRODUCT INFORMATION

TECAPRO®, FIT FOR ANY PURPOSE

Tecapro® BG 9600 is part of the Tecapro® collection that contain flame-retardant fabrics based on cotton, blended with polyester, para-aramid or polyamide. Each blend has its own specific special features, whether it is strength, comfort, protection, or a perfect combination of them all.

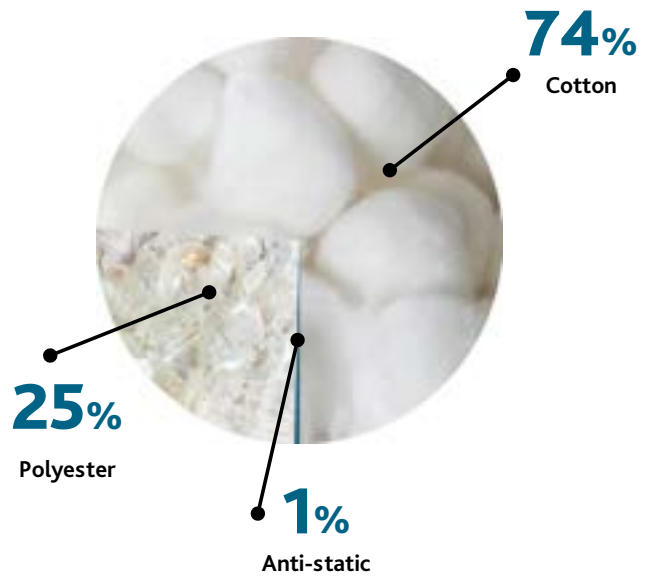


Illustration: Blend of Tecapro® BG 9600



FIT FOR ANY PURPOSE



MULTI-RISK PROTECTION

Provides protection to all major industrial risks, from heat & flame, welding, grinding, antistatic to chemical splashes and electric arc.



IMPROVED COMFORT

The lower weight, 2/1 twill construction and high cotton content ensure good moisture control and a soft touch to the skin.



SUPERIOR INDUSTRIAL LAUNDERABILITY

Unmatched mechanical stability, colour fastness, strength and FR performance, even after repeated industrial laundering.



TECHNICAL SPECIFICATIONS

FABRICS

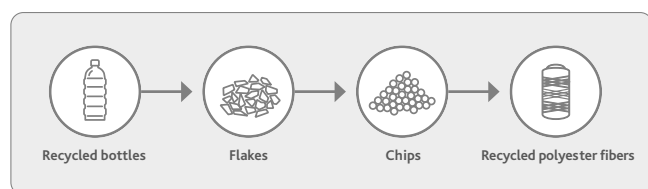
Tecapro® Ecogreen and Tecapro® are classified as Personal Protective Equipment (PPE). Both are flame retardant (FR) fabrics that protects workers against a wide range of life threatening risks. Garments made with these FR-treated protective fabrics are used in a variety of industries including utilities, (petro) chemical, metal & steel and general manufacturing. These industries often use industrial laundries services to clean their garments with efficient washing processes than can nevertheless be aggressive to the fabric. It is therefore important to include specifications and compliance to industrial launderability, often referred to as ISO15797 - compliant fabrics.

Find the technical specifications of all declared products in Table 1.

CONTENT DECLARATION

RECYCLED MATERIAL

The claim that REPREVE® mechanical recycled polyester fibre is made with recycled materials (80% post-consumer and 20% pre-consumer recycled polyester) is certified by third parties: Scientific Certification Systems (SCS Certification) as well as the Global Recycled Standard. Certifications are available upon request.



Thanks to a tracer technology (embedded in the fibre) our fabrics can be analysed by the fibre supplier to verify recycled polyester is in there, and in the right amounts.

PACKAGING

Since Tecapro® Ecogreen EG 9600 and Tecapro® BG 9600 are semi-finished goods, there is no consumer packaging involved. Distribution packaging consist of low density PE packaging to cover the rolls of fabrics. Those rolls are shipped on EUR-flat pallets. Packaging was found to give a negligible contribution to the environmental impact (<1% for all categories).

CHEMICAL SELECTION

All flame resistant fabrics are developed in the same production process from spinning the yarn, to weaving, to dyeing, to applying FR treatment, to finishing the fabric (see Figure 1: system boundary process, page 13). Throughout this production process, the use of harmful substances is regulated and controlled by OEKO-TEX® standard 100 certification, which ensures that the final fabrics represent no risk to human health and will ensure 'skin friendly' protective clothing.

