# meryl fabrics®

### 100% RECYCLABLE, ZERO MICROPLASTICS & ZERO WASTE TECHNOLOGY

TECHNOLOGIES & IMPLEMENTATION 2022 - 2025

## merylfabrics®

**R-ENGINEERING THE PRESENT & FUTURE OF APPAREL** 

Our mission is to lead a radical change in the materials of the textile industry, starting from a molecular quality structure to provide smart yarns & fabrics from zero microplastic pollution and fully recyclable.

Thanks to Nylstar's technology that uses Hydrogen bondings, we can create strong molecular chains that seals-in all microfibers in the yarns, and there is no release of microfibers into the air and oceans.

Our advanced technology provides an innovative solution to the world's microplastic problem and extend the durability of the garment.

## merylfabrics®

**Quality and Durability Exceptional Touch Zero Microplastics Pollution** Zero Solvents and Silicones Zero Water Ecodye Natural Stretch (no use of elastane) Fully RecyclABLE **Collecting Centre** 



## ZERO MICROPLASTIC POLLUTION

### ZERO USE OF WATER

## WATERLESS DYEING

Microplastic pollution is currently one of the most serious environmental problems.

Textile products generate a large amount of microplastics that are released during use and washes, polluting air and water.

be replenished in 45 years.						
NYLSTAR's yarn per month, the Aral Sea could						
With water savings resulting from 500 tons of						
standard cotton fiber).						
millions of liters of water saved (compared to						
500 tons/month of NYLSTAR's yarn = 5.000						

NYLSTAR developed a sustainable waterless dyeing technology Meryl® Ecodye. The color is added during the yarn extrusion process, completely eliminating the traditional dyeing step of fabrics and garments.

Meryl® Ecodye offers a high-quality color with excellent fastness properties, greater absorption, and a softer touch, along with being environmentally friendly.

Auxiliary Chemicals.



Zero Water, Zero Energy, Zero Waste and Zero

## **SOLVENTS & SILICONES** FREE

Meryl® yarns have been developed as performance yarns with outstanding properties without the need for any topical chemical treatments to either the yarn, fabric or garment.

No use of silicones or softeners is needed to enhance the Meryl® touch.

## Implement a technological change to provide 100% circular technology with zero microplastics for textiles.





1. PRODUCT DEVELOPMENT

2. IMPLEMENTATION & TESTING



3. PRODUCT LIFE CYCLE



4. COLLECTING & RECYCLING

## **COLLECTING & RECYCLING CENTER**

Meryl's facilities can accommodate a full Production & Recycling Center.

Our customer will have an exclusive space for Collecting & Recycling.

Video live-streaming will be available of whole process to be shared within your community which will encourage them to return the used garments.

Through this action, communities will become more engaged and loyal to the brand.

