



# Material Specification Opaque Fused Quartz **ilmasil® PO-2**

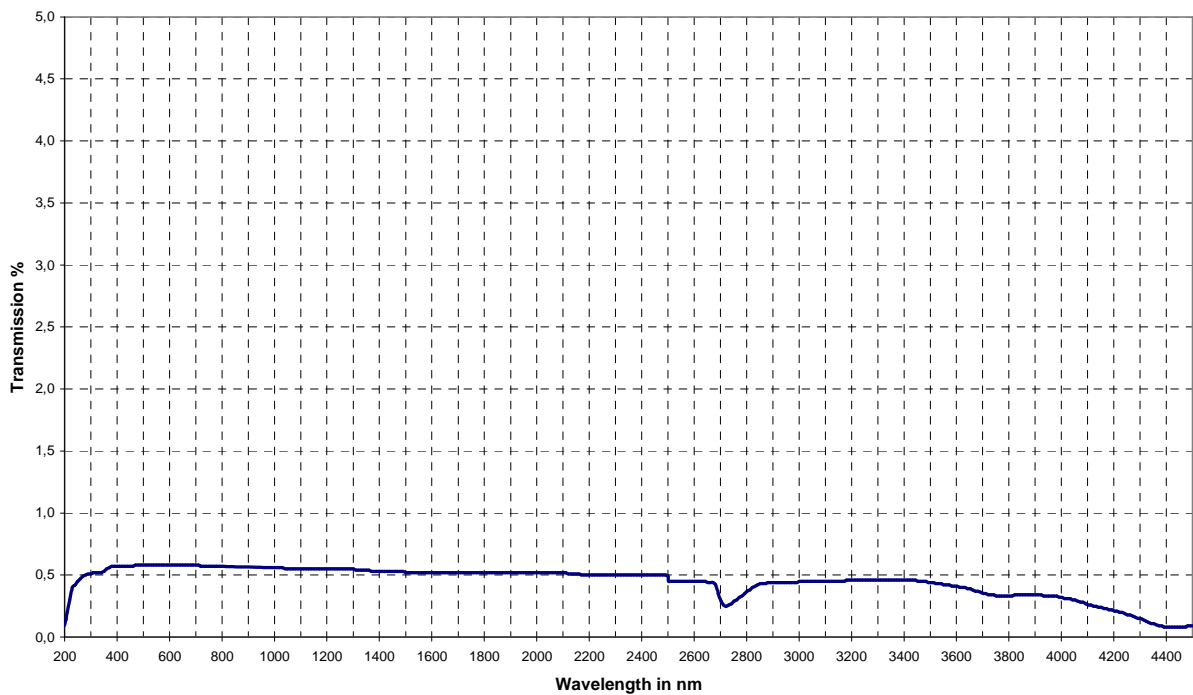
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**ilmasil® PO-2** is an electrically fused, opaque quartz, manufactured by fusing high purity quartz sand using QSIL's proprietary plasma melting process. The opacity is achieved by controlled distribution of fine microbubbles (typical diameter 10 – 150 µm). There are no chemical additives used to achieve opacity.

**Application:** This specification is applicable to all products produced with **ilmasil® PO-2**

## 1 Optical Properties

### 1.1 Typical Transmission



**Comment:** transmission measured on a plane surface

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

## 1 Chemical Properties

### 2.1 Trace Elements

Element	Typical content in ppm	Maximum content in ppm
Al	8	10
Ca	0,7	1,1
Cr	< 0,05	0,05
Cu	< 0,03	0,05
Fe	0,2	0,4
K	0,2	0,3
Li	0,2	0,4
Mn	< 0,01	0,03
Na	0,2	0,4
Ni	< 0,01	0,02
Ti	1,4	2
Zr	1	2
OH-content*	<100	100

### 2.2 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

### 2.3 Chemical resistances

Hydrolytic resistance per DIN 12111 (1<sup>st</sup>. class)

Acid resistance per DIN 12116 (1<sup>st</sup>.class)

Alkaline resistance per DIN 52322 (1<sup>st</sup>.class)



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### 3 Thermal Properties

<b>Softening Point</b> ( $\lg \eta$ (in dPas) = 7.6)	ca. 1715 °C
<b>Annealing Point</b> ( $\lg \eta$ (in dPas) = 13.0)	1169 °C
<b>Strain Point</b> ( $\lg \eta$ (in dPas) = 14.5)	1048 °C
<b>Processing Range</b> $\lg \eta$ (in dPa s) = 5 – 8	1700 – 2100 °C
<b>Max. usable temperature</b>	
Long term	1100 °C
Short term	1300 °C
<b>Coefficient of Thermal Expansion</b>	
20 ... 300 °C	$5.8 \times 10^{-7} \text{ } ^\circ\text{K}^{-1}$
<b>Heat conductivity</b> at 20 °C	1.21 W/(m*K)

### 4 Mechanical Properties

(at 20 °C)

Density	2.05...2,15 g/cm <sup>3</sup>
Elasticity modulus	$6.7 \times 10^4 \text{ N/mm}^2$
Compressive Strength	458 N/mm <sup>2</sup>
Tensile Strength	50 N/mm <sup>2</sup>
Bending Strength	36 N/mm <sup>2</sup>
Porosity	30...70 mm <sup>3</sup> /cm <sup>3</sup>
Vickers Hardness	922 ( $\triangleq$ 9045 N/mm <sup>2</sup> )
Mohs Hardness	5.0 ... 7.0
Knoop Hardness	614 ( $\triangleq$ 6023 N/mm <sup>2</sup> )

Mechanical property measurements are dependent upon geometry, thermal gradient and the surface quality. For calculation purpose, please use lower values.

### 5 Electrical Properties

<b>Dielectric strength</b>	
20 °C	23,2 kV/mm
500 °C	5,4 kV/mm
<b>Dielectric loss factor</b>	
at 1 kHz and 20 °C	$\text{tg } \delta \approx 2.0 \times 10^{-4}$
<b>Dielectric constant</b>	
at 1 kHz and 20 °C	$\epsilon \approx 3.3$

(measurement per DIN EN 60672-2)  
(measurement per DIN EN 60243-1)