TECASAFE®
Ecogreen

EPD®

ENVIRONMENTAL PRODUCT DECLARATION (EPD®)

In accordance with ISO 14025 for: protective workwear fabrics
Tecasafe® Ecogreen XL 9300 & XL 9240 and Tecasafe® XA 9001 & XA 9002

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.

TENCATE protectivefabrics | made for life

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Nijverdal

ABOUT TENCATE PROTECTIVE FABRICS

TenCate Protective Fabrics is enabling millions of people world-wide 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) 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 ground-breaking 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 Tecapro® 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 Tecasafe® Ecogreen fabrics.

FORWARD-THINKING PROTECTION

In the spirit of innovation, Tecasafe® Ecogreen was the first ever inherent FR multi-norm fabric to incorporate sustainable TENCEL™ Lyocell fibres. It provides improved comfort and extreme durability, while boasting a lower ecological footprint than conventional cotton. Soft and breathable with superior moisture management properties, these fabrics continue to look good and perform well even after extensive industrial laundering.

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 Tecasafe® Ecogreen and Tecasafe® fabrics. Tecasafe® is a standard inherent flame retardant fabric solution which consist of a blend of modacrylic and conventional cotton fibres.

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.

EPD®

PROACTIVELY LEADING THE WAY

Our EPD® is the next level of reporting and 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

Finishing

Fabric

Quality inspection

PRODUCT INFORMATION

TECASAFE® ECOGREEN, STEP FORWARD INTO YOUR NEW COMFORT ZONE

With protection features for multiple high-risk situations, Tecasafe® Ecogreen is a collection of inherently heat- and flame-resistant fabrics that offer excellent protection, especially against flash fire and electric arc, while providing the wearer with outstanding comfort.

Tecasafe® Ecogreen are the first eco-friendly inherent FR fabrics with close to 50% sustainable materials, with a blend of TENCEL™ Lyocell fibres from sustainable sourced wood.

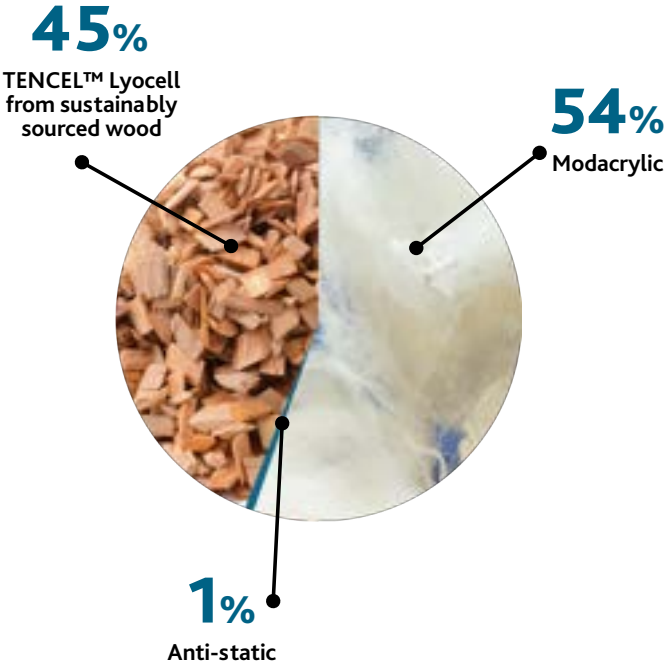


Figure is based on the content composition of Tecasafe® Ecogreen XL 9300.

THE BEST ALTERNATIVE TO COTTON EXPLAINED: TENCEL™ LYOCELL

Tencel™ Feels so right

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

The long lasting looks after frequent industrial washing is a result of color pigments that are deeply embedded into TENCEL™ Lyocell fibres, which retain long lasting colour vibrancy more than conventional cotton fibres, and are less prone to colour fading even after repeated washing.

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.

STEP FORWARD INTO YOUR NEW COMFORT ZONE

GUARANTEED COMFORT IN ANY SITUATION

Soft, silky natural fibres provide superior moisture management, keeping you comfortable, cool and dry at all times thanks to constant breathability.

LASTING LOOKS EVEN WITH FREQUENT WASHING

High durability maximises the lifetime of your protective workwear, with an excellent colour fastness rating of 4-5 after 50 industrial washing cycles (ISO 15797).

FIRST ECO-FRIENDLY INHERENT FR FABRIC WITH CLOSE TO 50% SUSTAINABLE MATERIALS

Lowers your footprint without compromising on the best inherent FR multi-norm performance. Featuring sustainably-sourced eco-friendly TENCEL™ Lyocell, with EPD® for measurable impact.