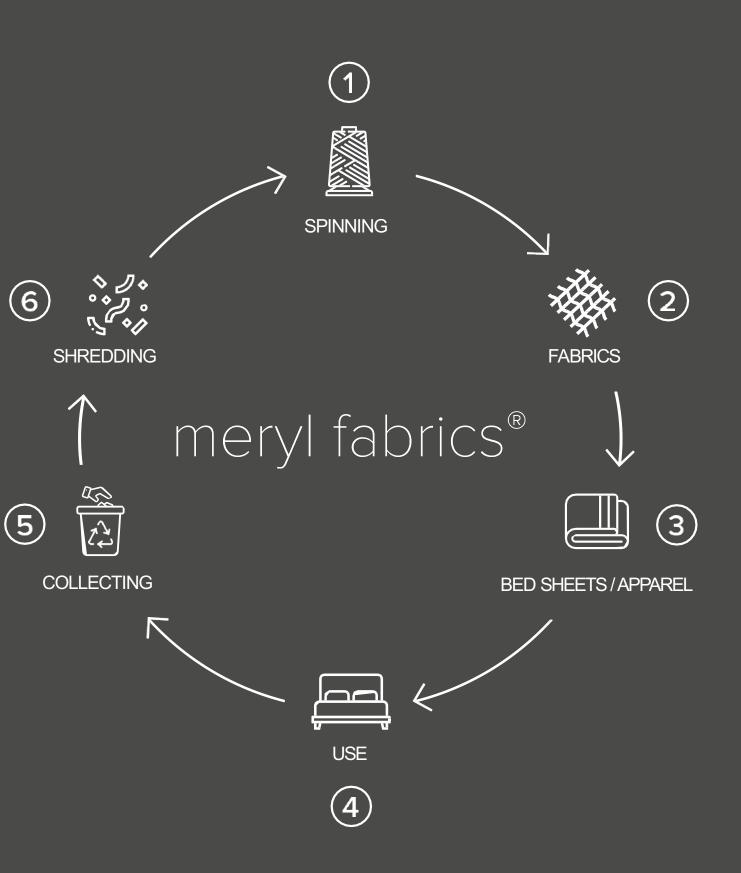


POST-CONSUMER RECYCLA-BLE

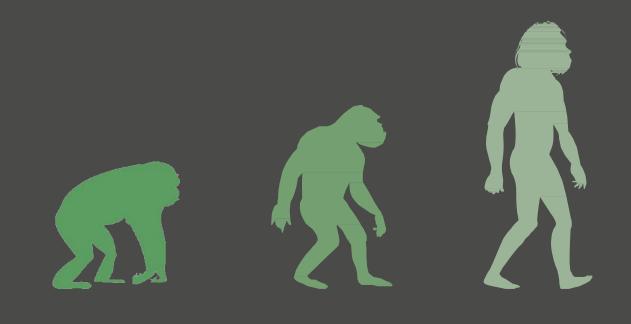




SOLVENTS & SILICONES FREE



## HOMO SAPIENS TO HOMO CONSCIOUS

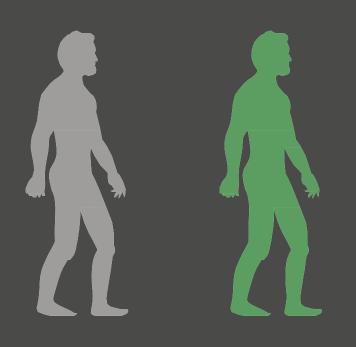


## **Current Thinking**





The trend of recycling plastic bottles, fishing nets, etc... into yarn is delaying the problem and creating more microplastics



## MERYL Thinking



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## **GOOD FOR YOUR SKIN**

**EXCEPTIONAL TOUCH** 

**BREATHABILITY (SOLVENT FREE)** 



+27% SKIN HYDRATION IN 7 DAYS (VS COTTON)

CERTIFIED RECYCLA-BLE GARMENT

Global Recycled Standard CU-1000441



## **GOOD FOR YOUR SKIN**





### **GOOD FOR YOUR SKIN**



## **GOOD FOR YOUR SKIN**



## CERTIFICATIONS



## ZERO WATER MICROPLASTIC RELEASE



### NYLSTAR

Quantification of microplastics released during laundering

25. October 2021

LEITAT

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Consulte nuestras Certificaciones y Acreditaciones en nuestra web corporativa - www.leitat.org

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### Introduction

NYLSTAR has shown an interest to quantify the microplastics released during the laundering process of a nylon polo shirt. Leitat has applied the internal assessment method for the quantification of microplastics released during laundering of textiles, which is based in an accelerated laundering process, the vacuum filtration of the wash liquor and the gravimetric determination of the material loss during laundering.

### Materials and methods

### Materials

The material analysed is a nylon polo shirt provided by Nylstar.

For accelerated washing process, a Gyrowash apparatus has been used. Stainless steel balls (6 mm) and a reference Light-duty detergent (LDD) from EU Ecolabel have been added. For filtration step, a vacuum filtration system for 47 mm diameter filter and glass fibre filters of 1.6 micron of pore size (Whatman Grade A) have been used.

### Methods

The following assessment method has been followed to quantify the microplastics released during laundering of the material.

### Sample preparation:

- 1. 3 samples of 110 x 180 mm have been cut with scissors in the same fabric direction (weft).
- 2. Each cut edge has been folded twice towards the reverse of the material to form a double rolled hem, resulting in a final size of 70 x 140 mm.
- 3. The folded edges have been sewed with a polyester monofilament yarn (Figure 1).



Figure 1. Folded and sewed samples

## **ZERO WATER MICROPLASTIC** RELEASE

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### Material conditioning and preparation:

- 1. Filters have been placed in aluminum trays and conditioned by drying in an oven without ventilation at 50°C for 12 h and cooled in a desiccator for 4 h. Conditioned filters have been weighted (W<sub>0</sub>) using an analytical balance (±0.0001 g).
- 2. Filters have been pre-rinsed with distilled water on vacuum filtration device to remove soluble compounds.
- 3. Pre-rinsed filters have been conditioned by drying in an oven without ventilation at 50°C for 12 h and cooled in a desiccator for 4 h. Conditioned pre-rinsed filters have been weighted (W1) using an analytical balance (±0.0001 g).
- 4. Textile samples have been conditioned at 20°C and 56% r.h. Conditioned textiles have been weighted (S1) using an analytical balance (±0.0001 g).

