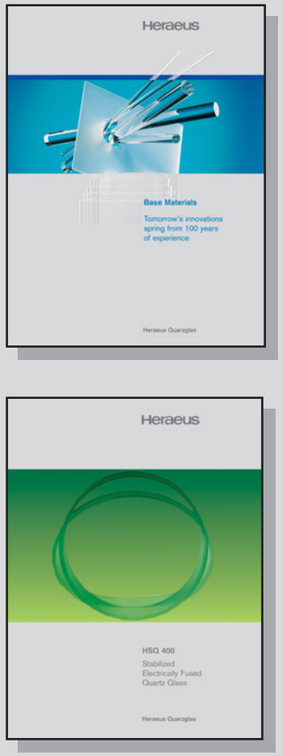
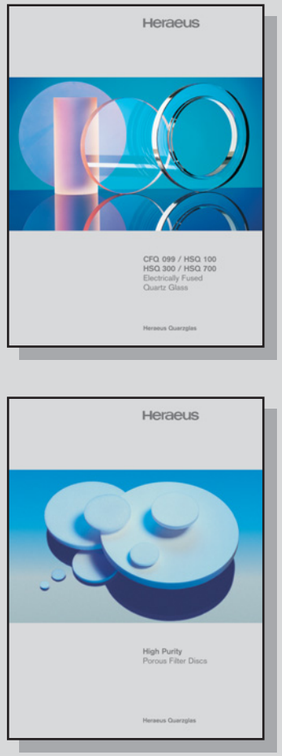
OM 100
High Purity Opaque Quartz Glass





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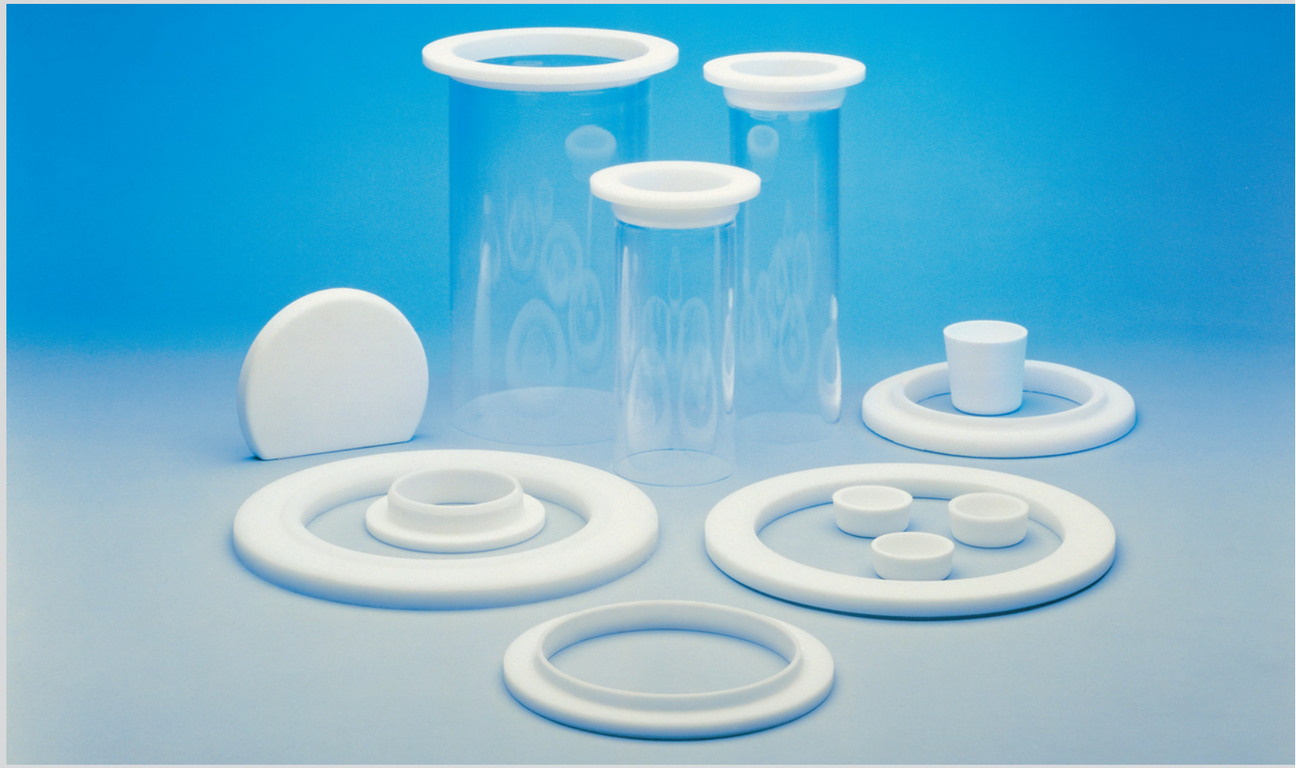