REACH COMPLIANT

TenCate Protective Fabrics is also REACH compliant. REACH is a regulation of the European Union. This regulation is adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals.



All fabrics are finished with a durable flame-retardant finish, as well a Comfort-Control and Hydro-Tec finish that makes the fabric soft and supply while having limited chemical splash resistance. The chemistry used is REACH and OEKO-TEX® 100 compliant.




	TECAPRO® ECOGREEN	TECAPRO®	
QUALITY	EG 9600	BG 9600	TEST METHOD
Width	152 cm (+2/-1 cm)	153 cm (+2/-1 cm)	ISO 22198: 2006
Weight	320 g/m ² (± 5%)	320 g/m ² (± 5%)	ISO 3801: 1978
Fibre composition	50%/30%/19%/1% Cotton/ TENCEL™ Lyocell/rPet/Static-Control	74%/25%/1% Cotton/Pes/ Static-Control	ISO 1833: 2006
Cellulosic content	80% (cotton and TENCEL™ Lyocell)	74% (cotton)	
Synthetic content	19% Recycled Polyester 1% Anti-static	25% Virgin Polyester 1% Anti-static	
Construction	2/1 Twill S	2/1 Twill S	ISO 3572: 1976
Finish	Durable flame-retardant finish with Comfort-Control and Hydro-Tec	Durable flame-retardant finish with Comfort-Control and Hydro-Tec	
PHYSICAL PERFORMANCE			
Tensile strength	1400 N x 700 N (± 10%)	1300 N x 650 N (± 10%)	ISO 13934-1: 2013
Tear strength	25 N x 20 N (± 10%)	30 N x 25 N (± 10%)	SO 13937-2: 2000
Pilling	4	4	ISO 12945-2: 2000 (5000 rubs), after 5x cleaning cycles at 75 °C, ISO 15797: 2018
Dimensional stability	<3%	<3%	ISO 5077: 2008, after 5x cleaning cycles at 75 °C, ISO 15797: 2018
pH value	4 - 7.5	4 - 7.5	ISO3071: 2020
COLOUR FASTNESS			
Laundering fastness 60 °C	Colour change: 4-5, Staining: 4-5	Colour change: 4-5, Staining: 4-5	ISO 105 C06 C2S: 1197
Laundering fastness 75 °C	Colour change: 4-5, Staining: 4-5	Colour change: 4, Staining: 4	ISO 105 C06 D2S: 1197
Perspiration Alkaline	Colour change: 4-5, Staining: 4-5	Colour change: 4-5, Staining: 4-5	ISO 105 E04: 2008
Perspiration Acid	Colour change: 4-5, Staining: 4-5	Colour change: 4-5, Staining: 4-5	ISO 105 E04: 2008
Dry rubbing	Change 4-5	Staining: 4	ISO 105 X12: 2001
Wet rubbing	Staining: 2-3	Staining: 3	ISO 105 X12: 2001
Ligth fastness (Xenon)	Colour change: 6	Colour change: 6	ISO 105 B02: 2013
CARE LABELLING			
Domestic laundering			NEN-EN-ISO 6330; 6N 60°C: 2012
Industrial laundering	White:  Colour:  75 °C - ISO 15797		ISO 15797, 75°C: 2018
CERTIFICATION			
Industrial flame & heat hazard	A1, A2, B1, C1, E3, F1	A1, A2, B1, C1, E3, F1	EN ISO 11612: 2015
Welding	Class 1 – A1, A2	Class 1 – A1, A2	EN ISO 11611: 2015
Electric arc	Class 1 – 4kA	Class 1 – 4kA	IEC 61482-2; 2018, IEC 61482-1-1: 2019
Anti-static for explosion risk	Pass	Pass	EN 1149-5: 2018, EN1149-3: 2004
Limited chemical splash	Pass	Pass	ISO13034: 2005 + A1:2009
Contrast colour	Pass	Pass	EN ISO 20471: 2013/A1: 2016
General requirements	Pass	Pass	EN ISO 13688: 2013
Human-ecological requirements	Class 2	Class 2	Oeko-Tex 100

Table 1

¹For this EPD® – colour Navy blue has been chosen as the standard for both fabrics. Chemistry will divers slightly per colour recipe.

²All fabrics are finished with a flame-retardant finish and fluor finish. By this, the fabric is both flame-retardant and repels to limited chemical splashes.

