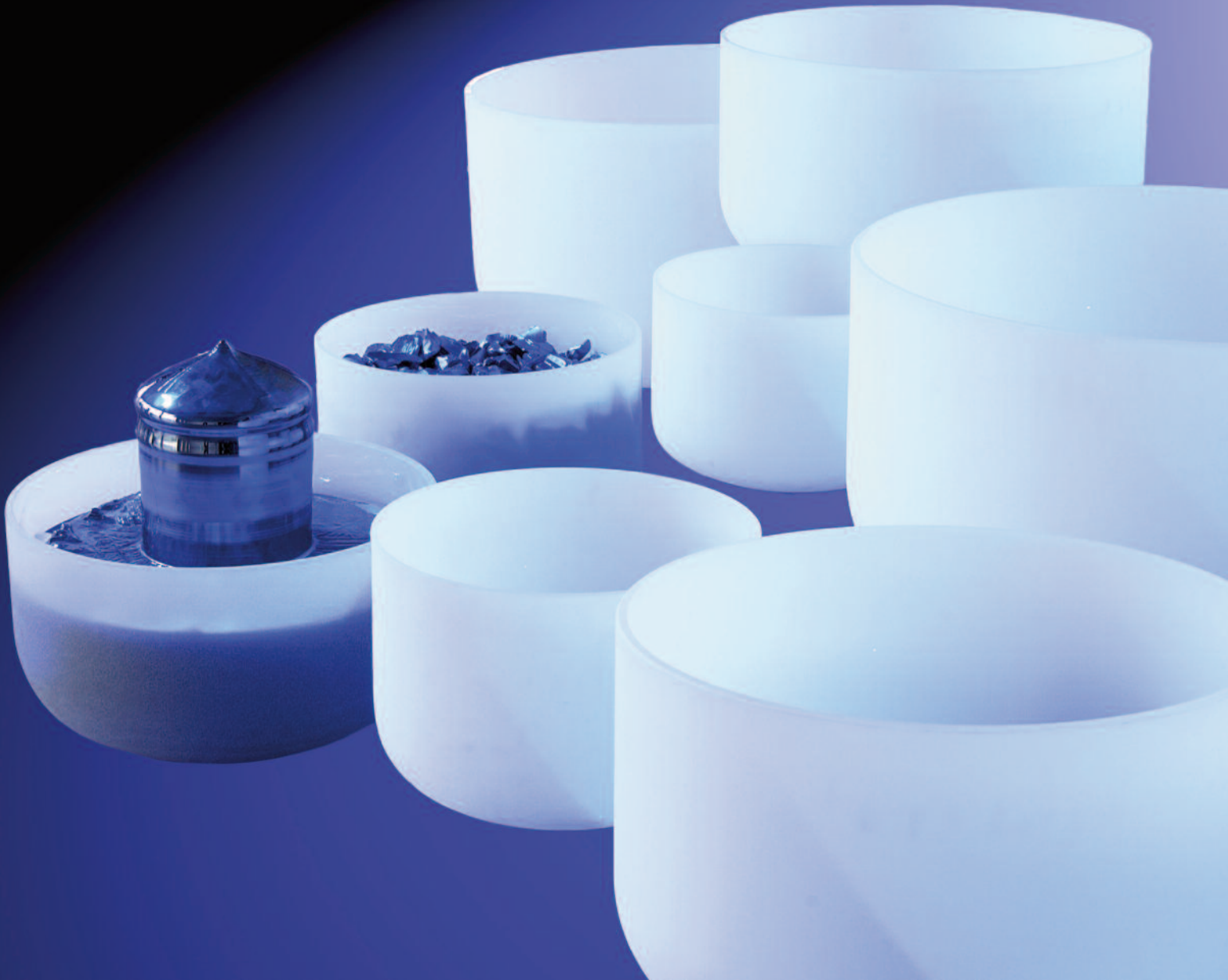


Heraeus



**Heraeus Quartz Glass Crucibles
for CZ Crystal Growing**

Heraeus Quartz Glass Crucibles for CZ Crystal Growing

Heraeus produces quartz glass crucibles for CZ crystal growing for customers in the photovoltaic industry. In close cooperation with our customers we develop crucibles that are tailored to the processes of our customers. Our product portfolio covers quartz glass crucibles with diameters from 20" to 36" made from natural as well as synthetic quartz glass qualities. These are designed according to the requirements and cost structure of the solar industry.

Heraeus quartz glass crucibles are available in 20", 22", 24", 28", 32" and 36" sizes. All crucibles have a typical bubble free layer fraction of 40% – 60% of wall thickness and an opaque outside layer made

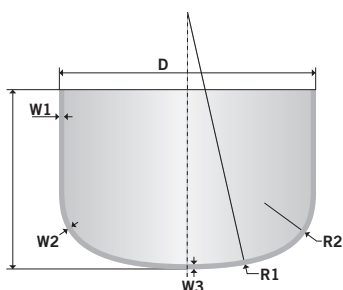
of high purity natural quartz. The specifications are tailored to the needs of every single customer in order to find an individual optimum in Cost of Ownership (CoO).

Heraeus Quarzglas offers the following types of inner layers:

- Standard crucible with ultra high purity natural inner layer suitable for standard solar processes (Grade "ADV")
- Crucible with ultra high purity synthetic inner layer for high purity wafer production (Grade "SYN")
- Improved standard crucible with synthetic bottom inner layer for improved ingot pulling processes (Grade "TYP")
- Crucible with Ba-doped inner layer to increase hot times in the pulling process (Grade "DOT")

Dimensions

(mm)	crucible	20"	22"	22"	24"	28"	32"	36"
D	outer diameter	503 ± 3	559 ± 3	559 ± 3	613 ± 3	706 ± 3	812 ± 3	910 ± 5
H	height (tolerance ± 2)	up to 410	up to 470	up to 470	up to 470	up to 530	up to 530	up to 530
W1	wall thickness 1	11 ± 3	10 ± 3	10 ± 3	11 ± 3	13 ± 4	16 ± 4	16 ± 5
W2	wall thickness 2	11.5 ± 3	12 ± 3	12 ± 3	12 ± 3	17 ± 3	24 ± 5	26 ± 5
W3	wall thickness 3	12 ± 3	9.5 ± 3	11 ± 3	11 ± 3	13 ± 4	14 ± 4	17 ± 5
R1	radius 1	508	558	558	610	708	810	914
R2	radius 2	127	110	90	127	140	170	180



Used Materials

Natural Quartz raw materials

Various natural quartz sands are used for the production of our crucibles. The used raw materials are optimized for the customer application. All different quartz sand qualities are purified and controlled at Heraeus, in order to ensure a constantly high level of quality and purity.

Synthetic Quartz raw materials

Heraeus is one of the largest producers of synthetic quartz glass. Our crucibles can be made with doped or undoped inner layers of synthetic quartz glass with customized properties.

Germany

Heraeus Quarzglas GmbH & Co. KG

Dr. Ruth Ahlers

Herausstr. 12-14

06803 Bitterfeld-Wolfen, Germany

Phone +49 6181 35-8925

Fax +49 6181 35-8938

crucibles@heraeus.com

www.crucibles.heraeus-quarzglas.com