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.

PRODUCT INFORMATION

TECASAFE®, TRUSTED FOR PROTECTION

The Tecasafe® collection of inherent-FR fabrics has been popular in a wide range of industries for more than 20 years. When it first came on the market, Tecasafe® was truly disruptive. As the first modacrylic blended product on the world market, it led the industry to move beyond FR-treated fabrics.

Tecasafe® is highly appreciated for its capabilities in combining multi-risk inherent protection with comfort, and easily withstands repeated industrial laundering.

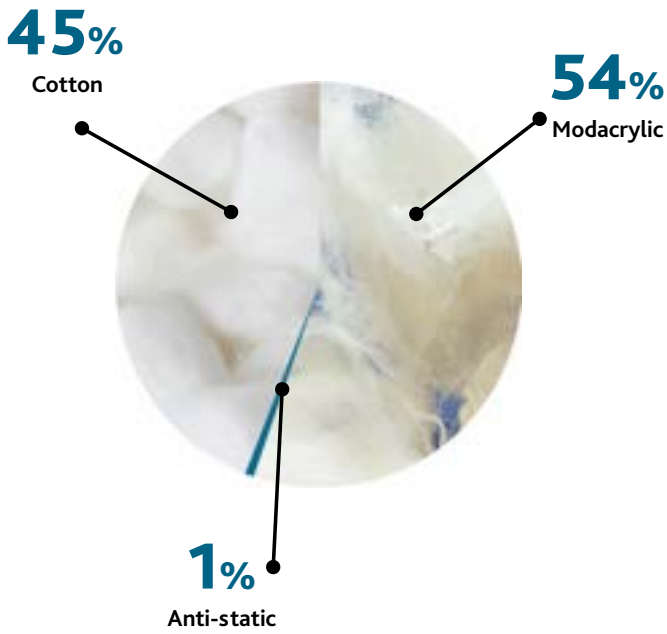


Figure is based on the content composition of Tecasafe® XA 9001.

TRUSTED FOR PROTECTION

SUPERIOR INHERENT FR PROTECTION

Inherent FR fabric that offers excellent protection against multiple high-risk situations, such as heat & flame and electric arc.

UNMATCHED DURABILITY

20 years of proven superior durability to intense working conditions and extensive industrial laundering.

COTTON COMFORT

Cotton fabrics maintain a natural comfort bringing softness to the skin and moisture absorption.

TECHNICAL SPECIFICATIONS

FABRICS

Tecasafe® Ecogreen and Tecasafe® fabrics are classified as Personal Protective Equipment (PPE). Both are collections of inherently heat- and flame-resistant fabrics that offer excellent protection, especially against flash fire and electric arc, while providing the wearer with outstanding comfort. Garments made with FR-inherent protective fabrics are used in a variety of industries including energy & utility, (petro)chemical and 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 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

As opposed to other fabrics in our Ecogreen portfolio, such as Tecawork® Ecogreen and Tecapro® Ecogreen, Tecasafe® Ecogreen does not contain recycled materials. The eco-friendly TENCEL™ Lyocell fibres that are used for Tecasafe® Ecogreen, are made of botanic origin (wood pulp).

PACKAGING

Since Tecasafe® Ecogreen and Tecasafe® 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 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.

