2.8 Commercial cylindrical lenses

Customise

These inexpensive cylindrical lenses are useful for educational demonstrations of basic lens optics and other less demanding applications.

Specification

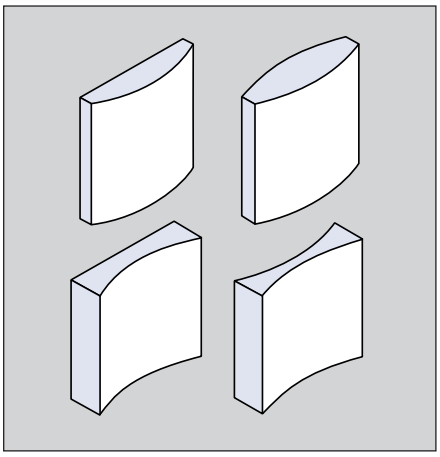
Dimensions	Nominal
Material	Float glass (see p.2)

Sets at special price

02 YC 00 Complete set (8 lenses)

Options available (see p.3)

- AR coating
- Edging or cutting to smaller size



Catalogue No.	Focal length (mm)	Length (mm)	Width (mm)	Form
Positive				
60 YC 50	60	50	50	planovex
80 YC 50	80	50	45	bivex
100 YC 50	100	50	50	planovex
143 YC 50	143	50	50	planovex
Negative				
60 UC 50	60	50	50	planocave
80 UC 50	80	50	45	bicave
155 UC 45	155	45	40	bicave
310 UC 22	310	22	40	planocave

See also:

Higher quality cylindricals p.12
Fresnel cylindricals p.16

3.1 Precision aspheric lenses

Aspheric surfaces allow single elements to achieve near-diffraction-limited performance even at large apertures, avoiding the complexity, bulk and reflection losses of multiple-element designs such as microscope objectives. However,until recently it has not been possible to produce them economically with good figure.

Precision moulding technology, and bulk demand for laser-diode collimators, allow us to offer this range at a very reasonable cost. They are also ideal for laser focusing and beam expanders and for fibre input and output.

Although designed for specific laser wavelengths, their performance will be practically as good over most of the visible and NIR range.

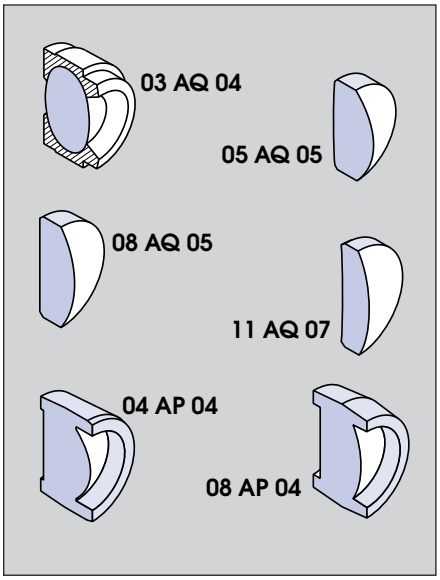
The glass lenses have a single-layer AR coating on high-index flint glass giving over 97% transmittance at the design wavelength. To calculate variation with wavelength see box on p.3. The plastic lenses offer high precision at a very low cost. Some items (see diagrams) have integral mounting rings to simplify handling and mounting.

Material specification

FDS-9	n_d = 1.847 V_d = 23.8
TaC-4	n_d = 1.734 V_d = 51.1
Acrylic	see p.2

Literature available

Data Sheet giving equations of aspheric curves



Catalogue No.	Focal length (mm)	Overall diameter (mm)	Back FL (mm)	Design aperture (mm)	NA	Centre thick (mm)	Wavefront distortion (waves RMS)*	Design wavelength (nm)	Material
Glass lenses, AR coated									
03 AQ 04	3.3	7.37	2.03	3.52	0.47	3.95	< 0.2	670	FDS-9
05 AQ 05	4.6	6.0	2.89	4.89	0.53	3.1	< 0.1	655	TaC-4
08 AQ 05	7.5	6.51	5.9	4.5	0.3	2.75	< 0.15	810	TaC-4
11 AQ 07	11.0	7.2	9.64	6.59	0.3	2.2	< 0.1	670	TaC-4
Plastic lenses, uncoated									
04 AP 04	4.25	5.6	2.29	3.8	0.5	3.0	< 0.07	670	acrylic
08 AP 04	7.71	5.6	6.17	3.8	0.25	2.5	< 0.06	670	acrylic

*Manufacturer's data. Measured with 0.25-0.3mm coverglass. Plastic lens data is double pass. See Data Sheet.