³EN 11612 A1, A2 (flammability) is tested after 50x ISO15797 laundering cycles

LIFE CYCLE ASSESSMENT

CALCULATING ENVIRONMENTAL IMPACT VALUES

Life Cycle Assessment (LCA) is a method for analyzing the environmental impact of a product throughout its life cycle, from the extraction of raw materials (the cradle) to handling the waste (grave). The scope of this particular study is cradle-to-gate and includes all processes up until the fabric is manufactured.

A LCA study has been conducted in accordance with ISO 14044 and the requirements stated in the General Program Instructions by The International EPD® System¹.

GOAL OF THE STUDY

The goal of this LCA study is to calculate environmental impact values for TenCate Protective Fabrics' Tecapro® BG 9600 and Tecapro® EG 9600 to create this Environmental Product Declaration. The EPD® is used for communicating environmental performance to stakeholders like garment makers, industrial laundries and professional end users.

SCOPE OF THE STUDY

The scope of this study is cradle-to-gate and includes all processes up until the fabric is manufactured and available for sale at TenCate Protective Fabrics (Figure 1). All material and resource consumption is tracked back to the point of raw material extraction, mainly by using cradle-to-gate data² from the Ecoinvent database. The functional unit of the study is 1 m² of protective workwear fabric, in accordance with the Product Category Rules (PCR)³ for woven, knitted or crocheted fabrics (Product category classification: UN CPC 267, 281).

DATA COLLECTION

The inventory for the LCA study was collected for 2020 and complemented with specific data (waste) from 2019. This covered all manufacturing processes:

- Spinning yarns and weaving grey cloth
- Finishing of protective workwear fabric (pre-treatment, dyeing, FR-treatment, finishing and quality inspection)*

ALLOCATION

Whenever it has been necessary to partition the system inputs and outputs, mass criteria have been used in accordance with the PCR. Such situations have for example been when the share of energy and water consumption of an entire production plant has been allocated to the specific fiber use or grey cloth based on the total production volume (mass) of the plant.

CUT-OFF RULES

The PCR states that life cycle inventory data for a minimum of 99% of total inflows to the three life cycle stage (upstream, core and downstream modules) shall be included and a cut-off rule of 1% regarding energy, mass and environmental relevance shall apply.

ASSUMPTIONS AND LIMITATIONS

Some general assumptions have been made around emission standards and distances for transports to enable use of database data from Ecoinvent 3.6 to represent primary data. Country specific electricity mixes have been used for manufacturing sites outside of Europe when no certificates of origin were provided.

DATA QUALITY

The data quality has been considerably increased by the experience from making similar studies in the past. Generally, the LCA data should be used with precaution if interpreted for any other purpose than this EPD®.

ADDITIONAL INFORMATION

ABOUT THE LCA STUDY

Time representativeness:	2020
Database(s) and LCA Software used:	SimaPro 9.1.0.11 Ecoinvent version 3.6
Description of system boundaries:	Cradle-to-gate
LCA Practitioner:	Jutta Hildenbrand RISE institute (RISE IVF) PO Box 104, SE-431 22 Mölndal, Sweden
Third party reviewer:	Martyna Mikusinska Sweco Environment AB Fredsgatan 14 Box 214, 70144 SE-703 62 Örebro, Sweden

* The data for fabric manufacturing was collected by the staff of TenCate Protective Fabrics.

SYSTEM DIAGRAM

The system boundaries of this EPD® are decided by the Product Category Rules (PCR) and illustrated by Figure 1. The upstream and core are included in the scope. Garment manufacturing, retail, use, (industrial) wash and end-of-life processes are not included.

