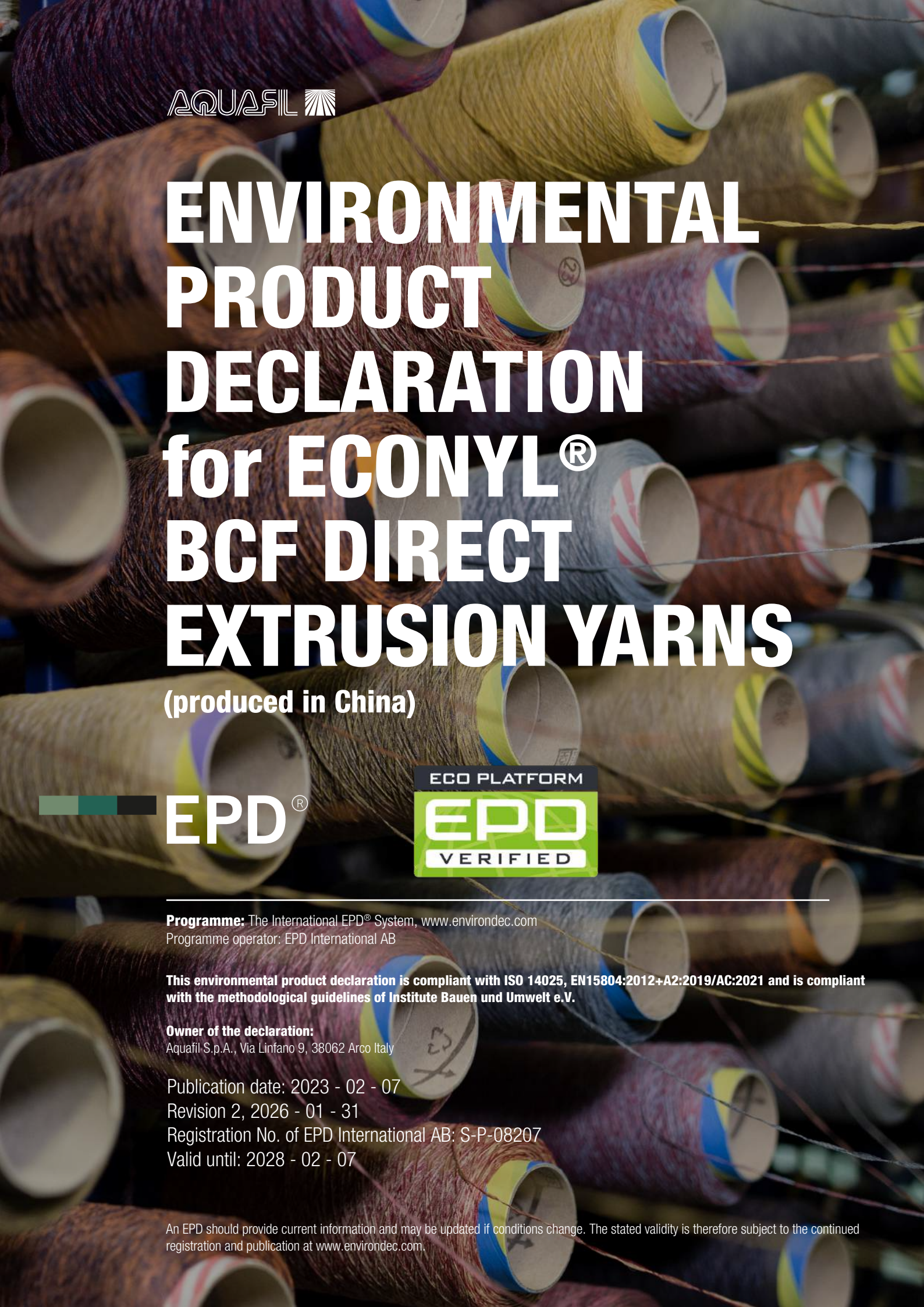


ENVIRONMENTAL PRODUCT DECLARATION for ECONYL® BCF DIRECT EXTRUSION YARNS

(produced in China)

EPD®

ECO PLATFORM EPD VERIFIED

Programme: The International EPD® System, www.environdec.com
Programme operator: EPD International AB

This environmental product declaration is compliant with ISO 14025, EN15804:2012+A2:2019/AC:2021 and is compliant with the methodological guidelines of Institute Bauen und Umwelt e.V.

