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Quartz Glass for Optics
Product Information

Heraeus

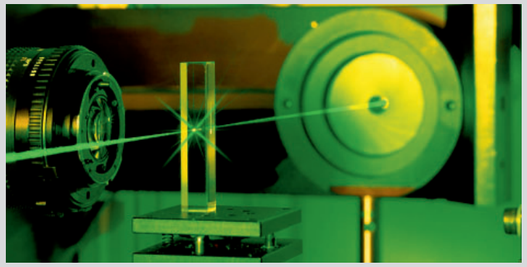
Quartz Glass Characterization

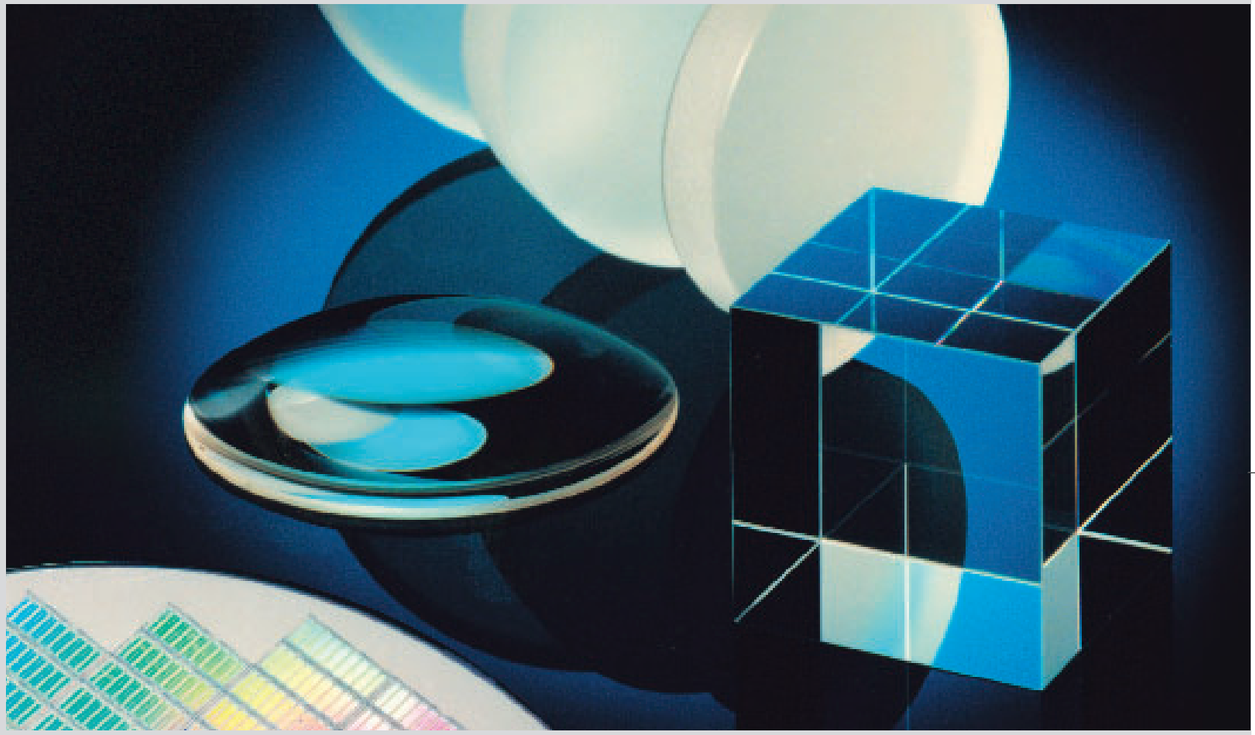
For a long period of time now Heraeus Quarzglas has developed and perfected inspection techniques specialized in characterizing Quartz Glass. The measurement techniques enable the determination of

- optical homogeneity
- stress birefringence
- UV - laser resistance
- OH content
- H_2 – content determined by Raman effect

In addition to the standard short time characterizations we perform long-time measurements with regard to possible alterations of Quartz Glass properties. With that Heraeus Quarzglas is able to model the behaviour of its different materials for a wide range of applications.

