ENVIRONMENTAL PRODUCT DECLARATION

MWool® by MANTECO

In accordance with ISO 14025

Program: The International EPD® System - www.environdec.com

Program Operator: EPD Internatonal AB

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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

EPD® ENVIRONMENTAL PRODUCT DECLARATION | MANTECO® MANTELLASSI COMPAGNIA TESSILE

PROGRAMME INFORMATION

Program: The International EPD® System
EPD International AB
Box 210 60
SE-100 31 Stockholm

www.environdec.com
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Product category rule (PCR): PCR 2013:12 Textile yarn and thread of natural fibres, man-made filaments or staple fibres, version 3.0 UN CPC 263 and 264.

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

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

☐ EPD process certification ☒ EPD verification

Third party verifier: Ugo Pretato, Studio Fieschi & soci

Approved by: The International EPD® System

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

☐ Yes ☒ No

EPDs within the same product category but from different 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 the EPD.

COMPANY INFORMATION

Owner of the EPD: Manteco S.p.A.
Via della Viaccia 19
59013 Montemurlo, Italy
E-mail: digital@manteco.com

Description of the organisation: Manteco is an Italian leading textile company since 1943. It was first established, in 1941, as a small spinning mill by Enzo Anacleto Mantellassi, who started the production of recycled wool yarns by regenerating old military garments and covers. And as the years passed, it has become a point of reference in the fashion world, thanks to a high level of creativity, constant research, investments, innovations and great textile solutions.

Name and location of production site: Manteco S.p.A. – Via della Viaccia 19, 59013 Montemurlo, Italy

Product-related or management system-related certifications: Global Recycled Standard (GRS), Responsible Animal Fibers (RAF), Organic Content Standard (OCS), European Flax®

CERTIFICATIONS IN OUR SUPPLY CHAIN

INITIATIVES

PRODUCT INFORMATION

Product name: Yarn of MWool®

Product identification: MWool® is the next generation of recycled wool by Manteco. It is obtained from pre-consumer materials, industrial waste and post-consumer materials, which are carefully selected and tested, sorted per color and composition, then turned back to fibers through a low-impact mechanical recycling process. The colors of MWool® are created through the Recype® process, which makes no use of additional dyes and chemicals.

UN CPC code: 26320. Yarn of wool, containing 85% or more by weight of wool, not put up for retail sale

TECHNICAL SPECIFICATIONS

Composition | Reg. UE 1007/2011 : 100% Wool

Yarn Count | ISO 2060-1994 : Range: Nm 2500 – Nm 18000

Spinning : Carded spinning

	LIGHT COLORS	**DARK COLOURS**
Colourfastness to light ISO 105-B02: 2014	Shade change 3	Shade change 3/4
Acid Perspiration ISO 105-E04: 2013	Shade change 3/4	Shade change 3/4
	Staining 3/4	Staining 3
Alkaline Perspiration ISO 105-E04: 2013	Shade change 3/4	Shade change 3/4
	Staining 3/4	Staining 3
Rubbing ISO 105-X12: 2016	Dry staining 4	Dry staining 3
	Wet Staining 3	Wet staining 2
Dry Cleaning ISO 105-D01: 2010	Shade change 3/4	Shade change 3/4
	Staining 3/4	Staining 3
Water ISO 105-E01: 2013	Shade change 3/4	Shade change 3/4
	Staining 3/4	Staining 3

Compliance to Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals

Geographical scope: Italy

LCA INFORMATION

Functional unit / declared unit: 1 kg of MWool® yarn.

Reference service life: not applicable.

Time representativeness: year 2019 was taken as reference, since more representative than years 2020-2021, affected by the Covid pandemic.

Database(s) and LCA software used: Ecoinvent 3.7 database and SimaPro 9.2 software

LCA SYSTEM DIAGRAM

UPSTREAM stage: MWool® yarns are produced from 100% recycled wool, coming from pre- and post-consumer textile wastes. The life cycle inventory of this stage includes:

- **For the post-consumer garments:**
  - Collection in USA and North Europe
  - Packaging of post-consumer textiles
  - Transport to India and Pakistan
  - Textile sorting and removal of accessories (zip, buttons, etc.)
  - Transport to Italian trading company
  - Waste treatment

- **For the pre-consumer textile waste:**
  - Collection of spinning textile wastes in Eastern Europe and Italy
  - Collection of tailoring textile wastes in in Eastern Europe, Turkey, Italy, North Africa
  - Packaging of pre-consumer textiles
  - Transport to Italian trading company
  - Waste treatment

CORE stage: The life cycle inventory of this stage includes:

- The shredding process (materials and energy consumption, waste production)
- The fraying process (materials and energy consumption, waste production)
- The spinning process (materials and energy consumption, waste production)
- The winding process (materials and energy consumption, waste production)
- Transports from and to companies
- Treatment of wastes/wastewater generated during the processes of fraying, shredding, spinning and winding and related treatments

DOWNSTREAM stage: The life cycle inventory of this stage includes the average transport of MWool® yarns to the customer company and a scenario of End-of-Life.