Owner of the declaration:
Aquafil S.p.A., Via Linfano 9, 38062 Arco Italy

Publication date: 2023 - 02 - 07
Revision 2, 2026 - 01 - 31
Registration No. of EPD International AB: S-P-08207
Valid until: 2028 - 02 - 07

1 FROM FAMILY BUSINESS TO GLOBAL SUSTAINABILITY CHAMPION

The Aquafil Group's history started in 1965, when the Bonazzi's family built the first manufacturing plant in Arco (Trentino Alto Adige region, Italy). More than 50 years later, Aquafil has become the international group it is today: a Company that employs around 2800 people across 3 continents and 9 main countries (Italy, Slovenia, Croatia, UK, US, China, Thailand, Japan, Chile) and that since 2017 has been listed on the Italian Stock Exchange.

On the top of being one of the most important players in the production of Nylon, Aquafil is nowadays recognized worldwide as pioneer of Circularity, whose uniqueness lies in the ability to develop highly innovative products with a lower environmental impact, forging a path of sustainability for the entire industry.

The Group is organized in 3 product areas:

- **Textile Flooring:** carpet yarn for manufacturers in a wide range of sectors, including automotive, residential and contract (airports, offices etc..)
- **Clothing:** yarn and synthetic fibers used by apparel, underwear and sportswear brands
- **Plastic moulding:** polymers used in the plastic moulding industry for the production of fashion accessories (e.g., glasses frames) and furniture (chairs, small tables, lamps).

THE SUSTAINABILITY JOURNEY

Aquafil's path to circularity began back in 1990, investing time and money to give waste a new life and design product supply chain in the most responsible way possible. The Company was among the first in Italy to adopt the "*Life Cycle Thinking*" approach, a framework that considers a holistic view of a product, from creation to end-of-life, assessing its environmental impact through the whole life cycle.
This led to the creation of the ECONYL® Plant that has allowed Aquafil to produce ECONYL® nylon entirely from pre- and post-consumer waste. It was

the beginning of a new era for the company and for the whole industry. This incredible achievement forged a path of sustainability, but the efforts have not been limited to rethinking products in a circular perspective: it includes also sharing responsibilities throughout the value chains, caring for the well-being of individuals and supporting the local communities.

2 PROGRAMME INFORMATION

PROGRAMME OPERATOR

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden; E-mail: info@environdec.com

and

Institute Bauen und Umwelt e.V. (IBU); Panoramstr.1, 10178 Berlin; www.bau-umwelt.de

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

The EPD owner has the sole ownership, liability, and responsibility for this EPD.

VERIFICATION INFORMATION

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
ISO standard ISO 21930 and CEN standard EN 15804 serve as the core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction products, version 1.2.5 C-PCR-015 SYNTHETIC CARPET YARN (CONSTRUCTION PRODUCT)

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life cycle assessment (LCA)
LCA accountability: Aquafil S.p.A.
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: EPD process certification by accredited certification body Third-party verification: Bureau Veritas is an approved certification body accountable for the third-party verification The certification body is accredited by: SWEDAC (Accreditation number:1236)
Procedure for follow-up of data during EPD validity involves third-party verifier. **X** Yes ☐ No

3 PRODUCT INFORMATION

OWNER OF THE EPD

Aquafil S.p.A., Via Linfano 9, 38062 Arco, Italy
P: +39 0464 581111
E-mail: info@aquafil.com

To get more information about this environmental declaration or about Aquafil activities please contact:

Tea Drobnič Lelja
E- mail: tea.drobnic@aquafil.com
T. +386 (0)30 642 320

PRODUCTION SITES INCLUDED IN EPD

- **AquafilSLO - Ljubljana** (Letališka cesta 15, 1000 Ljubljana, Slovenia)
  > process B, C
- **AquafilSLO - Ajdovščina** (Tovarniška cesta 15, 5270 Ajdovščina, Slovenia)
  > process A
- **Aquafil Carpet Recycling (ACR#1)** Phoenix (3555 W. Washington street, 85009 Phoenix, USA)
  > process S
- **Aquafil Jiaxing** (338 Changsheng North Road, Jiaxing, Zhejiang, China)
  > process D

DESCRIPTION OF THE PRODUCT

ECONYL® BCF yarns are bulk continuous filament yarns, made out of 100 % recycled PA6 polymer. As such are delivered to customers for manufacturing carpet tiles and tufted or woven carpets, within the scope of construction product.

This EPD refers to the ECONYL® Direct Extrusion yarn (dope dyed) groups of Bulk Continuous Filament yarns produced in China.

The group of yarn is consisting of several similar products, but different in terms of parameters that are not significant for the group of products.

AVAILABLE CERTIFICATIONS OF PRODUCTION SITES

ISO standard	AquafilSLO Ljubljana	AquafilSLO Ajdovscina	ACR#1	Aquafil Jiaxing
ISO 9001: 2015	X	X		X
ISO 14001: 2015	X	X		X
ISO 45001: 2018	X	X		X
ISO 50001: 2018	X	X		X
SA 8000: 2014	X	X		

IDENTIFICATION OF THE PRODUCT ACCORDING TO THE UN CPC SCHEME

355 – man-made fibers

PRODUCT CHARACTERISTICS

ECONYL® DIRECT EXTRUSION YARNS (DOPE DYED)

PARAMETER	UM	VALUE	TESTING METHOD
Linear density	dtex	700 - 3000	DIN 53830 Modified
Tenacity at break	cN/dtex	1,8 - 3,8	ISO EN 2062
Elongation at break	%	30 - 60	ISO EN 2062

DECLARED UNIT

Declared unit is 1 kg of ECONYL® BCF reprocessed yarn including primary packaging, with end of life.

REFERENCE SERVICE LIFE

This EPD does not indicate RSL

DATA COLLECTION

Life cycle assessment primary data of processes owned by Aquafil group were collected from period of January 2021 to December 2021.
Significant parameters that were determined through surveillance activity are from the year 2024.

BACKGROUND DATA AND METHOD

All the background data relevant for modelling were taken from Gabi database – content version 2022.2, software version GaBi 10.9.3.0. GaBi EN15804 + A2 assessment method is used.

SYSTEM BOUNDARIES

This is a »Cradle-to-gate« EPD with modules C1-C4 and including D module. Modules A1-A3 are reported as one number.

Modules A1-A3 include processes, that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as the waste processing.
Modules C1-C4 describe end of life of a product.
Module D is set to 0, as the end of life in modules C1-C4 is considered to be landfill.

CUT OFF CRITERIA

Life Cycle Inventory data for a minimum of 99% of total inflows (mass and energy) module A1-A3 are included.

ASSUMPTIONS AND ALLOCATIONS

The Life Cycle Analysis study is representing large number of similar products, each time taking into consideration an average primary data, for an average mix of products, within the same product group (Direct Extrusion BCF yarns), same geographical position of processes and same time frame (year 2021).

Sensitivity analysis has been performed in order to guarantee the validity of reported impacts.

