Fluosil® tubes are characterized by the unique high fluorine concentration, which leads to a depressed index of refraction up to -26 x10^-3. Our Fluosi® tubes feature the highest fluorine content and therefore the lowest refractive index in the market. They can be manufactured as multiple layer composite tubes with a polygonal structure e.g. as pump cladding for fiber laser core rods.

**Typical applications include:**
- Structured composite tubes to create laser fiber pump claddings
- Fluorine doped capillaries, e.g., for optical and viscosity matching
Uniformly fluorine doped Fluosi® tubes, referred to as U-types (TWU, TTU), are available. In addition, tubes are available with a double or multi step refractive index profile. These types are referred to as S-types (TWS, TTS).

### Typical geometries
- Outer tube diameter: 10 ... 40 mm
- Fluorine doped wall thicknesses: 3 ... 15 mm
- Lengths: Up to 1,300 mm
- Other custom geometries available on request

### Special tube cross sections
Beyond the standard cylindrical tube geometry, we also offer multi layer Fluosi® tubes with polygonal interface sections such as rectangular, square, hexagonal or octagonal.

### Physical Material Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Un-doped tube</th>
<th>F doped tube*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive index @ 633 nm</td>
<td>1.4571</td>
<td>1.440</td>
</tr>
<tr>
<td>Refractive index @ 1,064 nm</td>
<td>1.4498</td>
<td>1.433</td>
</tr>
<tr>
<td>Transformation temperature</td>
<td>1,050 °C</td>
<td>750 °C</td>
</tr>
<tr>
<td>Fluorine content</td>
<td>0 wt %</td>
<td>5.0 wt %</td>
</tr>
</tbody>
</table>

* Tube with Δn 17.1 x 10⁻³ respectively un-doped fused silica

**Available tubes**

<table>
<thead>
<tr>
<th>Available tubes</th>
<th>Composite tubes</th>
<th>TWU</th>
<th>TTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive index*</td>
<td>0 ... -26 x 10⁻³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OH (ppm) typical</td>
<td>1 ... 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (ppm)</td>
<td>0 ... 70,000</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Substrate tube material</th>
<th>F300</th>
<th>F320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive index*</td>
<td>0.35 ... 0.5 x 10⁻³</td>
<td>0.6 ... 1.2 x 10⁻³</td>
</tr>
<tr>
<td>OH (ppm) typical</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>F (ppm)</td>
<td>~</td>
<td>3,000 ... 4,000</td>
</tr>
</tbody>
</table>

* Difference to un-doped fused silica (Heraeus standard)

**About us**
Heraeus is the key global supplier of high purity synthetic fused silica products for optical fiber manufacturing. We have been a reliable partner in the world telecommunications industry since 1976.

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