POL-O/439M-E
05/00

HOMOSIL â 101 and HERASIL â 102

1. GENERAL PRODUCT DESCRIPTION

Heraeus HOMOSIL 101 and Herasil 102 are optical quartzglass grades manufactured by flame fusion of cultured quartz crystals. They combine excellent physical properties with outstanding optical characteristics in the UV and the visible wavelength range. The index homogeneity is controlled and specified either in one direction (the direction of use or functional direction) or even in all three dimensions

HOMOSIL and HERASIL 102 meet the requirements for bubble class 0.

The optical homogeneity, which is the main criteria for very low transmitted wavefront distortion, refers to two categories:

- HOMOSIL 101 is an optically isotropic 3D-material. It is highly homogeneous and has no striations in all three dimensions. These properties are very important for multiple axis optics such as prisms, steep lenses, beam splitters or etalons.

- HERASIL 102 is homogeneous in the primary functional direction. Weak striations, if any, are parallel to the major faces and do not affect the optical performance.
  HERASIL 102 is the preferred materials for demanding optics in one directional use such as lenses, UV-laser windows, optical flats, etc.

2. OPTICAL DATA OF HOMOSIL 101 and HERASIL 102

2.1 Bubbles and Inclusions

(Bubbles and inclusions ≤ 0.08 mm diameter are disregarded)

2.1.1 Bubble class (as per DIN 58927 2/70)

HOMOSIL 101	:	0	i.e. total bubble cross section within the volume is ≤ 0.03 mm²/100 cm³
HERASIL 102	:	0	i.e. total bubble cross section within the volume is ≤ 0.03 mm²/100 cm³

2.1.2 Maximum bubble diameter

HOMOSIL 101	:	≤ 0.10 mm	for pieces ≤ 6 kg
HERASIL 102	:	≤ 0.20 mm	for pieces ≤ 6 kg
		≤ 0.50 mm	for pieces > 6 - 30 kg

2.1.3 Inclusions

HOMOSIL 101 and HERASIL 102	:	None

2.1.4 Spots : None

2.1.1 and 2.1.3 should not be added together

2.2 Refractive Index and Dispersion

2.2.1 Refractive Index

n_C = 1.4564 at 656.3 nm
n_d = 1.4585 at 587.6 nm
n_F = 1.4632 at 486.1 nm
n_g = 1.4668 at 435.8 nm

At 20°C, 1 bar atmospheric pressure
Accuracy: $\pm 1 \cdot 10^{-4}$

2.2.2 Dispersion

$n_F - n_C = 0{,}00678$

$$\nu_d = \frac{n_d - 1}{n_F - n_C} = 67{,}6 \pm 0{,}5$$

2.3 Optical Homogeneity

2.3.1 Granular Structure: None

2.3.2 Layers and Striations

HOMOSIL 101 : In all three dimensions free from striations, i.e. better than grade A, MIL-G-174-B.

HERASIL 102 : In primary functional direction free from striations, i. e. grade A, MIL-G-174-B; weak striations, if any, are parallel to the major faces.

2.3.3 Index Homogeneity Δn

Specified across 90% of diameter or sidelength for machined parts, respectively 80% for raw formed ingots.

HOMOSIL 101	:	In all three dimensions guaranteed total $\Delta n \leq 3 \cdot 10^{-6}$; with power subtracted Δn (p.s.) $\leq 2 \cdot 10^{-6}$; on special request total $\Delta n \leq 1 \cdot 10^{-6}$. (Maximum weight ca. 6 kg; larger pieces available on request).
HERASIL 102	:	In primary functional direction guaranteed total $\Delta n \leq 4 \cdot 10^{-6}$; with power subtracted Δn (p.s.) $\leq 2 \cdot 10^{-6}$; on special request total $\Delta n \leq 1 \cdot 10^{-6}$. (No special limits on size and weight).

Δn (p.s.) (power subtracted) is calculated by subtracting from a measured Δn distribution the proportion that gives an exactly spherical aberration of an originally plane optical phasefront. This subtraction procedure is built into most modern interferometer software as an option.

2.4 Residual Strain

HOMOSIL 101 and HERASIL 102	:	$\leq$ 5 nm/cm across 80% of diameter or side length $\leq$ 5...15 nm/cm in the rim area.

2.5 Spectral Transmittance

2.5.1 Typical transmission curves (including Fresnel reflection losses) for a 10 mm path length are shown in the figure.

2.5.2 Infrared Absorption

OH absorption bands occur at wavelengths around 1.39 µm, 2.2 µm, and 2.72 µm according to an OH content of approximately 150 ppm (weight).

2.6 Fluorescence

Slight violet with 254 nm excitation (low pressure Hg lamp and Schott UG 5 filter) and visual inspection.

2.7 Radiation Resistance

Good, visible transmittance is not degraded significantly by ionizing radiation**.**