

# Ilmasil™ PN 235

## Clear fused quartz

### Material specification

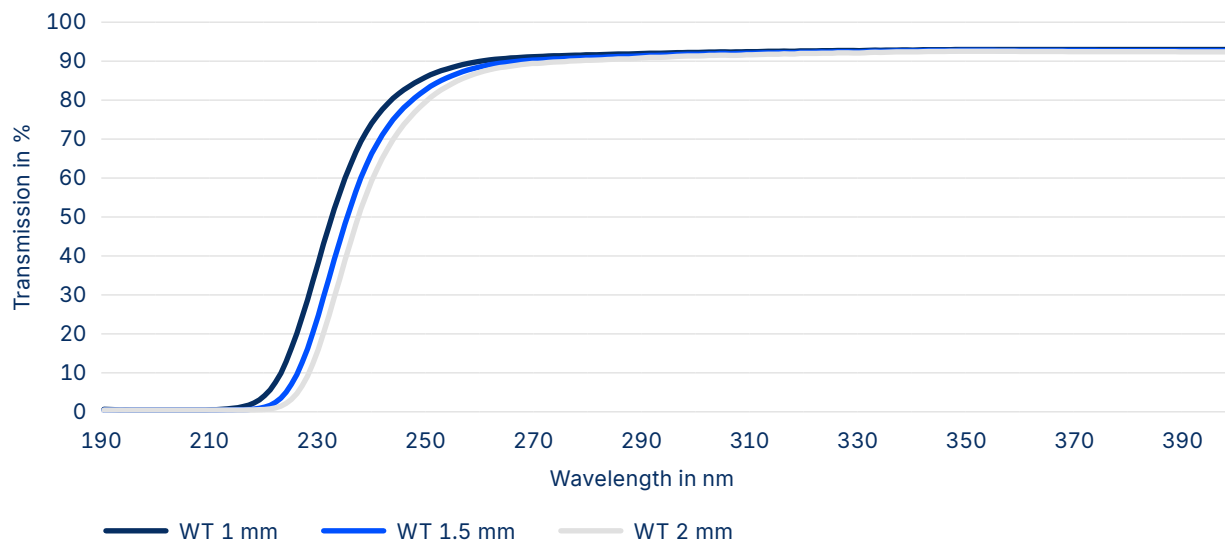
#### Application

Ilmasil™ PN 235 is a doped, clear fused quartz (quartz glass).  
This specification is applicable to all products produced with Ilmasil™ PN 235.

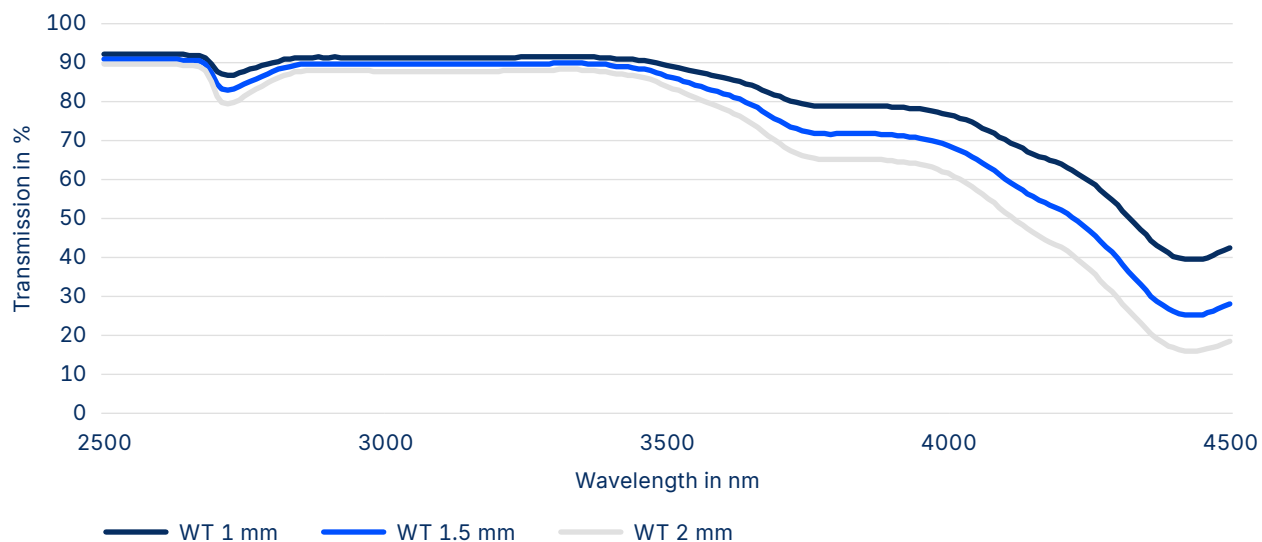
### Optical properties

#### Transmission

Typical transmission in UV-range



Typical transmission in IR-range



Comment: transmission measured on a plane surface

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### Chemical properties

#### OH-content

Typical: 15 – 55 ppm\*

Tolerance: max. 55 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)

### Thermal properties

|                                                   |                                                    |
|---------------------------------------------------|----------------------------------------------------|
| Softening point (lg $\eta$ (in dPas) = 7.6)       | ca. 1730 °C                                        |
| Annealing point (lg $\eta$ (in dPas) = 13.0)      | 1109 °C                                            |
| Strain point (lg $\eta$ (in dPas) = 14.5)         | 959 °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<br>20 ... 300 °C | $5.5 \times 10^{-7} \text{ }^{\circ}\text{K}^{-1}$ |

### Mechanical properties

(at 20 °C)

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

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

### Electrical properties

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