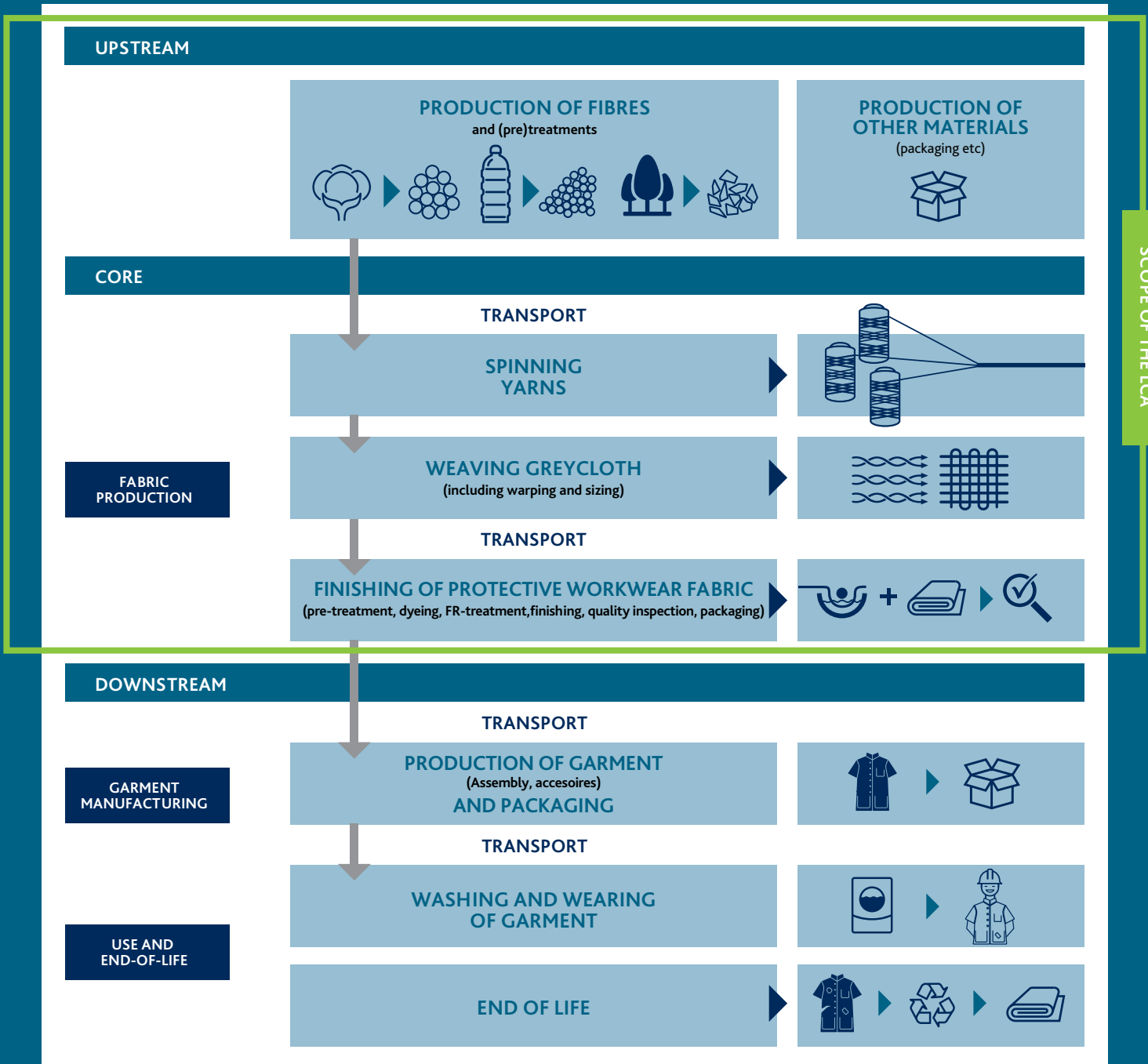


Figure 1

- 1 EPD® International, 'General Program Instructions for the International EPD® System Version 3.0' (2017) <www.environdec.com>.
- 2 Cradle-to-gate = all processes from cradle (mining site, forest etc.) to gate (until the goods is produced and ready for delivery at the factory gate).
- 3 EPD® International, Product Category Rules According to ISO 14025 for woven, knitted or crocheted fabrics (2016-09-23). Product category classification: UN CPC 267.281.
- 4 Ecoinvent, 'Ecoinvent' <<https://www.ecoinvent.org/database/database.html>>.

ENVIRONMENTAL PERFORMANCE

The potential environmental impact including the use of resources and waste has been analysed for the upstream and core processes (visualised in the system boundary of figure 1).

