Fused Silica

Vitreous silica is the generic term used to describe all types of silica glass, with producers referring to the material as either Fused Quartz or as Fused Silica. Originally, those terms were used to distinguish between transparent and opaque grades of the material. Fused Quartz products were those produced from quartz crystal into transparent ware, and Fused Silica described products manufactured from send Into opaque ware.

Today, however, advances in raw material beneficiation permit transparent fusions from sand as well as from crystal. Consequently, if naturally occurring crystalline silica (sand or rock) is melted, the material is simply called Fused Quartz. If the silicon dioxide is synthetically derived,however,the material is referred as aynthetic.

These materials are ultra pure, single component glasses (SiO2) with a unique combination of thermal, optical and mechanical properties, which make them the preferred materials for use in a variety of processes and applications where other materials are not suitable. The very high purity (over 99.9%) ensures minimum contamination in process application.

These materials can routinely with stand temperatures of over 1250 捞 C, and due to their very low coefficient of thermal expansion can be rapidly heated and cooled with virtually no risk of breakage due to thermal shock.

These materials are inert to most substances, including virtually all acids, allowing their use in arduous and hostile environments.

The dielectric properties and very high electrical receptivity of these materials over a wide range of temperatures, together with their low thermal conductivity allow their use as an electrical and thermal insulating material in a range of environments.

Main Properties

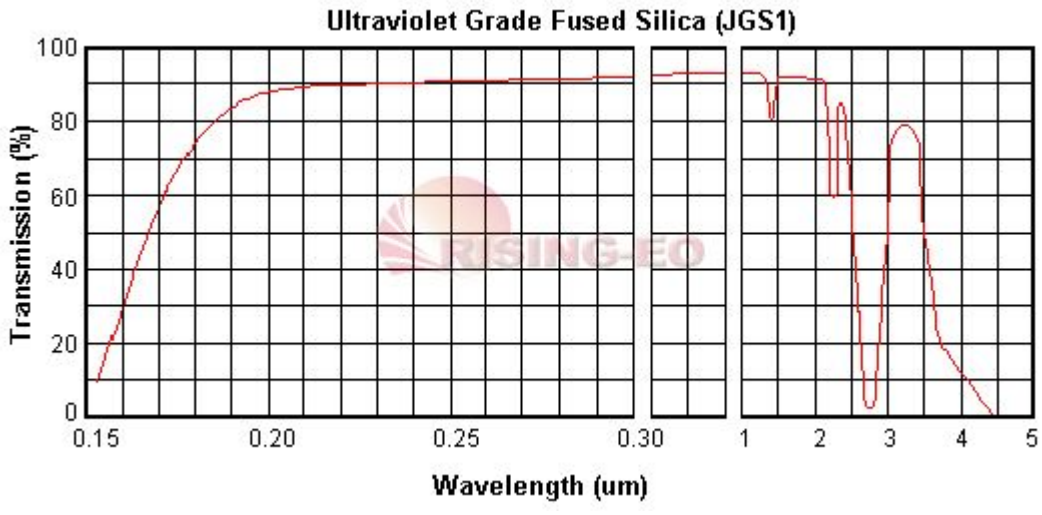
Difference properties			
Parameter/Value	**JGS1**	**JGS2**	**JGS3**
Maximum Size	<過 200mm	<過 300mm	<過 200mm
Transmission Range (Medium transmission ratio)	0.17~2.10um (Tavg>90%)	0.26~2.10um (Tavg>85%)	0.25~3.50um (Tavg>85%)
OH- Content	1200 ppm	150 ppm	5 ppm
Fluorescence (ex 254nm)	Virtually Free	Strong v-b	Strong V-B
Impurity Content	5 ppm	20-40 ppm	40-50 ppm
Birefringence Constant	2-4 nm/cm	4-6 nm/cm	4-10 nm/cm
Melting Method	Synthetic CVD	Oxy-hydrogen melting	Electrical melting
Applications	Laser substrate: Window, lens, prism, mirror...	Semiconductor and high temperature window	IR substrate

Same properties			
Density		2.20g/cm3	
Abbe Constant		67.6	
Refractive Index (nd) at 588nm		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	1.4462
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

