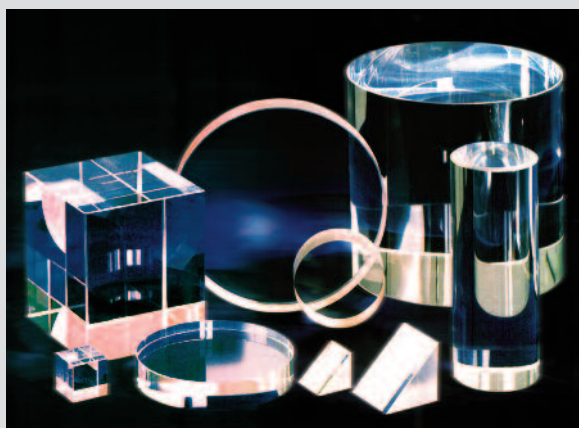


Spectrosil®

Spectrosil® synthetic fused silica is manufactured using a patented, environmentally friendly process resulting in a glass of exceptional purity and excellent visual quality. It is a highly homogeneous synthetic fused silica glass available in a range of grades. This includes Spectrosil® 2000 for deep UV optical applications, whereas Spectrosil® 2200 - ArF and Spectrosil® 2200 - KrF excimer laser grades are optimised for use in microlithography and other critical high-energy deep UV optical systems.

Spectrosil® is chlorine-free resulting in outstanding laser damage resistance due to the reduced tendency to form E' centres.

All Spectrosil® grades are free of bubbles and inclusions and due to their ultra-high purity, have exceptional optical



transmission in the deep ultraviolet and visible, with a useful range from below 180 nm through to 2000 nm.

Spectrosil® Grade	2000	2200
■ Refractive Index Homogeneity Lower values are available on request.	≤ 5 ppm	≤ 5 ppm
■ Striae Visible striae ISO 10110-4 MIL-G-174B	3 Directions Free Class 5 A	3 Directions Free Class 5 A
■ Birefringence / Residual Strain¹⁾ (Typical values)	≤ 2 nm/cm	≤ 1 nm/cm
■ Bubbles Bubble class (DIN 58927) Maximum number of inclusions	0 0	0 0
■ Fluorescence (254 nm excitations)	None	None
■ Typical Diameters²⁾	350+ mm	300+ mm

¹⁾ Residual strain is stress induced birefringence and the values shown are typical for the inner 90% of a 100 mm diameter machined component.

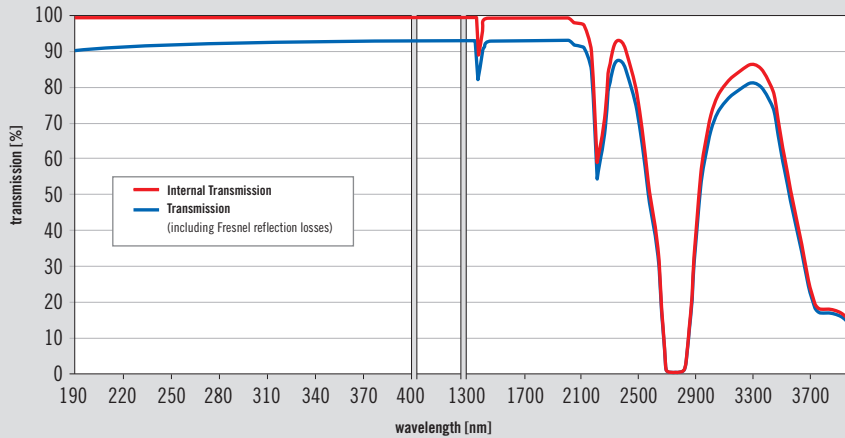
²⁾ Larger sizes of Spectrosil® 2000 & 2200 are available on request.

Transmission – Typical Internal Transmission (10 mm path length)

	$\lambda = 193.4 \text{ nm}$	$\lambda = 248 \text{ nm}$
Spectrosil® 2200 - ArF Grade	> 99.5 %	–
Spectrosil® 2200 - KrF Grade	–	> 99.9 %
Spectrosil® 2000	> 99 %	> 99.5%

Typical Transmission Spectrum

Sample thickness: 10 mm



Other Properties

Abbe number: 67.8
Density: 2.2 g/cm³
Hardness (Mohs scale): 6-7

Thermal Properties

Strain point*: 950°C
Annealing point*: 1100°C
Softening point*: 1710°C
Coefficient of thermal expansion:
(Average K⁻¹ 0-600°C) 0.54 x 10⁻⁶

*Note that these values may vary,
depending on the thermal history of the glass.

Typical Chemical Analysis

Typical trace elements in ppb	Al	Ca	Co	Cr	Cu	Fe	K	Li	Mg
Spectrosil® 2000/2200	<10	<10	<10	<10	<10	<10	<10	<10	<10

Typical trace elements in ppb	Mn	Na	Ti	V	Zn	Zr	in ppm	Cl	OH
Spectrosil® 2000/2200	<10	<10	<10	<10	<10	<10		<0.15	1000

(limits of detection)

Refractive Index & Thermal Coefficient (at 20°C & 1 bar / 760 mm Hg)

				n t	n s	n r	n c	n c'	n He-Ne	n D
Wavelength (nm)	1128.95	1064.00	1060.00	1013.98	852.11	706.52	656.27	643.85	632.80	589.29
Refractive Index (n)	1.44887	1.44963	1.44968	1.45024	1.45247	1.45515	1.45637	1.45670	1.45702	1.45840
Thermal Coefficient (dn/dT (ppm/K))	9.6	9.6	9.6	9.6	9.7	9.9	9.9	10.0	10.0	10.1
	n d	n e	n F'	n g	n h	n l	n KrF			
Wavelength (nm)	587.56	546.07	486.13	435.83	404.66	365.01	334.24	312.66	253.73	248.30
Refractive Index (n)	1.45846	1.46008	1.46313	1.46669	1.46962	1.47454	1.47975	1.48447	1.50547	1.50838
Thermal Coefficient (dn/dT (ppm/K))	10.1	10.2	10.4	10.6	10.8	11.2	11.6	12.0	13.9	14.2
	n ArF									
Wavelength (nm)	248.00	228.87	214.51	206.27	194.23	193.40	193.00	184.95		
Refractive Index (n)	1.50855	1.52109	1.53365	1.54259	1.55884	1.56014	1.56077	1.57495		
Thermal Coefficient (dn/dT (ppm/K))	14.2	15.5	17.0	18.1	20.3	20.5	20.6	22.7		

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