

Ilmasil™ PO-1

Opaque fused quartz

Material specification

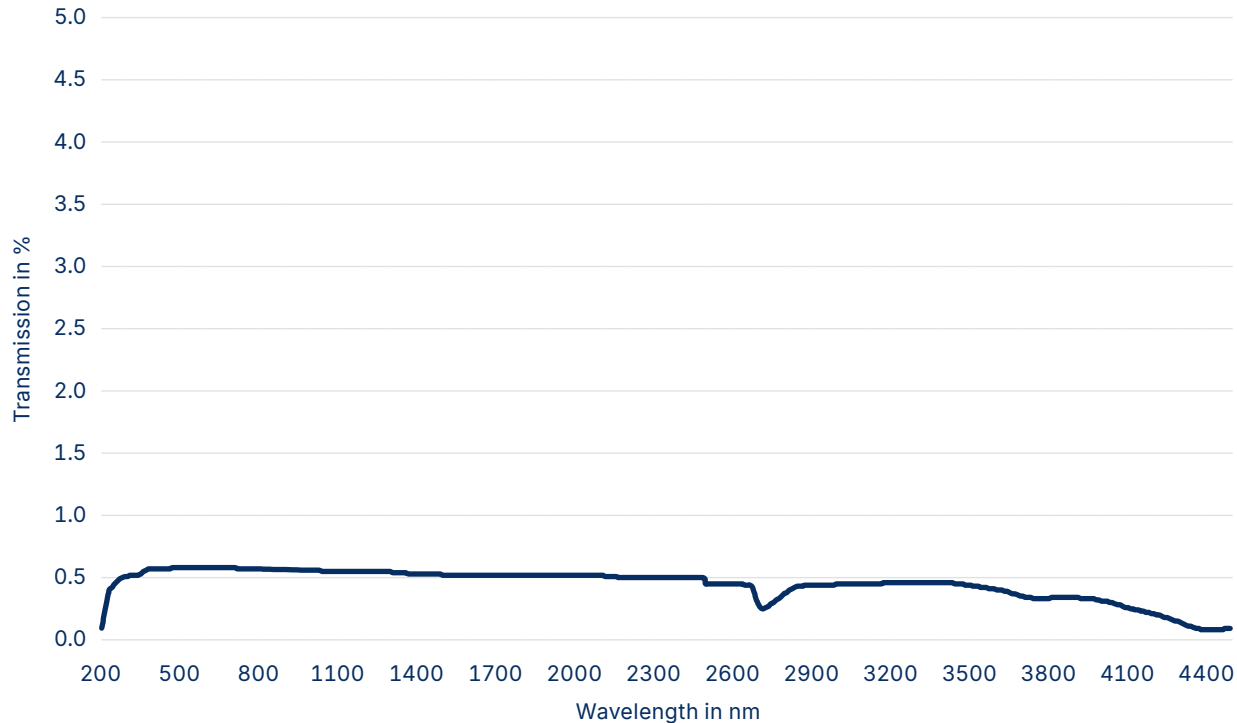
Ilmasil™ PO-1 is an electrically fused, opaque quartz, manufactured by fusing high purity quartz sand using SCHOTT Quartz Glass' propriety plasma melting process. The opacity is achieved by controlled distribution of fine microbubbles (typical diameter 10 – 150 µm). There are no chemical additives used to achieve opacity.

Application

This specification is applicable to all products produced with Ilmasil™ PO-1

Optical properties

Typical transmission



Comment: transmission measured on a plane surface

Limit: < 1% for thickness 3 mm within the wavelength range of 190...8000 nm

Ilmasil™ PO-1

Opaque fused quartz

Chemical properties

Typical trace elements

Element	Typical content in ppm	Maximum content in ppm
Al	15	20
Ca	0.8	1.5
Cr	< 0.05	0.05
Cu	< 0.03	0.05
Fe	0.3	1
K	0.7	1.5
Li	0.5	1.5
Mn	0.05	0.1
Na	1	1.5
Ni	< 0.02	0.05
Ti	1.5	2
Zr	1.5	2.7
OH-content*	< 100	100

OH-content

Typical: < 100 ppm*

Tolerance: max. 100 ppm*

Stability: after thermal treatment, a decrease of maximum 3 ppm is obtainable by tempering the material at 1000 °C under vacuum for a period of 30 hours.

* OH-content: values are applicable for non-flameworked material only

Chemical resistances

Hydrolytic resistance per DIN 12111 (1st class)

Acid resistance per DIN 12116 (1st class)

Alkaline resistance per DIN 52322 (1st class)

Ilmasil™ PO-1

Opaque fused quartz

Thermal properties

Softening point ($\lg \eta$ (in dPas) = 7.6)	ca. 1715 °C
Annealing point ($\lg \eta$ (in dPas) = 13.0)	1159 °C
Strain point ($\lg \eta$ (in dPas) = 14.5)	1043 °C
Processing range ($\lg \eta$ (in dPas) = 5 – 8)	1700 – 2100 °C
Max. usable temperature	
Long term	1100 °C
Short term	1300 °C
Coefficient of thermal expansion 20 ... 300 °C	$5.8 \times 10^{-7} \text{ °K}^{-1}$
Heat conductivity at 20 °C	1.21 W/(m*K)

Mechanical properties

(at 20 °C)

Density	$2.025 \pm 0.025 \text{ g/cm}^3$
Elasticity modulus	$6.7 \times 10^4 \text{ N/mm}^2$
Compressive strength	458 N/mm ²
Tensile strength	50 N/mm ²
Bending strength	36 N/mm ²
Porosity	30 ... 70 mm ³ /cm ³
Vickers hardness	922 ($\triangleq$ 9045 N/mm ²)
Mohs hardness	5.0 ... 7.0
Knoop hardness	614 ($\triangleq$ 6023 N/mm ²)

Mechanical property measurements are dependent upon geometry, thermal gradient and the surface quality.

Electrical properties

Dielectric strength	
20 °C	23.2 kV/mm
500 °C	5.4 kV/mm
Dielectric loss factor at 1 kHz and 20 °C	$\text{tg } \delta \approx 2.0 \times 10^{-4}$
Dielectric constant at 1 kHz and 20 °C	$\epsilon \approx 3.3$