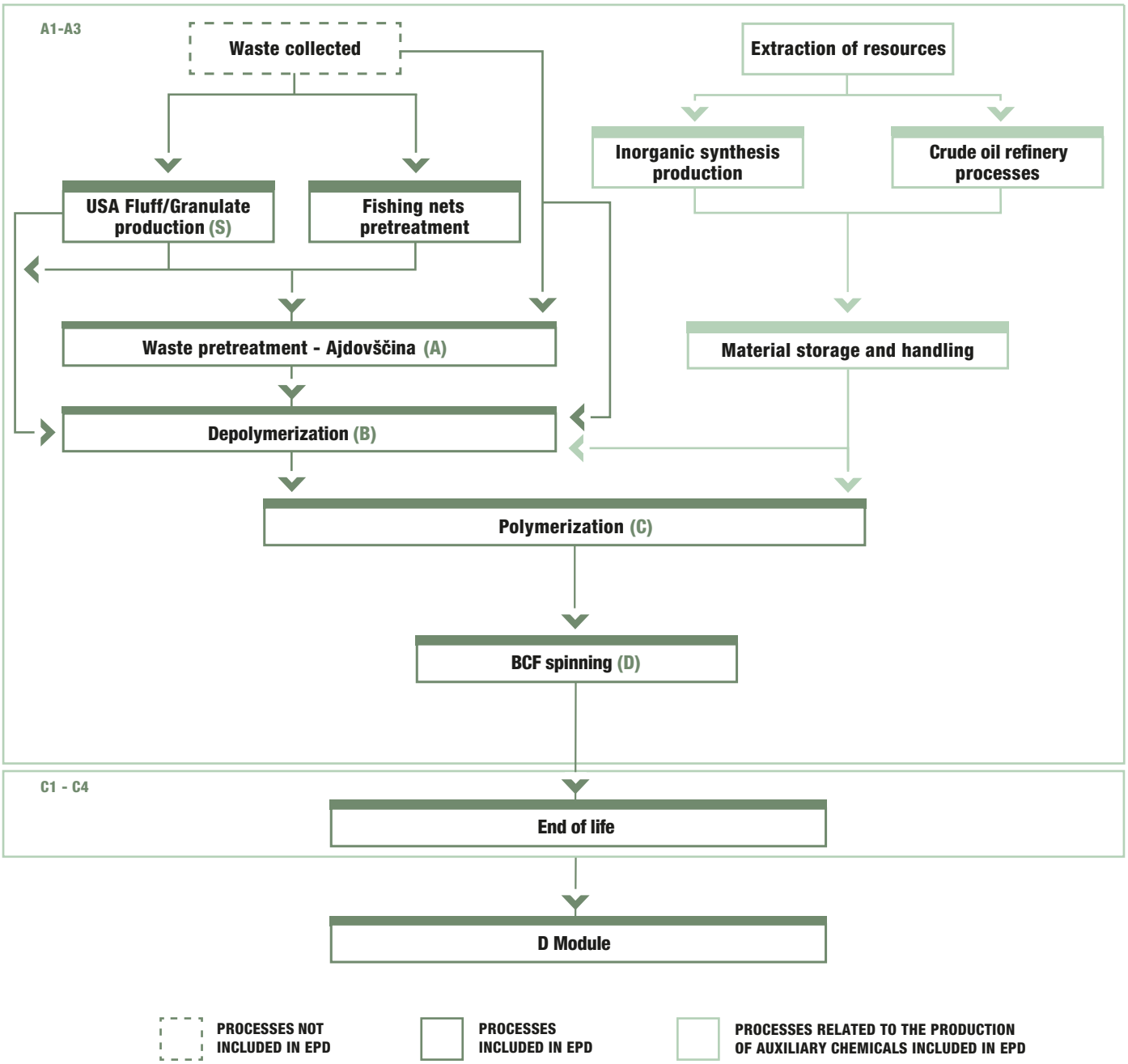
For waste being recycled, the environmental impact of processes until the end-of-waste state shall be attributed to the product system generating the waste, therefore are not included into this LCA study. Processes after the end-of-waste state are attributed to the product system using the recycled material flow (recycled materials are thereafter considered secondary materials).
A mass allocation was applied for water consumption, waste water, water emissions and waste generation for all of Aquafil Group plants in the EPD system boundaries.

The "polluter pays" principle has been applied.
Primary packaging material was considered:

- polymerization process: tank truck
- spinning: paper tubes

Excluded secondary packaging materials: paper boxes & separators, wooden pallets, labels, plastic bags, extensible film & adhesive tape.

