Highly functional protective fabrics with durable characteristics.
Overview

- Multi-functional fabrics for PPE
  - Demand
  - Standards
  - Materials
  - Processing
  - Characteristics
# Available FR Fabric range

<table>
<thead>
<tr>
<th>Blend</th>
<th>Weight g/m²</th>
<th>FR ISO 11612</th>
<th>Welding ISO 11611</th>
<th>Shrinkage</th>
<th>Electric Arc</th>
<th>Strength</th>
<th>Comfort</th>
<th>HI VIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO/PES FR Treated</td>
<td>330</td>
<td>A1 B1 C1 E1 F1</td>
<td>Class 1</td>
<td>-</td>
<td>Class 1</td>
<td>±</td>
<td>±</td>
<td>YE</td>
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<tr>
<td>MAC/CO</td>
<td>310</td>
<td>A1 B1 C1 E1 F1</td>
<td>Class 2</td>
<td>±</td>
<td>Class 1 ATPV 13,8</td>
<td>-</td>
<td>+</td>
<td>YE</td>
</tr>
<tr>
<td>Kermel Alpha™</td>
<td>230</td>
<td>A1 A2 B1 C1 F1</td>
<td>Class 1</td>
<td>+</td>
<td>Class 1 ATPV 9,8</td>
<td>+</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>LavaPro™</td>
<td>425</td>
<td>A1 B1 C1 E3 F1</td>
<td>Class 2</td>
<td>++</td>
<td>Class 2 ATPV 12,3</td>
<td>++</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Hepta™</td>
<td>270</td>
<td>A1 B1 C1 F1</td>
<td>Class 2</td>
<td>++</td>
<td>Class 1</td>
<td>++</td>
<td>++</td>
<td>YE OR RE</td>
</tr>
<tr>
<td>Tencel/CO/PES FR Treated</td>
<td>300</td>
<td>A1 B1 C1 E3 F1</td>
<td>Class 1</td>
<td>++</td>
<td>Class 1</td>
<td>+</td>
<td>+</td>
<td>YE</td>
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</table>
Normative demands

- Protective fabric for welders
- HI-VIS orange
- Inherent FR
- Protection against electric arc
- Protection against liquid metals/chemicals
- Anti-static
End-user demands

- Comfortable to wear
- Light weight
- Washable in industrial laundry
- Resistant to snagging
- Durable: long lasting characteristics
- Excellent mechanical characteristics
- Large variety of colours
Several solutions depending End-Use

- Hi-VIS with inherent FR properties and welding protection: Hepta™ Range
- Inherent FR with high protection against liquid metals: Lava Pro™
- Inherent FR with high protection against Arc flash: Kermel Alpha™
- Inherent FR for Fire-fighters with excellent comfort: Ingrid
- FR treated with excellent shrinkage and protection: TenCoPe
HEPTA™ Materials

- Use of 7 functional fiber materials:
  - Polyester HI VIS dope dyed
  - M-Aramid: FR
  - P-Aramid: High temperature, reinforcement
  - Modacrylic: FR
  - Cellulosic: FR + comfort
  - Polyamide: reinforcement
  - Anti-static fiber
Hepta™ Processing

- Different blended yarns
- Double weave fabric
  - Outside: HI VIS
  - Inside: FR + comfort
- Short finishing route
  - Water and oil repellency with C6 FC
- No coatings
Hepta™ Processing

Conventional dyeing & finishing of treated cotton fabric

- Bleaching
- Mercerizing
- Dyeing
- FR-Finishing
- FC-Finishing

Finishing of HEPTA™ fabric

- Washing
- FC-Finishing
Processing: Chemicals reduction

Hepta™ Chemicals reduction

<table>
<thead>
<tr>
<th>g/kg</th>
<th>CO treated</th>
<th>MC</th>
<th>Kermel Alpha</th>
<th>Hepta</th>
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<td>350</td>
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<td>50</td>
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</table>

I. Heyvaerts – Ronse 26/04/18
Processing: resources reduction

Hepta™ Water reduction

<table>
<thead>
<tr>
<th>l/kg</th>
<th>CO treated</th>
<th>MC</th>
<th>Kermel Alpha</th>
<th>Hepta</th>
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<td>140</td>
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</tr>
</tbody>
</table>

I. Heyvaerts – Ronse 26/04/18
Processing: resources reduction

Hepta™ CO₂ reduction

- CO treated
- MC
- Kermel Alpha
- Hepta
Hepta™ Characteristics

- **Reference 7915 C6**
- **Weight** ISO 3801 D5 270 g/m²
- **Tensile strength** ISO 13934-1 1400 N 1200 N
- **Tearing Strength** ISO 13937-1 90 N 90 N
- **Shrinkage** ISO 15797 -2% -2%
- **Pilling Martindale** ISO 12945-2 4-5
ISO 11612

- Results after 50x industrial laundering at 75°C
  - Flame propagation, surface ignition: A1
  - Convective heat: B1
  - Radiant heat: C1
  - Contact heat: F1
ISO 11611

➡ Results after 50x industrial laundering at 75°C

➡ Flame propagation, surface ignition: A1
➡ Radiant heat Class 2
➡ Welding droplets Class 2
Hepta™ Performances

- Okotex 100 Class II
- Hi VIS Yellow, Orange, Red ISO 20471
- Protection against heat and flames ISO 11612 A1 B1 C1 F1
- Firefighters: wildland clothing EN 15614
- Protection for welders ISO 11611 Class 2
- Protection against liquid chemicals ISO 13034
- Electrostatic characteristics EN 1149-5
- Electric Arc (Box) EN 61482-1-2 Class 1
- Electric Arc (Open) EN 61482-1-1 ATPV 8,3 cal/cm²
Lava Pro™ Range

- LAVApro is produced using inherent flame resistant fibers, which provide protection over the lifetime of the garments.
- The main component is LENZING FR.
- Excellent protection against molten iron.
- Even better comfort than cotton.
- Easily dyeable in any colour.
- The second component is para-aramid.
- Shrinkage is excellent, less than 3% after 5 industrial laundrings.
- Prevents break-open.
No 3rd degree Burns

Lava Pro

100% Aramid

I. Heyvaerts – Ronse 26/04/18
Kermel Alpha™

- Inherent FR with face changing components
- Light weight with high protection to Arc flash
- Good mechanical strength
- Excellent results in industrial laundry.

I. Heyvaerts – Ronse 26/04/18
INGRID: optimal protection and breathebility combined

- Mixture of Lenzing FR / Kermel and Para aramid
- Incredible wash performances without loss of protection or colour
- Excellent thermal insulation for a very light weight
- High mechanical performances
- No break open.
Developping optimal protection

- The know-how of all these products lies in an exact combination of specific fibers to achieve optimal performance and comfort.
- The vertical integration from fiber to ready fabric gives us the advantage of optimalising already in fiber the specific demands of our customers.
- Being partner of our suppliers gives us the opportunity to optimalise products using different aspects of different fibers and combining them to achieve performances that would never be met with one specific fiber. We search for an excellent value/cost ratio, always keeping in mind that the safety of the end-user is the goal of our efforts.