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General Product Description

OM 100 was developed by Heraeus Quarzglas through a desire for an opaque quartz glass with properties superior to those of standard available materials. The innovative manufacturing process results in not only enhanced opacity but also in a much smoother surface finish, high purity and greatly improved cosmetic appearance. What makes all of these very desirable attributes simultaneously possible is the presence of extremely fine microporosity uniformly distributed throughout the material.

Porosity is what lends opacity to all opaque quartz glass but the size, total volume and distribution of it is the key to determining performance and appearance. The porosity present in standard opaque materials consists of round bubbles roughly 100 microns in diameter. The OM 100 manufacturing process does not produce round bubbles but rather very fine irregularly shaped micorpores (see figure 1 and 2).

Even though the total volume of the porosity is much less than in conventional materials, the micropores scatter light much more efficiently. This is partly due to their shape but is mainly because their size is much closer to that of the light wavelength. The net result is a brilliant white, glossy appearance that is obviously superior to that of standard materials.

Since the total porosity volume is very low (only 1 vol. %), OM 100 has physical and thermal properties much closer to those of clear fused quartz. Flame welding can be accomplished without shrinkage resulting in a well-defined and smooth transition between the joined materials.

When flame polished, the micropores near the surface do not swell and burst resulting in the "orange peel" texture commonly seen with standard opaque materials. Instead, the micropores tend to close thus allowing a clear surface layer to form. Besides improving the cosmetic appearance, this enhances the ability to make tight vacuum seals. Furthermore, the lower porosity volume increases OM 100's resistance to HF acid attack. The surface will remain much smoother than that of standard materials even after prolonged HF exposure (see Figure 3). This increases the useful life of the quartzware.

These very desirable attributes and capabilities make OM 100 the material of choice for semiconductor processing technology as well as all general applications where demanding thermal requirements coincide with the need for exceptional purity and chemical resistance. For fields like optics and lighting technology, OM 100 also provides an opportunity for innovative problem solutions.

Available Dimensions

	Diameter (up to)	Thickness (up to)
Plates	500 mm	60 mm
Flanges	650 mm	200 mm

The OM 100 manufacturing process is ideally suited to produce near-net, complex shapes like flanges with dimensions up to 650 mm (OD). Thick plates and thin discs can also be readily made.

Technical Data
Optical and Infrared Properties

OM 100 is an ideal opaque quartz glass material with excellent light diffusion and thermal shielding capabilities. Due to its special material structure with well controlled micropores, incident radiation is scattered in a highly efficient way.

