DATA SHEET SCHOTT® BOROFLOAT

BOROFLOAT® has a very good homogeneity and very high transparency in the UV/visible/near IR range. The glass has low thermal expansion and high thermal resistance that make it particularly suitable for areas of application where high temperatures and thermal gradients are involved.

Chemical Properties

BOROFLOAT® is very resistant to attack from water, alkalis, acids and organic substances. This chemically resistant type of borosilicate glass contains a high percentage of silica and a considerable amount of boric oxide. Exposure of BOROFLOAT® to water and acids results in only small amounts of monovalent ions leaching out of the glass. This creates a thin pore-free silica coating on the outer surface of the glass making it near impermeable to further attack. Even over long periods of time at temperatures above 100°C, BOROFLOAT® exceeds the chemical resistance of most materials. BOROFLOAT's high chemical resistance makes it suitable for use in critical medical and scientific applications, such as electrophoresis, slides, cover plates and scintillators.

Common Reactants	Weight Loss mg/cm^2
5% HCl, 24 hr @ 95° C	**< 0.01**
0.02 n H_2SO_4, 24 hr @ 95° C	**< 0.01**
H_2O, 24 hr @ 95° C	**< 0.01**
5% NaOH, 6 hr @ 95° C	**1.1**
0.02 n NaOH, 6 hr @ 95° C	**0.16**
0.02 Na_2CO_3, 6 hr @ 95° C	**0.16**
10% HF, 20 min @ 23° C	**1.1**
10% NH_4F*HF, 20 min @ 23° C	**0.14**

Electrical Properties

Glass tends to be a good electrical insulator. The ability to carry an electrical charge in glass is a function of the alkali concentration (Sodium & Potassium) in the glass. The migratory effect of alkali ions in glass combined with increased mobility at higher temperatures can result in the glass carrying or passing a charge. The low alkali content of BOROFLOAT® compared to nearly all other glasses makes it a superior insulator. This makes it suitable for many electrical applications requiring good insulating capabilities at elevated temperatures.

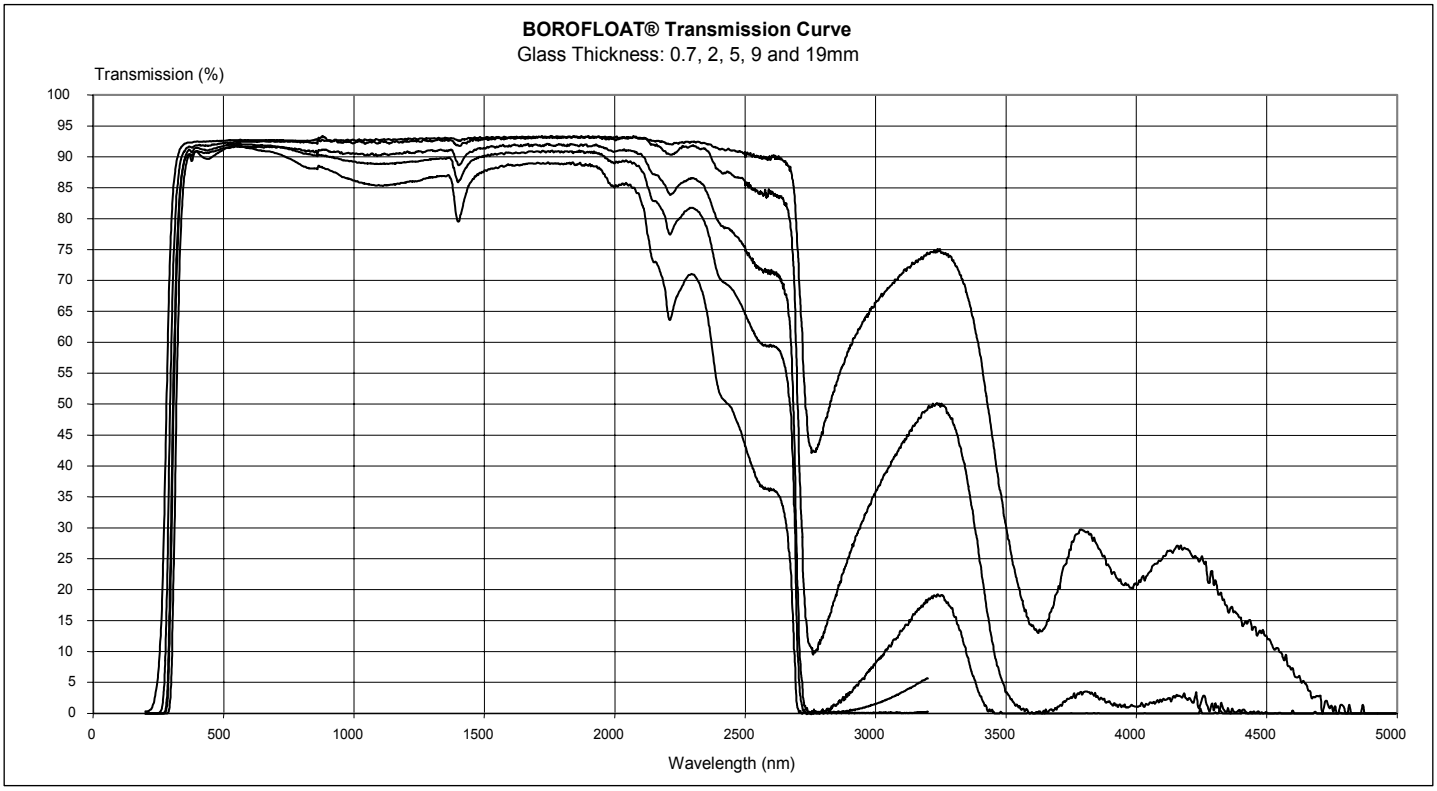
Dielectric Constant (κ)	**1 Mhz @ 25°C**	**4.6**
Dielectric Loss Factor (tan δ)	**1 Mhz @ 25°C**	**37 x 10^{-4}**
Dieletric Strength (Em)	**23°C**	**16kV/mm**
	149°C	**7kV/mm**
	160°C	**1.8kV/mm**
Volume Resistivity (log ρ)	**250°C**	**8.0**
	350°C	**6.5**

