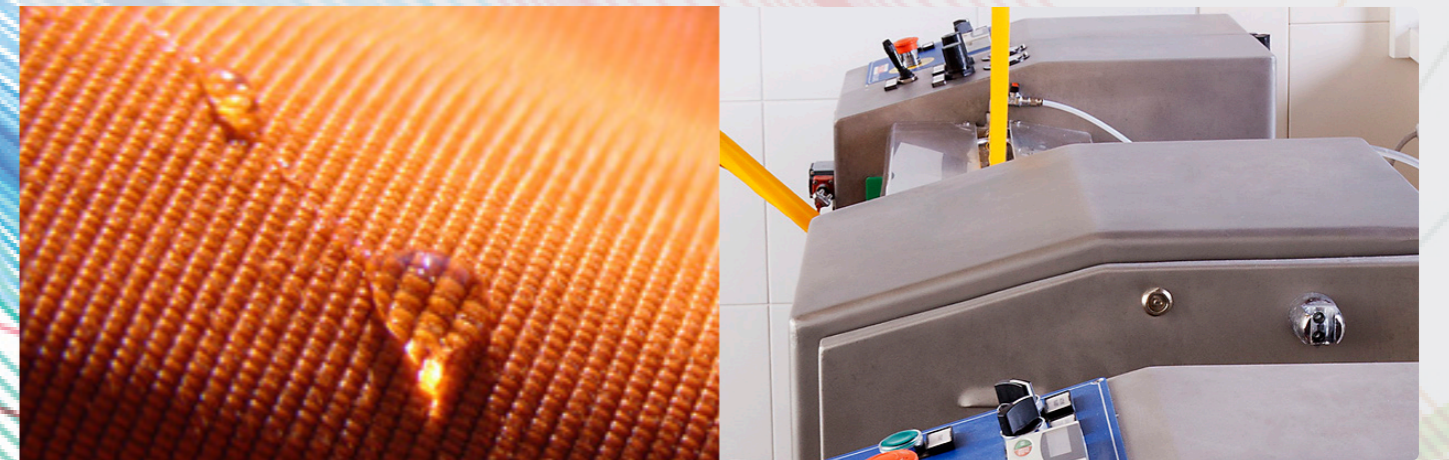


EcoPhob

Ecologically optimised hydrophobic finishing
fluorine-free and permanent



Storage

Store cool, but protected from frost. Avoid storage temperatures of above 38 °C. Changes of the product appearing when the temperatures are sub zero are in general not reversible after thawing.

For further notes on safe handling, see the safety data sheet!

The recommendations and information in word and text on our products here are based on comprehensive research work and correspond to our current experience from textile refinement. The information is deemed non-committal – also regarding property rights of third parties and foreign legal provisions - and shall not release the user from testing products and procedures for suitability for his use directly. In particular, we assume no liability for any purposes not expressly named by us in writing. We reserve technical changes in the scope of new product developments. We refer to our general sales and delivery conditions, item 7, in case of damage.

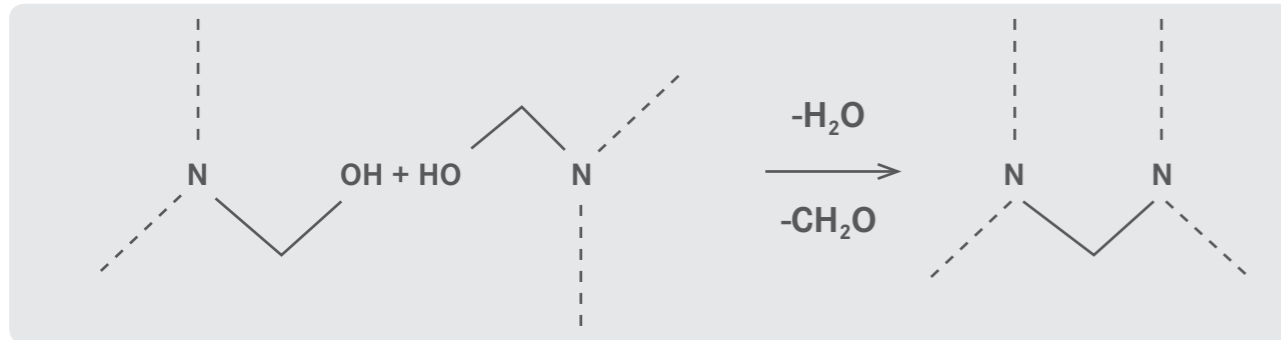
Properties and Advantages of EcoPhob

- ✓ Ecologically clean product – fluorine-free (production and application)
- ✓ Very good hydrophobic effect
- ✓ Good washing permanence
- ✓ No impairment of breathability
- ✓ Low influence of maximum force
- ✓ Low influence on grip
- ✓ Very low formaldehyde content (suitable for Öko-Tex standard class 2 – 4)
- ✓ Suitable for all fibre types

General

EcoPhob (modified resin) → fluorine-free and permanent

- The EcoPhob resin which will be applied via padding machine is turned into a duroplastic plastic that is water impermeable and does not melt by polycondensation (150 – 160 °C; 90 – 120 s.). The condensation reactions lead to linkage between the monomers via ether or methylene groups. After complete curing, plastics with narrow-meshed links via methylene groups form.



Property comparison

| | EcoPhob | Paraffin emulsion | Dendrimer system | Fluorocarbon |
|----------------------------|---------|-------------------|------------------|--------------|
| Hydrophobic effect | ++(+) | ++ | ++ | +++ |
| Washing permanence (40 °C) | ++ | - | +(+) | +++ |
| Dry cleaning | +++ | - | ++ | +++ |
| Breathability | ++ | - | ++ | +++ |
| Formaldehyde | Low | Low | Very low | Very low |
| Oil repellency | - | - | - | +++ |

Application and effect level

On lab scale, padding was performed by EcoPhob on 2 materials (CO, PES) 80 g/l, followed by condensing at 160 °C for 2 min. The effect level was assessed according to the following tests:

- Spray test according to DIN EN ISO 4920 (before washing and after 2, 5 and 10 times washed each at 40 °C) to determine hydrophobic effect
- Air permeability according to DIN EN ISO 9237 as measure of breathability
- Inspection of maximum force according to DIN EN ISO 13934-1
- Formaldehyde content on substrate [ppm]

Hydrophobic effect and breathability

Evaluation according to spray test DIN EN ISO 4920:

| | CO | 2-times washed | 5-times washed | 10-times washed |
|-------------------|-----|----------------|----------------|-----------------|
| Without finishing | 0 | 0 | 0 | 0 |
| EcoPhob | 100 | 100 | 100 | 90 |

| | PES | 2-times washed | 5-times washed | 10-times washed |
|-------------------|-----|----------------|----------------|-----------------|
| Without finishing | 0 | 0 | 0 | 0 |
| EcoPhob | 100 | 100 | 100 | 90 |

Evaluation of air permeability according to DIN EN ISO 9237

| | Cotton [mm/s] | Polyester [mm/s] |
|-------------------|---------------|------------------|
| Without finishing | 213 | 46.5 |
| EcoPhob | 138 | 52 |

Maximum force and formaldehyde

Inspection of maximum force on cotton according to DIN EN ISO 13934-1:

| | Maximum force [N] | Elongation at maximum force [%] |
|-------------------|-------------------|---------------------------------|
| Without finishing | 861 | 16.5 |
| EcoPhob | 138 | 52 |

Measurement of the formaldehyde content according to LAW 112 on the finished cotton:

| | Formaldehyde-content [ppm] |
|-------------------|----------------------------|
| Without finishing | 2 |
| EcoPhob | 17 |