	TECASAFE® ECOGREEN		TECASAFE®		
QUALITY AND CONTENT	**XL 9300**	**XL 9240**	**XA 9001**	**XA 9002**	**TEST METHOD**
Width	152 cm (+2/-1 cm)	152 cm (+2/-1 cm	152 cm (+2/-1 cm)	152 cm (+2/-1 cm)	ISO 22198: 2006
Weight	300 g/m² (± 5%)	240 g/m² (± 5%)	320 g/m²	250 g/m² (± 5%)	ISO 3801: 1978
Composition	54%/45%/1%, Modacrylic/ TENCEL™ Lyocell/Static--Control	51%/43%/5%/1%, Modacrylic/ TENCEL™ Lyocell/ para-aramid/Static-Control	54%/45%/1%, Modacrylic/ Cotton/Static-Control	49%/42%/5%/3%/1%, Modacrylic/ Cotton/para-aramid/PA/Static-Control	ISO 1833: 2006
Cellulosic content	45% TENCEL™ Lyocell	43% TENCEL™ Lyocell	45% cotton	42% cotton	
Synthetic content	54% Modacrylic, 1% Static-Control	51% Modacrylic, 5% para-aramid, 1% Static-Control	54% Modacrylic, 1% Static-Control	49% Modacrylic, 5% para-aramid, 3% polyamide, 1% Anti-Static	
Construction	2/1 Twill Z	2/1 Twill Z	2/1 Twill Z	2/1 Twill Z	ISO 3572: 1976
Finish[1]	Hydro-Tec	Hydro-Tec	Hydro-Tec	Hydro-Tec	
PHYSICAL PERFORMANCE					
Tensile strength	950N x 800 N (± 10%)	900N x 650 N (± 10%)	950 N x 850 N (± 10%)	950N x 750 N (± 10%)	ISO 13934-1: 2013
Tear strength	22 N x 22 N (± 10%)	30 N x 30 N (± 10%)	20 N x 20 N (± 10%)	25 N x 25 N (± 10%)	ISO 13937-2: 2000
Pilling	4	4	4	4	ISO 12945-2: 2000, (5000 rubs) After 5x cleaning cycles at 75°C ISO 15797: 2018
Dimensional stability	<3%	<3%	<3%	<3%	ISO 5077: 2008, After 5x cleaning cycles at 75 °C ISO 15797: 2018
COLOUR FASTNESS[2]					
Laundering fastness 60°C	Colour change: 4-5 Staining: 4-5	Colour change: 4-5 Staining: 4-5	Colour change: 4-5 Staining: 4	Colour change: 4-5 Staining: 4-5	ISO 105 C06 C2S: 1197
Laundering fastness 75°C	Colour change: 4 Staining: 4	Colour change: 4 Staining: 4	Colour change: 4-5 Staining: 4	Colour change: 4-5 Staining: 4	ISO 105 C06 D2S: 1197
Perspiration Alkaline	Colour change: 4-5 Staining: 4-5	Colour change: 4-5 Staining: 4-5	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	Colour change: 4-5 Staining: 4-5	Colour change: 4-5 Staining: 4-5	ISO 105 E04: 2008
Dry rubbing	Staining: 4	Staining: 4	Staining: 4	Staining: 4	ISO 105 X12: 2001
Wet rubbing	Staining: 3	Staining: 3	Staining: 3	Staining: 2-3	ISO 105 X12: 2001
Ligth fastness (Xenon)	Colour change: 4-5	Colour change: 4-5	Colour change: 4-5	Colour change: 5	ISO 105 B02: 2013
CARE LABELLING					
Domestic laundering	j H W E L				NEN-EN-ISO 6330, 6N 60 °C: 2012
Industrial laundering	White: PRO Colour: PRO 75 °C - ISO 15797				ISO 15797, 75°C: 2018
CERTIFICATION					
Industrial flame & heat hazard	A1[3], A2[3], B1, C1, E2, F1	A1[3], A2[3], B1, C1, E2, F1	A1[3], A2[3], B1, C1, E2, F1	A1[3], A2[3], B1, C1, E1, F1	EN ISO 11612: 2015
Welding	Class 1 – A1, A2	Class 1 – A1, A2	Class 1 – A1, A2	Class 1 – A1, A2	EN ISO 11611: 2015
Electric arc	Class 1 – 4kA	Class 1 – 4kA	Class 1 – 4kA	Class 1 – 4kA	IEC 61482-2; 2018 IEC 61482-1-1: 2019
Anti-static for explosion risk	PASS	PASS	PASS	PASS	EN1149-5: 2018, EN1149-3: 2004
Limited chemical splash	PASS	PASS	PASS	PASS	ISO13034: 2005 + A1:2009
Contrast colour	PASS	PASS	PASS	PASS	EN ISO 20471: 2013/A1: 2016
General requirements	PASS	PASS	PASS	PASS	EN ISO 13688: 2013
Human-ecological requirements	Class 2	Class 2	Class 2	Class 2	Oeko-Tex 100

Table 1:

[1]All fabrics are finished with a fluor finish branded as Hydro-Tec. The fabric is repels to limited chemical splashes.

[2]For this EPD®, the colour Navy Blue has been chosen as the standard for all fabrics. Chemistry will divers slightly per colour recipe.

[3]EN 11612 A1, A2 (flammability) is tested after 100x 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® System[1].

GOAL OF THE STUDY

The goal of the LCA study is to calculate environmental impact values for TenCate Protective Fabrics' Tecasafe® Ecogreen – sustainable protective fabrics collection to create this EPD®. 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 data[2] from the Ecoinvent database. The functional unit of the study is 1 m^2 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, 28).

DATA COLLECTION

The inventory for the LCA study was collected for 2020 and completed 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, 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.

