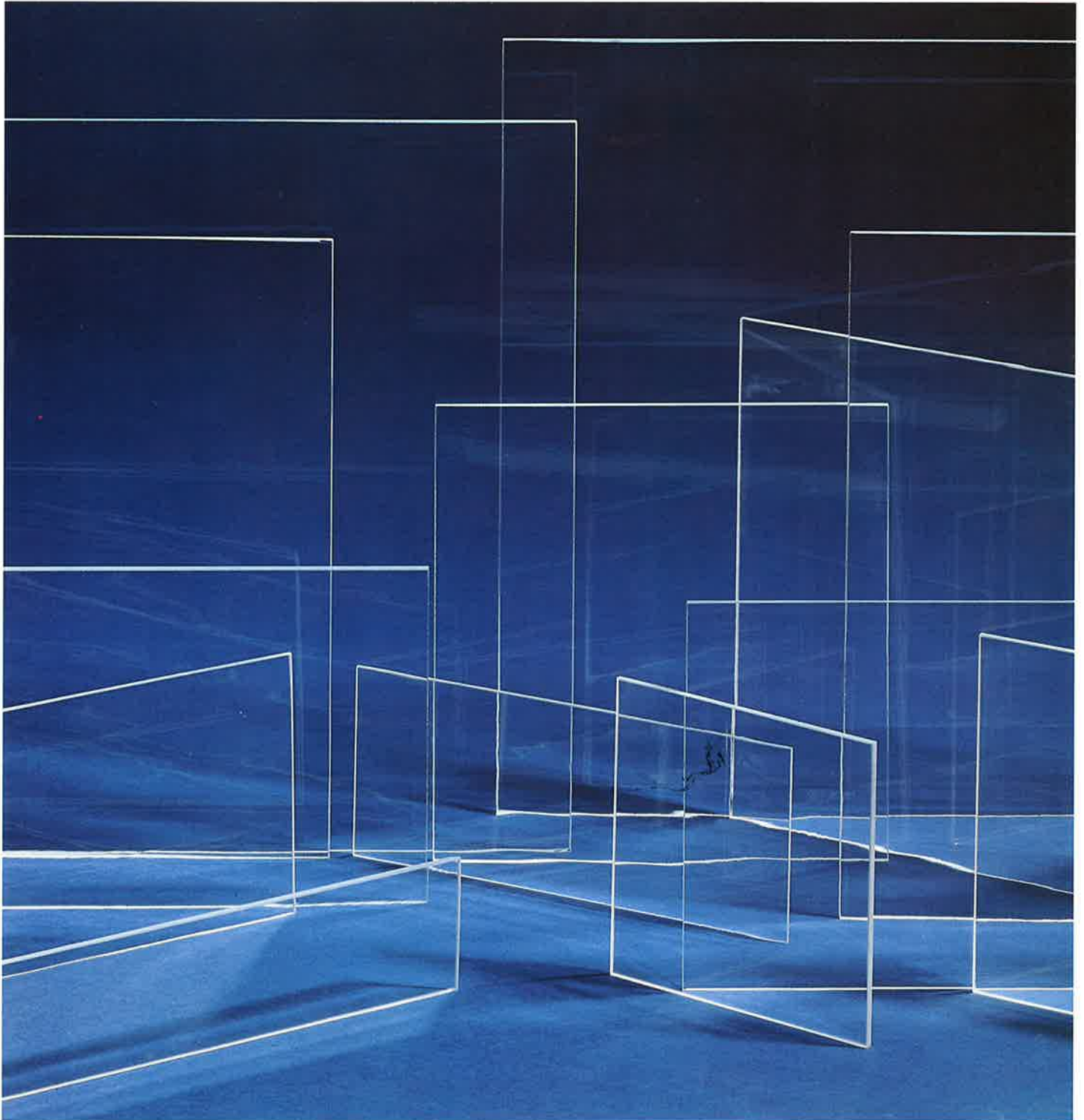


TYPE 214-P

Clear Fused Quartz Plate



Westdeutsche Quarzschmelze GmbH & Co. KG



214-P Quartz Glass Plate

Type 214-P is a transparent glazed quartz glass plate which combines the excellent chemical and physical properties of GE/WQS 214 quartz at an attractive price/specification ratio.

The characteristics of 214-P plate are:

- High purity
- Low water content
- Good transparency
- Excellent infra-red transmission
- Good ultra-violet transmission

We recommend 214-P plate for:

Semiconductor Industry

- Manufacture of tanks and beakers
- Storage and hot plates
- Quartzware fabrication

Paper Industry

- Infra-red drying system windows
- Ultra-violet curing system windows

General

- Any application requiring high purity or good optical characteristics at a keen price.

214-P is available in 2 specifications of purity:

214-P Standard quality as defined by the GE/WQS specification for Type 214 quartz.

214-PLS Has a reduced alkaline content (see table) and is ideal for specially sensitive processes such as semiconductor device manufacture.