SYSTEM BOUNDARIES



CONSIDERED LIFE CYCLE STAGES

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage process stage
	Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	global	global	SI, CN	-	-	-	-	-	-	-	-	-	CN	CN	CN	CN	CN
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	NA			-	-	-	-	-	-	-	-	-	-	-	-	-	-

(X = included in the LCA; ND = module not declared)

4 CONTENT DECLARATION

CONTENT OF THE PRODUCT

MATERIAL	SUBSTANCE	WEIGHT (%)	CAS NUMBER
polymer	polyamide 6	92-96	25038-54-4
pigments	several	0-3	several
spin finish	several	max.1	several
water	-	3-4	7732-18-5
TOTAL	-	100	-

ECONYL® BCF yarns do not contain any materials / substances hazardous to health and the environment (carcinogenic, mutagenic or toxic to reproduction, PBT, vPvB) or substances of very high concern (SVHC), according to Regulation (EC) No 1907/2006 and Regulation (EC) No 1272/2008.

Input raw material is waste that is being collected and then further recycled within the Aquafil's system boundaries to produce recycled PA6 polymer. All types of yarns are produced out of 100 % recycled PA6 polymer, with post-consumer and pre-consumer recycled content certified by independent third party DNV 18590-2008-PC-ITA-DNV.

5 ENVIRONMENTAL PERFORMANCE

POTENTIAL ENVIRONMENTAL IMPACTS

ECONYL® DIRECT EXTRUSION YARNS

CORE ENVIRONMENTAL IMPACT INDICATORS		A1 - A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq.	2,17E+00	0,00E+00	6,77E-02	0,00E+00	7,02E-02	0,00E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq.	2,15E+00	0,00E+00	6,48E-02	0,00E+00	7,09E-02	0,00E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq.	2,17E-02	0,00E+00	2,93E-03	0,00E+00	-7,54E-04	0,00E+00
Global Warming Potential land use and land use change (GWP-luluc)	kg CO_2 eq.	2,37E-03	0,00E+00	1,49E-06	0,00E+00	3,45E-05	0,00E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	5,11E-09	0,00E+00	4,83E-15	0,00E+00	9,52E-14	0,00E+00
Acidification potential, Accumulated Exceedance (AP)	mol H+eq.	1,46E-02	0,00E+00	4,27E-04	0,00E+00	2,10E-04	0,00E+00
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq.	1,36E-05	0,00E+00	8,17E-09	0,00E+00	1,32E-05	0,00E+00
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	4,82E-03	0,00E+00	2,08E-04	0,00E+00	4,65E-05	0,00E+00
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	3,96E-02	0,00E+00	2,28E-03	0,00E+00	5,10E-04	0,00E+00
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	1,05E-02	0,00E+00	5,76E-04	0,00E+00	1,49E-04	0,00E+00
[2]Abiotic depletion potential for nonfossil resources (ADP-minerals & metals)	kg Sb eq.	2,64E-07	0,00E+00	2,65E-09	0,00E+00	4,92E-09	0,00E+00
[2]Abiotic depletion for fossil resources potential (ADP-fossil)	MJ, net calorific value	2,92E+01	0,00E+00	9,09E-01	0,00E+00	1,01E+00	0,00E+00
[2]Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m3 world eq. deprived	2,45E+00	0,00E+00	4,26E-04	0,00E+00	-6,99E-04	0,00E+00

CORE ENVIRONMENTAL IMPACT INDICATORS		A1 - A3	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	2,15E+00	0,00E+00	6,48E-02	0,00E+00	7,09E-02	0,00E+00

Totals may not match, because of rounded data.
The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF RESOURCES