GMP SA Main office: Avenue des Baumettes 17 CH -1020 Renens Tél. 021 633 21 21 Fax. 021 633 21 29 info@gmp.ch
GMP SA Büro Zürich: Dübendorfstrasse 11a CH-8117 Fällanden Tel. 044 825 34 00 Fax. 044 825 34 01 info@gmp.ch

3.2 Plastic aspheric lenses

Customise

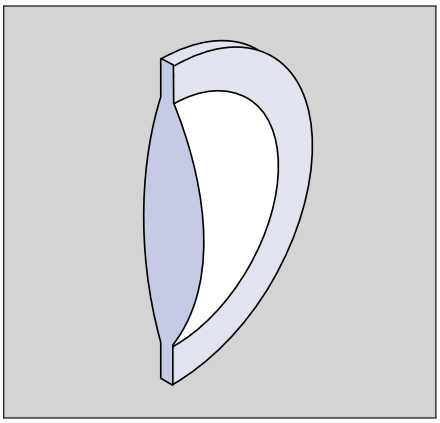
These lenses are excellent as simple magnifiers, with a much larger distortion-free field than spherical lenses. They are designed for collimating a point source and are very suitable for low-power sources such as LEDs; for tungsten lamp condensers use the glass lenses in the next section. The plastic is light-weight, shatterproof and machinable; some items have flanges to simplify mounting.

Specification

Focal length	±5%
Overall dia.	+0, -0.2mm
Material	Acrylic (see p.2)

Sets at special price

02 AP 00 Complete set (11 lenses)



Catalogue No.	Focal length (mm)	Overall diameter (mm)	Lens aperture (mm)	Back FL (mm)	Centre thickness (mm)
05 AP 04	4.63	7.8	4.5	3.2	2.7
09 AP 09	8.8	19.7	9.0	6.9	3.7
18 AP 18	17.5	19.7	18.3	14.6	6.7
18 AP 26	18.2	30.9	26.0	13.1	13.0
28 AP 34	27.5	36.1	34.0	22.7	13.0
31 AP 29	31.0	29.4	29.4	27.2	7.9
41 AP 36	41.3	38.2	35.5	35.4	11.3
42 AP 29	41.6	29.4	29.4	38.1	6.4
57 AP 50	56.6	49.7	49.7	49.6	13.5
68 AP 50	68.4	49.9	49.9	63.3	11.1
86 AP 64	85.6	64.1	64.1	79.0	14.3

See also:

Higher-quality plastic aspherics p.14
Fresnel lenses p.16

3.3 Glass aspheric condensers

Customise

These lenses are thermally toughened to withstand high temperatures (except as noted) and are usually used to collimate light from a lamp or similar source. Their large apertures allow efficient collection.

The steeply-curved aspheric surface is moulded and fire-polished; the second surface, facing the source, is ground and polished (except as noted).

Specification

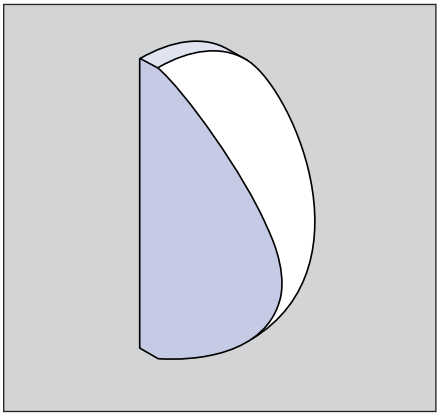
Diameter	nominal
Focal length	nominal
Material	B270 (see p.2)

Literature available

Technical note 'Design of illumination systems'.