Mechanical Properties

Density	2.15 - 2.18 g / cm^3
Rel. Density	approx. 99% (relative to transparent quartz glass)
Porosity	< 1% Vol. (the SEM picture shows closed micropores with a typical size < 10 µm)
4-Point Bending Strength	σ_{4B} = 115.3 N / mm^2 (ref. DIN 51110, Part 1 and 3 / Test Report, V.2/13417)

Chemical Properties -
Typical Trace Elements (ppm by weight oxide)

Elements	Al	Ca	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ti	Zr
Content	15	1.2	< 0.01	< 0.05	0.2	0.4	0.6	0.05	< 0.03	0.2	1.2	0.8

Direct Spectral Transmittance

Thickness	1 mm	3 mm	4 mm
λ (200 - 5000 nm)	1 - 4 %	< 1 %	< 1 %

Scanning Electron Microscope (SEM) Views

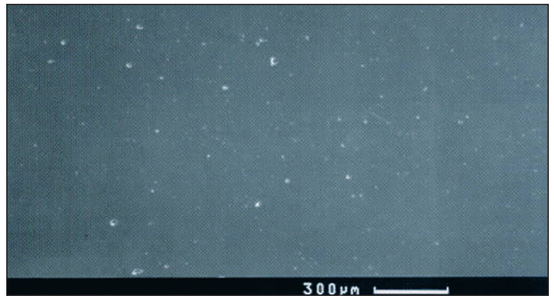

Figure 1: OM 100 Quartz Glass
Density: 2.15 - 2.18 g / cm^3
Micropores: less than 10 µm
Fused quartz matrix with nonspherical, closed micropores. The reason for opaque appearance is the scattering of light at the opaque matrix itself, in addition to the scattering at the micropores.

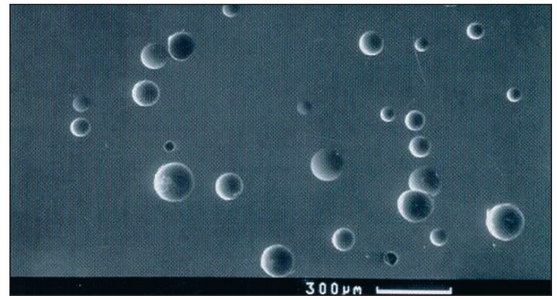

Figure 2: Typical Material
Density: 2.05 - 2.10 g / cm^3
Bubble size: 50 - 150 µm
Fused quartz matrix with spherical closed bubbles formed during the melting process. The large bubbles scatter light inefficiently.

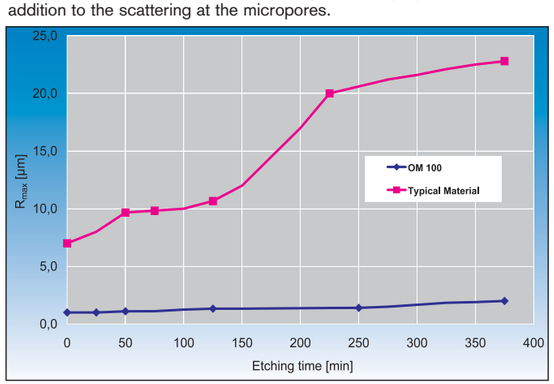

Figure 3:
Surface roughness versus etching time in 5 % HF.
The higher density of OM 100 results in a very smooth surface finish that does not roughen significantly even after long exposure. This makes OM 100 a perfect material for all opaque quartz applications.

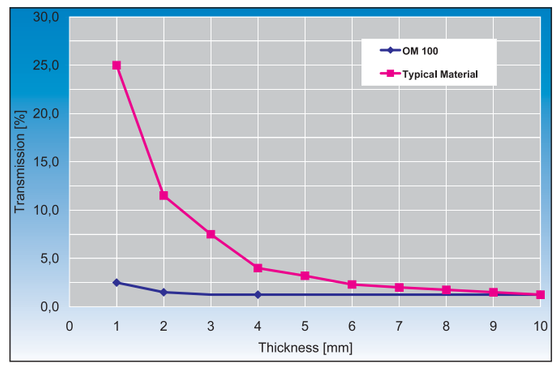

Figure 4:
Comparison of the transmission of OM 100 opaque quartz glass with that of a typical material for thicknesses from 1 - 10 mm. The advantage of OM 100 material is obvious for sample thicknesses below 6 mm.