

# Windows & Filters

COATINGS

WINDOWS & FILTERS

MIRRORS

LENSES

PRISMS

POLARIZING OPTICS

UV & IR OPTICS

## CURVED WINDOWS

### FEATURES

- › Made from BK7 glass or UV grade fused silica
- › Polished to high surface quality
- › Standard substrates are available with a variety of radii of concave curvature

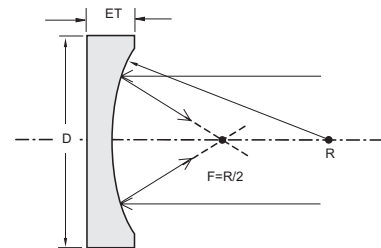
We offer two substrate materials spanning a range of thermal expansion coefficients. For applications in which thermal shock is absent and thermal stability is not critical, BK7 glass is a suitable and inexpensive material. For applications requiring high thermal stability or involving severe thermal shock, UV grade fused silica is a good choice.

### SPECIFICATIONS

Material	BK7, UV FS
S1/S2 Surface Quality	20 – 10 scratch & dig (MIL-PRF-13830B)
S1/S2 Surface Flatness	$\lambda/10$ @ 633 nm
Curved Surface Radius Tolerance	$\pm 1\%$
Diameter Tolerance	+0.00 / -0.12 mm
Thickness Tolerance	$\pm 0.2$ mm

## PLANO-CONCAVE WINDOWS

Presented substrates are *uncoated*. For appropriate coating, please refer to the *Coatings section*.



Diameter D, mm	Edge thickness ET, mm	ROC, mm	BK7		UV FS	
			Catalogue number	Price, EUR	Catalogue number	Price, EUR
12.7	3.0	-25	010-0101E	32	010-1101E	57
12.7	3.0	-50	010-0103E	32	010-1103E	57
12.7	3.0	-75	010-0104E	32	010-1104E	57
12.7	3.0	-100	010-0105E	32	010-1105E	57
12.7	3.0	-150	010-0107E	32	010-1107E	57
12.7	3.0	-200	010-0108E	32	010-1108E	57
12.7	3.0	-250	010-0110E	32	010-1110E	57
12.7	3.0	-300	010-0111E	32	010-1111E	57
12.7	3.0	-400	010-0109E	32	010-1109E	57
12.7	3.0	-500	010-0115E	32	010-1115E	57
12.7	3.0	-1000	010-0120E	32	010-1120E	57
12.7	3.0	-1500	010-0123E	32	010-1123E	57
12.7	3.0	-2000	010-0125E	32	010-1125E	57
12.7	3.0	-3000	010-0130E	32	010-1130E	57
12.7	3.0	-4000	010-0140E	32	010-1140E	57
12.7	3.0	-5000	010-0150E	32	010-1150E	57
12.7	6.0	-25	010-0101T6	33	010-1101T6	58
12.7	6.0	-50	010-0103T6	33	010-1103T6	58
12.7	6.0	-75	010-0104T6	33	010-1104T6	58
12.7	6.0	-100	010-0105T6	33	010-1105T6	58
12.7	6.0	-150	010-0107T6	33	010-1107T6	58
12.7	6.0	-200	010-0108T6	33	010-1108T6	58
12.7	6.0	-250	010-0110T6	33	010-1110T6	58
12.7	6.0	-300	010-0111T6	33	010-1111T6	58
12.7	6.0	-400	010-0109T6	33	010-1109T6	58
12.7	6.0	-500	010-0115T6	33	010-1115T6	58
12.7	6.0	-1000	010-0120T6	33	010-1120T6	58
12.7	6.0	-1500	010-0123T6	33	010-1123T6	58
12.7	6.0	-2000	010-0125T6	33	010-1125T6	58
12.7	6.0	-3000	010-0130T6	33	010-1130T6	58
12.7	6.0	-4000	010-0140T6	33	010-1140T6	58
12.7	6.0	-5000	010-0150T6	33	010-1150T6	58

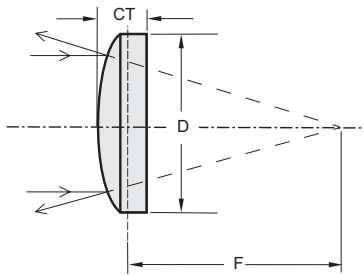
Diameter D, mm	Edge thickness ET, mm	ROC, mm	BK7		UV FS	
			Catalogue number	Price, EUR	Catalogue number	Price, EUR
25.4	6.0	-50	010-0201E	55	010-1201E	75
25.4	6.0	-75	010-0207E	55	010-1207E	75
25.4	6.0	-100	010-0202E	55	010-1202E	75
25.4	6.0	-125	010-0208E	55	010-1208E	75
25.4	6.0	-150	010-0203E	55	010-1203E	75
25.4	6.0	-200	010-0204E	55	010-1204E	75
25.4	6.0	-250	010-0205E	55	010-1205E	75
25.4	6.0	-300	010-0206E	55	010-1206E	75
25.4	6.0	-350	010-0211E	55	010-1211E	75
25.4	6.0	-400	010-0209E	55	010-1209E	75
25.4	6.0	-500	010-0210E	55	010-1210E	75
25.4	6.0	-600	010-0212E	55	010-1212E	75
25.4	6.0	-700	010-0214E	55	010-1214E	75
25.4	6.0	-750	010-0215E	55	010-1215E	75
25.4	6.0	-800	010-0216E	55	010-1216E	75
25.4	6.0	-900	010-0217E	55	010-1217E	75
25.4	6.0	-1000	010-0220E	55	010-1220E	75
25.4	6.0	-1500	010-0222E	55	010-1222E	75
25.4	6.0	-2000	010-0225E	55	010-1225E	75
25.4	6.0	-2500	010-0226E	55	010-1226E	75
25.4	6.0	-3000	010-0227E	55	010-1227E	75
25.4	6.0	-4000	010-0229E	55	010-1229E	75
25.4	6.0	-5000	010-0230E	55	010-1230E	75
25.4	6.0	-6000	010-0235E	55	010-1235E	75
25.4	6.0	-8000	010-0240E	65	010-1240E	80
25.4	6.0	-10000	010-0250E	65	010-1250E	80

