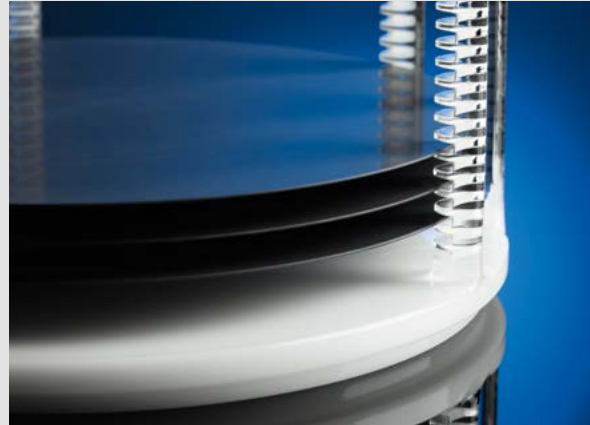


HBQ® 100 Dummy- & Filler-Wafers for semiconductor furnace applications



HBQ® Wafers exemplarily shown in a CVD Boat

Your CoO solution

- **Improved layer adhesion** in semiconductor CVD processes – less replacement due to cracking or peel off in SiO₂ and Nitride CVD & ALD processes
- Potentially resulting in **less tool downtime** and less chamber conditioning cycles
- **Reduces reclaim cost** for standard silicon wafers due to increase of deposited layer thickness
- Black opacity and IR-blockage enable **automatic loading** of HBQ® 100 wafers by common wafer handling systems (IR-controlled or vacuum-controlled)
- **Heat homogenization** ability adjacent to the wafer due to **high – silicon like – emissivity** combined with **low thermal conductivity**
- Composite based on **high purity quartz** glass, ensuring highly pure process chamber – no outgassing from the material is detected up to 1300 °C

Dimensions and tolerances and available geometries (*)

| | (6") – 150 mm | (8") – 200 mm |
|-------------------------------|---------------|---------------|
| Diameter | (6") – 150 mm | (8") – 200 mm |
| Diameter tolerance | ±0.3 mm | ±0.3 mm |
| Thickness | 800 µm | 800 µm |
| Thickness tolerance | ±50 µm | ±50 µm |
| Surface roughness (Ra) | < 0.5 µm | < 0.5 µm |

The wafer **edge** profile is **SEMI standard** compliant. Wafers are **cleaned** in **clean room class 1000** compliant to Fed 209 (class 6 compliant to ISO 14644) and **boxed** in 'Entegris Ultrapak®' (or comparable) wafer carriers.

Chemical purity compared to standard quartz

Composite material contains only highly pure Silicon (Si) and Silicondioxide (SiO₂), typical impurity levels below:

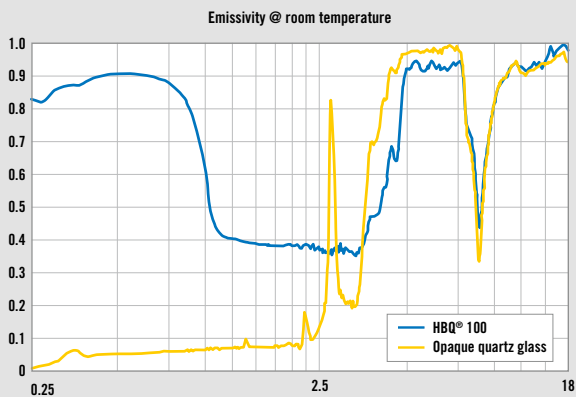
| | Li | Na | K | Mg | Ca | Fe | Cu | Cr | Ni | Mn | Ti | Zr | Al | OH |
|-----------------|-----|-----|-----|--------|-----|-----|--------|--------|--------|--------|-----|-----|----|-------|
| HBQ® 100 | 0.1 | 0.1 | 0.2 | < 0.03 | 0.4 | 0.2 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | 1.1 | 1.0 | 15 | n. s. |
| HSQ® 300 | 0.5 | 0.2 | 0.3 | < 0.03 | 0.5 | 0.1 | 0.01 | < 0.01 | < 0.01 | < 0.03 | 1.1 | 1.0 | 15 | < 30 |
| OM® 100 | 0.1 | 0.1 | 0.2 | < 0.03 | 0.4 | 0.1 | < 0.01 | < 0.01 | < 0.01 | < 0.03 | 1.1 | 1.0 | 15 | n.s. |