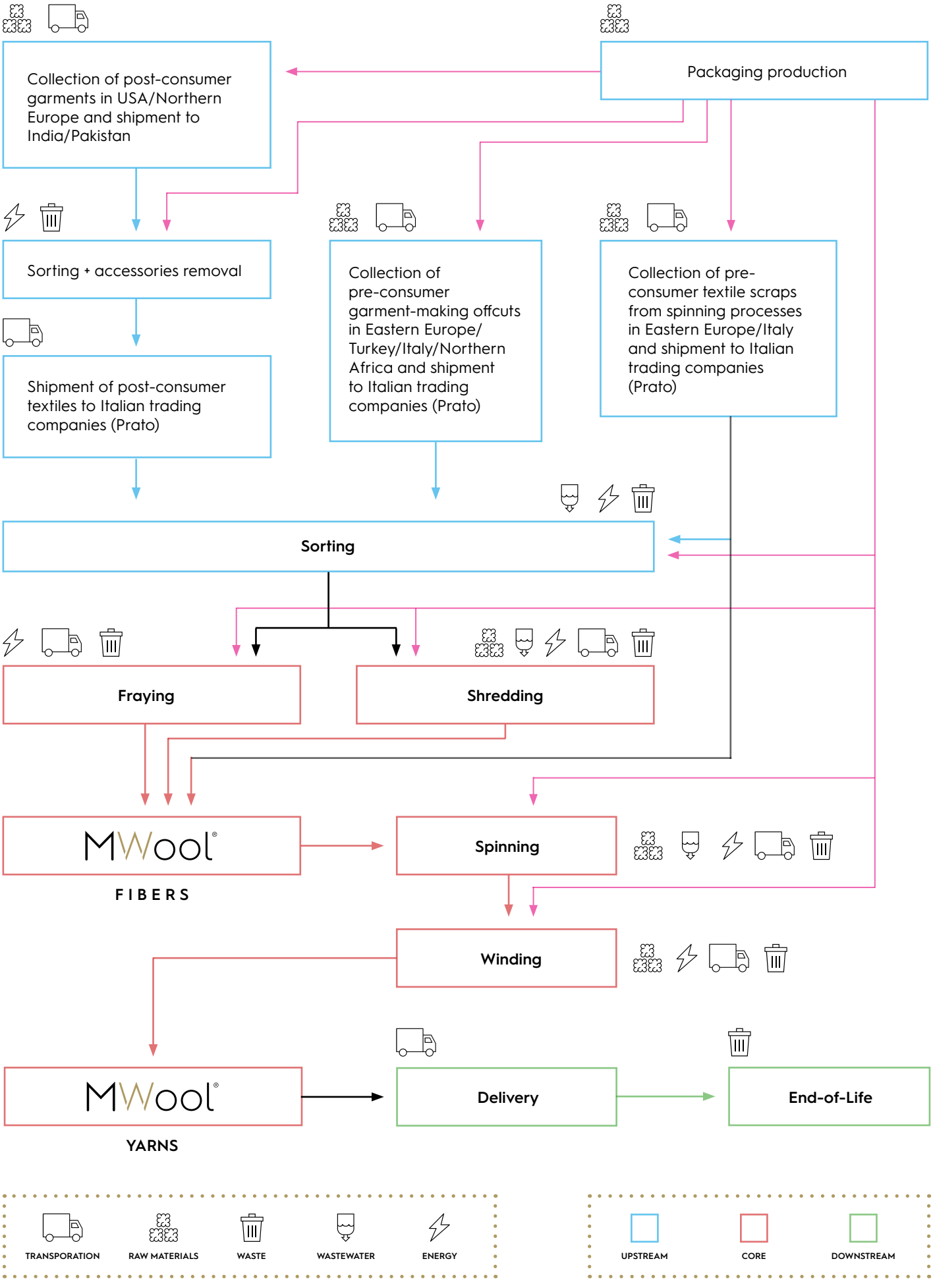
Description of the value chain of MWool® yarn:

Post-consumer garments are collected in USA and North Europe, where end-of-life clothes are deposited in dedicated containers, and/or in plastic bags. Subsequently, they are transported to a collection centre, where clothes are gathered, packed into big bales and sent to India (85%) or Pakistan (15%). In India/ Pakistan textiles are manually sorted, according to the type of material, and accessories (such as zips, buttons, labels) are removed. Subsequently textiles are packed into big plastic bales (which are assumed to contain 400 kg of textile). The process of clothes sorting and accessories removal is manual, and just electricity for working environments and conveyor belt is considered.