Diameter D, mm	Edge thickness ET, mm	ROC, mm	BK7		UV FS	
			Catalogue number	Price, EUR	Catalogue number	Price, EUR
50.8	10.0	-100	010-0501E	110	010-1501E	210
50.8	10.0	-150	010-0508E	110	010-1508E	210
50.8	10.0	-200	010-0502E	110	010-1502E	210
50.8	10.0	-250	010-0503E	110	010-1503E	210
50.8	10.0	-300	010-0506E	110	010-1506E	210
50.8	10.0	-400	010-0504E	110	010-1504E	210
50.8	10.0	-500	010-0505E	110	010-1505E	210
50.8	10.0	-600	010-0507E	110	010-1507E	210
50.8	10.0	-750	010-0510E	110	010-1510E	210
50.8	10.0	-800	010-0511E	110	010-1511E	210
50.8	10.0	-1000	010-0515E	110	010-1515E	210
50.8	10.0	-1500	010-0518E	110	010-1518E	210
50.8	10.0	-2000	010-0520E	110	010-1520E	210
50.8	10.0	-2500	010-0521E	110	010-1521E	210
50.8	10.0	-3000	010-0522E	110	010-1522E	210
50.8	10.0	-4000	010-0524E	110	010-1524E	210
50.8	10.0	-5000	010-0525E	110	010-1525E	210
50.8	10.0	-6000	010-0530E	110	010-1530E	210
50.8	10.0	-8000	010-0540E	110	010-1540E	210
50.8	10.0	-10000	010-0550E	110	010-1550E	210

Diameter D, mm	Edge thickness ET, mm	ROC, mm	BK7		UV FS	
			Catalogue number	Price, EUR	Catalogue number	Price, EUR
76.2	12.7	-200	010-0705E	195	010-1705E	285
76.2	12.7	-300	010-0708E	195	010-1708E	285
76.2	12.7	-400	010-0710E	195	010-1710E	285
76.2	12.7	-500	010-0712E	195	010-1712E	285
76.2	12.7	-600	010-0714E	195	010-1714E	285
76.2	12.7	-800	010-0720E	195	010-1720E	285
76.2	12.7	-1000	010-0725E	195	010-1725E	285
76.2	12.7	-1500	010-0730E	195	010-1730E	285
76.2	12.7	-2000	010-0735E	195	010-1735E	285
76.2	12.7	-3000	010-0745E	195	010-1745E	285
101.6	15.0	-300	010-0808E	440	010-1808E	540
101.6	15.0	-400	010-0810E	440	010-1810E	540
101.6	15.0	-500	010-0812E	440	010-1812E	540
101.6	15.0	-600	010-0814E	440	010-1814E	540
101.6	15.0	-800	010-0820E	440	010-1820E	540
101.6	15.0	-1000	010-0825E	440	010-1825E	540
101.6	15.0	-1500	010-0830E	440	010-1830E	540
101.6	15.0	-2000	010-0835E	440	010-1835E	540
101.6	15.0	-3000	010-0845E	440	010-1845E	540

### PLANO-CONVEX WINDOWS

Presented substrates are *uncoated*. For appropriate coating, please refer to the *Coatings Section*.



We provide a wide selection of shapes and sizes, with plano, spherical or cylindrical surfaces.

Diameter D, mm	Center thickness CT, mm	ROC, mm	BK7		UV FS	
			Catalogue number	Price, EUR	Catalogue number	Price, EUR
12.7	6.0	+50	011-0103E	34	011-1103E	60
12.7	6.0	+100	011-0105E	34	011-1105E	60
12.7	6.0	+150	011-0107E	34	011-1107E	60
12.7	6.0	+200	011-0108E	34	011-1108E	60
12.7	6.0	+300	011-0111E	34	011-1111E	60
12.7	6.0	+400	011-0113E	34	011-1113E	60
12.7	6.0	+500	011-0115E	34	011-1115E	60
25.4	6.0	+50	011-0201E	65	011-1201E	85
25.4	6.0	+75	011-0207E	65	011-1207E	85
25.4	6.0	+100	011-0202E	65	011-1202E	85
25.4	6.0	+150	011-0203E	65	011-1203E	85
25.4	6.0	+200	011-0204E	65	011-1204E	85
25.4	6.0	+300	011-0205E	65	011-1205E	85
25.4	6.0	+400	011-0206E	65	011-1206E	85
25.4	6.0	+500	011-0209E	65	011-1209E	85
25.4	6.0	+600	011-0210E	65	011-1210E	85
25.4	6.0	+800	011-0212E	65	011-1212E	85
25.4	6.0	+1000	011-0215E	65	011-1215E	85
25.4	6.0	+1500	011-0216E	65	011-1216E	85
25.4	6.0	+2000	011-0220E	65	011-1220E	85
25.4	6.0	+3000	011-0222E	65	011-1222E	85
25.4	6.0	+4000	011-0225E	65	011-1225E	85
25.4	6.0	+5000	011-0227E	65	011-1227E	85
50.8	10.0	+100	011-0502E	120	011-1502E	220
50.8	10.0	+150	011-0503E	120	011-1503E	220
50.8	10.0	+200	011-0504E	120	011-1504E	220
50.8	10.0	+300	011-0505E	120	011-1505E	220
50.8	10.0	+400	011-0506E	120	011-1506E	220
50.8	10.0	+500	011-0509E	120	011-1509E	220
50.8	10.0	+600	011-0510E	120	011-1510E	220
50.8	10.0	+800	011-0512E	120	011-1512E	220
50.8	10.0	+1000	011-0515E	120	011-1515E	220
50.8	10.0	+1500	011-0518E	120	011-1518E	220
50.8	10.0	+2000	011-0520E	120	011-1520E	220
50.8	10.0	+3000	011-0522E	120	011-1522E	220
50.8	10.0	+4000	011-0525E	120	011-1525E	220

