HEBO
SPEZIALGLAS

Datasheet

FSUV1 (Fused Silica)
FQVIS2 (Fused Quartz)

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FSUV1 (Fused Silica)

FQVIS2 (Fused Quartz)

Fused Silica is the glassy form of quartz and is thus isotropic. It is tough and hard and has a very low expansion. Normal varieties contain water that gives strong absorption in the IR. Water-free varieties are available.

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 sand 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 to as synthetic Fused Silica.

These materials are ultra pure, single component glasses (SiO_2) 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 applications.

These materials can routinely withstand temperatures of over 1250 °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.

Fused Quartz is less expensive vitreous silica formed by fusing naturally occurring quartz crystal or lower grade synthetic stock material, the UV use is limited to 250 nm and this material is usually used for windows covering visible wavelengths.

Fused Silica is vitreous silica formed by fusing high purity synthetic material. The UV use can be reached about 160 nm.

FSUV1 (Fused Silica)

Equivalent to Suprasil 1 and 2 (Heraeus), Spectrosil A and B (Saint-Gobain) and Corning 7940 (Corning), Dynasil 1100 and 4100 (Dynasil).

FQVIS2 (Fused Quartz)

Equivalent to Homosil 1, 2 & 3 (Heraeus), Dynasil 1000 & 4000 and 5000 & 6000 (Dynasil)

UV grade Fused Silica (FSUV1) is synthetic amorphous silicon dioxide of extremely high purity. This non-crystalline, colorless silica glass combines a very low thermal expansion coefficient with good optical qualities, and excellent transmission in the ultraviolet. Transmission and homogeneity exceed those of crystalline quartz without the problems of orientation and temperature instability inherent in the crystalline form. Fused Silica is used for both transmissive and reflective optics, especially where high laser damage threshold is required.

FSUV1 is transparent in the ultraviolet and visible regions, and has no absorption bands in the 170-250 nm wavelength intervals. It has an intensive OH absorption band in the interval of wavelength 2600-2800 nm. FSUV1 is used for optics operating in the deep UV and the visible wavelength range (laser lenses, windows, prisms, mirrors, etc.). It is practically free of bubbles and inclusions.

Optical Grade Fused Quartz (FQVIS2) provides good UV and visible transmission. It has almost the same physical and chemical properties with FSUV1. However only in thin & small sheet pieces, FQVIS2 is virtually bubble-free. Elements built from larger pieces will most likely contain bubbles, so application should not be sensitive to these inclusions. But in cases where simple light gathering and strong mechanical properties are the primary goals, FQVIS2 grade provides excellent performance at a low price.

Ideal Applications for FQVIS2:
- Condenser optics not concerned with scatter or distortion
- High temperature and pressure applications
- Optical flats, microscope slides and sight glasses

Samples ex stock

We keep polished samples in size 50 × 50 mm on stock. Delivery within one day.

Prices

Thickness	FSUV1	FQVIS2
1,0 ± 0,1 mm	25,00 € / pce.	20,00 € / pce.
2,0 ± 0,1 mm	30,00 € / pce.	25,00 € / pce.
3,0 ± 0,1 mm	35,00 € / pce.	30,00 € / pce.

All other dimensions prices upon request.