All values given for homogeneity, stress birefringence, transmission and laser durability represent the minimum requirements. Locally one usually finds superior values to those specified. A detailed inspection protocoll will be issued for each product upon request.





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Heraeus Quarzglas offers a wide product range of high quality quartz glass. We produce custom tailored or standardized products for your optical applications be it from deep UV to Infrared or if you are essentially interested in the thermal, chemical or mechanical properties of fused quartz or fused silica.

In addition to standard geometries or standard specifications we offer products custom tailored to your needs. Our technical and scientific experience is at your disposal for your tasks at hand. Our customized Quartz Glass solutions refer to your desired geometry and /or the manufacturing of demanding optical specifications.

Quartz Glass for Optics
Product Information

Heraeus Quarzglas

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Quartz Glass for Optics
Product Information

Suprasil® 1 Suprasil® 2

Suprasil® 1 and Suprasil® 2 (Grade A & B) are high purity synthetic fused silica materials manufactured by flame hydrolysis of $SiCl_4$.

They combine excellent physical properties with outstanding optical characteristics in the deep 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.

In addition, **Suprasil® 1 and Suprasil® 2 (Grade A & B)** provide excellent resistance to damage by high energy radiation especially in UV-Laser-applications.

All synthetic fused silica **Suprasil®** grades are practically free from bubbles and inclusions. The optical homogeneity, which is the main criterion for very low transmitted wavefront distortion, refers to three categories:

Suprasil® 1 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, etalons or retroreflectors.

Suprasil® 2 Grade A & B are homogeneous in the primary functional direction. Weak striations, if any, are parallel to the major faces and do not affect the optical performance.

Suprasil® 2 Grade A & B are the preferred materials for demanding optics in one directional use such as lenses, UV-laser windows or optical flats.

Suprasil® 311 Suprasil® 312

Suprasil® 311 and 312 are high purity synthetic fused silica materials manufactured by flame hydrolysis of $SiCl_4$. They combine excellent physical properties with outstanding optical characteristics in the deep UV to the near IR. The most prominent property of **Suprasil® 311 and 312** is the high degree of index homogeneity which is controlled and specified either in one direction (the direction of use or functional direction) or even in all three dimensions. In addition, **Suprasil® 311 and 312** provide a high degree of resistance to radiation damage and are therefore the preferred materials in high energy laser applications.

Suprasil® 311 and 312 are practically free from bubbles and inclusions. The optical homogeneity, which is the main criterion for very low transmitted wavefront distortion, refers to two categories:

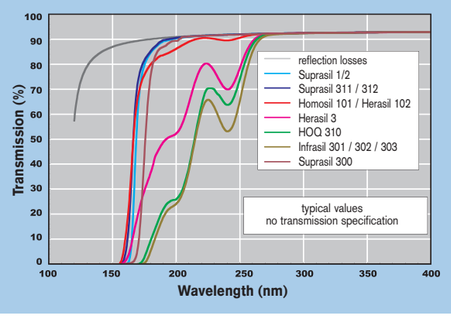
Suprasil® 311 is an optically isotropic 3D-material. It is highly homogeneous and has no striations in all three dimensions. These properties are very important for multiple axis optics such as prisms, steep lenses, beam splitters, etalons or retroreflectors.

Suprasil® 312 is homogeneous in the primary functional direction. Weak striations, if any, are parallel to the major faces and do not affect the optical performance.

Suprasil® 312 is the preferred material for demanding optics in one directional use such as laser windows, optical flats or lenses.

Suprasil® 311 and 312 are the preferred materials for UV-microlithography, interferometry, special laser applications, VUV applications, high quality retroreflectors and prisms. In the DUV, **Suprasil® 311 and 312** show the highest transmission of all **Suprasil®** grades.

Transmisson graphs (sample thickness 10 mm)



Suprasil® 300

Suprasil® 300 is a high purity synthetic fused silica material manufactured by flame hydrolysis of $SiCl_4$. It combines excellent physical properties with outstanding optical characteristics from the deep UV to the near IR.

