BREVIOL® DENIM TECHNOLOGY

Pulcra Chemicals
The solution specialist
THE MOST ECOLOGICAL, SUSTAINABLE, SAFE AND EASY WAY FROM COTTON TO JEANS

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INTRODUCTION OF THE BREVIOL® DENIM TECHNOLOGY

The BREVIOL® DENIM TECHNOLOGY (BDT) is based on a polymer which react with the dyestuff as well as the fiber, forming a polymer net or chain that creates a ring resin effect, accelerating the exclusive ring dyeing characteristics.

The BREVIOL® DENIM TECHNOLOGY (BDT) is used in the Indigo and Sulfur dyeing processes, reducing the amount of water which is used after the dyeing process to remove the unfixed dyes which would normally go to the waste water treatment facilities.

This technology not only cares for the planet, offering a cleaner water-treatment concept, but is a cost-saving solution, using less water in the process and reducing the amount of dyes.
EFFICIENCY
The BREVIOL® DENIM TECHNOLOGY (BDT) ensures that almost 100% of the applied dyestuff remains on the yarn, versus the standard process, where 15 to 25% of the dye is eliminated by washed-off.

ECOLOGY
Due to the reduction of the rinsing water flow and much less water contamination, makes the BREVIOL® DENIM TECHNOLOGY (BDT) a more ecological and sustainable process compared to the current technologies.

FASTNESS
Using the BREVIOL® DENIM TECHNOLOGY (BDT), even without rinsing the dye, the washing fastness is much better than usual.

SHADE
The BREVIOL® DENIM TECHNOLOGY (BDT) gives the possibility – even only with indigo – to obtain shades differentiating from more "reddish-clean" to more "greenish-greyish".

CONTRAST
Thanks to the BREVIOL® DENIM TECHNOLOGY (BDT) performance, the generated effects are very unique, distinctive and contrasting/fashionable. The fastness is improved.

SUSTAINABILITY
All mentioned characteristics make the BREVIOL® DENIM TECHNOLOGY (BDT) in pure indigo, topping, bottoming, black-denim and color-denim a more sustainable process with good fastness, more ecological due to their advantages of water savings and a much more cleaner process.
PROCESSES

PURE INDIGO
Process Bottoming, reddish and clean shade, more ring dyeing, intensity and good wash fastness properties. Effects in garments such as sand-paper or mechanical effects are easy to be applied. Process Topping, slightly greenish shade, high intensity and good wash fastness, better wash-down results.

BOTTOMING
BDT blocks the solubility of the sulfur dye during the indigo dyeing. Due to physical bonding and effects on the yarn, better ring effect is achieved (indigo is more superficial). More darker shades and not contamination. Not loss of the sulfur dye during the indigo dyeing.

TOPPING
Practically 100 % of the dyestuff remains on the surface of the yarn, and is not eliminated during the rinsing process, more safe and differentiated than the traditional topping process. Excellent contrast in stone-washed garments.

BLACK-DENIM
BDT provides a very dark shade and good fastness, without metallic aspect and neither bronzed appearance. Tendering effect practically disappears Very low contamination of the waste water enables to work non stop.

COLOR-DENIM
BDT is an easy way that gives very good uniformity of the dyes among different lots with a guaranty of a total dyestuff shade development.

BENEFITS:
- Water Savings advantages
- Control of Indigo shade
- Less Waste Water Contamination, including water color
- Less energy and water consumption
- Provide Reduced Indigo and Sulfur Dye Usage & Cost Savings
- Less & Even Zero Dye Bleeding during Re-beaming, Sizing & Finishing Processes
- Provide an Ecological Overdyeing Process with / without a Steamer
- Reduce Fabric Back Staining
- Topping use less sulfur dyes, better fastness and clean weft in.
- Improve Dye Fastness properties & the ability to produce darker Dye shades
- Produce Special and better Ring Dyeing Effects
- Total elimination of bronzing effect
**BREVIOL® DENIM TECHNOLOGY**

