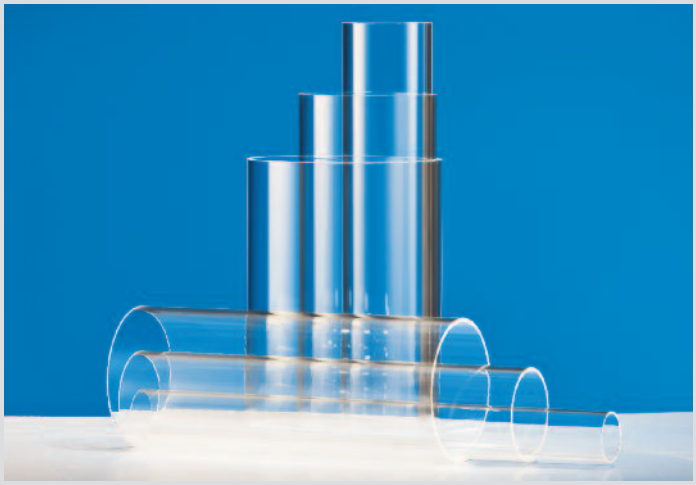
Heraeus

Quartz Glass Tubes



Applications

Process chambers, tubes and parts for semiconductor, photovoltaic and industrial applications

Characteristics

High purity, temperature stability, corrosion resistant, transparent

Heraeus Quarzglas' material grades are qualified at major players in the semiconductor and solar industry. Heraeus offers quartz glass tubes in a very broad diameter range from 2 mm up to 900 mm. It is a specialty of Heraeus to be able to supply tubes made through various production routes and of different material grades. Quartz glass tubes are either made in a cost efficient single step process or a very flexible multi step process.

In the single step process, very pure and tightly controlled raw material is continuously electrically fused to form quartz glass tubes. The range of direct-drawn tubes covers an outer diameter of 10 – 60 mm with a wall thickness of 1 mm up to 6 mm depending on the outer diameter. These tubes are available with snap cut or machine cut ends.

In the multi step process, batches of quartz glass are formed to the desired dimensions. Heraeus' multistep quartz glass tubing covers a wide variety of material grades. With this process it is possible to supply electrically fused as well as flame fused and synthetic quartz glass tubes. The whole diameter range (2 – 900 mm) is covered by this process. Additional annealing is optional for all quartz glass tubes.

For high temperature applications Heraeus offers quartz glass tubes with better temperature stability (less sagging). These tubes have been impregnated with an agent to trigger cristobalite formation. This crystalline layer forms once the tube has been exposed to temperatures of 1150°C. The crystal layer supports the glass, resulting in significantly lower sagging of the tube. Once crystal formation has started, it is necessary to keep the tubes at temperatures above 300°C.

Dimensions (mm)

Single Step												
Outer Diameter	10 – 12	12 – 15	15 – 17	17 – 23	23 – 28	28 – 30	30 – 40	40 – 45	45 – 50	50 – 55	55 – 60	60 – 62
Wall Thickness	1 – 2	1 – 2.5	1 – 3	1 – 4	1 – 5	1 – 5.5	1 – 6	1.2 – 5	1.4 – 4.5	1.5 – 4	1.5 – 3.5	1.5 – 3

Multi Step											
Outer Diameter	2 ≤ 8	8 ≤ 17	17 ≤ 25	25 ≤ 40	40 ≤ 54	54 ≤ 99	100 ≤ 129	130 ≤ 169	170 ≤ 249	250 ≤ 349	> 350
Wall Thickness	0.5 – 2	0.8 – 3.5	1 – 4.5	1.2 – 4.5	1.8 – 6	2 – 8	2.2 – 8	2.5 – 10	3 – 12	3 – 13	≥ 4

Heraeus

Chemical Purity – Typical trace elements and OH content (ppm by weight oxide)