POTENTIAL ENVIRONMENTAL IMPACT

PARAMETER		UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	BG 9600	1.7	3.17	4.88
			EG 9600	1.38	2.92	4.3
	Biogenic	kg CO ₂ eq.	BG 9600	0.19	0.140	0.159
			EG 9600	0.028	0.144	0.172
	Land use and land transformation	kg CO ₂ eq.	BG 9600	0.155	0.005	0.160
			EG 9600	0.113	0.055	0.168
	TOTAL	kg CO ₂ eq.	BG 9600	1.88	3.32	5.19
			EG 9600	1.52	3.12	4.64
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	BG 9600	9.90E -08	5,85E -07	6.48E -07
			EG 9600	7.60E -08	5,16E -07	5.92E -07
Acidification potential (AP)		kg CO ₂ eq.	BG 9600	0.0191	0.0250	0.0441
			EG 9600	0.0137	0.0216	0.0352
Eutrophication potential (EP)		kg PO ₄ ³⁻ - eq.	BG 9600	0.0244	0.0092	0.0335
			EG 9600	0.018	0.0073	0.0253
Abiotic depletion, elements		kg Sb eq.	BG 9600	4,82E-05	6,55E-04	7,03E-04
			EG 9600	2,36E-03	5,63E-04	2,92E-03
Abiotic depletion potential – Fossil resources		MJ	BG 9600	18.5	46	64.5
			EG 9600	11.0	41.8	52.8
Formation potential of tropospheric ozone (POCP)		kg NMVOC	BG 9600	0.0070	0.0116	0.0186
			EG 9600	0.0050	0.0107	0.0253
Water scarcity potential		m3 eq.	BG 9600	37.1	3.0	40.1
			EG 9600	26.9	2.1	29.0

Table 2, values per m² fabric

USE OF RESOURCES

PARAMETER		UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	BG 9600	10.92	7.85	18.77
			EG 9600	8.08	8.52	16.60
	Used as raw materials	MJ, net calorific value	BG 9600	0.00	0.00	0.00
			EG 9600	0.00	0.00	0.00
	TOTAL	MJ, net calorific value	BG 9600	10.92	7.85	18.77
			EG 9600	8.08	8.52	16.60
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	BG 9600	21.14	54.51	75.66
			EG 9600	12.7	49.3	62.0
	Used as raw materials	MJ, net calorific value	BG 9600	0.00	0.00	0.00
			EG 9600	0.00	0.00	0.00
	TOTAL	MJ, net calorific value	BG 9600	21.14	54.51	75.66
			EG 9600	12.7	49.31	62.00
Secondary material	kg	BG 9600	0.00	0.00	0.00	
		EG 9600	0.00	0.69	0.69	
Renewable secondary fuels	MJ, net calorific value	BG 9600	0.00	0.00	0.00	
		EG 9600	0.00	0.00	0.00	
Non-renewable secondary fuels	MJ, net calorific value	BG 9600	0.00	0.00	0.00	
		EG 9600	0.00	0.00	0.00	
Net use of fresh water	m ³	BG 9600	2.39	0.39	2.78	
		EG 9600	1.74	0.32	2.06	

Table 3, values per m² fabric

WASTE PRODUCTION

PARAMETER	UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Hazardous waste disposed	kg	BG 9600	0.00	0.01	0.01
		EG 9600	0.00	0.01	0.01
Non-hazardous waste disposed	kg	BG 9600	0.00	0.05	0.05
		EG 9600	0.00	0.05	0.05
Radioactive waste disposed	kg	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00

Table 4, values per m² fabric

OUTPUT FLOWS

PARAMETER	UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Components for reuse	kg	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00
Material for recycling	kg	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00
Materials for energy recovery	kg	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00
Exported energy, electricity	MJ	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00
Exported energy, thermal	MJ	BG 9600	0.00	0.00	0.00
		EG 9600	0.00	0.00	0.00

Table 5, values per m² fabric

ADDITIONAL INFORMATION

The diagrams below show selected results from the environmental performance tables per square meter of fabric.

WATER SCARCITY FOOTPRINT SIGNIFICANT REDUCED

The water scarcity footprint of Tecapro® Ecogreen fabrics, compared to traditional FR-treated fabrics based on cotton and virgin polyester like Tecapro® BG 9600, is reduced significantly. This stems mainly from substituting conventional cotton fibres by TENCEL™ Lyocell fibres in the upstream processes, which is illustrated in Figure 2. As table 2 illustrates, the reduction of the water scarcity footprint of Tecapro® Ecogreen is almost 11m³/m², which is equivalent to more than 17.000 liter (17 m³) water reduction per linear meter of fabric, or 140 filled bathtubs with an average water capacity of 120 liter.