### HOUSING ACCESSORIES

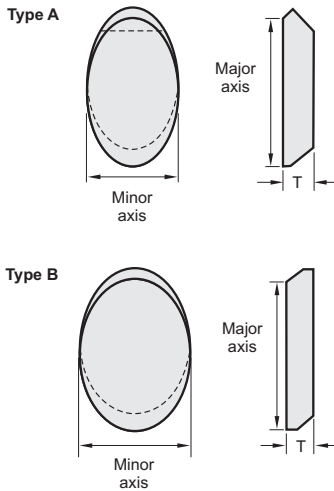
Kinematic Mirror Mount 840-0020



## ELLIPTICAL WINDOWS

### FEATURES

- › Bend light at precise angles with minimum wave distortion



Elliptical windows bend light at precise angles with minimum wave distortion due to elongated major axis. Precision 45 degree elliptical flat mirrors are ideal for technical and astronomical applications.

### SPECIFICATIONS

Material	BK7, UV FS
Surface Quality S1, S2	20 – 10 scratch & dig (MIL-PRF-13830B)
Surface Flatness S1, S2	$\lambda/4$ @ 633 nm
Axis Tolerance	+0.00 / -0.12 mm
Thickness Tolerance	$\pm 0.25$ mm
Parallelism	<3 min

Presented substrates are *uncoated*. For appropriate coating, please refer to the *Coatings Section*.

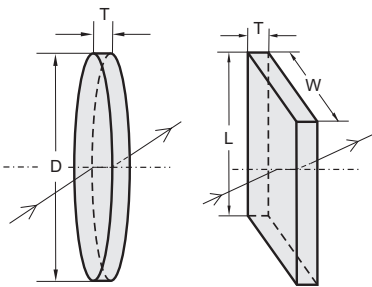
Material	Minor axis, mm	Major axis, mm	Thickness T, mm	Catalogue number	Price, EUR
BK7	18.0	25.0	3.0	<a href="#">020-0183</a>	43
	25.0	35.0	4.0	<a href="#">020-0254</a>	49
	30.0	42.5	4.0	<a href="#">020-0304</a>	56
UV FS	18.0	25.0	3.0	<a href="#">020-1183</a>	71
	25.0	35.0	4.0	<a href="#">020-1254</a>	75
	30.0	42.5	4.0	<a href="#">020-1304</a>	99

Please add letter A to the catalogue number for type A and letter B for type B. Contact us for other size or precision requirements.

## FLAT WINDOWS

### FEATURES

- › Have high transmittance, low wavefront distortion and low scatter
- › Are durable and strong
- › BK7 glass is an economical and ideal choice for high-quality visible applications
- › UV FS has the deepest UV range and the highest transmittance



Windows are used to allow optical radiation to pass from one environment to another without allowing other components of these environments to mix. Considerations in selecting windows may include transmission, scattering, wavefront distortion and resistance to certain environments. An ideal window allows an optical beam to pass from one medium to the next without changing the wavelength distribution of the beam, the transmitted wavefront or scatter any of the

light out of the beam. We offer windows made from three different materials, from which you may choose in view of the properties you need: BK7 or UV grade fused silica.

*Windows can be anti-reflection coated. For a required coating, please refer to the **Coatings Section**. Diameters of up to 250 mm are available on request.*

### SPECIFICATIONS

Material	BK7, UV FS
Surface quality	60 – 40 scratch & dig (MIL-PRF-13830B)
Clear aperture	>80% of the diameter
Diameter tolerance	+0.00 / -0.5 mm
Thickness tolerance	$\pm 0.2$ mm
Surface flatness	1 $\lambda$ per inch @ 633 nm
Parallelism	2 arcmin

## ROUND WINDOWS

### HOUSING ACCESSORIES

Kinematic Mirror Mount 840-0020



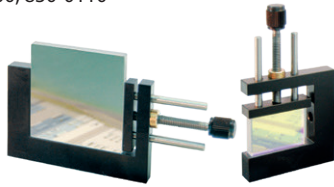
Diameter D, mm		Thickness T, mm	BK7		UV FS	
Metric	English		Catalogue number	Price, EUR	Catalogue number	Price, EUR
12.5	12.7	2.0	<a href="#">210-0102</a>	9	<a href="#">210-1102</a>	18
12.5	12.7	3.0	<a href="#">210-0103</a>	10	<a href="#">210-1103</a>	19
25.0	25.4	2.0	<a href="#">210-0202</a>	15	<a href="#">210-1202</a>	25
25.0	25.4	3.0	<a href="#">210-0203</a>	16	<a href="#">210-1203</a>	26
40.0	38.1	2.0	<a href="#">210-0402</a>	23	<a href="#">210-1402</a>	40
40.0	38.1	3.0	<a href="#">210-0403</a>	24	<a href="#">210-1403</a>	41
50.0	50.8	2.0	<a href="#">210-0502</a>	28	<a href="#">210-1502</a>	48
50.0	50.8	3.0	<a href="#">210-0503</a>	29	<a href="#">210-1503</a>	49
75.0	76.2	6.3	<a href="#">210-0703</a>	90	<a href="#">210-1703</a>	150

Please add letter M to the catalogue number for metric dimensions and letter E for English.