Grade	Prod. Route	Al	Ca	Cl	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ti	Zr	OH
CFQ 099	E	15	0.8	n.s.	<0.05	<0.1	0.4	0.8	1.2	0.1	0.1	0.9	1.5	0.8	n.s.
HSQ 100	E	15	0.5	n.s.	<0.05	<0.05	0.1	0.4	0.6	0.05	<0.05	0.3	1.1	0.7	n.s.
HSQ 300*	E	15	0.5	n.s.	<0.05	<0.05	0.1	0.4	0.6	0.05	<0.05	0.3	1.1	0.7	<30
HSQ 400	E	HSQ 300 with chemical precursor													
HSQ 700	E	15	0.5	n.s.	<0.05	<0.05	0.1	0.1	0.05	0.05	<0.05	0.3	1.1	0.7	<30
HSQ 800	E	HSQ 700 with chemical precursor													
HSQ 351	F	15	0.6	n.s.	0.05	0.07	0.2	0.7	0.4	0.1	0.05	0.8	1.1	1.1	175
HSQ 751	F	8	0.5	n.s.	<0.05	<0.06	0.2	<0.1	0.2	<0.05	0.05	<0.05	1.4	0.1	175
HSQ 900	S	<0.04	<0.02	1500	<0.001	<0.001	<0.03	<0.01	<0.002	<0.01	<0.0005	<0.01	<0.03	<0.04	0.2
HSQ 910	S	<0.04	<0.02	<50	<0.001	<0.001	<0.03	<0.01	<0.002	<0.01	<0.0005	<0.01	<0.03	<0.04	250

E = electrically melted, F = Flame fused , S = Soot process **guaranteed values available as HSQ 330*

Technical Properties (typical values)

Mechanical Data	
Density	2.203 g/cm³
Mohs Hardness	5.5 … 6.5
Micro Hardness	8600 … 9800 N/mm²
Knoop Hardness	5800 … 6100 N/mm²
Modulus of elasticitiy (at 20°C)[2]	7.25 x 10^4 N/mm²
Modulus of torsion	3.0 x 10^4 N/mm²
Poisson's ratio	0.17
Compressive strength (approx.)	1150 N/mm²
Tensile strength (approx.)	50 N/mm²
Bending strength (approx.)	67 N/mm²
Torsional strength (approx.)	30 N/mm²
Sound velocity	5720 m/s

Thermal Data	electrically fused	flame fused	synthetic
Softening temperature °C	1710	1660	1600
Annealing temperature °C	1220	1160	1100
Strain temperature °C	1125	1070	1000
Max. working temperature continuous °C	1160	1110	950
short-term °C	1300	1250	1200

Mean specific heat J/kg·K	
0 … 100°C	772
0 … 500°C	964
0 … 900°C	1052

Heat conductivity W/m·K	
20°C	1.38
100°C	1.47
200°C	1.55
300°C	1.67
400 °C	1.84
950°C	2.68

Mean expansion coefficient K^{-1}	
0 … 100°C	5.1 x 10^{-7}
0 … 200°C	5.8 x 10^{-7}
0 … 300°C	5.9 x 10^{-7}
0 … 600°C	5.4 x 10^{-7}
0 … 900°C	4.8 x 10^{-7}
-50 … 0°C	2.7 x 10^{-7}

Europe
Heraeus Quarzglas GmbH & Co. KG
Base Materials
Kleinostheim, Germany
Phone +49 (6181) 35-7444
sales.hqs.basematerials.de
@heraeus.com

UK
Heraeus Quarzglas GB
Send, Woking
Surrey GU23 7EF, UK
Phone +44 (1483) 213324
sales.hqs.basematerials.uk
@heraeus.com

China
Heraeus ShinEtsu Quartz (China) Inc.
200122 Shanghai, China
Phone +86 (21) 68672266-809
sales.hqs.basematerials.cn
@heraeus.com

USA
Heraeus Quartz America LLC
Base Materials Division
Austin, TX 78728, USA
Phone (+1) 512 989 05 03
sales.hqs.basematerials.us
@heraeus.com

Japan
Shin-Etsu Quartz Products Co., Ltd.
Tokyo 160-0023, Japan
Phone +81 (3) 3348 1913
division2@sqp.co.jp
division3@sqp.co.jp

Korea
HS Advanced Materials Co.,Ltd.
Quartz Materials Division
Jincheon-Gun, ChungBuk, Prov., Korea
Phone +82 (0) 43-532-5373
HSAM@hs-am.com

www.base-materials.heraeus-quartzglas.com

HQS-BM TUBES 09.2009/V1.0_E/Lunis

The data given here is correct at September 2009 and is subject to change.