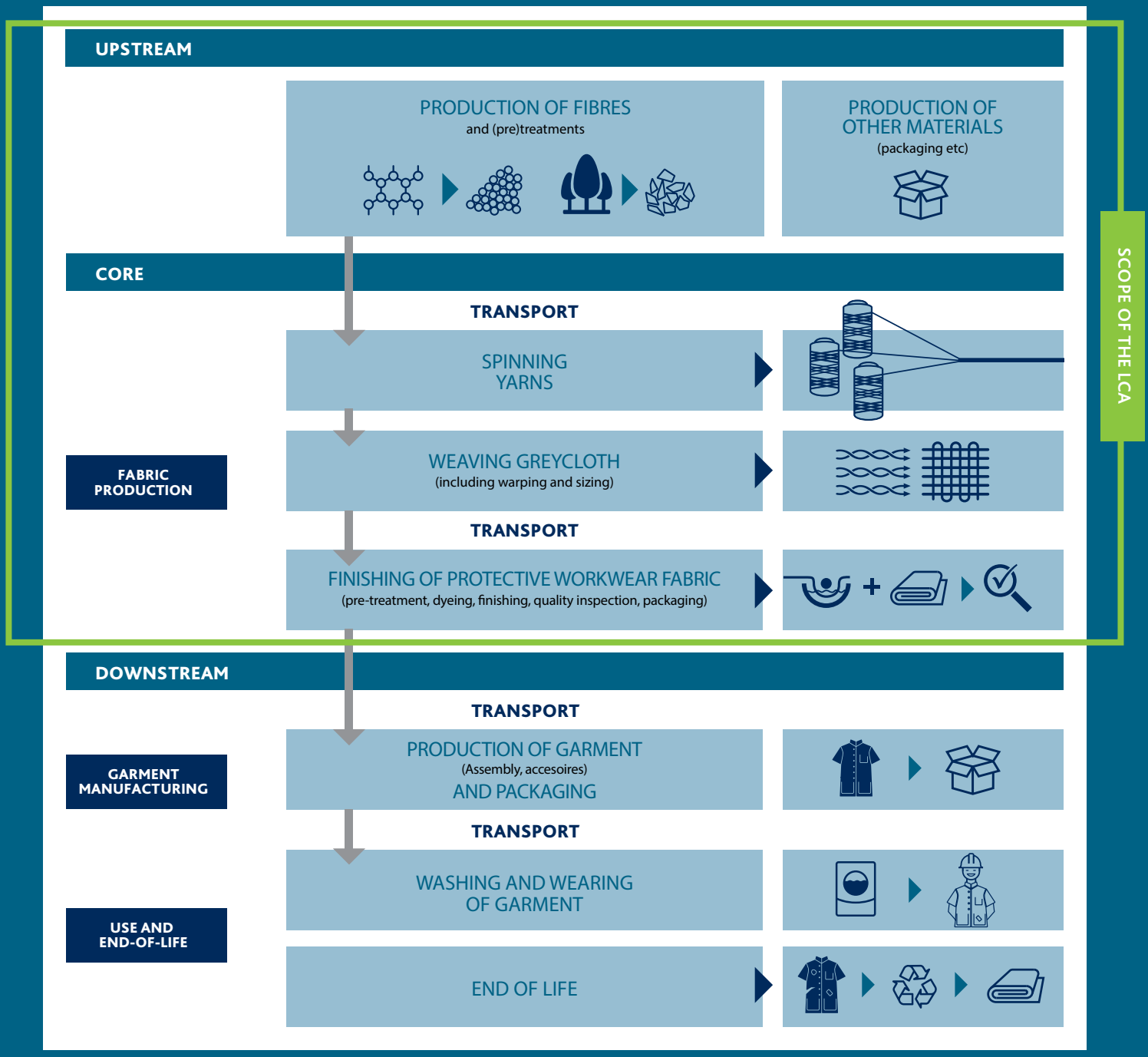


Figure 1

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. Version 2.0' (2012:14).
4 Ecoinvent, 'Ecoinvent' <https://www.ecoinvent.org/database/database.html>.
5 PRé Consultants, 'SimaPro 9.0' <http://www.pre-sustainability.com/simapro.
6 Ecoinvent (n4).