all values given in parts per million [ppm] by weight

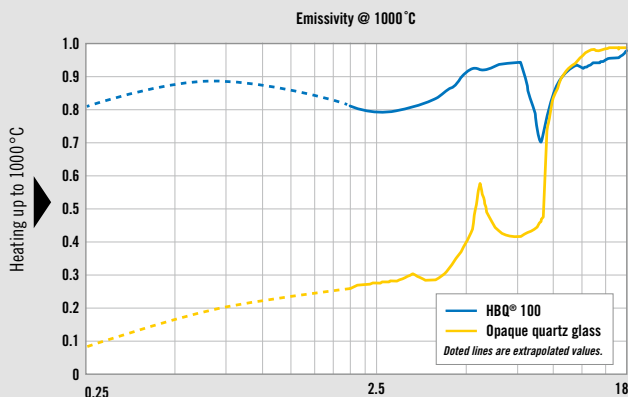
(*) 300mm diameter and other geometries (e.g. customer specific baffle-plates or adiabatic-plates) available on request

Emissivity (compared to opaque quartz glass)

HBQ® @ room temperature
Opaque quartz glass



HBQ® @ 1000 °C
Opaque quartz glass @ 1000 °C



Physical properties

| | HBQ® 100 | electrically fused quartz glass (e.g. HSQ® 300) |
|--|-------------------------|---|
| Density g/cm ³ | 2.19 – 2.20 | 2.203 |
| Porosity | < 0.5 % | 0 % |
| Pore size | < 10 µm | – |
| CTE [1/K], (0...900 °C) | 0.57 x 10 ⁻⁶ | 0.48 x 10 ⁻⁶ |
| Max. working temp – continuous | 1160 °C | 1160 °C |
| Max. working temp – short term | 1300 °C | 1300 °C |
| Specific heat [J/(gK)], 20 °C | 0.75 | 0.77 |
| Specific heat [J/(gK)], 500 °C | 1.10 | 0.96 |
| Specific heat [J/(gK)], 900 °C | 1.12 | 1.05 |
| Heat conductivity [W/(mK)], 20 °C | 1.49 | 1.38 |
| Heat conductivity [W/(mK)], 700 °C | 1.99 | 2.50 |
| Heat conductivity [W/(mK)], 1000 °C | 2.17 | 2.70 |
| Dielectric constant (ε), RT, 1 kHz | 4.04 | 3.70 |
| Dielectric constant (ε), RT, 1 MHz | 3.76 | 3.70 |
| Dielectric constant (ε), RT, 13.56 MHz | 3.82 | 3.72 |
| Dielectric loss angle (tan δ), 1 MHz | 64.3 x 10 ⁻⁴ | 1.0 x 10 ⁻⁴ |
| Dielectric loss angle (tan δ), 13.56 MHz | 90 x 10 ⁻⁴ | 1.0 x 10 ⁻⁴ |

Germany

Heraeus Quarzglas GmbH & Co. KG

Heraeus Conamic

Reinhard-Heraeus-Ring 29
63801 Kleinostheim, Germany
Phone +49 (6181) 35-7444
hbq@heraeus.com

HBQ® registered trademark of Heraeus in the European Union (EU) and in DE and US.

In the above context, "Heraeus" means Heraeus Holding GmbH or any affiliate of Heraeus Holding GmbH, e.g. Heraeus Quarzglas GmbH & Co. KG.