

# Fused Quartz

## Chemical Impurities

Material	Typical mean value (ppm)													
	Al	B	Ca	Co	Cu	Fe	K	Li	Mg	Mn	Na	Ni	Ti	OH
Fused Quartz	18.00	0.15	1.00	0.05	0.01	1.00	1.50	1.50	0.20	0.30	1.50	0.10	1.50	200

## properties

Parameter Value	Fused Quartz
Transmission Range (Medium transmission ratio)	0.26~2.10um (Tavg>85%)
OH- Content	200 ppm
Fluorescence (ex 254nm)	Strong v-b
Impurity Content	20-40 ppm
Birefringence Constant	4-6 nm/cm
Melting Method	Oxy-hydrogen melting
Applications	Semiconductor and high temperature window

Density		2.20g/cm <sup>3</sup>	
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	1.44462
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
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	7x107 ohm.cm (350°C)
Dielectric Properties (20°C and 1 MHz) Constant Strength Loss Factor Dissipation Factor	3.75 5x107 V/m Less than 4x10-4 Less than 1x10-4
Velocity of Sound-Shear Wave	3.75x103 m/s
Velocity of Sound/Compression Wave	5.90x103 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