ENVIRONMENTAL PERFORMANCE

The potential environmental impact including the use of resources and waste has been analyzed for the upstream and core processes (visualized 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.	XA 9001	2.53	1.91	**4.43**
			XL 9300	1.89	1.81	**3.70**
			XA 9002	2.09	1.6	**3.69**
			XL 9240	1.60	1.48	**3.08**
	Biogenic	kg CO_2 eq.	XA 9001	0.024	0.167	**0.191**
			XL 9300	0.018	0.155	**0.173**
			XA 9002	0.022	0.132	**0.154**
			XL 9240	0.017	0.124	**0.141**
	Land use and land transformation	kg CO_2 eq.	XA 9001	0.114	0.002	**0.116**
			XL 9300	0.001	0.003	**0.003**
			XA 9002	0.083	0.002	**0.085**
			XL 9240	0.001	0.002	**0.003**
	TOTAL	kg CO_2 eq.	XA 9001	2.66	2.08	**4.74**
			XL 9300	1.91	1.97	**3.88**
			XA 9002	2.20	1.73	**3.93**
			XL 9240	1.62	1.60	**3.22**
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	XA 9001	2,35E-07	2,29E-07	**4,64E-07**
			XL 9300	1,79E-07	2,21E-07	**4,00E-07**
			XA 9002	1,99E-07	1,91E-07	**3,90E-07**
			XL 9240	1,64E-07	1,71E-07	**3,35E-07**
Acidification potential (AP)		kg CO_2 eq.	XA 9001	0.0191	0.0077	**0.0268**
			XL 9300	0.0063	0.0057	**0.01119**
			XA 9002	0.016	0.006	**0.022**
			XL 9240	0.0068	0.0048	**0.0116**

Table 2, values per m^2 fabric

PARAMETER	UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Eutrophication potential (EP)	kg PO_4^3- eq.	XA 9001	0.0197	0.0070	**0.0267**
		XL 9300	0.0025	0.0069	**0.0094**
		XA 9002	0.016	0.006	**0.012**
		XL 9240	0.0030	0.0055	**0.0085**
Abiotic depletion potential – Elements	kg Sb eq.	XA 9001	5,10E-05	2,10E-04	**2,60E-04**
		XL 9300	3,70E-03	2,05E-04	**3,72E-03**
		XA 9002	4,00E-05	1,60E-04	**2,00E-04**
		XL 9240	2,77E-03	1,00E-05	**2,78E-03**
Abiotic depletion, fossil fuels	MJ	XA 9001	33.4	24.5	**57.9**
		XL 9300	25.8	23.4	**49.2**
		XA 9002	27.6	20.9	**48.5**
		XL 9240	21.8	19.2	**41.0**
Formation potential of tropospheric ozone (POCP)	kg NMVOC	XA 9001	0.0077	0.0047	**0.0125**
		XL 9300	0.0038	0.0039	**0.0077**
		XA 9002	0.008	0.004	**0.012**
		XL 9240	0.0047	0.0034	**0.0080**
Water scarcity potential	m3 eq.	XA 9001	27.6	0.5	**28.1**
		XL 9300	0.48	0.52	**1**
		XA 9002	20.3	0.42	**20.7**
		XL 9240	0.48	0.43	**0.91**

Table 2, values per m^2 fabric

USE OF RESOURCES

PARAMETER		UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	XA 9001	8.42	4.98	**13.40**
			XL 9300	1.07	4.80	**5.88**
			XA 9002	6.31	4.53	**10.84**
			XL 9240	0.95	4.13	**5.08**
	Used as raw materials	MJ, net calorific value	XA 9001	0.00	0.00	**0.00**
			XL 9300	0.00	0.00	**0.00**
			XA 9002	0.00	0.00	**0.00**
			XL 9240	0.00	0.00	**0.00**
	TOTAL	MJ, net calorific value	XA 9001	8.42	4.98	**13.40**
			XL 9300	1.07	4.80	**5.88**
			XA 9002	6.31	4.53	**10.84**
			XL 9240	0.95	4.13	**5.08**

