



## HSQ 900 / HSQ 910 Ultra High Purity Synthetic Fused Silica

### General Product Description

As the technology for semiconductors, optical devices and other advanced industrial processes steadily marches toward nano-scale geometries requiring ultra-high purity processing conditions, Heraeus Quarzglas finds itself in a unique position among traditional fused quartz suppliers to offer materials that can meet such extreme demands.

Heraeus has successfully developed processes to manufacture high purity electrically and flame fused quartz. In

addition Heraeus has also developed the ability to produce ultra-high purity synthetic fused silica on a large scale.

### Production Process

Synthetic fused silica is produced by the oxidation / hydrolysis of silicon tetrachloride ( $\text{SiCl}_4$ ) vapor in an  $\text{H}_2/\text{O}_2$ -flame.

This process is called the soot process.

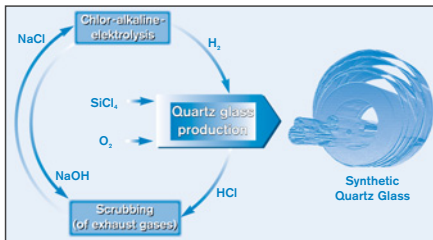
Because silicon tetrachloride is a synthetic chemical with exceptional starting purity, alkali and metal contamination in the final product is reduced to ppb

levels. To put this in perspective, one part per billion is equivalent to a 40 mm section of the earth's equator (total length > 40,000 km).

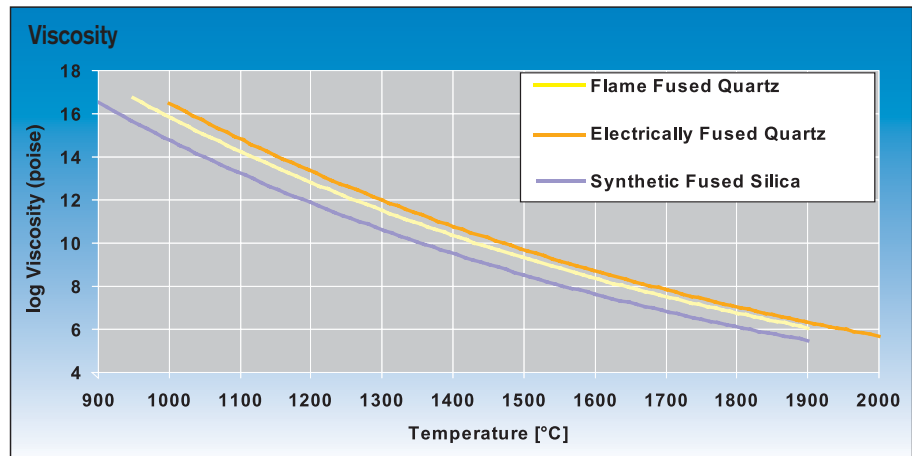
However, the hydrolyzation process results in a large amount of water (as hydroxyl / OH) being incorporated into the glass. Although this does not cause contamination in the final use application, it does strongly affect viscosity and infrared optical transmission. On the other hand, ultraviolet transparency is greatly enhanced by the very low metal contamination levels.

# HSQ 900 / HSQ 910

## Ultra High Purity Synthetic Fused Silica



Density	2.203 g/cm <sup>3</sup>
Modulus of elasticity (at 20°C)	7.25 x 10 <sup>4</sup> N/mm <sup>2</sup>
Poisson's ratio	0.17
Modulus Hardness	5.5...6.5
Compressive strength (approx.)	1150 N/mm <sup>2</sup>
Tensile strength (approx.)	50 N/mm <sup>2</sup>
Bending strength (approx.)	67 N/mm <sup>2</sup>
Torsional strength (approx.)	30 N/mm <sup>2</sup>
Softening temperature	1600°C
Annealing temperature	1100°C
Strain temperature	1000°C
Max. working temperature continuous short-term	950°C 1200°C
Mean coefficient of thermal expansion	≈ 5.0 x 10 <sup>-7</sup> /K



### OH Content

It is possible to remove most of the water by adding a chlorine treatment step in the manufacturing process. Although it removes the hydroxyl content, this results in a significant chlorine content in the glass which also lowers viscosity but does not affect the infrared transmission.

### Product Range

HSQ 900 is a dry synthetic fused silica whereas HSQ 910 is our low chlorine variety. Both are available as large and small diameter tubing as well as rod or even solid or hollow near net shape forms.

<b>Tubes</b>	Diameter Ø 2 – 1000 mm wall thickness 0.5 – 14 mm
<b>Rods</b>	Ø 2 – 100 mm

### Chemical Purity

Typical Trace Elements and OH Content in Quartz Glass (ppm by weight oxide)

Elements	Al	Ca	Cl	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ti	Zr	OH Content
HSQ 900	< 0.04	< 0.02	1500	< 0.001	< 0.001	< 0.03	< 0.01	< 0.002	< 0.01	< 0.0005	< 0.01	< 0.03	< 0.04	0,2
HSQ 910	< 0.04	< 0.02	< 50	< 0.001	< 0.001	< 0.03	< 0.01	< 0.002	< 0.01	< 0.0005	< 0.01	< 0.03	< 0.04	250

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