Suprasil® 300 has no absorption bands from the visible to the IR spectral region. Due to its excellent wide transmission region **Suprasil® 300** is the preferred material for wide band optical applications, such as spectrophotometer-cells.

During the manufacturing process an intermediate drying step reduces the OH-content of the **Suprasil® 300** below 1 ppm. Thus a chlorine content of 1000 ppm – 3000 ppm is material inherent and results a slight shift of the UV-absoprtion edge to the longer wavelength region.

* **Suprasil 1, 2 ArF** and **KrF** are optimized for Excimer laser applications. Please ask for our Application Note.

* The Technical data can be found in our data-sheets "Quartz Glass for Optics - Data and Properties" and O431m, O432m, O433m, O434m, O438m.

Homosil® 101 Herasil® 102 Herasil® 3

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 from the UV to the IR. 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® 101 and Herasil® 102 meet the requirements for bubbles class 0 and are practically free of inclusions.

The optical homogeneity, which is the main criterion 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, etalons or retroreflectors.

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 material for demanding optics in one directional use such as lenses, UV-laser windows or optical flats.

Herasil® 3 is a cost effective preferred material for simple technical optics-components having a good homogeneity even under difficult environmental conditions such as high temperatures, temperature-shocks, chemically agressive media or pressure load.

HOQ 310

HOQ 310 is manufactured by fusion of natural quartz crystals in an electrically heated furnace. **HOQ 310** is economically priced and has been developed especially for applications in the technical optics field. Compared with "typical" optical glasses it provides a unique combination of attractive properties:

- Excellent optical transmission from the UV into the IR spectral region
- Outstanding high temperature resistance
- Extremely low coefficient of thermal expansion
- Superior temperature shock resistance
- Excellent chemical resistance
- Outstanding chemical purity

Combined with a low bubble content and an attractive price **HOQ 310** is the preferred material for lower precision optical applications such as inspection and/or illumination windows, cover plates, windows for pressurized cabins in a hostile environment, e.g. high temperature and/or thermal shock loads, pressure loads or chemically aggressive atmosphere.

Infrasil® 301 Infrasil® 302 Infrasil® 303

Infrasil® 301, 302 and 303 are optical quartz glass grades manufactured by fusion of natural quartz crystals in an electrically heated furnace. They combine excellent physical properties with outstanding optical characteristics especially in the IR 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.

Infrasil® 301 meets the requirements for bubble class 0 and is practically free of inclusions.

Infrasil® 302 and 303 show a low bubble and inclusion content. The optical homogeneity, which is the main criterion for very low transmitted wavefront distortion, refers to three categories:

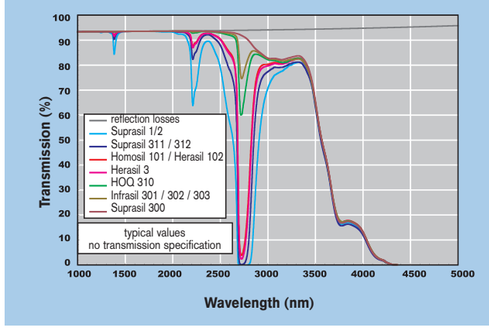
Infrasil® 301 is an optically isotropic 3D-material. It is highly homogeneous and has no striations in all three dimensions. These properties are very important for multiple axis IR-optics such as prisms, steep lenses, beam splitters, etalons or retroreflectors.

Infrasil® 302 and 303 are homogeneous in the primary functional direction. Weak striations, if any, are parallel to the major faces and do not affect the optical performance.

Infrasil® 302 is the preferred material for demanding optics in one directional use such as lenses, IR-laser windows or optical flats.

Infrasil® 303 is designed for commercial optical infrared applications such as substrates, lightguide elements, microscope slides and IR-windows.

Transmisson graphs (sample thickness 10 mm)



The uppermost curves in the transmission graphs indicate the calculated Fresnel reflection losses for two uncoated surfaces.