Table 3, values per m^2 fabric

USE OF RESOURCES

PARAMETER		UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	XA 9001	37.5	31.4	**68.9**
			XL 9300	29.1	29.8	**58.8**
			XA 9002	31.3	26.5	**57.8**
			XL 9240	24.7	24.3	**49.0**
	Used as raw materials	MJ, net calorific value	XA 9001	0.00	0.00	**0.00**
			XL 9300	0.00	0.00	**0.00**
			XA 9002	0.00	0.00	**0.00**
			XL 9240	0.00	0.00	**0.00**
	TOTAL	MJ, net calorific value	XA 9001	37.5	31.4	**68.9**
			XL 9300	29.1	29.8	**58.8**
			XA 9002	31.3	26.5	**57.8**
			XL 9240	24.7	24.3	**49.0**
Secondary material		kg	XA 9001	0.00	0.00	**0.00**
			XL 9300	0.00	0.00	**0.00**
			XA 9002	0.00	0.00	**0.00**
			XL 9240	0.00	0.00	**0.00**
Renewable secondary fuels		MJ, net calorific value	XA 9001	0.00	0.00	**0.00**
			XL 9300	0.00	0.00	**0.00**
			XA 9002	0.00	0.00	**0.00**
			XL 9240	0.00	0.00	**0.00**
Non-renewable secondary fuels		MJ, net calorific value	XA 9001	0.00	0.00	**0.00**
			XL 9300	0.00	0.00	**0.00**
			XA 9002	0.00	0.00	**0.00**
			XL 9240	0.00	0.00	**0.00**
Net use of fresh water		m^3	XA 9001	1.80	0.19	**1.99**
			XL 9300	0.06	0.18	**0.24**
			XA 9002	1.33	0.16	**1.49**
			XL 9240	0.06	0.18	**0.24**

Table 3, values per m^2 fabric

WASTE PRODUCTION

PARAMETER	UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Hazardous waste disposed	kg	XA 9001	0.00	0.01	**0.01**
		XL 9300	0.00	0.01	**0.01**
		XA 9002	0.00	0.01	**0.01**
		XL 9240	0.00	0.01	**0.01**
Non-hazardous waste disposed	kg	XA 9001	0.00	0.03	**0.03**
		XL 9300	0.00	0.03	**0.03**
		XA 9002	0.00	0.02	**0.02**
		XL 9240	0.00	0.02	**0.02**
Radioactive waste disposed	kg	XA 9001	0.00	0.00	**0.00**
		XL 9300	0.00	0.00	**0.00**
		XA 9002	0.00	0.00	**0.00**
		XL 9240	0.00	0.00	**0.00**

Table 4, values per m² fabric

OUTPUT FLOWS

PARAMETER	UNIT	FABRIC	UPSTREAM	CORE	TOTAL
Components for reuse	kg	XA 9001	0.00	0.00	**0.00**
		XL 9300	0.00	0.00	**0.00**
		XA 9002	0.00	0.00	**0.00**
		XL 9240	0.00	0.00	**0.00**
Material for recycling	kg	XA 9001	0.00	0.00	**0.00**
		XL 9300	0.00	0.00	**0.00**
		XA 9002	0.00	0.00	**0.00**
		XL 9240	0.00	0.00	**0.00**
Materials for energy recovery	kg	XA 9001	0.00	0.3	**0.3**
		XL 9300	0.00	0.3	**0.3**
		XA 9002	0.00	0.25	**0.25**
		XL 9240	0.00	0.25	**0.25**
Exported energy, electricity	MJ	XA 9001	0.00	0.00	**0.00**
		XL 9300	0.00	0.00	**0.00**
		XA 9002	0.00	0.00	**0.00**
		XL 9240	0.00	0.00	**0.00**
Exported energy, thermal	MJ	XA 9001	0.00	0.00	**0.00**
		XL 9300	0.00	0.00	**0.00**
		XA 9002	0.00	0.00	**0.00**
		XL 9240	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 SIGNIFICANTLY REDUCED

The water scarcity footprint of Tecasafe® Ecogreen fabrics, when comparing Tecasafe® Ecogreen XL 9300 to traditional inherent-FR fabrics based on modacrylic cotton blends like Tecasafe® XA 9001, 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.
The reduction of the water scarcity footprint of Tecasafe® Ecogreen XL 9300 is almost 27m³/m², according to table 2, reduced by 27.1m3 eq. which is equivalent to more than 41.000 liter (41 m³) water reduction per linear meter of fabric, or 340 filled bathtubs with an average water capacity of 120 liter.

