Cell Solution® LYOCELL SPECIALTY FIBRES AND THEIR PROPERTIES AND FUNCTIONS IN COTTON BLENDS

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Outline

Introduction
Lyocell Process
The functional Fibres:
  Cell Solution® - CLIMA
  Cell Solution® - PROTECTION
  Cell Solution® - SKIN CARE
Applications
Outlook
Patented German Technology
developed by
Thuringian Institute for Textile and Plastics Research (TITK e.V.)
Rudolstadt, Germany
ALCERU (Lyocell) Process

- Cellulose enzymatic activated
- Wastewater Treatment
- Post-Treatment (e.g. Washing, Bleaching)
- Spinning
- NMMN-Solution
- Dispense
- Water
- Slurry
- Addition of Functional Additives

Moulded Padding (e.g. Fibre, Filament, Foil)

Sewerage
Cell Solution® -
A new Lyocell-Type Fibre with Active Agents

What is new?

• Incorporation of lipophilic substances into the fibre
• Depot of lipophilic substance
• No Microcapsules; No Coating
• An easy and long lasting storage system of active agents
Cell Solution® - **CLIMA**
Fibre for thermal regulation
Active agent: Paraffin

Cell Solution® - **PROTECTION**
Fibre for Insect Protection
Active agent: Permethrin

Cell Solution® - **SKIN CARE**
Fibre for Skin Care
Active agent: Tocopherol
Cell Solution® CLIMA
unique temperature regulation

Paraffin wax as a thermal buffer
DSC-Analysis: high buffer capacity (50 – 90 J/g)
Cell Solution® CLIMA

Life-long thermal regulating property

High thermal regulating properties through the buffer-effect of the CLIMA fibre.
Cell Solution® CLIMA

Fibre 2,3 dtex ≥ 50 J/g
Fibre 6,7 dtex ≥ 90 J/g

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Titre</td>
<td>2.3 / 6.7 dtex</td>
</tr>
<tr>
<td>Tenacity,</td>
<td>16 - 24 cN/tex</td>
</tr>
<tr>
<td>conditioned</td>
<td></td>
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<tr>
<td>Tenacity,</td>
<td>14 - 20 cN/tex</td>
</tr>
<tr>
<td>conditioned</td>
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<tr>
<td>Elongation,</td>
<td>11 – 14 %</td>
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<tr>
<td>conditioned</td>
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<td>Elongation,</td>
<td>13 – 18 %</td>
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<tr>
<td>wet</td>
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<tr>
<td>Loop tenacity</td>
<td>3 – 5 cN/tex</td>
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Oeko-Tex Class 1

smart polymer GmbH
Breitscheidstraße 97
07407 Rudolstadt, GERMANY

for the following articles:
Lyocell-staple fibre Cell Solution™ clima, raw white.
The results of the inspection made according to Oeko-Tex® Standard 100, product class I have shown that the above mentioned goods meet the human-ecological requirements of the standard presently established for baby articles.
Cell Solution® CLIMA

≥20% of Cell Solution® CLIMA is recommended

Application in combination with Cotton:
• Socks
• Gloves
• Shirts
• Trousers
• Sportive Underwear
• Bedsheets
• Duvet- and Pillow covers
• Quilts

www.cellsolution.eu
Cell Solution® PROTECTION
Live-long insect protection

Fibre Composition:
< 61% Cellulose
8-10% Permethrin
~ 16% Paraffin
~ 6% Minerals

Permethrin,
recommended for insect protection by WHO
Cell Solution® PROTECTION

Paraffin → Primary PCM function
Permethrin → Insecticide

Protective clothing with
→ excellent washing stability
→ excellent UV – stability
in comparison to Permethrin-coated fabrics

Biological active Product (Öko-Tex)
Öko-Tex Class I certified for fabrics
Cell Solution® PROTECTION

Tested function after 100 washing-cycles:

→ WHO tube test (Mosquitoes)
→ Test against ticks
→ Test against bed bugs
→ Test against dust mites
Cell Solution® PROTECTION

15 % of Cell Solution® PROTECTION is recommended

Applications in combination with Cotton:

• Socks (ticks, mosquitoes)
• Garments for forest workers (ticks, mosquitoes)
• Military products (anti-vectors)
• Bedsheets (bed bugs)
• Tents
• Protection wear for Hunters and Fishermen (ticks, mosquitoes)
Cell Solution® Skin Care
Fibre with Cosmetic Function!

Continuous release of Tocopherol:

→ life-long release of Tocopherol
→ washing stability of active agent > 100 washing-cycles
→ UV-stability
Cell Solution® Skin Care

Fibre Composition:
< 61 % Cellulose
> 6 % Tocopherole (Vitamin E)
~ 16 % Paraffin
~ 6 % Minerals

### Properties

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td><strong>Titre</strong></td>
<td>2.3 dtex</td>
</tr>
<tr>
<td><strong>Tenacity, conditioned</strong></td>
<td>&gt; 20 cN/tex</td>
</tr>
<tr>
<td><strong>Tenacity, wet</strong></td>
<td>&gt; 17 cN/tex</td>
</tr>
<tr>
<td><strong>Elongation, conditioned</strong></td>
<td>12 – 15 %</td>
</tr>
<tr>
<td><strong>Elongation, wet</strong></td>
<td>14 – 15 %</td>
</tr>
<tr>
<td><strong>Loop tenacity</strong></td>
<td>6 – 8 cN/tex</td>
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Oeko-Tex Class 1

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The transfer of active substance from textile to the skin was repeatedly tested e.g. by Hohenstein Laboratories (Test report no. 14.8.5.0091)
Cell Solution® Skin Care

20 % Cell Solution® SKIN CARE in the product is recommended

Applications in combination with Cotton:
- Bedlinen
- Underwear
- Nightwear
- Bathrobes
- Babywear
- Socks
- Gloves
- Semi-medical products
Outlook:

- **Cell Solution® CLIMA** → life-long thermal regulation
- **Cell Solution® PROTECTION** → life-long insect repellent
- **Cell Solution® SKIN CARE** → life-long skin protection

- **Cell Solution® a brand for future novel functional fibers**
THANK YOU FOR YOUR ATTENCION
and
ENJOY LIFE WITH CELL SOLUTION FIBERS

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