

## 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	610
x=30.0, y=80-160, z=30.0	optical axis along z +/-15min in both planes	610
x=27.3, y=80-160, z=27.3	optical axis along z +/-15min in both planes	610
x=21.8, y=80-160, z=21.8	optical axis along z +/-15min in both planes	610
x=19.8, y=80-160, z=19.8	optical axis along z +/-15min in both planes	610
x=18.8, y > 140, z=18.8	optical axis along z +/-15min in both planes	610
x=16.8, y > 140, z=16.8	optical axis along z +/-15min in both planes	610

### 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

# Crystalline Quartz

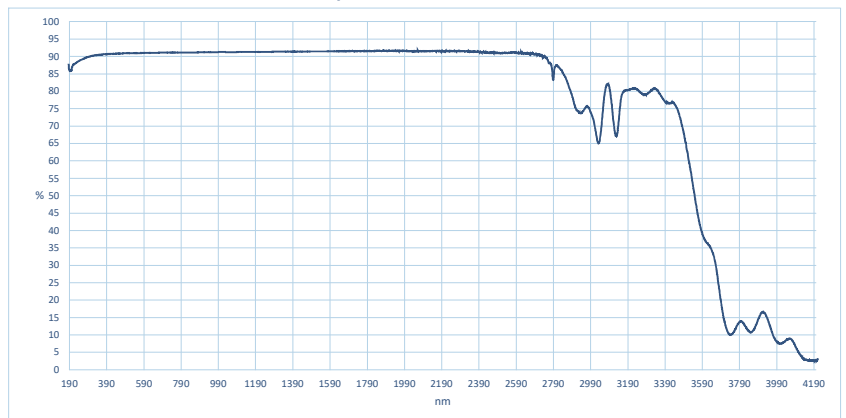
λ [nm]	refraction	
	no	ne
170.0	1.71103	1.72671
185.0	1.67680	1.69100
194.2	1.65890	1.67270
214.4	1.63050	1.64270
280.3	1.58517	1.59571
302.2	1.57733	1.58758
365.0	1.56283	1.57257
404.7	1.55715	1.56669
435.8	1.55379	1.56321
546.1	1.54614	1.55531
587.6	1.54427	1.55338
589.3	1.54421	1.55331
643.8	1.54224	1.55128
656.3	1.54185	1.55087
706.5	1.54044	1.54941
852.1	1.53735	1.54621
1014.0	1.53480	1.54356
1083.0	1.53384	1.54257
1128.7	1.53323	1.54193
1395.1	1.52976	1.53832
1709.1	1.52546	1.53384
1813.1	1.53391	1.53223
2058.1	1.51996	1.52810
2437.4	1.51284	1.52067
2500.0	1.51154	1.51931
2720.0	1.50662	1.51417
2800.0	1.50470	1.51217
2900.0	1.50219	1.50955
3000.0	1.49956	1.50681
3100.0	1.49681	1.50393
3243.9	1.49262	1.49955
3302.6	1.49082	1.49786
3507.0	1.48419	1.49075
3706.7	1.47707	1.48331
3750.0	1.47544	1.48160
3910.0	1.46912	1.47500
4000.0	1.46535	1.47106
4220.0	1.45544	1.46070
4300.0	1.45158	1.45666
4400.0	1.44654	1.45138
	dispersion	
λ [nm]	v(λ)	v(λ)
e-line 546.1	69.7	68.5
d-line 587.6	69.5	68.4

The crystalline quartz is grown in trapezform blocks with maximal size of about 100mm along the optical axis (in rare cases it is possible to grow the crystal with the size up to 150mm along the optical axis). We offer the material in standard orientated grinded blocks like in the table below. Also complicated forms and other sizes are possible by request.

## properties

density, g/cm <sup>3</sup>	2.65
Young module parallel to optical axis, Gpa	97.2
Young module normal to optical axis, Gpa	76.5
Mohs hardness, Mohs	7
thermal conductivity parallel to optical axis (z), W/m x K	10.7
thermal conductivity normal to optical axis (z), W/m x K	6.2
CTE@0-200°C parallel to optical axis (z), 1/K	13.2x10 <sup>-6</sup>
CTE@0-200°C normal to optical axis (z), 1/K	7.1x10 <sup>-6</sup>
melting point, °C	1,713
dielectric constant parallel to optical axis (z) @30MHz	4.34
dielectric constant normal to optical axis (z) @30MHz	4.27
impurities density of 10-30µm, cm <sup>3</sup>	< 2
impurities density of 30-70µm, cm <sup>3</sup>	< 1
impurities density of >70µm, cm <sup>3</sup>	0
etch channels, cm <sup>2</sup>	< 100

transmission per 10mm incl. Fresnel reflection



size, mm	price, EUR/kg
x=32.0, y=80-160, z=32.0	610
x=30.0, y=80-160, z=30.0	610
x=27.3, y=80-160, z=27.3	610
x=21.8, y=80-160, z=21.8	610
x=19.8, y=80-160, z=19.8	610
x=18.8, y > 140, z=18.8	610
x=16.8, y > 140, z=16.8	610