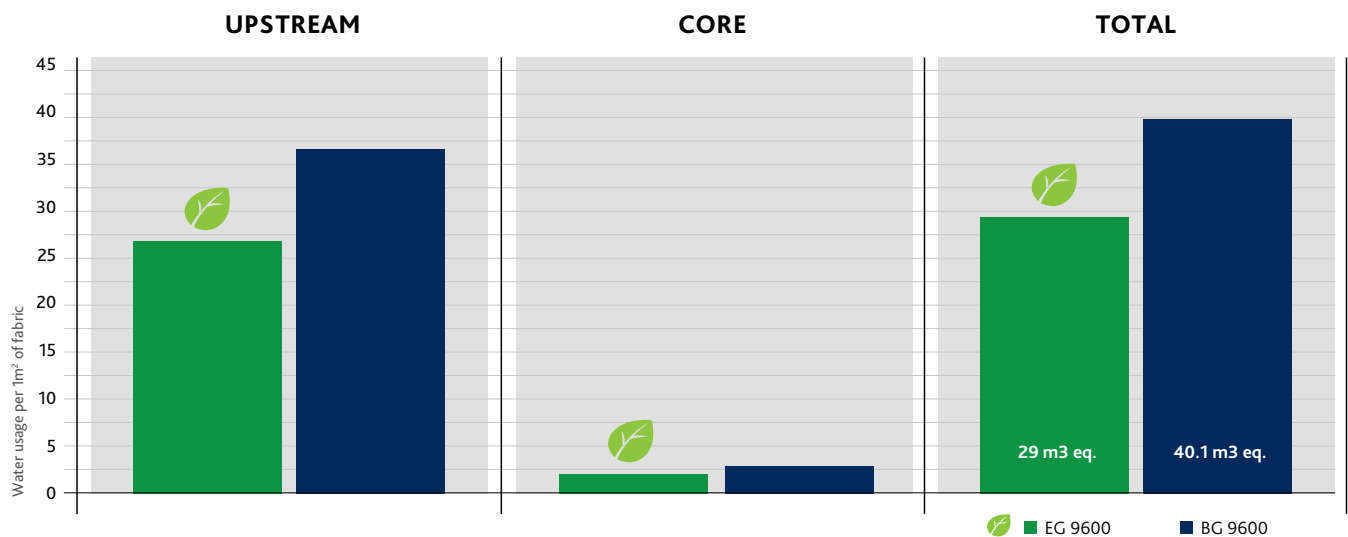
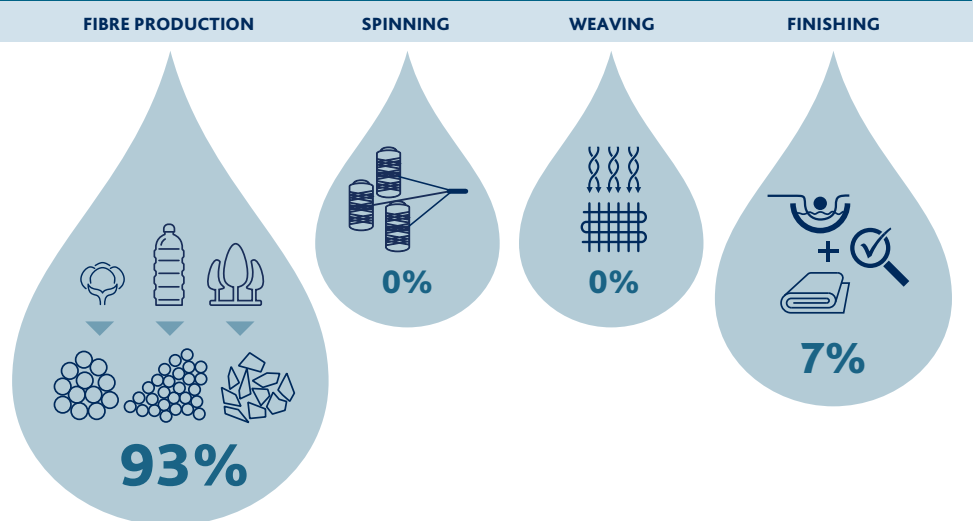


Figure 2. The Water Scarcity Footprint of the Tecapro® Ecogreen fabric EG 9600, compared to conventional FR-treated protective workwear fabrics solutions containing cotton blended with virgin polyester and Tecapro® BG 9600. Figures for one square meter fabric.

WATER SCARCITY IMPACT TROUGHOUT THE PROTECTIVE FABRICS VALUE CHAIN

Figure 3. Breakdown of the water scarcity footprint throughout the value chain of traditional FR-treated fabrics made of conventional cotton and virgin PES. In this case the Tecapro® BG9600.