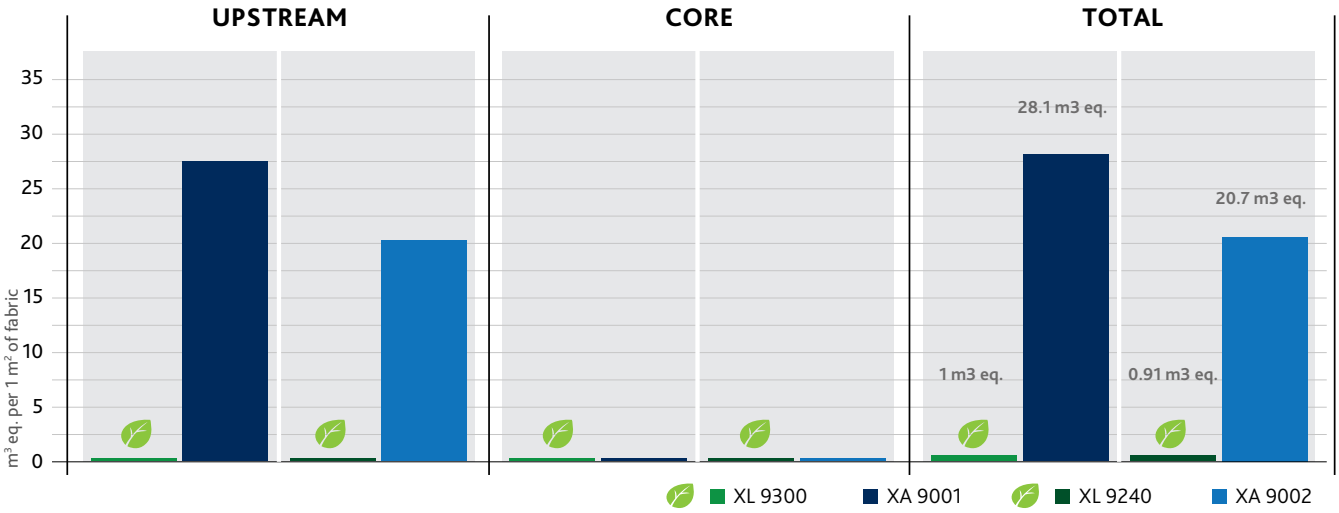


Figure 2. The Water Scarcity Footprint of the Tecasafe® Ecogreen fabrics XL 9300 and XL 9240, compared to traditional inherent-FR fabrics based on modacrylic cotton and Tecasafe® XA 9001 and XA 9002. Figures for one square meter of fabric.

WATER SCARCITY IMPACT TROUGHOUT THE PROTECTIVE FABRICS VALUE CHAIN

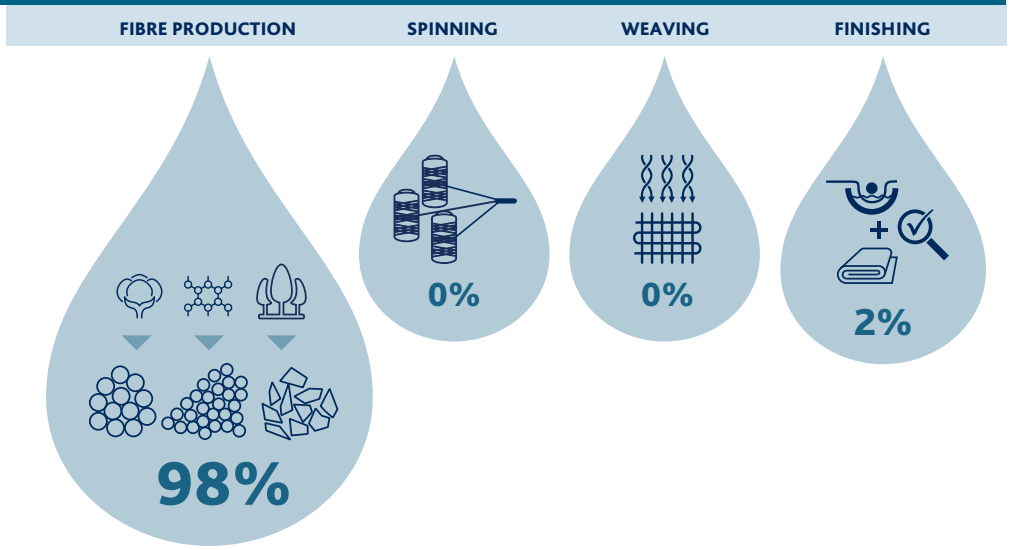


Figure 3. Breakdown of the water scarcity footprint throughout the value chain of traditional modacrylic/cotton blends. In this case the Tecasafe® XA 9001.

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. Banning conventional cotton in fabrics results in 95% water reduction in (mainly) semi-aral regions where water is a scarce resource.

GLOBAL WARMING POTENTIAL

The Global Warming Potential (GWP) of Tecasafe® Ecogreen, when comparing Tecasafe® Ecogreen XL 9300 to traditional inherent-FR fabrics based on modacrylic cotton blends like Tecasafe® XA 9001, is shown in Figure 4. The lower climate impact stems from substituting the full cotton fibres by TENCEL™ Lycocell fibres. As table 2 illustrates, the reduction in CO2 is 0.86 kg CO2/m², which is equivalent to 1.31 kg per linear meter of fabric or the CO2 emissions while driving 11 km with an average medium segment car (118 g/km).

