

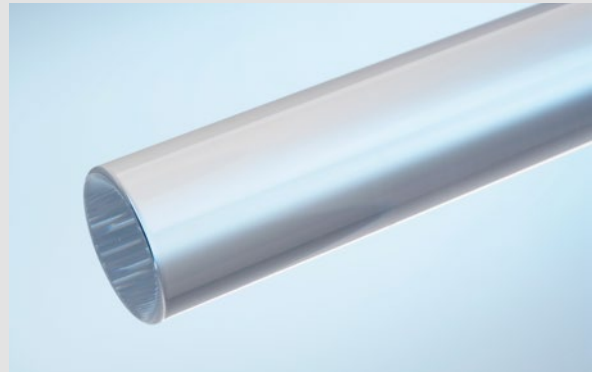
Quartz Rods

Fused quartz rods manufactured by Heraeus Quarzglas are available in various material grades and dimensions.

HSQ® 100 single-step quartz rods are directly drawn in a continuous electrical fusion process that covers an outer diameter range from 10 mm – 45 mm. These standard quality direct drawn quartz rods are a cost efficient solution for many industrial applications.

HSQ® 300 / 330 multi-step and improved single step fused silica rods yield an especially low bubble content and superior surface purity for high-end applications. Available sizes range from 1,5 to 90 mm outer diameter.

HSQ® 330S is a new selected grade that guarantees particularly low metal concentrations as required for super high purity semiconductor materials.



HSQ® 900 / 910 and Spectrosil® 1000 synthetic fused silica rods feature an outstanding purity and are therefore the recommended products for leading edge semiconductor applications.

All quartz glass rods are supplied with either snap-cut or machine-cut ends. Typical lengths for fused quartz rods are 1220mm (48") and 1300mm.

Chemical purity – Trace element concentration (ppm)

Typical Values (= Statistical Average Value)

| | Li | Na | K | Mg | Ca | Fe | Cu | Cr | Ni | Mn | Ti | Zr | Al | OH |
|--|---------|--------|--------|--------|--------|--------|---------|---------|--------|----------|--------|--------|--------|--------|
| Electrically fused quartz | | | | | | | | | | | | | | |
| HSQ® 100/300 | 0.5 | 0.2 | 0.3 | < 0.03 | 0.5 | 0.1 | 0.01 | < 0.01 | < 0.01 | < 0.03 | 1.1 | 1.0 | 15 | < 30* |
| HSQ® 330 | 0.5 | 0.1 | 0.2 | < 0.03 | 0.5 | 0.1 | < 0.01 | < 0.01 | < 0.01 | < 0.03 | 1.1 | 1.0 | 15 | < 30* |
| * OH content can be reduced by additional annealing. | | | | | | | | | | | | | | |
| Synthetic fused silica** | | | | | | | | | | | | | | |
| HSQ® 900 | < 0.002 | < 0.01 | < 0.01 | < 0.01 | < 0.02 | < 0.03 | < 0.001 | < 0.001 | n. s. | < 0.0005 | < 0.03 | < 0.04 | < 0.04 | 0.2 |
| HSQ® 910 | < 0.002 | < 0.01 | < 0.01 | < 0.01 | < 0.02 | < 0.03 | < 0.001 | < 0.001 | n. s. | < 0.0005 | < 0.03 | < 0.04 | < 0.04 | 250 |
| Spectrosil® 1000 | < 10 | < 10 | < 10 | < 10 | < 15 | < 10 | < 10 | < 10 | < 10 | n. s. | < 10 | n. s. | < 10 | < 1350 |