Same Properties

Density 2.20 g/cm³

Abbe Constant 67.6

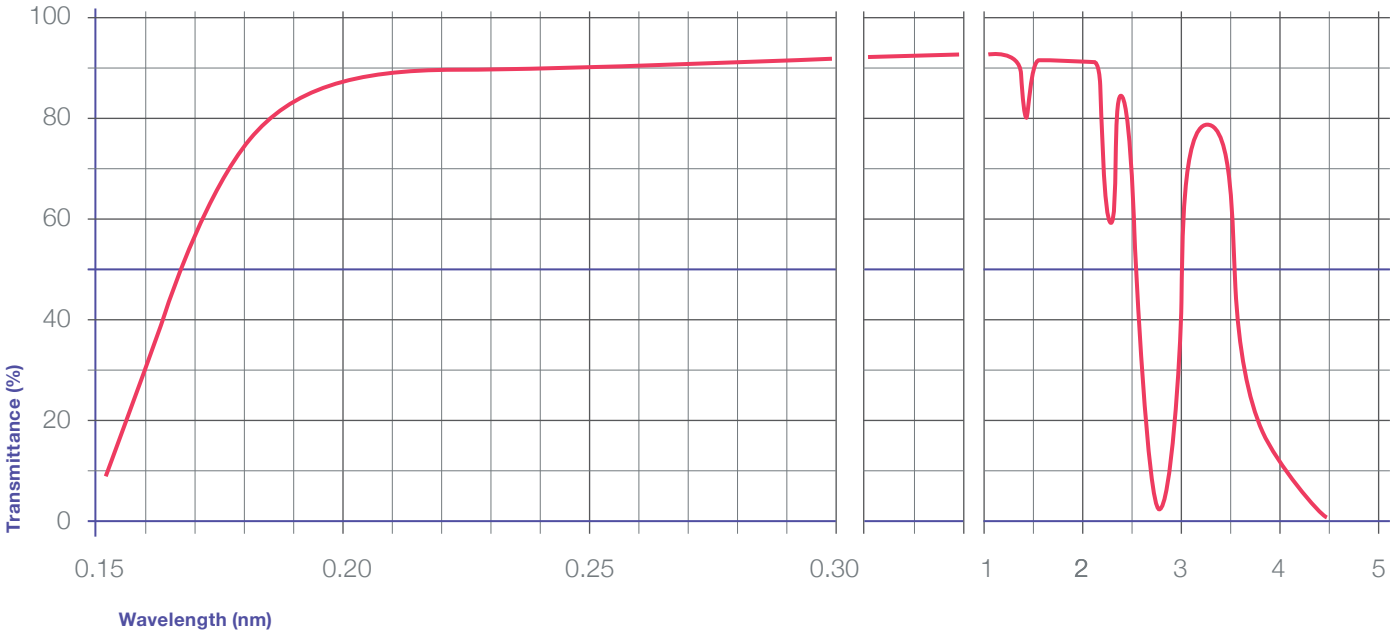
Refractive Index (nd) at 588 nm 1.4586

Wavelength (µm)	Refractive Index (n)
0.200	1.55051
0.220	1.52845
0.250	1.50745
0.300	1.48779
0.320	1.48274
0.360	1.47529
0.400	1.47012
0.450	1.46557
0.488	1.46302
0.500	1.46233
0.550	1.46008
0.588	1.45860
0.600	1.45804
0.633	1.45702
0.650	1.45653
0.700	1.45529
0.750	1.45424
0.800	1.45332
0.850	1.45250
0.900	1.45175
1.000	1.45042
1.064	1.44962
1.100	1.44920
1.200	1.44805
1.300	1.44692
1.500	1.44462
1.600	1.44342
1.700	1.44217
1.800	1.44087
1.900	1.43951
2.000	1.43809
2.200	1.43501
2.400	1.43163
2.600	1.42789
2.800	1.42377
3.000	1.41925
3.200	1.41427
3.370	1.40990
3.507	1.40566
3.707	1.39936