## RECTANGULAR WINDOWS

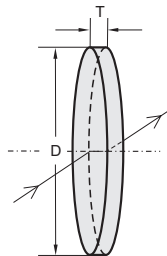
### HOUSING ACCESSORIES

Rectangular Optics Holders 830-0100, 830-0110



Rectangular dimensions		Thickness T, mm	BK7		UV FS	
Width W, mm	Length L, mm		Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR
15.0	20.0	2.0	<a href="#">215-0122</a>	11	<a href="#">215-1122</a>	20
25.4	25.4	2.0	<a href="#">215-0222</a>	15	<a href="#">215-1222</a>	25
20.0	30.0	2.0	<a href="#">215-0232</a>	16	<a href="#">215-1232</a>	26
25.4	50.8	2.0	<a href="#">215-0252</a>	20	<a href="#">215-1252</a>	32
50.8	50.8	2.0	<a href="#">215-0552</a>	28	<a href="#">215-1552</a>	48
50.8	50.8	6.3	<a href="#">215-0556</a>	33	<a href="#">215-1556</a>	53

## PRECISION THIN ROUND WINDOWS



### SPECIFICATIONS

Material	UV FS
Surface quality	20 - 10 scratch & dig (MIL-PRF-13830B)
Clear aperture	>90% of the diameter
Diameter tolerance	+0.00 / -0.12 mm
Thickness tolerance	±0.2 mm
Surface flatness	$\lambda/4$ or $\lambda/10$ @ 633 nm
Parallelism	<1 arcmin or <30 arcsec

### HOUSING ACCESSORIES

Optical Component Mount 830-0037



Plate Clamp 830-0055



Universal Plate Holder 830-0075



Diameter D, mm		Thickness T, mm	Flatness	Parallelism	Catalogue number	Price, EUR
Metric	English					
12.5	12.7	1.0	$\lambda/10$	30 arcsec	<a href="#">226-1111</a>	60
12.5	12.7	2.0	$\lambda/10$	30 arcsec	<a href="#">226-1121</a>	53
20.0	20.0	1.0	$\lambda/10$	30 arcsec	<a href="#">226-1191</a>	75
20.0	20.0	2.0	$\lambda/10$	30 arcsec	<a href="#">226-1201</a>	72
25.0	25.4	1.0	$\lambda/10$	30 arcsec	<a href="#">226-1211</a>	80
25.0	25.4	2.0	$\lambda/10$	30 arcsec	<a href="#">226-1221</a>	75
50.0	50.8	3.0	$\lambda/10$	30 arcsec	<a href="#">226-1531</a>	165
12.5	12.7	1.0	$\lambda/4$	1 arcmin	<a href="#">226-1116</a>	42
12.5	12.7	2.0	$\lambda/4$	1 arcmin	<a href="#">226-1126</a>	38
25.0	25.4	1.0	$\lambda/4$	1 arcmin	<a href="#">226-1216</a>	61
25.0	25.4	2.0	$\lambda/4$	1 arcmin	<a href="#">226-1226</a>	55
50.0	50.8	1.0	$\lambda/4$	1 arcmin	<a href="#">226-1516</a>	139
50.0	50.8	2.0	$\lambda/4$	1 arcmin	<a href="#">226-1526</a>	131
50.0	50.8	3.0	$\lambda/4$	1 arcmin	<a href="#">226-1536</a>	125

Please add letter M to the catalogue number for metric dimensions and letter E for English.

## PRECISION WINDOWS

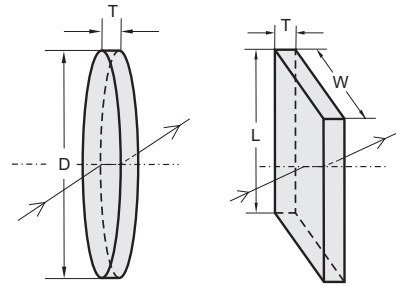
### FEATURES

- › Manufactured from the high quality UV FS and BK7
- › Precision polished on both surfaces and held parallel up to 3 arcsec

These windows are designed to be used in precision optical systems. The optical transmission is high with little distortion of the transmitted signal.  $\lambda/10$  transmitted wavefront distortion is usually preferred but  $\lambda/4$  is offered as an option when this is not an issue.

Windows can be anti-reflection coated. For required coating, please refer to the **Coatings Section**. Diameters of up to 250 mm are available on request.

