

Optics from Synthetic Crystalline Quartz

Along with phase retardation plates we manufacture some other optical polarizing elements from synthetic crystalline quartz. From the original raw trapeziform blocks with the approximate size (x=100mm, y=200mm, z=100mm) we prepare orientated blanks for further processing as well as completed polished and coated optical elements like depolarizers for application e. g. in display industry. Our standard products are shown below. Certainly other sizes and orientations are also possible.

orientated blanks from synthetic crystalline quartz

size, mm	orientation	price, EUR/kg
x=32.0, y=80-160, z=32.0	optical axis along z +/-15min in both planes	595
x=30.0, y=80-160, z=30.0	optical axis along z +/-15min in both planes	595
x=27.3, y=80-160, z=27.3	optical axis along z +/-15min in both planes	595
x=21.8, y=80-160, z=21.8	optical axis along z +/-15min in both planes	595
x=19.8, y=80-160, z=19.8	optical axis along z +/-15min in both planes	595
x=18.8, y > 140, z=18.8	optical axis along z +/-15min in both planes	595
x=16.8, y > 140, z=16.8	optical axis along z +/-15min in both planes	595

depolarizers from synthetic crystalline quartz

Depolarizers are plane optical windows from crystalline quartz, where the optical axis of the material is parallel to the polished plane surfaces of the window. The depolarizers work in broadband wavelength ranges and usually the VIS wavelength range is used. The linearly polarized incident beam is transformed into „quasi“-random polarized beam after pathing the depolarizer.

size, mm	antireflection coating	price, EUR/pc
dia 50 x 1	AR/AR@400-700nm	54.00
22 x 22 x 9	AR/AR@400-700nm	29.50
25 x 25 x 6	AR/AR@400-700nm	29.50
30 x 25 x 6	AR/AR@400-700nm	35.00
30 x 25 x 8.2	AR/AR@400-700nm	39.00

properties of the synthetic crystalline quartz

refraction, transmission per 10mm (with Fresnel reflection)

λ [nm]	no	ne	T(λ) [%]		
170.0	1.71103	1.72671	80.1	Young's Modulus	97 GPa, ⊥77 GPa
185.0	1.67381	1.68784	82.2		
194.2	1.65693	1.67024	84.2	Shear Modulus	31 GPa
214.4	1.62967	1.64188	86.5		
280.3	1.58517	1.59571	89.6	Bulk Modulus	36.4 MPa
302.2	1.57733	1.58758	89.9		
365.0	1.56283	1.57257	90.2	Specific Heat Capacity	710 J/Kg·K
404.7	1.55715	1.56669	90.4		
435.8	1.55379	1.56321	90.5	Dielectric Constant (at 30MHz)	4.34 ⊥4.27
546.1	1.54614	1.55531	90.7		
587.6	1.54427	1.55338	90.7	Density	2.65 g/cm ³
589.3	1.54421	1.55331	90.7		
643.8	1.54224	1.55128	90.8	Knoop Hardness (100g load)	741 kg/mm ²
656.3	1.54185	1.55087	90.8		
706.5	1.54044	1.54941	90.8	Melting Point	1467 °C
852.1	1.53735	1.54621	90.9		
1014.0	1.53480	1.54356	91.0	Expansion Coefficients (+0~ +200°C)	13.2x ⊥7.1x 10 ⁻⁶ /K
1083.0	1.53384	1.54257	91.0		
1128.7	1.53323	1.54193	91.0		
1395.1	1.52976	1.53832	91.1	Thermal Conductivity	10.7 ⊥6.2 W/m·K
1709.1	1.52546	1.53384	91.2		
1813.1	1.53391	1.53223	91.3	Etch Channels	< 100 cm ⁻¹
2058.1	1.51996	1.52810	91.4		
2437.4	1.51284	1.52067	91.6	Orientation:	zx +/- 15 arcmin
2500.0	1.51154	1.51931	91.0	z-surface to y- and x- axes	zy +/- 15 arcmin
2720.0	1.50662	1.51417	90.5		
2800.0	1.50470	1.51217	89.9		
2900.0	1.50219	1.50955	88.2	Dimensions	y up to 200 mm x up to 100 mm z up to 100 mm
3000.0	1.49956	1.50681	97.5		
3100.0	1.49681	1.50393	85.5		
3243.9	1.49262	1.49955	90.0		
3302.6	1.49082	1.49786	90.0		
3507.0	1.48419	1.49075	94.9		
3706.7	1.47707	1.48331	65.5		
3750.0	1.47544	1.48160	60.2		
3910.0	1.46912	1.47500	64.3		
4000.0	1.46535	1.47106	56.1		
4220.0	1.45544	1.46070	27.5		
4300.0	1.45158	1.45666	27.3		
4400.0	1.44654	1.45138	8.70		
dispersion					
λ [nm]	v(λ)	v(λ)			
e-line 546.1	69.7	68.5			
d-line 587.6	69.5	68.4			