

Ilmasil™ PI

Clear fused quartz

Material specification

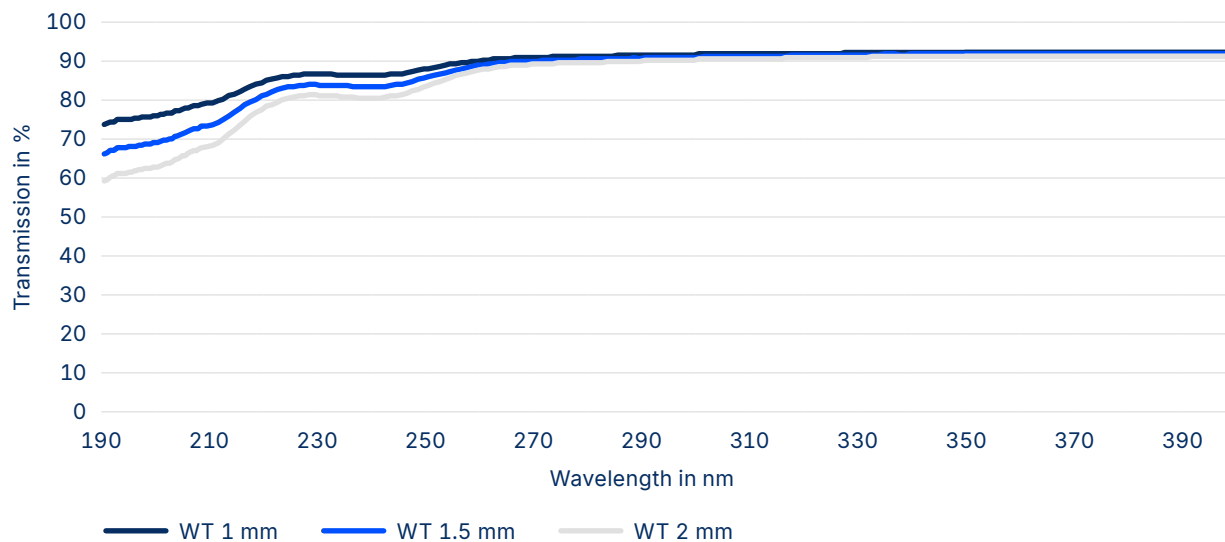
Application

Ilmasil™ PI is a clear fused quartz (quartz glass).
This specification is applicable to all products produced with Ilmasil™ PI.

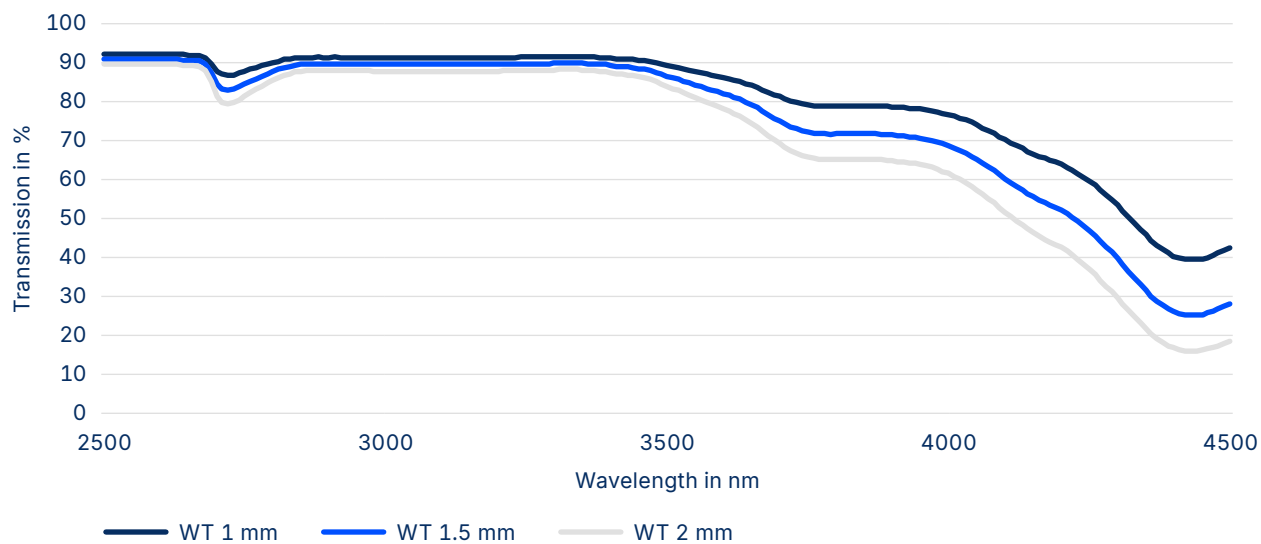
Optical properties

Transmission

Typical transmission in UV-range



Typical transmission in IR-range



Comment: transmission measured on a plane surface

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Chemical properties

Typical trace elements

Element	Typical content in ppm	Maximum content in ppm
Al	8	10
Ca	0.8	1.3
Cr	< 0.05	0.05
Cu	< 0.03	0.05
Fe	0.3	0.6
K	0.4	0.5
Li	0.2	0.4
Mn	< 0.01	0.03
Na	1	1.5
Ni	< 0.01	0.02
Ti	1.4	2
Zr	1.3	2.3
OH-content*	30	45

OH-content

Typical: 30 ppm*

Tolerance: max. 45 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)

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Thermal properties

Softening point (lg η (in dPas) = 7.6)	ca. 1730 °C
Annealing point (lg η (in dPas) = 13.0)	1180 °C
Strain point (lg η (in dPas) = 14.5)	1048 °C
Processing range (lg η (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	$5.5 \times 10^{-7} \text{ °C}^{-1}$

Mechanical properties

(at 20 °C)

Density	2.2 g/cm ³
Mohs hardness	5.5 ... 6.5
Elasticity modulus	$7.5 \times 10^4 \text{ N/mm}^2$
Compressive strength	1150 N/mm ²
Tensile strength	50 N/mm ²
Bending strength	68 N/mm ²

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

Electrical properties

Specific electrical resistance	
20 °C	$10^{18} \Omega \times \text{cm}$
400 °C	$10^{10} \Omega \times \text{cm}$
800 °C	$6.3 \times 10^6 \Omega \times \text{cm}$
1200 °C	$1.3 \times 10^5 \Omega \times \text{cm}$
Dielectric strength	
20 °C	25 ... 40 kV/mm
500 °C	4 ... 5 kV/mm
Dielectric loss factor at 7.5 GHz	$\text{tg } \delta \approx 5.0 \times 10^{-4}$
Dielectric constant at 20 °C and 7.5 GHz	$\epsilon \approx 3.7$