Please refer to the **UV and IR Optics section for windows made from other materials: LiF, ZnSe, Ge, Sapphire, etc.**



### SPECIFICATIONS

Material	BK7, UV FS
Surface quality	20 – 10 scratch & dig (MIL-PRF-13830B)
Clear aperture	>90% of the diameter
Diameter tolerance	+0.00 / -0.12 mm
Thickness tolerance	±0.2 mm
Surface flatness	$\lambda/4$ or $\lambda/10$ @ 633 nm
Parallelism	<1 arcmin, <30 arcsec or <3 arcsec

## ROUND WINDOWS

Diameter D, mm		Thickness T, mm	Flatness	Parallelism	BK7		UV FS	
Metric	English				Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR
12.5	12.7	3.0	$\lambda/10$	30 arcsec	220-0101	28	220-1101	43
12.5	12.7	6.0	$\lambda/10$	30 arcsec	220-0161	25	220-1161	40
20.0	20.0	3.0	$\lambda/10$	30 arcsec	220-0191	35	220-1191	45
20.0	20.0	5.0	$\lambda/10$	30 arcsec	220-0211	31	220-1211	43
25.0	25.4	3.0	$\lambda/10$	30 arcsec	220-0231	44	220-1231	57
25.0	25.4	6.0	$\lambda/10$	30 arcsec	220-0201	39	220-1201	49
40.0	38.1	6.0	$\lambda/10$	30 arcsec	220-0462	56	220-1462	80
40.0	38.1	8.0	$\lambda/10$	30 arcsec	220-0402	51	220-1402	90
50.0	50.8	6.0	$\lambda/10$	30 arcsec	220-0562	78	220-1562	125
50.0	50.8	8.0	$\lambda/10$	30 arcsec	220-0582	71	220-1582	120
50.0	50.8	10.0	$\lambda/10$	30 arcsec	220-0502	65	220-1502	145
75.0	76.2	12.7	$\lambda/10$	30 arcsec	220-0722	135	220-1722	225
75.0	76.2	15.0	$\lambda/10$	30 arcsec	220-0752	140	220-1752	235
101.6	100.0	15.0	$\lambda/10$	30 arcsec	220-0852	240	220-1852	450
12.5	12.7	3.0	$\lambda/10$	3 arcsec	220-0103	44	220-1103	62
12.5	12.7	6.0	$\lambda/10$	3 arcsec	220-0163	41	220-1163	56
12.5	12.7	10.0	$\lambda/10$	3 arcsec	220-0193	37	220-1193	50
25.0	25.4	6.0	$\lambda/10$	3 arcsec	220-0203	69	220-1203	94
25.0	25.4	10.0	$\lambda/10$	3 arcsec	220-0293	62	220-1293	84
40.0	38.1	10.0	$\lambda/10$	3 arcsec	220-0403	89	220-1403	139
50.0	50.8	12.0	$\lambda/10$	3 arcsec	220-0503	119	220-1503	185
12.5	12.7	3.0	$\lambda/4$	1 arcmin	220-0106	19	220-1106	34
12.5	12.7	6.0	$\lambda/4$	1 arcmin	220-0166	17	220-1166	31
25.0	25.4	3.0	$\lambda/4$	1 arcmin	220-0236	23	220-1236	40
25.0	25.4	6.0	$\lambda/4$	1 arcmin	220-0206	22	220-1206	35
40.0	38.1	6.0	$\lambda/4$	1 arcmin	220-0466	38	220-1466	75
40.0	38.1	8.0	$\lambda/4$	1 arcmin	220-0406	37	220-1406	85
50.0	50.8	6.0	$\lambda/4$	1 arcmin	220-0566	55	220-1566	120
50.0	50.8	8.0	$\lambda/4$	1 arcmin	220-0586	52	220-1586	115
75.0	76.2	8.0	$\lambda/4$	1 arcmin	220-0786	120	220-1786	210
75.0	76.2	12.7	$\lambda/4$	1 arcmin	220-0726	125	220-1726	215

Please add letter M to the catalogue number for metric dimensions and letter E for English.

### HOUSING ACCESSORIES

Kinematic Mirror and Beamsplitter Mount 840-0030-02



## RECTANGULAR WINDOWS

Surface flatness:  $\lambda/10$  @633nm. Parallelism: <30 arcsec

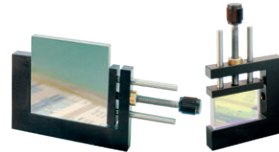
Rectangular dimensions		Thickness T, mm	BK7		UV FS	
Width W, mm	Length L, mm		Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR
15.0	20.0	3.0	<a href="#">225-0123</a>	45	<a href="#">225-1123</a>	78
15.0	20.0	6.0	<a href="#">225-0126</a>	40	<a href="#">225-1126</a>	70
25.4	25.4	6.0	<a href="#">225-0226</a>	43	<a href="#">225-1226</a>	76
20.0	30.0	6.0	<a href="#">225-0236</a>	46	<a href="#">225-1236</a>	110
25.4	50.8	10.0	<a href="#">225-0250</a>	59	<a href="#">225-1250</a>	135
50.8	50.8	10.0	<a href="#">225-0550</a>	83	<a href="#">225-1550</a>	189

### RELATED PRODUCTS

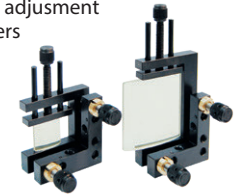
We offer AR Coated Precision Windows for Nd:YAG laser applications

See page 3.11

Rectangular Optics Holders  
830-0100, 830-0110



For applications where fine adjustment is required, use Prism Holders  
840-0160, 840-0170



## OPTICAL FLATS

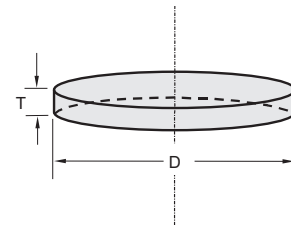
### FEATURES

- › Flatness of reference surface  $\lambda/20$

Optical flats are used for testing and evaluating other optical elements. An interference pattern is formed in the air between the flat and object being evaluated, and this pattern is usually more easily seen through the flat than through the object. The pattern consists of alternating bright and dark bands or fringes which are a contour map of the thickness of the air film. If the surface of the optic is significantly flatter than the surface being evaluated, it is correct to interpret the interference pattern directly as a contour map of the surface being evaluated. If the flat is used on the top of the object, and the interference pattern viewed through the flat, it is advantageous to have an anti-

reflection coating on the top surface of the flat (the surface which does not touch the object being evaluated).