Pre-consumer textile waste are as well used to produce MWool® yarns. It includes waste from the spinning process (68%) and the tailoring phase (32%) (fabric leftover after cutting out a pattern or textiles presenting some flaws, for example). Pre-consumer waste from spinning is collected in Eastern Europe (assumed 50%) and in Italy (assumed 50%); pre-consumer waste from tailoring is collected in Eastern Europe (assumed 25%), in Turkey (assumed 25%), in Italy (assumed 25%) and in North Africa (assumed 25%).

The pre- and post-consumer textile arrives at Italian trading companies (located in Prato) in plastic big bales. Here the packaging is removed and the textile is sorted according to the type of treatment (shredding or fraying) it will be subjected to and according to the colour. This step is manual and requires time and expertise, but allow to avoid the treatment of dyeing (and the related environmental impacts). After the sorting process, the pre- and post-consumer textiles are ready to be transformed into secondary wool fibres. According to the state of the textile, it can be submitted to the processes of shredding or to the process of fraying. In addition, in some cases, waste from spinning (pre-consumer textile) are already fibres and, as a consequence, do not require any type of treatment. The fibres of recycled wool are transported with lorries from the trading companies to Manteco SpA, within an average distance of 20 km. The recycled wool fibres take the brand MWool® and are ready to be spun into MWool® yarns. The thread is wound on a plastic coil (weight: 15 g), which carries 150-180 g of thread. The plastic coil can be reused (assumption of 100 reuses). Subsequently, the yarn is winded on cardboard cones (40 g, each one carrying 1,5-1,8 kg of yarn). The winded MWool® yarn is sent to local enterprises that produce the fabrics. An average of 20 km covered with a lorry is considered for the transportation.

The yarn is employed to produce clothes, which after the use (not included in the EPD, as indicated in the PCR) can undergo very variable End-of-Life scenarios. According to a recent review [9], worldwide, 75% of textile waste is landfilled, while 25% is recycled or reused. These percentages have been used for modelling the End-of-Life scenario of the MWool® yarn.


Collection of post-consumer garments in USA/Northern Europe and shipment to India/Pakistan
Packaging production
Sorting + accessories removal
Collection of pre-consumer garment-making offcuts in Eastern Europe/ Turkey/Italy/Northern Africa and shipment to Italian trading companies (Prato)
Collection of pre-consumer textile scraps from spinning processes in Eastern Europe/Italy and shipment to Italian trading companies (Prato)
Shipment of post-consumer textiles to Italian trading companies (Prato)
Sorting
Fraying
Shredding
MWool®
FIBERS
Spinning
Winding
MWool®
YARNS
Delivery
End-of-Life
TRANSPORATION
RAW MATERIALS
WASTE
WASTEWATER
ENERGY
UPSTREAM
CORE
DOWNSTREAM

Description of system boundaries: cradle-to-grave

Excluded lifecycle stages: The consumer use of the product is not included in the PCR.

More information:

- Assumptions: In the upstream stage some assumptions to fill data gaps were required, mainly on the specific locations of collection and sorting centres in USA, Europe, India, Pakistan, Turkey, Eastern Europe. Other assumptions concern the mean of transport, the waste textile packaging and the energy used in India and Pakistan to remove accessories. Nevertheless, all the above assumptions can be considered fairly representative of the collection network and recycling chain, so also the result can be considered representative of the impacts of MWool®. For the core stage primary data collected by Manteco SpA were used. The core of the analysed supply chain is organised with different subcontractor companies working for Manteco Spa. Because of this fragmentation, the Italian electricity residual mix is used. For the downstream stage a waste treatment scenario has been assumed according to literature.

