Dynasil Synthetic Fused Silica Properties

- **Mechanical**
- **Sonic**
- **Electrical**
- **Thermal**
- **Chemical**

Mechanical Properties

Formula	SiO_2
Solid State	Amorphous
Density (25°)	2.202 +/- .002 gm/cm
Refractive Index (632.8 nm)	1.457
Useful Optical Transmission Range	180-2500 nm
Water Absorption - Saturation	0%
Poisson's Ratio	0.17
Elasticity (Young's) Modulus (25°C)	745 x 10^3 kg/cm²
Shear (Rigidity) Modulus (25°C)	320 x 10^3 kg/cm²
Bulk Modulus (25°C)	420 x 10^3 kg/cm²
Tensile Strength (25°C)	600 kg/cm²
Compressive Strength (25°C)	11.3 x 10^3 kg/cm²
Hardness	
Knoop-KH_m (100 gm load)	600 kg/mm²
Moh	7

Sonic Properties

Velocity of Sound	
Shear Wave	3.75 x 10^3 m/sec
Compressional Wave	5.70 x 10^3 m/sec
Ultrasonic Velocity (50°C)	
Shear Wave	3.75 x 10^3 m/sec
Compressional Wave	5.95 x 10^3 m/sec
Temperature Coefficient of Ultrasonic Velocity	
Compressional Wave (°C^{-1})	81.5 x 10^{-6}
Sonic Attenuation	> .11 db/mMhz
Internal Damping	1 x 10^{-5}

Chemical Properties

Resistance	
Acids - Concentrated	Good
Acids - Dilute	Good
Alkalis	Fair
Halogens	Good
Metals	Fair

Electrical Properties

Dielectric Constant	3.8
Dielectric Strength	
25° C	300-400kV/cm
500° C	150-200 kV/cm

@25° C	100 Hz	1KHz	10 KHz	100 KHz	1 MHz	10 MHz	100 MHz	8.6 GHz	24 GHz
Dielectric Constant	3.826	3.826	3.826	3.826	3.826	3.826	3.826	3.824	3.82
Loss Tangent	<.000004	<.000002	<.000005	0.00001	0.000015	0.00002	0.00003	0.00012	0.00033
Volume Resistivity $Log_{10}R$, ohm-cm	>15.0	>14.3	>12.9	11.7	10.5	9.34	8.2	5.65	

Measurement performed at Laboratory of A.R. Von Hippel, Laboratory for Insulation Research, Massachusetts Institute of Technology, May 1970.

Thermal Properties

Softening Point	1600°C +/- 25°C
Annealing Point	1100°C +/- 20°C
Strain Point	1000°C +/- 20°C
Use Temperature	
Continuous	950°C +/- 50°C
Limited	1200°C +/- 50°C
Thermal Conductivity (25°C)	3.3 x 10^{-3} (cal cm)/(cm^2sec°C)
Average Coefficient of Thermal Expansion	
20°C to 320°C	5.5 x 10 cm/cm°C
Specific Heat (25°C)	0.177 cal/gm°C
Thermal Diffusivity (25°C)	8.5 x 10^{-3}