For an appropriate AR coating, please refer to the **Coatings Section** (see pages 1.5-1.6).



Diameter D, mm		Thickness T, mm	Catalogue number	Price, EUR
Metric	English			
25.0	25.4	8.0	<a href="#">230-1208</a>	112
40.0	38.1	10.0	<a href="#">230-1410</a>	149

For metric dimensions please add to catalogue number letter M, for English – letter E.

### SPECIFICATIONS

Material	UV FS
Diameter tolerance	+0.00 / -0.12 mm
Thickness tolerance	±0.2 mm
Surface flatness: 1st surface	$\lambda/20$ @ 633 nm
2nd surface	$2\lambda$ @ 633 nm

## CRYSTALLINE MATERIALS FOR OPTICAL UV BAND PASS FILTERS

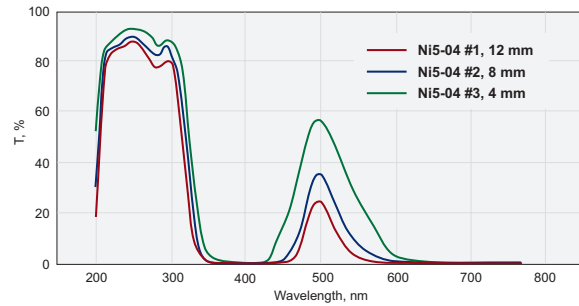
Almost all UV radiation (especially 240–280 nm) is absorbed by the Earth's ozone layer, and UV radiation that is created by some objects near the Earth surface can be detected only using special ozone filters.

Crystalline materials are robust substrates from which optical filters of high purity and optical homogeneity can be fabricated.

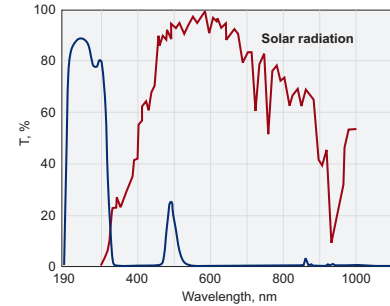
Available crystalline materials:  $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$  (NSH) and  $\text{K}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  (KNSH).

Polished cylinders of  $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$  measuring up to  $\varnothing 60 \times 40$  mm are available.

Polished cylinders of  $\text{K}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  measuring up to  $\varnothing 60 \times 40$  mm are available.



Typical spectral transmittance curves of different thickness  $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$  elements



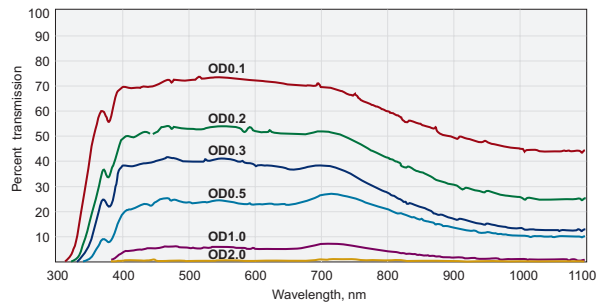
## SPECIFICATIONS

Surface quality	60 – 40 scratch & dig (MIL-PRF-13830B)
Surface flatness	$\lambda - \lambda/2$ @ 633 nm
Parallelism	1 arcmin
Side surfaces	fine grinding
Coating	uncoated

## NEUTRAL DENSITY ABSORPTION TYPE FILTERS AT 450-650 nm

### SPECIFICATIONS

Material	Neutral density colour glass
Surface quality	60 – 40 scratch & dig (MIL-PRF-13830B)
Surface flatness	1 $\lambda$ per inch @ 633 nm
Parallelism	3 arcmin
Diameter tolerance	+0.0 / -0.2 mm
Clear aperture	90% of the diameter
Design wavelength	450 – 650 nm
Optical density tolerance	$\pm 5\%$ of density



External transmission curves (include reflections from uncoated surfaces)

Neutral density absorption type filters decrease the intensity of light without altering the relative spectral distribution of energy. They are used to filter the entire visible spectrum evenly, allowing light reduction without influencing the colour or contrast. Attenuation is accomplished by using light-absorbing glass.

### RELATED PRODUCTS

Variable Wheel Attenuator 990-0604

Filter Holder  
830-0060A,  
830-0070A



Optical Density	Internal Transmittance, % @ 633 nm	$\varnothing 25.4$ mm		25.4x25.4 mm		$\varnothing 50.8$ mm		50.8x50.8 mm	
		Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR
0.05	89	240-2500	21	240-2600	22	240-5000	56	240-5600	55
0.1	80	240-2501	21	240-2601	22	240-5001	56	240-5601	55
0.2	63	240-2502	21	240-2602	22	240-5002	56	240-5602	55
0.3	50	240-2503	21	240-2603	22	240-5003	56	240-5603	55
0.4	40	240-2504	21	240-2604	22	240-5004	56	240-5604	55
0.5	32	240-2505	21	240-2605	22	240-5005	56	240-5605	55
0.6	25	240-2506	21	240-2606	22	240-5006	56	240-5606	55
0.7	20	240-2507	21	240-2607	22	240-5007	56	240-5607	55
0.8	15	240-2508	21	240-2608	22	240-5008	56	240-5608	55
0.9	12.5	240-2509	21	240-2609	22	240-5009	56	240-5609	55
1.0	10	240-2510	21	240-2610	22	240-5010	56	240-5610	55
1.5	3	240-2515	21	240-2615	22	240-5015	56	240-5615	55
2.0	1	240-2520	22	240-2620	23	240-5020	57	240-5620	56
3.0	0.1	240-2530	23	240-2630	24	240-5030	58	240-5630	57
4.0	0.01	240-2540	24	240-2640	25	240-5040	59	240-5640	58