- Life Cycle Impact Assessment methods:

- EF 3.0 method for the impact categories of
  - Global warming potential (GWP): GWP-fossil, GWP-biogenic, GWP-land use and land use change (luluc), and GWP-total;
  - Acidification potential (AP);
  - Eutrophication potential (EP);
  - Photochemical ozone creation potential (POCP);
  - Ozone depletion potential (ODP);
  - Abiotic depletion potential (ADP) for minerals and metals (non-fossil resources);
  - Abiotic depletion potential (ADP) for fossil resources;
  - Water deprivation potential (WDP)
- Cumulative Energy Demand (CED) for the calculation of energy use;

- LCA practitioners: PhD Isabella Bianco, Prof. Gian Andrea Blengini

- Organisation: Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129, Torino

CONTENT DECLARATION

PRODUCT

Materials / chemical substance	% of material weight	% of biobased material	% of which recycled	
			PRE consumer share	POST consumer share
Recycled wool	93%	100%	36%	64%
Pigments and dye stuff	<1%	0%	0%	100%
Other materials (e.g. anti-stat, oils)	1%	0%	0%	0%
Water	5%	0%	0%	0%
Total	100%			

MWool® yarns don't contain any materials or substances included in the Candidate List of Substances of Very High Concern (SVHC) for authorisation issued by the European Chemicals Agency. Under normal storage and use conditions, these yarns can be handled with no particular precautions or special protective equipment.

PACKAGING

Distribution packaging: plastic big bags (HDPE), core board and polypropylene coils, low-density polyethylene film and euro flat pallets.

Weight of the packaging materials for 1 kg of MWool® yarn:

Polypropylene: 1,02 g

HDPE: 2,39 g

Low-density polyethylene film: 1,58 g

Euro flat pallet: 0,321 g

Core board: 26,7 g

RECYCLED MATERIAL

Provenience of recycled materials (pre-consumer or post-consumer) in the product: The MWool® yarn is produced from 100% recycled wool. With reference to year 2019, the provenience of the recycled wool is for the 64% coming from post-consumer textiles and for the 36% from pre-consumer scraps.
Post-consumer garments are collected for about the 50% in USA and for the other 50% in North Europe. The pre-consumer textile waste comes for the 68% from spinning processes (located in Eastern Europe and Italy), and for the 32% from tailoring processes (located in Eastern Europe, Turkey, Italy, North Africa).

ENVIRONMENTAL PERFORMANCE

Version 2.0 (published on 2022-03-29) of the default list of environmental performance indicators has been applied.

POTENTIAL ENVIRONMENTAL IMPACTS

PARAMETER		**UNIT**	**Upstream**	**Core**	**Down-stream**	**TOTAL**
Global warming potential (GWP)	Fossil	kg CO_2 eq.	6,51E-01	1,04E+00	5,14E-02	1,74E+00
	Biogenic	kg CO_2 eq.	2,72E-02	1,57E-01	5,53E-01	7,37E-01
	Land use and land transformation	kg CO_2 eq.	3,41E-02	9,27E-05	7,61E-06	3,42E-02
	TOTAL	kg CO_2 eq.	7,12E-01	1,20E-00	6,04E-01	2,51E+00
Acidification potential (AP)		kg mol H^+ eq.	9,70E-03	4,10E-03	1,49E-04	1,40E-02
Eutrophication potential (EP)	*Aquatic freshwater*	kg P eq.	1,09 E-04	1,99E-04	1,07E-05	3,19E-04
	Aquatic marine	kg N eq.	3,17E-03	7,95E-04	1,38E-03	5,33E-03
	Aquatic terrestrial	mol N eq.	2,86E-02	7.59E-03	4,59E-04	3,67E-02
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	7,31E-03	2,26E-03	3,02E-04	9,87E-03
Ozone layer depletion (ODP)		kg CFC 11 eq.-	1,05E-07	1,45E-07	5,20E-09	2,55E-07
Abiotic depletion potential (ADP)	*Metals and minerals*	kg Sb. eq.	5,58E-06	1,40E-06	9,20E-08	7,07E-06
	Fossil resources	MJ, net calorific value	9,85E+00	1,64E+01	3,92E-01	2,66E+01
Water deprivation potential (WDP)		m3 world eq.	4,24E-01	1,01E-01	2,24E-03	5,28E-01

USE OF RESOURCES

PARAMETER		UNIT	Upstream	Core	Down-stream	TOTAL
Primary energy resources - Renewable	Use a energy carrier	MJ, net calorific value	9,2E-01	9,5E-01	0	1,87E+00
	Used as raw materials	MJ, net calorific value	1,80E+00	0	0	1,80E+00
	TOTAL	MJ, net calorific value	2,72E+00	9,5E-01	5,0E-03	3,68E+00
Primary energy resources - Non-renewable	*Use as energy carrier*	MJ, net calorific value	1,09 E-04	1,77E+01	3,1E-01	2,76E+01
	Used as raw materials	MJ, net calorific value	9,3E-01	0	0	9,3E-01
	TOTAL	MJ, net calorific value	1,06E+01	1,77E+01	3,1E-01	2,85E+01

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