Looking at the impact throughout the value chain (Figure 3) from fibre to fabric production, we can conclude that the fibre production (the upstream process), is the most contributing element that impacts the water scarcity footprint. Substituting conventional cotton in fabrics results in significant water reduction in (mainly) semi-aral regions where water is a scarce resource.



GLOBAL WARMING POTENTIAL

The Global Warming Potential (GWP) of Tecapro® Ecogreen compared to traditional FR-treated fabrics is shown in Figure 4. The lower climate impact stems from using less fossil fuels in the upstream phase due to the use of 19% REPVEVE® recycled polyester fibres instead of virgin polyester. As Table 2 illustrates, the reduction in CO2 is 0.55 kg CO2/m², which is equivalent to 0.84 kg per linear meter of fabric or the CO2 emissions while driving 7 km with an average medium segment car (118 g/km).

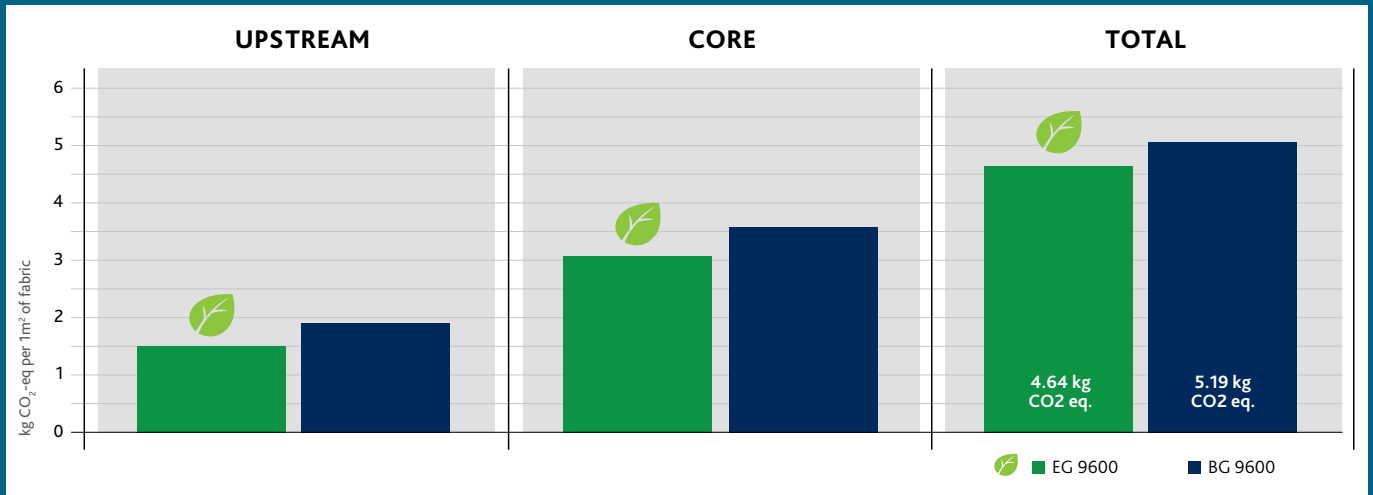


Figure 4. The Global Warming Potential of the Tecapro® Ecogreen fabric EG 9600, compared to conventional FR-treated protective workwear fabric solutions containing cotton blended with virgin polyester like Tecapro® BG 9600. Figures for one square meter fabric.

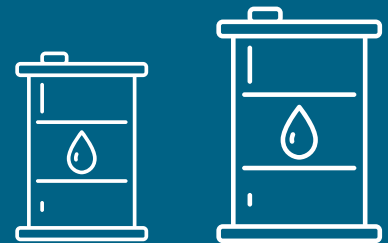
MINIMAL CHEMICAL FERTILIZERS

Wood and pulp used to make TENCEL™ Lyocell comes from natural forests and plantations that grow without using chemical fertilizers. A major step forward knowing that conventional cotton cultivation is criticized for its use of pesticides, using 25% of the world consumption of insecticides on a land area which is only 2.4% of total agriculture. Besides fertilizers and pesticides, it is also established that Eutrophication (over fertilizing land/water) is higher for blends containing high amounts of cotton (traditional FR-treated).

FOSSIL AND MINERAL DEPLETION (ABIOTIC DEPLETION):

Another advantage of using TENCEL™ Lyocell and REPVEVE® recycled polyester is that no virgin fossil/nonliving/abiotic materials are being used. In the case of REPVEVE® recycled polyester, post-consumer materials are used that are already in the 'loop'. Beside the re-use of materials, this process of mechanically recycling also results in lower CO2 emissions.