**SAVINGS**

<table>
<thead>
<tr>
<th>INDIGO DYESTUFF SAVINGS</th>
<th>SULFUR DYESTUFF SAVINGS</th>
<th>PURE INDIGO PROCESS</th>
<th>SULFUR BOTTOM + INDIGO TOP PROCESS</th>
<th>SULFUR BLACK PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 25%</td>
<td>20 - 30%</td>
<td>75 - 95%</td>
<td>70 - 90%</td>
<td>40 - 50%</td>
</tr>
<tr>
<td>(WATER SAVINGS)</td>
<td>(WATER SAVINGS)</td>
<td></td>
<td>(WATER SAVINGS)</td>
<td>(WATER SAVINGS)</td>
</tr>
</tbody>
</table>

**EXAMPLE OF PROCESSES**

**BREVIOL WATERLESS CONCEPT**

1. **Feeding BREVIOL**: X g/L with Securon acid pH: 4.5
2. **Filling with water at 60-65°C**: No fresh water feeding
3. **Indigo Dips**: 2.55%
4. **BREVIOL**: X g/L with Securon acid pH: 4.5
5. **Temp**: 60-65°C
6. **Filling with water at 60-65°C**: No fresh water feeding

**BREVIOL® SULFUR BLACK WATERLESS ROPE DYEING PROCESS**

1. **Feeding**: Black Sulfur Dye: X g/L
2. **Mercerizing**: 24° Be
3. **Pass**: Cold Rinse
4. **Box**: BREVIOL: X g/L Securon Acid: X g/L pH: 4.5 Temperature: 65°C
5. **Water Temperature**: 65°C No Fresh Water Feeding

**BREVIOL® SULFUR BLACK PROCESS**

1. **Feeding Caustic Soda & Auxiliaries**
2. **Dosing Head Tank**
3. **Head Tank Feeding**: BREVIOL: X g/L Securon Acid: X g/L pH: 1
4. **Rope Bottom**: W W2 W3 W4 I1 I2 I3 I4 I5 I6 I7 I8 W1 W2 W3 W4
5. **Pass**: DRY CANS

**INDIGO DYESTUFF SAVINGS**

- **20 - 25%**
- **20 - 30%**
- **75 - 95%** (WATER SAVINGS)
- **70 - 90%** (WATER SAVINGS)
- **40 - 50%** (WATER SAVINGS)

**SULFUR DYESTUFF SAVINGS**

- **20 - 30%**
- **30 - 45%**
- **30 - 50%**

**PURE INDIGO PROCESS**

- **75 - 95%**

**SULFUR BOTTOM + INDIGO TOP PROCESS**

- **70 - 90%**

**SULFUR BLACK PROCESS**

- **40 - 50%**
- **70 - 90%** (WATER SAVINGS)
- **40 - 50%** (WATER SAVINGS)
- **75 - 95%** (WATER SAVINGS)

**WATER SAVINGS**

- **20 - 25%**
- **20 - 30%**
- **75 - 95%**
- **70 - 90%**
- **40 - 50%**

**SULFUR BOTTOM + INDIGO TOP PROCESS**

- **70 - 90%** (WATER SAVINGS)

**SULFUR BLACK PROCESS**

- **40 - 50%** (WATER SAVINGS)
BREVIOLE® DENIM TECHNOLOGY
EXAMPLE OF PROCESSES

- Breviole Waterless Concept / Indigo Dyeing
- Breviole Sulfur Black Waterless Rope Dyeing Process
- Breviole Sulfur Bottom & Indigo Top Rope Dyeing Waterless Process
- Breviole Sulfur Black Slasher Dyeing Waterless Process with Sulfur Dye reduction
- Waterless Sulfur Overdyeing Process
- Breviole Sulfur Bottom & Indigo Top Slasher Dyeing Waterless Process with Indigo Dye reduction
- Bottoming Waterless Process

