



Optics Leading the Light

RONAR-SMITH® Laser Optics & IR Imaging



Introduction

RONAR-SMITH® Laser Optics

Optics for Medical Laser System

Optics for Semiconductor Spectroscopy Biomedical Application Laser

Optical Material

Laser Accessories Components

## Ultraviolet Grade Fused Silica

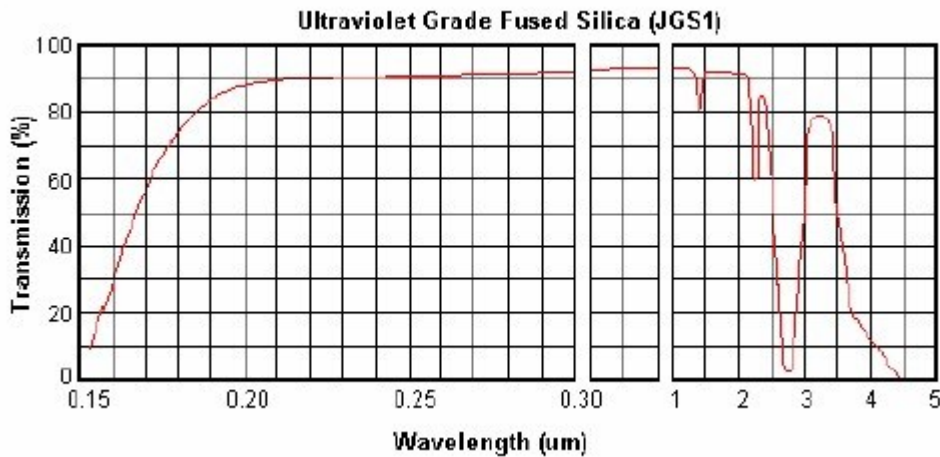
UV grade Fused Silica (JGS1) is synthetic amorphous silicon dioxide of extremely high purity. This non-crystalline, colorless silica glass combines a very low thermal expansion coefficient with good optical qualities, and excellent transmittance in the ultraviolet. Transmission and homogeneity exceed those of crystalline quartz without the problems of orientation and temperature instability inherent in the crystalline form. Fused silica is used for both transmissive and reflective optics, especially where high laser damage threshold is required. JGS1 is transparent in the ultraviolet and visible regions, and has no absorption bands in the 170-250 nm wavelength intervals. It has an intensive OH absorption band in the interval of wavelength 2600-2800 nm. JGS1 is used for optics operating in the deep UV and the visible wavelength range (Laser Lenses, Windows, Prisms, Mirrors, etc.). It is practically free of bubbles and inclusions.

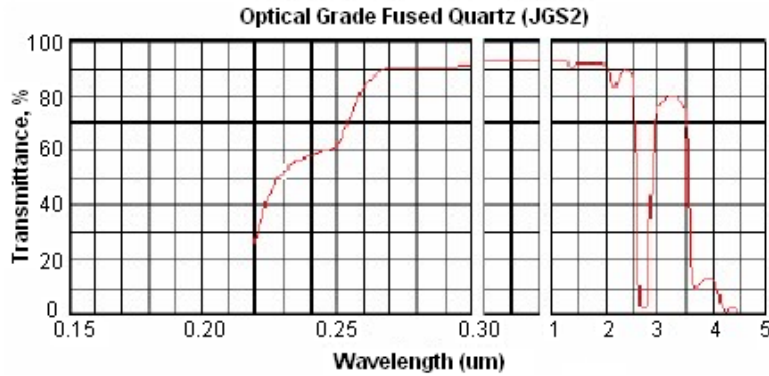
Optical Grade Fused Quartz (JGS2) provides good UV and visible transmission. It has almost the same physical and chemical properties with JGS1. However only in thin & small sheet pieces, JGS2 is virtually bubble-free. Elements built from larger pieces will most likely contain bubbles, so application should not be sensitive to these inclusions. But in cases where simple light gathering and strong mechanical properties are the primary goals, JGS2 grade provides excellent performance at a low price. Ideal Applications for JGS2

### Material Specification:

Parameter Value	UV grade Fused Silica
Maximum Size	<Φ200mm
Transmission Range (Medium transmission ratio)	0.17~2.10um (Tavg>90%)
OH- Content	1200 ppm
Fluorescence (ex 254nm)	Virtually Free
Impurity Content	5 ppm
Birefringence Constant	2-4 nm/cm
Melting Method	Synthetic CVD
Applications	Laser substrate: Window, lens, prism, mirror...

Hardness	5.5 - 6.5 Mohs' Scale 570 KHN 100
Design Tensile Strength	4.8x10 <sup>7</sup> Pa (N/mm <sup>2</sup> ) (7000 psi)
Design Compressive Strength	Greater than 1.1x10 <sup>9</sup> Pa (160,000 psi)
Bulk Modulus	3.7x10 <sup>10</sup> Pa (5.3x10 <sup>6</sup> psi)
Rigidity Modulus	3.1x10 <sup>10</sup> Pa (4.5x10 <sup>6</sup> psi)
Young's Modulus	7.2x10 <sup>10</sup> Pa (10.5x10 <sup>6</sup> psi)
Poisson's Ratio	0.17
Coefficient of Thermal Expansion	5.5x10 <sup>-7</sup> cm/cm.°C (20°C-320°C)
Thermal Conductivity	1.4 W/m.°C
Specific Heat	670 J/kg.°C
Softening Point	1683°C
Annealing Point	1215°C
Strain Point	1120°C
Electrical Receptivity	7x10 <sup>7</sup> ohm.cm (350°C)
Dielectric Properties (20°C and 1 MHz)	
Constant	3.75
Strength	5x10 <sup>7</sup> V/m
Loss Factor	Less than 4x10 <sup>-4</sup>
Dissipation Factor	Less than 1x10 <sup>-4</sup>
Velocity of Sound-Shear Wave	3.75x10 <sup>3</sup> m/s
Velocity of Sound/Compression Wave	5.90x10 <sup>3</sup> m/s
Sonic Attenuation	Less than 11 db/m MHz
Permeability Constants (cm <sup>3</sup> mm/cm <sup>2</sup> sec cm of Hg)	(700°C)
Helium	210x10 <sup>-10</sup>
Hydrogen	21x10 <sup>-10</sup>
Deuterium	17x10 <sup>-10</sup>
Neon	9.5x10 <sup>-17</sup>
Chemical Stability (except hydrofluoric)	High resistance to water and acids





**Properties**

<b>Density</b>	2.20g/cm <sup>3</sup>
<b>Abbe Constant</b>	67.6
<b>Refractive Index (nd) at 588nm</b>	1.4586

Wavelength (um)	Refractive Index (n)	Wavelength (um)	Refractive Index (n)
0.200	1.55051	1.000	1.45042
0.220	1.52845	1.064	1.44962
0.250	1.50745	1.100	1.44920
0.300	1.48779	1.200	1.44805
0.320	1.48274	1.300	1.44692
0.360	1.47529	1.500	1.44462
0.400	1.47012	1.600	1.44342
0.450	1.46557	1.700	1.44217
0.488	1.46302	1.800	1.44087
0.500	1.46233	1.900	1.43951
0.550	1.46008	2.000	1.43809
0.588	1.45860	2.200	1.43501
0.600	1.45804	2.400	1.43163
0.633	1.45702	2.600	1.42789
0.650	1.45653	2.800	1.42377
0.700	1.45529	3.000	1.41925
0.750	1.45424	3.200	1.41427
0.800	1.45332	3.370	1.40990
0.850	1.45250	3.507	1.40566
0.900	1.45175	3.707	1.39936