Properties of Type 214 Clear Fused Quartz

Mechanical Properties	values according to international standards	
Density	2.2×10^3	kg/m ³
Tensile Strength	4.8×10^7	Pa (N/m ²)
Compressive Strength	$>1.1 \times 10^9$	Pa
Young's Modulus	7.2×10^{10}	Pa
Rigidity Modulus	3.1×10^{10}	Pa
Torsional Strength	30×10^7	Pa
Bending Strength	70×10^7	Pa
Poisson's Ratio	0.17	
Mohs Hardness	5.5 - 6.5	
Micro Hardness	1000×10^7	Pa
Sound Velocity for Longitudinal Waves	5720	m/s

Thermal Properties	values according to international standards	
Coefficient of Thermal Expansion (293 - 893 °K)	5.5×10^{-7}	m/m·°K
Strain Point	1393	°K
Annealing Point	1488	°K
Working Range	2003 - 2373	°K
Max. Use Temperature, Continuous	1373	°K
Max. Use Temperature, Limited	1673	°K
Specific Heat	670	J/kg·°K
Thermal Conductivity	1.46	W/m·°K

Electrical and optical Properties	values according to international standards	
Electrical Resistivity (293 °K)	10^{18}	$\Omega \cdot \text{cm}$
Dielectric Constant	3.75	
Dielectric Strength (293 °K, for path length of 5 mm)	250 - 400	kV/cm
Dielectric loss factor tg δ (1 kHz, 473 °K)	$5 \cdot 10^{-4}$	
Index of Refraction (587.56 nm)	1.45857	
Photoelastic stress constant	3.54	nm/cm·bar
Abbe Coefficient	67.6	

Typical Contaminants in Type 214-P Quartz

Type	Al	As	B	Ca	Cd	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ni	P	Sb	Ti	Zr	OH
214-P	16	<0.4	<0.1	0.6	<0.01	0.05	<0.1	0.3	0.7	1.0	0.1	0.1	1.0	<0.1	1.5	<0.4	1.1	1.5	<30
214-PLS	16	<0.4	<0.1	0.6	<0.01	0.05	<0.01	0.3	<0.5	0.001	0.1	0.1	<0.05	<0.1	1.5	<0.4	1.1	1.5	<30

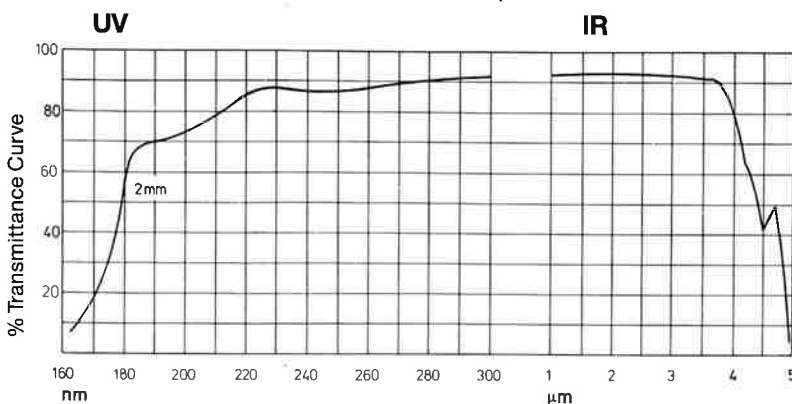
(ppm by weight)

Optical Properties

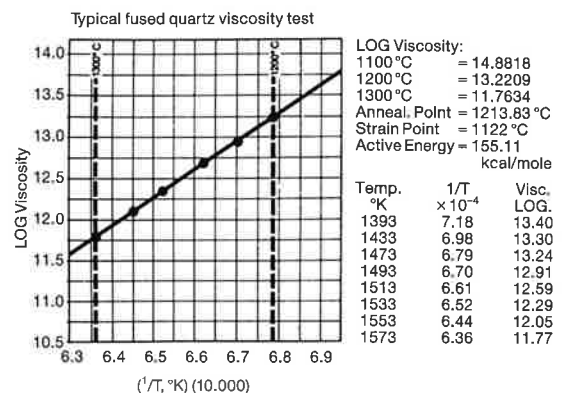
Optical transmission properties provide a means for distinguishing among various types of vitreous silica as the degree of transparency reflects material purity and the method of manufacture.

Specific indicators are the UV cutoff and the presence or absence of bands at 0.245 μm and 2.73 μm . The UV cutoff ranges from 0.155 to 0.175 μm for a 10 mm thick specimen and for pure fused quartz is a reflection of material purity. The presence of transition metallic impurities will shift the cutoff toward longer wavelengths. When desired, intentional doping, e.g., with Ti in the case of Type 219, may be employed to increase absorption in the UV.

Average Transmittance Curve
including surface reflection losses
for 2 mm thick 214-P plate



Typical Fused Quartz Viscosity Test



214-P is available in 4 categories:

CATEGORY 1

Code No. 333210 • Rough cut at all sides

These are the standard sizes in mm of plate available:

Thickness	Length	Width	Thickness	Length	Width
2.5	750	470	4.0	560	500
3.0	620	480	4.5	530	520
3.5	550	490	5.0	450	530

Further dimensions on request.