As table 2 indicates, the abiotic depletion footprint of Tecapro® Ecogreen EG 9600 is reduced significantly - expressed in Megajoule (MJ) - which comes down to more than 11.7 MJ/m² less than a conventional FR-treated fabric (see Table 2). Per linear meter, this reduction is almost 19 MJ.



Tecapro® Ecogreen
EG 9600
52.8 MJ

Tecapro®
BG 9600
64.5 MJ

WHY COTTON CAN NOT (YET) BE COMPLETELY EXCLUDED

Although we have innovated the world's first sustainable FR-treated solution with the development of Tecapro® Ecogreen, it wouldn't be technically feasible to completely exclude cotton. Looking at the current technological possibilities within FR-treated fabric solutions, minimizing the cotton content used for Tecapro® Ecogreen to 50% is the maximum we can do. The remaining amount of cotton is necessary to ensure that the fabric maintains its protecting properties and keeps the wearer safe.

PRODUCTION TECHNOLOGY

In addition to the environmental performance of our workwear fabrics (pag 16 – 17 of the EPD®), TenCate Protective Fabrics continuously strives to make improvements for a safe, social and sustainable environment for all stakeholders.

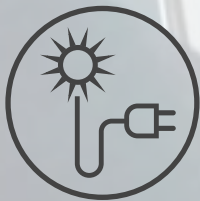
We have established a solid base by innovating on our products and improving our production technologies. As the examples below show, this already has had a positive effect on the environmental impact of our production process. Continued improvements on different assets ensure we keep on contributing to a better world.



WASTE WATER TREATMENT

TenCate Protective Fabrics applies highly efficient waste water treatment and technologies to improve the environment. It's a stable process that is practically odour-free and sludge-free, making sludge treatment obsolete. Efficiency on this comes from the removal of 60% COD (Chemical Oxygen Demand) as well as all toxicity. After discharge, the water is clean to the point that further neutralisation can be handled by the sewage treatment company.

An additional advantage of this waste water treatment technique is the formation of biogas. TenCate Protective Fabrics uses this purified source of energy to create steam for the standard manufacturing process that otherwise would have been wasted.



ENERGY CARE

In compliance with ISO 14001, TenCate Protective Fabrics uses an energy management system that ensures continuous improvements. In line with compliance, an energy-efficiency plan (EPP 2017-2020) has been developed and carried out. Recent examples of realised energy savings are:

- The upgrade from conventional Fluorescent light (TL light) to LED-lighting in all operational and auxiliary facilities. This has resulted in a reduction of energy consumption by 80%.
- Within operations a flue gas condenser is installed in the exhaust of the steam generator to preheat the water used in our 40°C and 60°C systems. This investment reduces the direct gas consumption significantly with >14%.
- The investment in a state-of-the-art continuous dyeing line that is much more energy-efficient and better insulated (the previous machinery dated from the 1980s).

The energy source used for electricity is supported by green power generated mainly by hydro power. Guarantees of its origin are available via certification upon request.



CLEAN AIR (AIR)

TenCate Protective Fabrics purifies air from exhausting emissions with extraction systems to ensure that no harmful substances are released and odours are depleted. This system is compliant with all hydrocarbon regulations (class O3 < 100 mg/m³ and O2 < 50 mg/m³).

PROGRAM-RELATED

INFORMATION AND VERIFICATION

The EPD® owner has the sole ownership, liability, and responsibility for the EPD®. EPD®s within the same product category but from different programs may not be comparable.

Program	<ul style="list-style-type: none"> • The International EPD® System • EPD® International AB, Box 210 60, SE-100 31 Stockholm, Sweden • www.environdec.com, info@environdec.com
EPD® registration number	S-P-02913
Published	2021-08-23
Valid until	2026-07-02
Product Category Rules	pcr2012:14 V2.13 Woven, knitted and crocheted fabrics (2020-11-18)
Product group classification	UN CPC 267, 281 -
Reference year for data	2020
Geographical scope	Global
PCR review was conducted by	The Technical Committee of the International EPD® System. Review chair: Lars-Gunnar Lindfors. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006	<input type="checkbox"/> EPD® process certification <input checked="" type="checkbox"/> EPD® verification
Third party verifier	Martyna Mikusinska Sweco Environment AB
Approved by	The International EPD® System
Procedure for follow-up of data during EPD® validity involves third party verifier	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

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