<table>
<thead>
<tr>
<th>WASTE WATER</th>
<th>PH</th>
<th>BOD SPECIFIC (M G/L)</th>
<th>COD SPECIFIC (M G/L)</th>
<th>COLOUR GRADES PT-CO</th>
<th>FLOW (M^3/H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DYEING PROCESS CAUSTIFICATION + INDIGO DYEING</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1 Standard Process 2,04 % Indigo o.w.y.</td>
<td>12,13</td>
<td>3780,00</td>
<td>5780,00</td>
<td>12100,00</td>
<td>5,4</td>
</tr>
<tr>
<td>2 BREVIOL® DENIM TECHNOLOGY Process 2,04 % Indigo o.w.y.</td>
<td>13,47</td>
<td>740,00</td>
<td>2540,00</td>
<td>1140,00</td>
<td>4,4</td>
</tr>
</tbody>
</table>

| DYEING PROCESS PRE-WETTING + INDIGO DYEING |
| 3 Standard Process 2,3 % Indigo o.w.y. | 9,78 | 2600,00 | 3200,00 | 19350,00 | 5,4 |
| 4 BREVIOL® DENIM TECHNOLOGY Process 2,3 % Indigo o.w.y. | 10,02 | 1360,00 | 2360,00 | 1980,00 | 4,4 |
| 5 BREVIOL® DENIM TECHNOLOGY Process 3,58 % Indigo o.w.y. | 10,95 | 1220,00 | 2800,00 | 2260,00 | 4,4 |
| 6 BREVIOL® DENIM TECHNOLOGY Process 5,76 % Indigo o.w.y. | 10,98 | 1980,00 | 3640,00 | 3500,00 | 4,4 |

SLASHER DYEING PROCESS USING BREVIOLE® TECHNOLOGY

Sample of Waste Water Collected at Waste Drain after 15,000 Meters of Dyed Yarn

Sizing Box after 15,000 Meters of Dyed Yarn

NORMAL PROCESS / BREVIOLE® PROCESS

Waste Water from Indigo Wash Water Discharge after BREVIOLE® PROCESS

Waste Water from Indigo Wash Water Discharge after NORMAL PROCESS

SIZING BOX from BREVIOLE® PROCESS
No Black or Blue Color Contamination
**SULFUR BLACK BOTTOMING DYEING**

**BREVIOL® WILL PREVENT BLEEDING / REDUCTION OF SULFUR DYESTUFF INTO INDIGO DYE BATH DURING THE BOTTOMING PROCESS**

**DEGRADATION OF NORMAL SULFUR BOTTOM DYE BECAUSE OF REDUCTION**

1. Normal sulfur bottom dyed shade
2. Reduced sulfur color after a reductive clearing process using the normal dyeing process

**CONSTANCY OF SULPHUR BOTTOM DYE WITH BREVIOL® DENIM TECHNOLOGY**

3. BREVIOL® DENIM TECHNOLOGY provides a darker sulfur dyed shade
4. BREVIOL® DENIM TECHNOLOGY process provides practically the same color strength after the reduction process

**FABRIC DESCRIPTIONS**

1. Normal Sulfur Bottom Dyed Shade
2. Reduced Sulfur Color after a Reductive Clearing Process using the Normal Dyeing Process
3. Breviol® Denim Technology Provides a Darker Sulfur Dyed Shade
4. Breviol® Denim Technology Process provides practically the same Color Strength after the reduction process

**REMARKS**

Breviol® Denim Technology provides a darker sulfur dyed shade and provides protection against chemical and environmental conditions including dye reduction which causes loss of color and shade change.
Sustainability is a major part of the Pulcra Chemicals philosophy and commitment

Pulcra Chemicals aims to succeed as a business by increasing the productivity and environmental compatibility of complex manufacturing processes in the fiber, textile, and leather industries. This means that Pulcra addresses the regulatory requirements in most important target markets and the trends related to health, safety, ecological sustainability and innovation.

Together with our exemplary social commitment and the continuous development and training of our employees, this approach is the key to our philosophy of sustainable development.

The Pulcra Chemicals product line fully complies with Europe’s newest chemical requirements (REACH). We register our products according to textile eco-standards and criteria including OEKO-TEX®, GOTS, ZDHC and bluesign®.
The indications given herein correspond to practical experiences. Owing to the differences in local conditions, they cannot claim to be complete, so that any liabilities – also with a view to claims of third parties – are excluded.

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