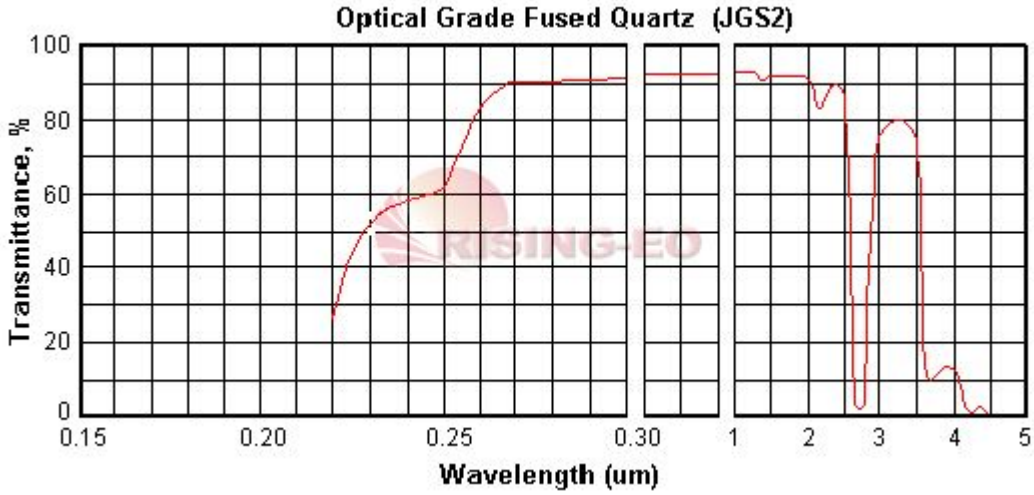
Bldg 24#, Iinshan Fuwan Industrial Park, Fuzhou, China
Tel: +86-591-83349016 Fax: +86-591-83300646 Mail: sales@rising-eo.com Web: www.RISING-EO.com

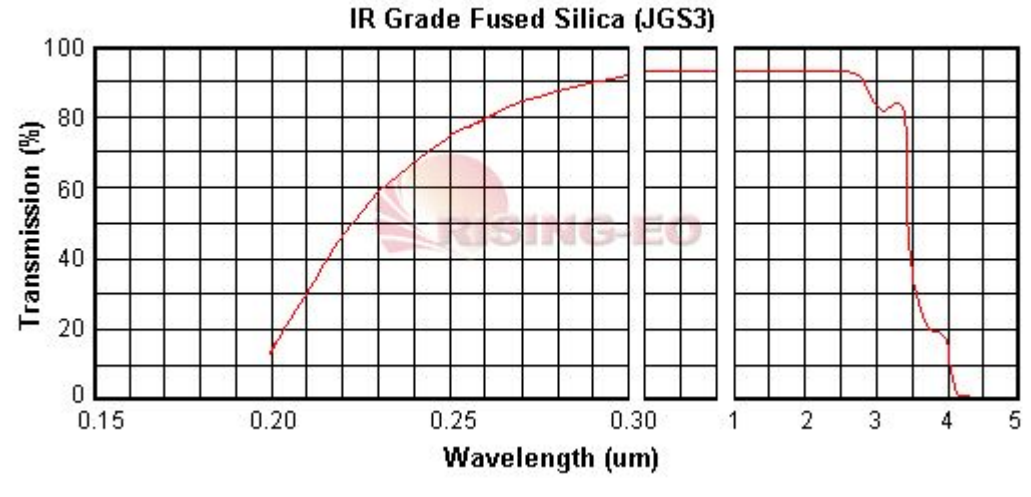
0.588	1.45860	2.200	1.43501
0.600	1.45804	2.400	1.43163
0.633	1.45702	2.600	1.42789
0.650	1.45653	2.800	1.42377
0.700	1.45529	3.000	1.41925
0.750	1.45424	3.200	1.41427
0.800	1.45332	3.370	1.40990
0.850	1.45250	3.507	1.40566
0.900	1.45175	3.707	1.39936

Transmission Curve see below



Transmission Curve see below





Hardness	5.5 - 6.5 Mohs' Scale 570 KHN 100
Design Tensile Strength	$4.8x10^7$ Pa (N/mm^2) (7000 psi)
Design Compressive Strength	Greater than $1.1x10^9$ Pa (160,000 psi)
Bulk Modulus	$3.7x10^{10}$ Pa ($5.3x10^6$ psi)
Rigidity Modulus	$3.1x10^{10}$ Pa ($4.5x10^6$ psi)
Young's Modulus	$7.2x10^{10}$ Pa ($10.5x10^6$ psi)
Poisson's Ratio	0.17
Coefficient of Thermal Expansion	5.5x10-7cm/cm.°C (20°C-320°C)

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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	$7x10^7$ ohm.cm (350°C)
Dielectric Properties (20°C and 1 MHz) Constant Strength Loss Factor Dissipation Factor	 3.75 $5x10^7$ V/m Less than $4x10^{-4}$ Less than $1x10^{-4}$
Velocity of Sound-Shear Wave	$3.75x10^3$ m/s
Velocity of Sound/Compression Wave	$5.90x10^3$ m/s
Sonic Attenuation	Less than 11 db/m MHz
Permeability Constants (cm3mm/cm2 sec cm of Hg) Helium Hydrogen Deuterium Neon	(700°C) $210x10^{-10}$ $21x10^{-10}$ $17x10^{-10}$ $9.5x10^{-17}$
Chemical Stability (except hydrofluoric)	High resistance to water and acids