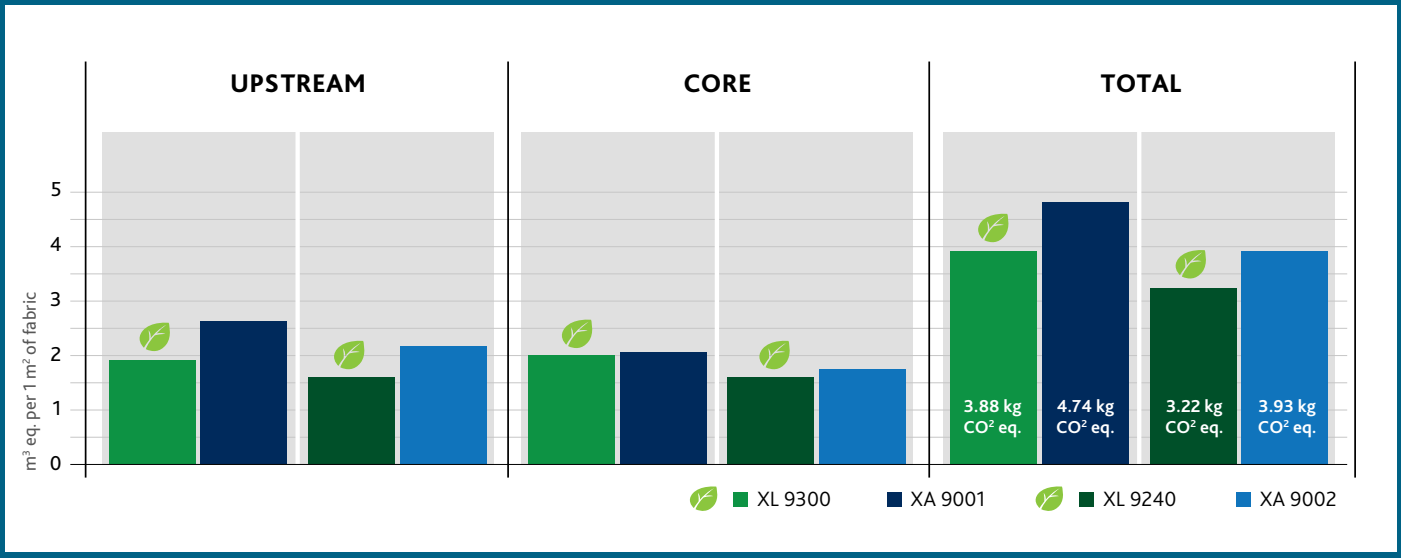


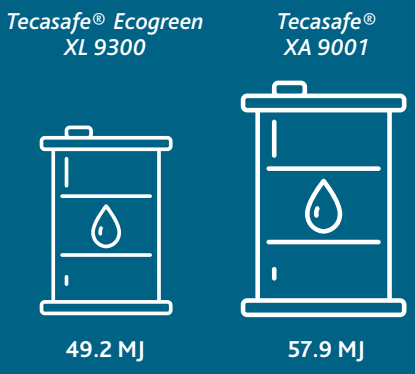
Figure 4. The Global Warming Potential of the Tecasafe® Ecogreen fabric XL 9300 and XL9240, compared to traditional inherent-FR fabrics based on modacrylic cotton like Tecasafe® XA 9001 and XA9002. Figures for one square meter fabric.

NO 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 traditional inherent-FR fabrics based on modacrylic cotton blends like Tecasafe® XA 9001.

FOSSIL AND MINERAL DEPLETETION (ABIOTIC DEPLETION):

Another advantage of using TENCEL™ Lyocell is that less virgin fossil/nonlivinig/ abiotic materials are being used. In case of using the Tecasafe® Ecogreen XL 9300 fabric, your abiotic depletion footprint is reduced significantly - which comes down to 8.7 MJ/m2 less than a modacrylic cotton blended fabric like XA Tecasafe® 9001 (see table 2). Per linear meter, this reduction is almost 14 MJ.



PRODUCTION TECHNOLOGY

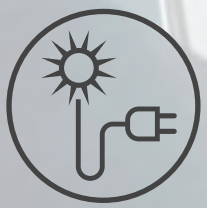
In addition to the environmental performance of our workwear fabrics (pag 16 – 17 of the EPD®), TenCate Protective Fabrics continuously strives to make improvements for a safe, social and sustainable environment for all stakeholders.

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 conventual 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/m^3 and O2 < 50 mg/m^3).

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	• 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-03061
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	☐ EPD® process certification ☑ 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	☐ YES ☑ NO

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