ECONYL® DIRECT EXTRUSION YARNS

USE OF RESOURCES	UNIT	A1 - A3	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,03E+01	0,00E+00	5,47E-03	0,00E+00	8,27E-02	0,00E+00
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources; primary energy and primary energy resources used as raw materials	MJ	1,03E+01	0,00E+00	5,47E-03	0,00E+00	8,27E-02	0,00E+00
Use of non-renewable primary energy excluding non -renewable primary energy resources used as raw materials	MJ	2,54E+01	0,00E+00	9,10E-01	0,00E+00	1,01E+00	0,00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	4,60E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non- renewable primary energy resources; primary energy and primary energy resources used as raw materials	MJ	3,00E+01	0,00E+00	9,10E-01	0,00E+00	1,01E+00	0,00E+00
Use of secondary material	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non - renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	5,81E-02	0,00E+00	1,09E-05	0,00E+00	1,30E-05	0,00E+00

Totals may not match, because of rounded data.

WASTE PRODUCTION AND OUTPUT FLOWS

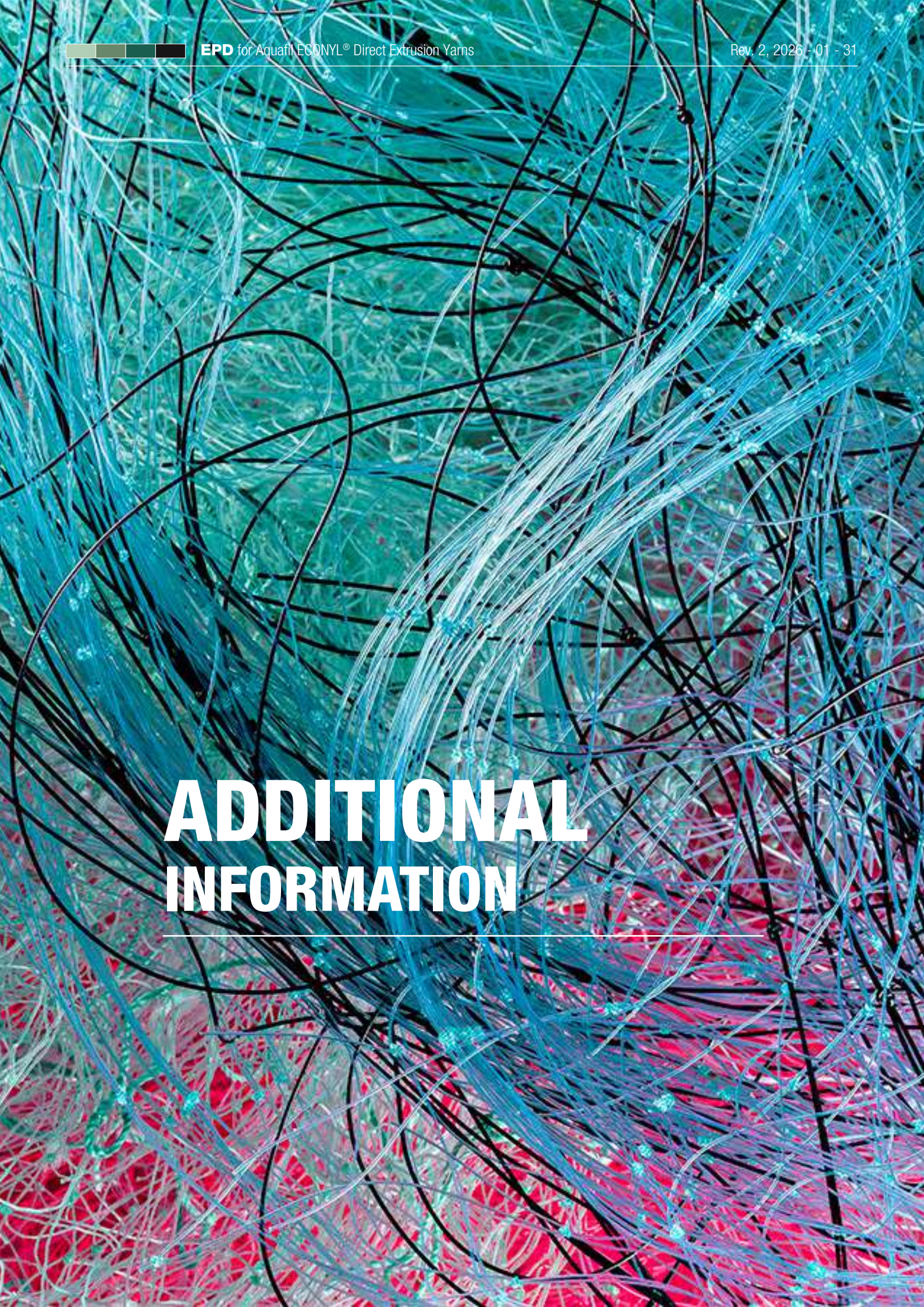
ECONYL® DIRECT EXTRUSION YARNS

OUTPUT FLOW	UNIT	A1 - A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2,94E-03	0,00E+00	1,85E-12	0,00E+00	1,55E-10	0,00E+00
Non-Hazardous waste disposed	kg	7,70E-02	0,00E+00	3,59E-05	0,00E+00	9,96E-01	0,00E+00
Radioactive waste disposed	kg	7,78E-05	0,00E+00	4,17E-07	0,00E+00	1,24E-05	0,00E+00

Totals may not match, because of rounded data

OUTPUT FLOW	UNIT	A1 - A3	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,89E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	9,75E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Totals may not match, because of rounded data



ADDITIONAL INFORMATION

6 ADDITIONAL INFORMATION

This chapter is intended to provide specific additional information about the ECONYL® Regeneration System as well as some comments of its environmental benefit.

In 2009, we set ourselves the challenge of collecting waste material all over the world and turning it into recycled polymers. It is possible to mention other environmental benefits, besides those appreciated from the impact categories investigated in the present study. In fact, part of virgin raw materials extraction and natural resources exploitation is prevented by the use of waste otherwise disposed of.