Optical Properties

The visual clarity of BOROFLOAT® is a result of the float process with stringent quality control that minimizes defects such as bubbles, seeds and striae. The low amount of iron oxide in BOROFLOAT®, results in improved transmission of ultra-violet, visible and infra-red light over soda-lime glass. In comparison to many glasses, BOROFLOAT® has a very low dispersion. These advantages make BOROFLOAT® a good choice for beam splitters, dichroics, hot and cold mirrors, photolithography masks and lens blanks.

n	n_i	n_h	n_g	$n_{F'}$	n_e	n_d	$n_{C'}$	n_r	n_t
wavelength	365.0	404.7	435.8	480.0	546.1	587.6	643.8	706.5	1014.0
index	1.489	1.484	1.481	1.477	1.473	1.472	1.470	1.468	1.463
.	UV Hg	Violet Hg	Blue Hg	Blue Cd	Green Hg	Yellow He	Red Cd	Red He	IR Hg

Dispersion (n_F- n_C) 71.94 x10^{-4} Optical Stress Constant (K) 4.0x10^{-6} mm^2/N



Physical Properties

The density of BOROFLOAT® is one of the lowest for silicate-based glasses. BOROFLOAT® has extremely good abrasion and scratch resistance. As with all glass the bending strength of BOROFLOAT® is influenced by the surface condition of the glass part, the rate at which the load is applied and the area on the glass part placed under load.

Density(ρ)	**@25°C**	**2.22 g/cm3**
Young's Modulus (E)	**@25°C**	**63 GPa**
Knoop Hardness (HK 0.1/2.0)	**per ISO 9385**	**480**
Poisson's Ratio (μ)		**0.20**
Bending Strength	**per DIN 52292**	**25 N/mm2**

Thermal Properties

BOROFLOAT® has one of the lowest coefficients of thermal expansion for conventional glass materials, this provides BOROFLOAT® with good thermal shock resistance. Combined with a maximum long term use temperature of 450°C, which makes BOROFLOAT® a good choice for applications requiring good thermal stability.

Coefficient of Thermal Expansion	**(α 20 - 300° C)**	**3.25 x 10^{-6}/K**
Thermal Conductivity(λ)	**10°C** **50°C** **90°C** **190° C**	**1.11 W/m K** **1.17 W/m K** **1.22 W/m K** **1.31 W/m K**
Heat Capacity(Cp)	**20 - 100°C**	**0.83 kJ/kg K**
Maximum Operating Temperature	**Short-term** **Long-term**	**500°C** **450°C**
Resistance to Thermal Gradients	**< 1 hour** **1 - 100 hours** **> 100 hours**	**110K** **90K** **80K**
Resistance to Thermal Shock	**< 4 mm** **4-6 mm** **6-15 mm** **> 15 mm**	**175K** **160K** **150K** **140K**

WHILE EVERY ATTEMPT HAS BEEN MADE TO VERIFY THE SOURCE OF THE INFORMATION, NO RESPONSIBILITY IS ACCEPTED FOR ACCURACY OF DATA.

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