Technical Properties (typical values)**Mechanical Data**

| | |
|--|--|
| Density | 2.203 g/cm ³ |
| Mohs Hardness | 5.5 ... 6.5 |
| Micro Hardness | 8600 ... 9800 N/mm ² |
| Knoop Hardness | 5800 ... 6100 N/mm ² |
| Modulus of elasticity (at 20°C) ² | 7.25 x 10 ⁴ N/mm ² |
| Modulus of torsion | 3.0 x 10 ⁴ N/mm ² |
| Poisson's ratio | 0.17 |
| Compressive strength (approx.) | 1150 N/mm ² |
| Tensile strength (approx.) | 50 N/mm ² |
| Bending strength (approx.) | 67 N/mm ² |
| Torsional strength (approx.) | 30 N/mm ² |
| Sound velocity | 5720 m/s |

| Thermal Data | electrically fused | flame fused | synthetic |
|----------------------------------|--------------------|-------------|-----------|
| Softening temperature °C | 1710 | 1660 | 1600 |
| Annealing temperature °C | 1220 | 1160 | 1100 |
| Strain temperature °C | 1125 | 1070 | 1000 |
| Max. working temp. continuous °C | 1160 | 1110 | 950 |
| Short-term °C | 1300 | 1250 | 1200 |

Mean specific heat J/kg·K

| | |
|--------------|------|
| 0 ... 100 °C | 772 |
| 0 ... 500 °C | 964 |
| 0 ... 900 °C | 1052 |

Heat conductivity W/m·K

| | |
|--------|------|
| 20 °C | 1.38 |
| 100 °C | 1.47 |
| 200 °C | 1.55 |
| 300 °C | 1.67 |
| 400 °C | 1.84 |
| 950 °C | 2.68 |

Mean expansion coefficient K⁻¹

| | |
|--------------|------------------------|
| 0 ... 100 °C | 5.1 x 10 ⁻⁷ |
| 0 ... 200 °C | 5.8 x 10 ⁻⁷ |
| 0 ... 300 °C | 5.9 x 10 ⁻⁷ |
| 0 ... 600 °C | 5.4 x 10 ⁻⁷ |
| 0 ... 900 °C | 4.8 x 10 ⁻⁷ |
| -50 ... 0 °C | 2.7 x 10 ⁻⁷ |

Electrical resistivity in Ω*cm

| | |
|---------|-----------------------|
| 20 °C | 10 ¹⁸ |
| 400 °C | 10 ¹⁰ |
| 800 °C | 6.3 x 10 ⁶ |
| 1200 °C | 1.3 x 10 ⁵ |

Dielectric strength in kV/mm

(sample thickness ≥ 5 mm)

| | |
|--------|-----------|
| 20 °C | 25 ... 40 |
| 500 °C | 4 ... 5 |

Dielectric loss angle (tgδ)

| | |
|-------------------------|------------------------|
| 1 kHz | 5.0 x 10 ⁻⁴ |
| 1 MHz | 1.0 x 10 ⁻⁴ |
| 3 x 10 ¹⁰ Hz | 4.0 x 10 ⁻⁴ |

Dielectric constant (ε)

| | |
|---------------------------------|------|
| 20 °C, 0 ... 10 ⁶ Hz | 3.70 |
| 23 °C, 9 ... 10 ⁸ Hz | 3.77 |
| 23 °C, 3 x 10 ¹⁰ Hz | 3.81 |

Germany

Heraeus Quarzglas GmbH & Co. KG

Base Materials

Kleinostheim, Germany

Phone +49 (6181) 35-7444

sales.hqs.basematerials.de

@heraeus.com

China

Heraeus ShinEtsu Quartz**(China) Inc.**

200122 Shanghai, China

Phone +86 (21) 68672266-809

sales.hqs.basematerials.cn

@heraeus.com

USA

Heraeus Quartz North America LLC

Base Materials Division

Chandler, AZ 85226, USA

Phone (+1) 512 989 05 03

sales.hqs.basematerials.us

@heraeus.com

UK

Heraeus Quartz UK Ltd.

Neptune Road

Wallsend, Tyne & Wear

NE28 6DD, United Kingdom

Phone +44 (0)191.2598411

sales.hqs.tsc.uk@heraeus.com