The European Commission has estimated that the EU discards 5.8 million tons of textiles and apparel every year, 75% of this is sent to landfill or incinerated, but the vast bulk is destined for landfill. The USA generates 12.7 million tons of textile waste; of this only 14.9% is recycled (US Environmental Protection Agency, 2009, which means more than 85% is waste, again largely being sent to landfill).

To put this number in context, in 2009, a total of 71.6 million tons of fiber was used around the world. This means that the EU and the USA in one year alone discarded 18.5 million tons is equal to 26% of annual global fiber usage.

Another aspect not directly emerging from the present study, which is worth a mention, is the contribution to the prevention of oceans pollution from the collection of fishing nets in their end of life, thanks to the help of Healthy Seas. It is a foundation born in 2013, that spreads awareness on marine litter prevention and organizes cleanups with volunteer divers. The various nylon fishing nets collected by volunteers are regenerated, together with other nylon waste, into ECONYL® yarn while the different types of plastics are reused or recycled.

7 DIFFERENCES VERSUS PREVIOUS VERSION OF EPD

An update of previously published REV.1 EPDs was needed due to changes in energy mix and addition of internal recycling process to the overall production process. The mentioned changes led to an increase of more than 10% to the total environmental impacts.

References

Methodological report 2025_REV.8

> ISO 14025:2010

Environmental labels and declarations — Type III environmental declarations — Principles and procedures

> EN 15804:2012+A2

Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

General Programme instructions 4.0
PCR 2019:14 Construction products, version 1.2.5
C-PCR-015 Synthetic carpet yarns (construction product)

> DIN 53830 Modified

Testing of textiles; determination of linear density of single and plied yarns; simple yarns and plied yarns, textured yarns, short length method - Modified

> ISO EN 2062

Determination of single-end breaking force and elongation at break using constant rate of extension (CRE) tester

> ISO 9001: 2015

Quality management systems — Requirements

> ISO 14001: 2015

Environmental management systems — Requirements with guidance for use

> ISO 45001: 2018

Occupational Health and safety management system — Requirements with guidance for use

> ISO 50001: 2018

Energy management systems — Requirements with guidance for use

> SA 8000: 2014

Social accountability 8000 International standard