Options available (see p.3)

- Mounting (some lenses only)
- AR coating (single-layer only)
- Edging to smaller diameters



Catalogue No.	Focal length (mm)	Diameter (mm)	Back FL (mm)	Centre thick. (mm)	Form
06 AF 07	5.9	6.8	4.0	2.8	planovex
08 AF 10	8.3	9.9	5.6	4.1	planovex
10 AF 12	10.5	12.0	7.6	5.2	bivex
14 AF 13*	14.0	12.9	10.2	5.7	planovex
15 AF 16	15.0	16.0	11.1	6.0	planovex
16 AF 25	16.5	24.8	10.5	9.2	planovex
18 AF 27	18.5	27.4	9.2	14.2	planovex
22 AF 21*†	21.8	21.3	17.5	8.2	bivex
29 AF 40	28.6	39.9	18.7	15.4	planovex
39 AF 50	39.0	50.0	26.2	19.5	planovex
55 AF 73	55.0	73.0	34.3	31.5	planovex

*Not toughened † Fire-polished both sides

See also:

Combinations including these lenses p.18
UV condenser lens p.19
Lamphouses pp.51,52

Comar

UK/Europe/Rest of world
Sales +44 (0)1223 866120
Technical +44 (0)1223 866130
Fax +44 (0)1223 866125
Email mail@comarinstruments.com

The Americas
Sales 1 866 40 COMAR (26627)
Technical 1 306 522 1515
Fax 1 306 781 6006
Email solutions@comaroptics.com

3.4 Fresnel lenses

Customise

These lightweight large-aperture plastic lenses are widely used as collimators and collectors, e.g. in sensor or communication systems. Alongside our low-cost standard range, we offer a precision range of different manufacture, with very close tolerances and better surface finish, and so suitable for more demanding applications such as projection systems and simulators.

Some 'cylindrical' lenses focusing light in one direction only are included.

Specification

Focal length:	
Standard range*	±5%
Precision range*	±1%
Design condition	Parallel light on grooved side
Material	Acrylic (see p.2)

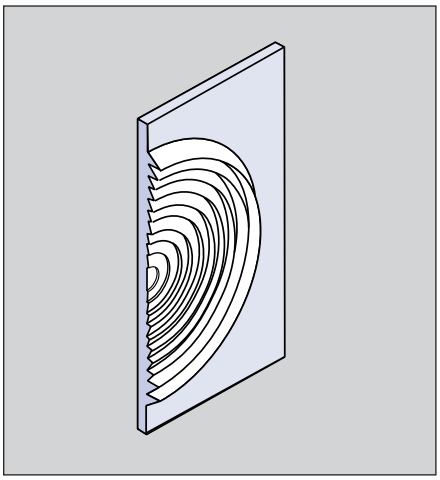
*Manufacturer's data

Options available

- Cutting to size
- Many other types available at short notice

See also:

Fresnel prisms and beam dividers p.30



Standard range

Catalogue No.	Focal length (mm)	Effective dia. (mm)	Overall size (mm)	Facet width (mm)	Thick-ness (mm)
10 FQ 13	10	13	26 x 26	0.1	1.5
15 FQ 25	15	25	39 x 39	0.13	1.5
22 FQ 33	22	33	51 x 51	0.1	1.5
25 FQ 25	25	25	38 x 38	0.25	1.5
32 FQ 50	32	50	58 x 58	0.2	1.5
38 FQ 50	38	50	58 x 58	0.2	1.5
50 FQ 50	50	50	64 x 64	0.25	1.5
61 FQ 63	61	63	76 x 76	0.2	1.5
70 FQ 102	70	102	127 x 127	0.25	1.5
76 FQ 152	76	152	170 x 170	0.25	1.5
100 FQ 63	100	63	76 x 76	0.2	1.5
127 FQ 102	127	102	127 x 127	0.2	1.5
152 FQ 152	152	152	170 x 170	0.2	1.5
254 FQ 152	254	152	170 x 170	1.0	1.5
Cylindrical-type lens					
152 FY 76	152	76 x 76	76 x 76	0.37	1.5