Tolerances Length: $\pm 10\%$, Width: $\pm 10\%$, Thickness: ± 0.3 mm

CATEGORY 2

Code No. 333220 • Cut to order
• Edges are snap cut
• Cut edges are sharp and fragile

Tolerances Length: ± 1.0 mm, Width: ± 1.0 mm, Thickness: ± 0.3 mm

CATEGORY 3

Code No. 333230 • Cut to order
• Laser cut
• Cut edges are lightly glazed

Tolerances Length: ± 0.3 mm, Width: ± 0.3 mm, Thickness: ± 0.3 mm

CATEGORY 4

Code No. 333240 • Plate according to drawing and customer's request, different from Cat. 1 – 3. Please, always indicate tolerances and finish of edges.

General Specification – valid for all categories:

Bubbles: – Occasional, clearly visible elongated vacuum voids

Bow: < 500 mm plate length: 1.0 mm maximum
> 501 mm plate length: 1.5 mm maximum

Surface Quality: – Slight optical irregularity

Inspection Criteria 214-P

Bubbles: A void, wholly enclosed within Quartz.
Limits: Diameter 1.0 mm
Length 10.0 mm
10 bubbles per plate

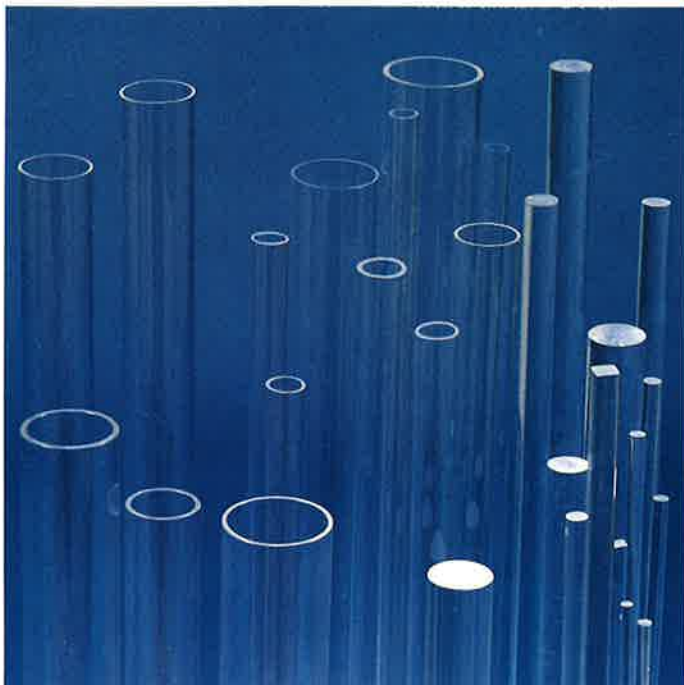
Surface voids: Depressions at the surface caused by collapsed voids causing distinguished optical distortions.
Limits: No depression deeper than 0.6 mm

Repair marks: A distinguished optical distortion at the surface as a result of a fused large bubble.
Limits: No repair area larger than 5 % of the surface at both sides
No variation of plate thickness by more than 0.4 mm allowed

When specifying please state quality, 214-P or 214-PLS, code number and required plate measurements.

Product Range

WQS quartz glass tube and rod



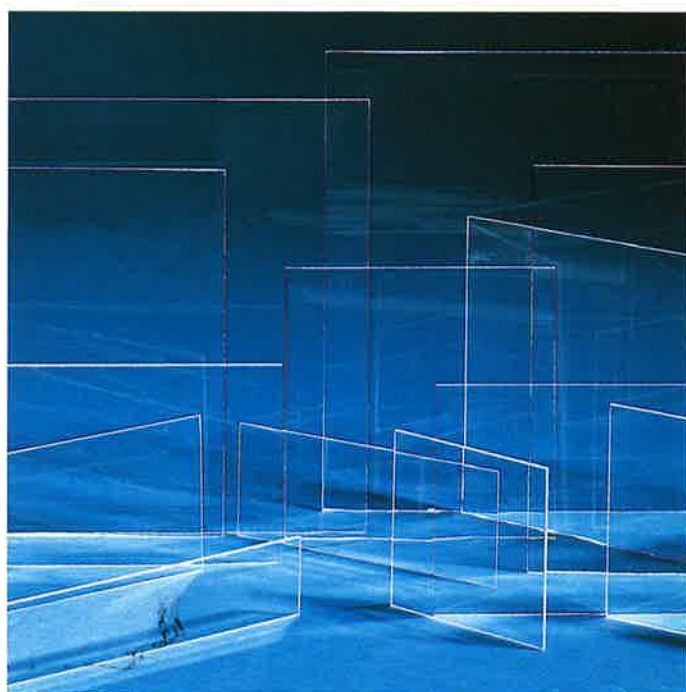
WQS quartzware for the semiconductor industry



WQS quartz glass for research and optics



WQS quartz glass plate



WQS snowball crucibles



WQS Synsil





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