Thread Guides for Technical Fibres
Ceramic Coatings for Technical Fibres

Process
The ceramic powder melts within 0.5 seconds in a plasma flame at temperatures between 10,000 °C and 20,000 °C. The molten material is deposited at supersonic speeds onto a metal surface that has been pre-prepared by sand blasting. For improved surface finishes the coatings can be machined with diamond tooling.

Surface structure
The ceramic coating has a laminar, porous structure that gives good adhesive strength and impact resistance. It also readily allows for the difference in the thermal expansion between the metal and ceramic.

Electrical Characteristics
The choice of ceramic coating allows for varying levels of electrical insulation or it can even be semi-conductive. For example, the material R103 is used for the electrical insulation of roller bearing outer casings. With a layer thickness of 150 µm, a dielectric strength of 1000V is guaranteed.

Ceramic Coatings

<table>
<thead>
<tr>
<th>layer material</th>
<th>Nr.</th>
<th>colour</th>
<th>wear resistance</th>
<th>electrical insulation</th>
<th>thermal insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al₂O₃ / TiO₂</td>
<td>(97/3)</td>
<td>R103</td>
<td>grey</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Al₂O₃ / TiO₂</td>
<td>(87/13)</td>
<td>R113</td>
<td>anthracite</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Al₂O₃ / TiO₂</td>
<td>(60/40)</td>
<td>R140</td>
<td>black</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>(99)</td>
<td>R100</td>
<td>white</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ZrO₂ / CaO</td>
<td>(95/5)</td>
<td>R295</td>
<td>ivory</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ZrO₂ / Y₂O₃</td>
<td>(92/8)</td>
<td>R292</td>
<td>ivory</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Cr₂O₃</td>
<td>(99)</td>
<td>R399</td>
<td>grey green</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Cr₂O₃ / TiO₂</td>
<td>(60/40)</td>
<td>R360</td>
<td>anthracite</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

layer thickness
- standard layer thickness: 90 µm ± 30 µm
- with polished finish: 120 µm ± 60 µm
- with subsequent grinding: >= 200 µm
- maximum layer thickness: ca. 500 µm

Hardness HV: depending on the layer material 700 - 1800

Porosity: depending on the layer material 3.0 - 5.0 %

Dielectric strength: at 150 µm < 1000 V

Surface properties
- unprocessed surface: for electrical insulation
- non-slip surface: for transport function  Ra = 3 - 4 µm
- thread-friendly surface:  Ra = 1.5 - 2 µm
- finely machined surface: for guiding particulary sensitive chemical fibres or metal wires  Ra = 0.2 - 0.5 µm
Defect free ceramic surfaces

RAUSCHERT ceramics can offer the optimum kinetic friction for any ceramic/yarn interface, combined with any additional and specific production process requirements for carbon, glass or aramid high-tenacity technical fibres.

Thanks to our special ‘defect free’ ceramic surfaces, yarn filament breakages or damage caused by adhesion or abrasion are eliminated and thus the yarn physical properties are maintained at consistently high levels for a longer period of time. As a consequence, the lifespan of components and the cleaning cycles of components is extended.

These are all key factors which influence the quality and cost effectiveness of technical textiles.

Physical Properties

<table>
<thead>
<tr>
<th>Material according to DIN EN 60672</th>
<th>RAPAL®300 C 799</th>
<th>RAPAL®200 AZ C 799</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium oxide %</td>
<td>99.9</td>
<td>84</td>
</tr>
<tr>
<td>Zirconium oxide %</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Colour</td>
<td>ivory</td>
<td>white</td>
</tr>
<tr>
<td>Density g/cm³</td>
<td>&gt; 3.95</td>
<td>4.1</td>
</tr>
<tr>
<td>Porosity %</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flexural strength MPa</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Hardness Vickers (depending on the shape) HV 0.1</td>
<td>1900-2300</td>
<td>1800-2300</td>
</tr>
<tr>
<td>Volume resistivity at Alternating voltage Q cm</td>
<td>$10^{12}$</td>
<td>$10^{12}$</td>
</tr>
<tr>
<td>Coefficient of linear expansion $10^{-6} \cdot \text{K}^{-1}$ between 20 ... 1000 °C</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Thermal conductivity $\frac{W}{m \cdot K}$ at 30... 100 °C</td>
<td>19 - 30</td>
<td>19 - 30</td>
</tr>
</tbody>
</table>

100 µm Rauschert Rapaltex 167 f 36 black
Rauschert
Thread Guides for Technical Fibres

Take advantage of the Rauschert experience!

The Thread Guides for Technical Fibres belong to the textile ceramics business unit.

The production of ceramic yarn guides is a major business activity for Rauschert.

The Yarn Guides Product Division is very successful and has expanded greatly. Our goal is to be a competitive supplier in the marketplace. Management and employees are constantly striving to improve the quality of our products and efficiency of production.

The representatives for the Yarn Guides Product Division are based in Pressig/Germany and Shanghai/China. Pressig is located 120 km north of Nuremberg and can be reached via Autobahn A9 and A73.

Rauschert Textile Ceramics (Shanghai) Co., Ltd was founded in 2003 and is a supplier of textile ceramics for the Chinese market.

Send us your inquiries!

Rauschert
Heinersdorf-Pressig GmbH
Postfach 1162
D-96329 Pressig
Phone +49 (0)9265-78-0
Fax +49 (0)9265-78-10899
email info@prg.rauschert.de

Rauschert Technical Ceramics (Shanghai) Co., Ltd
Section A, Second Floor, No. 55 Xi Ya Road,
Waigaoqiao Free Trade Zone, Shanghai 200131, China
Phone +86 (0)21 50643668
Fax +86 (0)21 50462220
email sales@rauschert.cn

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