Precision range

Catalogue No.	Focal length (mm)	Effective aperture (mm)	Overall size (mm)	Facet width (mm)	Thick-ness (mm)
22 FQ 44	22.2	Ø44.4	50	0.64	2
25 FQ 61	25.4	Ø61.5	80	0.51	2
40 FQ 100	40	Ø100	110 x 110	0.5	2
100 FQ 200	100	Ø200	210 x 210	0.5	2
102 FQ 137	101.6	Ø137.2	150	0.51	2
150 FQ 300	150	Ø300	310 x 310	0.5	2
152 FQ 203	152.4	Ø203.2	220	0.25	2
200 FQ 400	200	Ø400	410 x 410	0.5	2
254 FQ 254	254	Ø254	315	0.25	2
279 FQ 406	279.4	Ø406.4	425	0.51	2
305 FQ 310	304.8	Ø310	315	0.51	2
400 FQ 387	400	Ø387	410	0.51	2
400 FQ 500	400	500 x 450	510 x 460	0.5	2
500 FQ 500	500	Ø500	510 x 510	0.5	2
600 FQ 600	600	Ø600	610 x 610	0.5	2
610 FQ 464	609.6	Ø463.6	465	0.51	2
Cylindrical-type lenses					
38 FY 203	38.1	203 x 38	250 x 50	0.25	2
150 FY 300	150	310 x 100	310 x 110	0.3	2

3.5 Commercial achromatic doublets

Customise

These are manufacturer's surplus items offered whilst stocks last at an economical price. Some items may have minor cosmetic defects.

For designs intended for production we would recommend the doublets on p.17, which are our own designs with full technical specification and are ongoing stock items.

Catalogue No.	Focal length (mm)	Dia. (mm)
24 DC 08	24	8.4
28 DC 17	28	17.5
29 DC 09	29	8.6
40 DC 18	40	17.7
47 DC 08	47	7.9
50 DC 18	50	17.8
53 DC 22	53	21.7
59 DC 25	59	25.2
69 DC 08	69	8.3

Catalogue No.	Focal length (mm)	Dia. (mm)
72 DC 15	72	14.9
99 DC 26	99	26.0
103 DC 29	103	28.5
170 DC 22	170	22.1

3.6 Achromatic doublets

Customise

These doublets easily outperform equivalent singlets even in monochromatic light, being corrected for spherical aberration and coma, as well as for chromatic aberration. Their performance and uses depend on the relative aperture. All but the largest apertures are essentially diffraction-limited on axis and give excellent imaging over a small field (say 5°) as required for microscopes, telescopes etc.

The performance of the largest-aperture lenses (marked *) is inevitably affected by higher-order aberrations, and they are typically used for laser or fibre collimation or focusing onto detectors, etc. For better imaging at these apertures in monochromatic light see doublet/meniscus combinations (p.19); for white light, see microscope objectives (p.20, section 4.6). All positive doublets are designed for an infinite conjugate (parallel light) on the more steeply curved side.

Negative doublets are commonly inserted between an objective and its image to increase the tube length (as in microscopy) or magnification (as in astronomy – a Barlow lens). They are therefore optimised for these conditions with a magnification of 2x. The conjugates can of course be adjusted to vary the magnification.

Specification

Diameter	+0, -0.1mm
Focal length	±0.1mm (≤10mm) ±1% (>10mm)
Scratch-dig	40-20 (see p.2)
Centration	0.1mm (FL≤40mm) 2.5mrad (FL>40mm)
AR coating	SLAR (see graph)

Options available (see p.3)

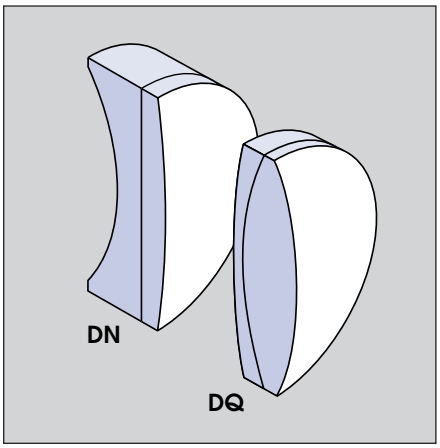
- Mounting (all items)
- Edging to smaller diameters

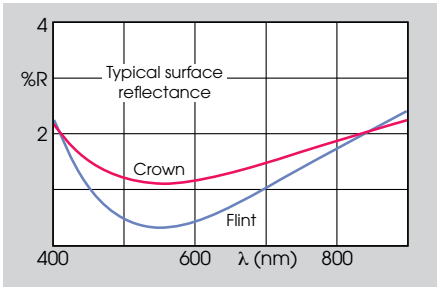
Technical data

Full prescriptions are available for computing purposes – please enquire

See also:

Doublet objectives (**OD** series) p.20
Doublet pairs for finite conjugates p.18





Catalogue No.	Focal length (mm)	Dia. (mm)	Back FL (mm)	Design aperture (mm)	Centre thick. (mm)	Edge thick. (mm)
Positive doublets						
04 DQ 03*	4	3.15	2.5	2.65	2.9	2.1
05 DQ 04*	5	4	3.1	3.3	3.6	2.7
06 DQ 04	6.3	4	4.8	3.15	3.6	2.8
08 DQ 06*	8	6.3	5.0	5.3	5.8	4.3
10 DQ 06	10	6.3	7.6	4.8	5.7	4.4
12 DQ 06	12.5	6.3	10.5	5.0	4.4	3.5
16 DQ 06	16	6.3	14.2	5.3	4.0	3.3
25 DQ 06	25	6.3	23.4	5.3	3.6	3.2
40 DQ 06	40	6.3	38.5	5.3	3.3	3.0
16 DQ 08	16	8	13.8	6.4	5.1	3.9
16 DQ 10*	16	10	12.7	9.0	6.1	4.3
20 DQ 10	20	10	17.2	8.0	6.4	4.9
25 DQ 10	25	10	22.9	9.0	4.5	3.4
40 DQ 10	40	10	38.0	9.0	4.3	3.5
63 DQ 10	63	10	61.2	9.0	4.0	3.6
32 DQ 12	31.5	12.5	28.9	11.3	5.7	4.3
25 DQ 16*	25	16	19.8	14.2	9.5	6.7
32 DQ 16*	31.5	16	27.8	14.4	7.7	5.3
40 DQ 16	40	16	36.7	14.4	7.3	5.4
50 DQ 16	50	16	47.4	14.5	5.6	4.1
63 DQ 16	63	16	60.5	14.5	5.3	4.0
100 DQ 16	100	16	97.6	14.5	5.3	4.6
63 DQ 20	63	20	59.7	18.3	7.0	5.2
80 DQ 20	80	20	77.4	18.4	5.6	4.1
40 DQ 25*	40	25	34.0	24.3	10.5	6.1
50 DQ 25*	50	25	45.1	23.5	10.3	6.6

Catalogue No.	Focal length (mm)	Dia. (mm)	Back FL (mm)	Design aperture (mm)	Centre thick. (mm)	Edge thick. (mm)
63 DQ 25*	63	25	58.6	23.5	9.2	6.3
80 DQ 25	80	25	76.3	23.2	7.7	5.4
100 DQ 25	100	25	96.8	23.0	7.0	5.2
125 DQ 25	125	25	122.3	23.7	5.7	4.3
160 DQ 25	160	25	157.7	24.0	4.9	3.7
200 DQ 25	200	25	197.4	24.0	5.7	4.7
250 DQ 25	250	25	248.0	24.0	4.2	3.5
315 DQ 25	315	25	312.7	24.0	5.0	4.4
400 DQ 25	400	25	397.7	24.0	4.8	4.3
500 DQ 25	500	25	497.6	24.0	4.6	4.3
160 DQ 32	160	31.5	156.5	30.4	7.3	5.6
200 DQ 32	200	31.5	197.1	30.0	6.1	4.6
63 DQ 40*	63	40	53.6	38.2	16.5	9.6
100 DQ 40*	100	40	94.2	38.0	11.8	7.2
160 DQ 40	160	40	155.5	38.0	9.2	6.4
250 DQ 40	250	40	246.4	37.5	7.6	5.7
400 DQ 40	400	40	397.2	38.8	5.9	4.7
100 DQ 50*	100	50	91.9	48.2	15.9	8.6
160 DQ 50*	160	50	153.8	48.2	12.4	7.9
250 DQ 50	250	50	245.2	48.2	9.6	6.7
400 DQ 50	400	50	395.6	48.5	8.6	6.7
630 DQ 50	630	50	627.1	48.5	6.3	5.1
Negative doublets						
40 DN 16	40	16	43.8	14.4	3.8	5.5
63 DN 25	63	25	69.0	24.0	6.0	8.7
100 DN 25	100	25	107.7	24.0	6.9	8.2
160 DN 25	160	25	169.8	24.0	8.7	9.6

*Apertures too large to be diffraction-limited (see text)