### Accelerated laundering process:

- 1. The accelerated laundering machine has been pre-heated to 60°C.
- 2. Wash solution has been prepared with distilled water and 0.25% detergent.
- 3. Textile samples have been rolled up and placed into 500 ml vessels containing 150 ml of wash solution and 20 steel balls.
- 4. 4 vessels have been placed into the accelerated laundering device: 1 vessel for each sample and 1 verification vessel, containing only wash solution.
- 5. The laundering process has been conducted at 60°C (as requested by Nylstar), with a rotation speed of 40 rpm and during 45 min.

### Filtration process:

- 1. Conditioned pre-rinsed filters have been placed into the vacuum filtration device and vacuum has been applied.
- 2. The wash solution from each vessel has been filtered separately and using a different filter. The inside of the vessel and the textile samples have been rinsed with distilled water to recover all possible remaining microplastics.
- 3. Filters have been dried in an oven without ventilation at 50°C for 12h and cooled in a desiccator for 4h. Conditioned filters (Figure 2) have been weighted (W2) using an analytical balance (±0.0001 g).

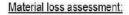


Figure 2. Filters after filtration

4. Textile samples have been flat dried and conditioned at 20°C and 56% r.h. Conditioned textiles have been weighted (S<sub>2</sub>) using an analytical balance (±0.0001 g).

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1. The microplastics loss or release is determined gravimetrically:

$$W_{loss}(mg) = W_2 - W_1$$

Where:

WIccs = Mass (mg) of microplastics released.

W1 = Mass (mg) of pre-rinsed conditioned filters and weighing tray.

W2 = Mass (mg) of post-filtration conditioned filters and weighing tray.

2. The amount of material loss as a mass percentage of the original specimen is calculated as follows:

$$W_{loss}(mg / g \ of \ textile) = \frac{W_{loss}}{S_1}$$

Where:

Wloss = Mass (mg) of microplastics released.

S1 = Mass (g) of pre-test conditioned textile sample.

### Results

In Table 1 the results from this study are presented. As explained before, Wo is the mass of the filter (placed on a tray) before the pre-rinsing step, W1 is the mass of the same filter after the pre-rinsing and before the filtration step, and W<sub>2</sub> is the mass of the filter after the filtration step, containing the microplastics released during the simulated laundering process. A blank has been added to validate the results with a low weight gain after filtration.

Table 1. Quantification of microplastics released during accelerated laundering process

Sample	W <sub>0</sub> [Mass (mg) initial conditioned filters and weighing tray]	W <sub>1</sub> [Mass (mg) of pre-rinsed conditioned filters and weighing tray]	W <sub>2</sub> [Mass (mg) of post-filtration conditioned filters and weighing tray]	S <sub>1</sub> [Mass (g) of initial conditioned textile sample]	W loss [W <sub>2</sub> -W <sub>1</sub> (mg)]	of textile	stics per g ng/g textile)]
1	93,866	93,652	96,224	4,284	2,572	0,6004	0,6171 ±
2	92,509	92,421	94,862	4,0748	2,441	0,5990	0,0301
3	93,658	93,558	96,230	4,0995	2,672	0,6518	
Blank	93,603	93,513	93,557	-	0,044	-	-

The results of the microplastic release quantification study conducted on a nylon polo shirt provided by Nylstar show that 0,6171 ± 0,0301 mg of microplastics are released per each gram of textile during laundering process at 60°C and with a light-duty detergent (LDD).



## ZERO WATER MICROPLASTIC RELEASE



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## ZERO AIR MICROPLASTIC RELEASE



## **GLOBAL RECYCLED STANDARD (POST-**CONSUMER)



Scope Certificate CU1000441GP5-2021-00106630 and License Number 1000441 Page 1 / 3



## GLOBAL RECYCLED STANDARD (POST-**CONSUMER**)



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Place and date of issue:



Stamp of the issuing body



2021-10-18,Zwolle

Name of authorised person

On behalf of the Managing Director Cristina Rodriguez Vegas/Certifier



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