## NEUTRAL DENSITY REFLECTIVE TYPE FILTERS AT 400-2000 NM

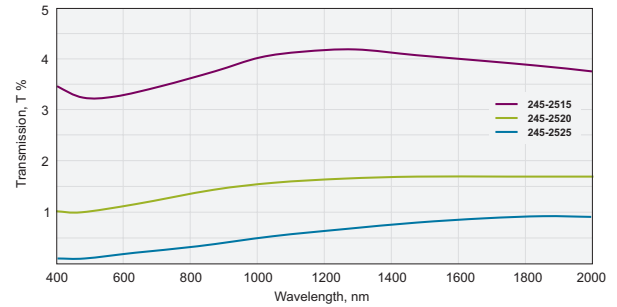
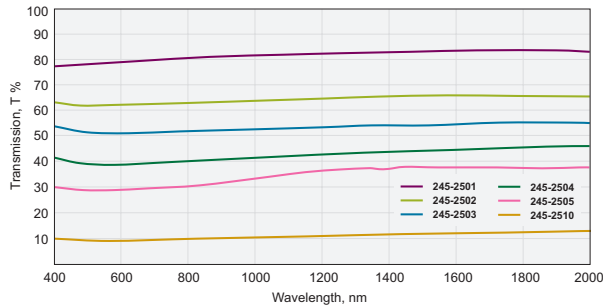
Neutral density reflective type filters of 1" (25.4 mm) size with optical density that varies from 0.1 to 2.5 are available.

Neutral density filters of Corning 7059 glass provide spectrally uniform attenuation from 400 nm to 2000 nm.

The reflective coatings enable to reduce thermal effects when these filters are used with moderate power lasers.

### SPECIFICATIONS

Glass Material	Corning 7059 (Borosilicate)
Surface Quality	40 – 20 scratch & dig (MIL-PRF-13830B)
Surface Flatness	$\lambda$ @ 633 nm
Parallelism	<2 arcmin
Outer Diameter	25.4 mm +0.0/-0.2 mm
Thickness	1.1 mm $\pm$ 0.1 mm
Coating	Reflective
Laser Damage Threshold	20 mJ/cm <sup>2</sup> (10 ns pulse)
Design Wavelength	400 – 2000 nm
Optical Density Tolerance	$\pm$ 10% Nominal



Optical Density	Transmission T, % @ 550 nm	Catalogue number	Price, EUR
0.1	79	245-2501	29
0.2	63	245-2502	29
0.3	50	245-2503	29
0.4	40	245-2504	29
0.5	32	245-2505	29
1.0	10	245-2510	29
1.5	3	245-2515	29
2.0	1	245-2520	29
2.5	0.3	245-2525	29

### RELATED PRODUCTS

Plate Clamp 830-0055



Universal Plate Holder 830-0075



Variable Wheel Attenuator 990-0604-02



Filters Holder with 90° Flip 990-0400

See page 5.21





## COLOR GLASS FILTERS

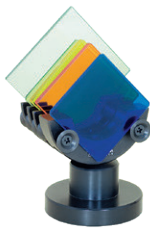
Color glass filters are made from optically polished highest quality Schott coloured optical glass. The spectral properties of these filters are uniform over the entire aperture and independent of the angle of incidence. Color glass filters can be used alone or in conjunction with monochromators or interference filters to isolate various spectral regions.

### SPECIFICATIONS

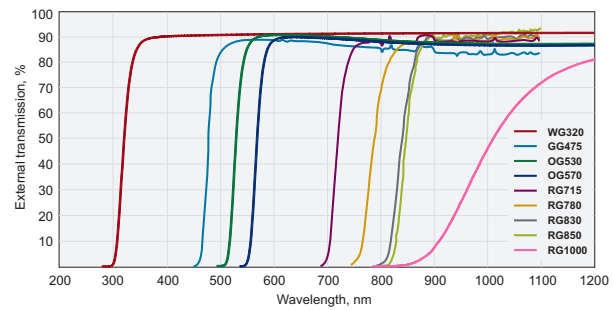
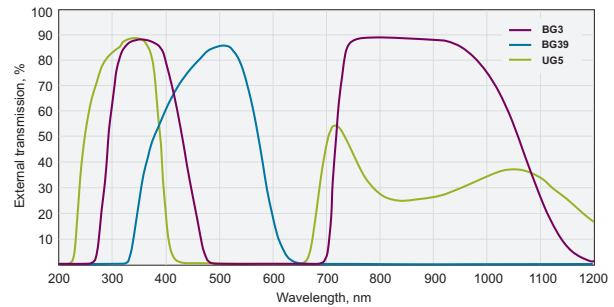
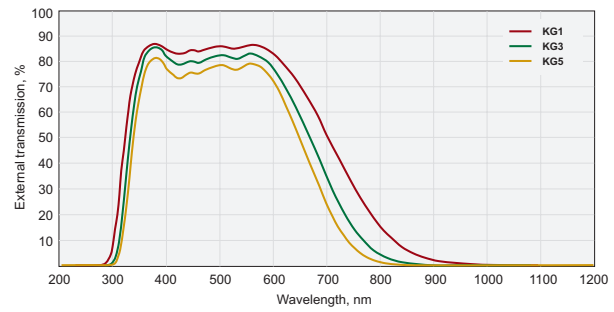
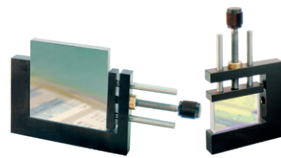
Material	Schott colour glass
Surface quality	60 – 40 scratch & dig (MIL-PRF-13830B)
Surface flatness	1λ per inch @ 633 nm
Parallelism	3 arcmin
Diameter tolerance	+0.0 / -0.2 mm
Thickness	3.0 ± 0.2 mm
Clear aperture	90% of the diameter