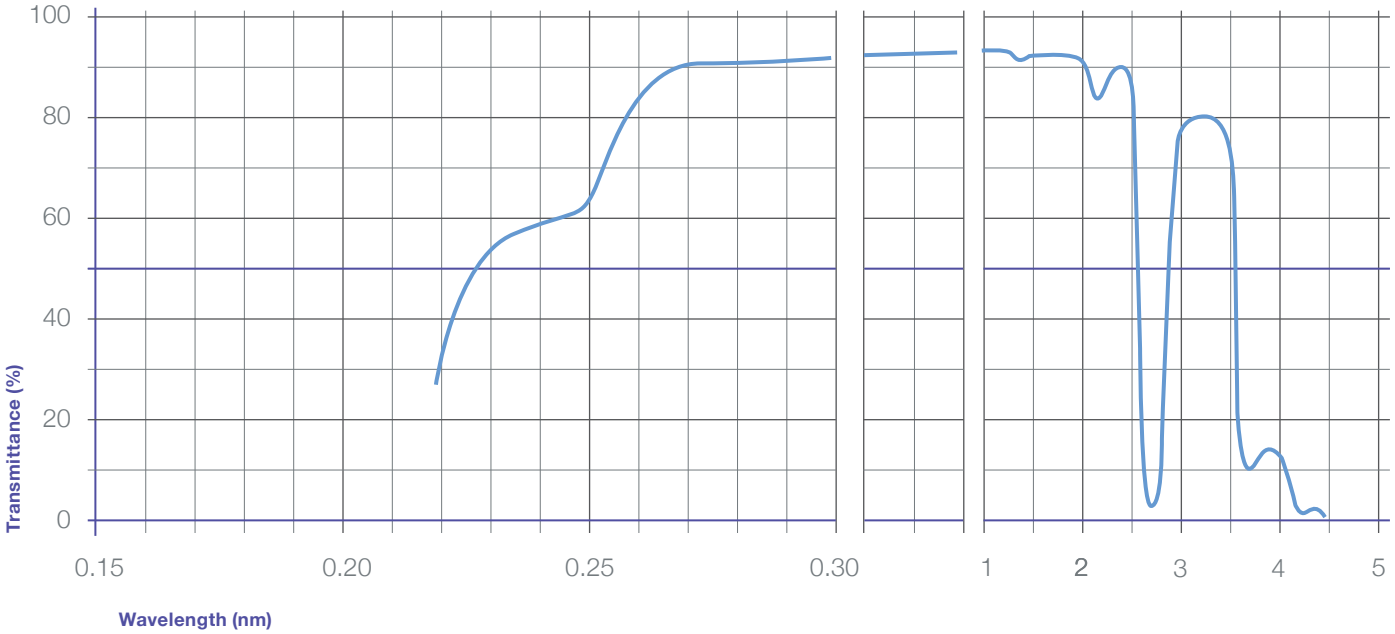
Hardness	5.5-6.5 Mohs' Scale 570 KHN 100
Design Tensile Strength	4.8 × 107 Pa (N/mm²) (7000 psi)
Design Compressive Strength	Greater than 1.1 × 109 Pa ()
	(160,000 psi)
Bulk Modulus	3.7 × 1010 Pa (5.3x106 psi)
Rigidity Modulus	3.1 × 1010 Pa (4.5x106 psi)
Young's Modulus	7.2 × 10-10 Pa (10.5x106 psi)
Poisson's Ratio	0.17
Coefficient of Thermal Expansion	5.5 × 10-7 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	7 × 107 ohm cm (350°C)
Dielectric Properties	
(20°C and 1 MHz)	
Constant	3.75
Strength	5 × 107 V/m
Loss Factor	Less than 4 × 10 -4
Dissipation Factor	Less than 1 × 10 -4
Velocity of Sound-Shear Wave	3.75 × 10³ m/s
Velocity of Sound/Compression	5.90 × 10³ m/s
Wave	
Sonic Attenuation	Less than 11 db/m MHz
Permeability Constants	(700°C)
(cm³ mm/cm² sec cm of Hg)	
Helium	210 × 10 $^{-10}$
Hydrogen	21 × 10 $^{-10}$
Deuterium	17 × 10 $^{-10}$
Neon	9.5 × 10 $^{-17}$
Chemical Stability	High resistance to water and acids
(except hydrofluoric)	

Parameter | Value	FSUV1	FQViS2
Maximum Size	< Ø 200 mm	< Ø 300 mm
Transmission Range	0.17 ~ 2.10 µm	0.26 ~ 2.10 µm
(Medium transmission ratio)	(Tavg > 90%)	(Tavg > 85%)
OH-Content	1200 ppm	150 ppm
Fluorescence (ex 254nm)	Virtually Free	Strong v-b
Impurity Content	5 ppm	20 - 40 ppm
Birefringence Constant	2 - 4 nm/cm	4 - 6 nm/cm
Melting Method	Synthetic CVD	Oxy-hydrogen melting
Applications	Laser substrate: Windows, lenses,	Semiconductor and high temperature
	prisms, mirrors...	window

Transmission FSUV1 (Fused Silica)



Transmission FQVIS2 (Fused Quartz)



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