### RELATED PRODUCTS

Filter Holders  
830-0070A



Rectangular Optics Holders  
830-0100, 830-0110



External transmission curves (include reflections from uncoated surfaces)

Material	Ø25.4 mm		25.4x25.4 mm		Ø50.8 mm		50.8x50.8 mm	
	Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR	Catalogue nr.	Price, EUR
BG3	241-2003	27	241-3003	26	241-5003	51	241-6003	53
UG5	241-2005	45	241-3005	44	241-5005	89	241-6005	88
BG39	241-2039	32	241-3039	31	241-5039	63	241-6039	62
KG1	242-2001	24	242-3001	23	242-5001	47	242-6001	46
KG3	242-2003	27	242-3003	26	242-5003	51	242-6003	50
KG5	242-2005	28	242-3005	27	242-5005	52	242-6005	51
WG320	243-2320	24	243-3320	23	243-5320	47	243-6320	46
GG475	243-2475	24	243-3475	23	243-5475	47	243-6475	46
OG530	243-2530	24	243-3530	23	243-5530	47	243-6530	46
OG570	243-2570	24	243-3570	23	243-5570	47	243-6570	46
RG715	243-2715	24	243-3715	23	243-5715	47	243-6715	46
RG780	243-2780	28	243-3780	27	243-5780	52	243-6780	51
RG830	243-2830	28	243-3830	27	243-5830	52	243-6830	51
RG850	243-2850	28	243-3850	27	243-5850	52	243-6850	51
RG1000	243-2990	24	243-3990	23	243-5990	47	243-6990	46

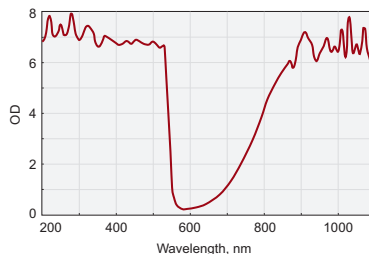
## LASER SAFETY EYEWEAR

### FEATURES

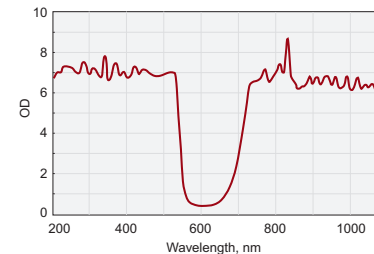
- › Wide spectrum of visibility
- › Comfort and universal fit
- › For Nd:YAG, Yb:KGW/KYW, Ti:sapphire applications



251-1064 Goggles



Nd:YAG and Harmonics, VLT 24%



Nd:YAG + Ti:Sapphire and Harmonics, VLT 11%



250-0800 Spectacles

### 250-1064, 251-1064

Wavelength, nm	Optical Density
190-534	6.5+
910-1070	6+
870-1070	5+

### 250-0800, 251-0800

Wavelength, nm	Optical Density
190-534	6+
720-1064	5+
740-1064	5+

Description	Catalogue number	Price, EUR
Spectacles for Nd:YAG + Ti:Sapphire applications	<a href="#">250-0800</a>	170
Goggles for Nd:YAG + Ti:Sapphire applications	<a href="#">251-0800</a>	170
Spectacles for Nd:YAG applications	<a href="#">250-1064</a>	150
Goggles for Nd:YAG applications	<a href="#">251-1064</a>	150

## VISUALIZATORS

### VISUALIZATOR WITH A HOLDER

#### FEATURES

- › Produces a diffused second-harmonic reflection (visible) from an infrared (invisible) beam
- › High mechanical durability
- › High sensitivity to laser radiation
- › Damage threshold for pulse laser – 1 J/cm<sup>2</sup>, 10 ns
- › Damage threshold for CW laser – 400 W/cm<sup>2</sup>

**Laser Beam Visualizer 990-0840** is used for visualization of CW or pulsed laser radiation with wavelength 880 – 1070 nm. When CW or pulsed laser radiation of wavelength 880 – 1070 nm falls onto the working surface, the latter glows in the second harmonic of the beam. Use this item to adjust and check a shape of a laser beam. It helps to see the structure of a laser beam intensity distribution. Working surface diameter – 35 mm.

**Laser Beam Visualizer 990-0841** visualize IR and UV coherent and incoherent radiation from various light sources, lasers and others. Made of rare-earth materials, it is an eco-friendly ceramic tablet.

**Laser Beam Visualizer 990-0842** combines 990-0840 and 990-0841 in one for user convenience. One side visualizes radiation with wavelength 190-1600 nm by emitting red color and the other side visualizes radiation with 880-1070 nm by emitting green color.



990-0840

Spectral range, nm	Emitted light colour	Threshold sensitivity, W/cm <sup>2</sup>	Catalogue number	Price, EUR
880 – 1070	Green	0.02	<a href="#">990-0840</a>	80
190 – 1090 + 1470 – 1600	Red	0.01	<a href="#">990-0841</a>	99
190 – 1090 + 1470 – 1600 / 880 – 1070	Red / Green	0.01 / 0.02	<a href="#">990-0842</a>	155