GMP
General Microtechnology & Photonics
Systems for Industry, Research, Telecom & Medicine

9.1 Diffraction gratings

≡Customise

Our **research** range of high-quality replica reflection gratings includes both ruled and holographic types. Generally ruled gratings have higher efficiency,while holographics have lower stray-light levels and are available in closer rulings. For the UV,however,blazed holographics are available with a similar profile and efficiency to ruled types. Efficiency curves are available on request.

The **commercial** range are inexpensive transmission replicas mounted between glass plates and are suitable for simple demonstrations etc.

Options available

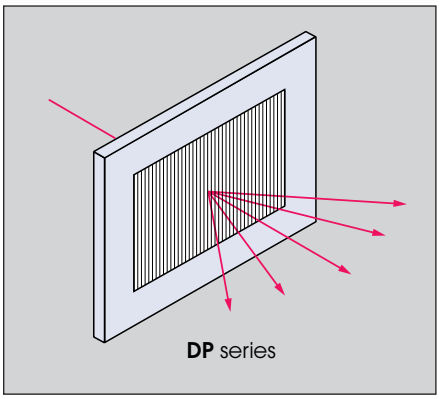
Research range: Other wavelengths, sizes and coatings, transmission types etc. available to order.

Data for calculation

Light of wavelength λ incident at an angle i will be diffracted at angles i' given by:

$$\sin i' = Gn\lambda - \sin i$$

where G = groove density (lines/mm) and n is the order of diffraction (any integer). Blazed gratings have facets inclined at an angle b to the surface to concentrate light into the first order (n = +1). When the grating is used in the Littrow condition (retroreflection, i = i') peak efficiency will be near the blaze wavelength shown (= (2/G) sin b).



DP series

Research range – ruled

Catalogue No.	Lines/ mm	Blaze (nm)	Size (mm)
600 DG 300	600	300	25 x 25 x 9.5
600 DG 500	600	500	25 x 25 x 9.5
600 DG 1000	600	1000	25 x 25 x 9.5
600 DG 1600	600	1600	25 x 25 x 9.5
1200 DG 250	1200	250	25 x 25 x 9.5
1200 DG 500	1200	500	25 x 25 x 9.5
1200 DG 750	1200	750	25 x 25 x 9.5

Research range – holographic

Catalogue No.	Lines/ mm	Blaze (nm)	Size (mm)
Optimised for visible			
1200 DI 00	1200	–	25 x 25 x 9.5
2400 DI 00	2400	–	25 x 25 x 9.5
Blazed for UV			
1200 DI 240	1200	240	25 x 25 x 9.5
2400 DI 240	2400	240	25 x 25 x 9.5

Commercial range

Catalogue No.	Lines/ mm	Eff. size (mm)	Size (mm)
100 DP 00	100	45 x 30	65 x 50
200 DP 00	200	45 x 30	65 x 50
300 DP 00	300	45 x 30	65 x 50
600 DP 00	600	45 x 30	65 x 50

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9.2 Bar gratings and resolution charts

≡Customise

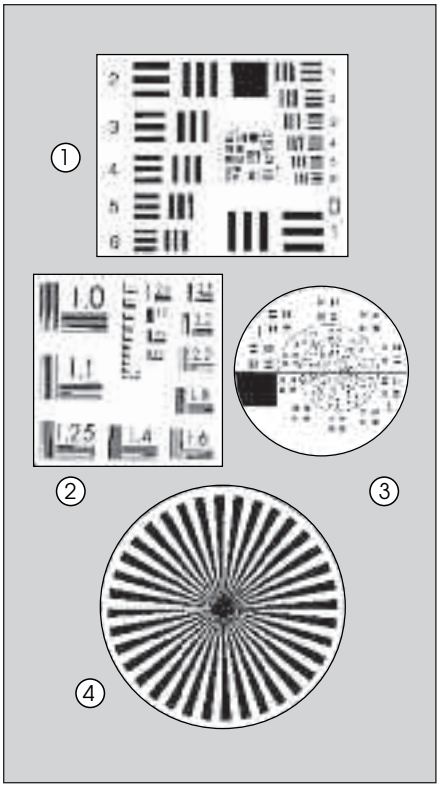
Bar gratings consist of a pattern of equal bars and spaces formed in chromium on a glass substrate, commonly used for moiré, Ronchi and other metrological techniques.

Resolution charts provide a range of spatial frequencies for optical testing, and similarly consist of precision metallic patterns deposited on a transparent glass substrate.

See also:

Scratch-dig standard p.2

Catalogue No.	Lines/mm	Overall size (mm)	Fig.	Pattern
Bar gratings				
02 RD 50	2	50 x 50	–	Bar gratings with equal bars and spaces
08 RD 50	8	50 x 50	–	
20 RD 50	20	50 x 50	–	
40 RD 50	40	50 x 50	–	
50 RD 50	50	50 x 50	–	
100 RD 50	100	50 x 50	–	
125 RD 50	125	50 x 50	–	
Resolution charts				
02 RU 50	1-228	50 x 50	1	USAF 1951, groups 0-7
04 RU 75	1-18	75 x 75	2	NBS 1963A (BS 4657)
06 RU 75	1-10	75 x 75	3	Cobb chart (BS 1613)
08 RU 50	0.46-57	50 x 50	4	36-sector star 25mm dia.



9.3 Eyepiece and stage graticules

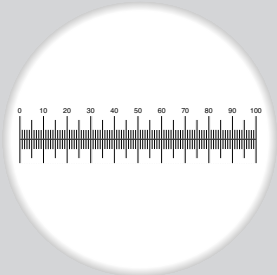
Customise

Eyepiece graticules include scales for measuring linear dimensions, circles for estimating diameters and radii, and a protractor for angles. Scales can be calibrated by comparison with a stage graticule, supplied in convenient microscope slide format.

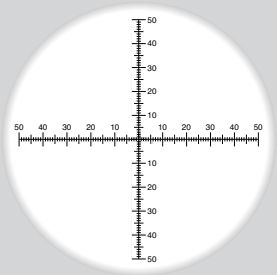
Catalogue No. Eyepiece graticules 19mm dia.	21mm dia.	Catalogue No. Stage graticules 76 x 25mm	Line width (µm)	Pattern
00 GG 19	00 GG 21	–	10	cross lines
02 GG 19	02 GG 21	–	20	cross lines
–	–	11 GG 76	1	scale 1mm in 0.01mm divisions
05 GG 19	05 GG 21	05 GG 76	10	scale 5mm in 0.05mm divisions
06 GG 19	06 GG 21	06 GG 76	10	scale 10mm in 0.1mm divisions
07 GG 19	07 GG 21	–	10	crossed scales 10mm/0.1mm div.
08 GG 19	08 GG 21	–	10	grid 10 x 10mm of 0.1mm squares
10 GG 19	10 GG 21	–	10	protractor 10mm dia.
12 GG 19	12 GG 21	–	5/10	circles 1-16mm dia.

See also:

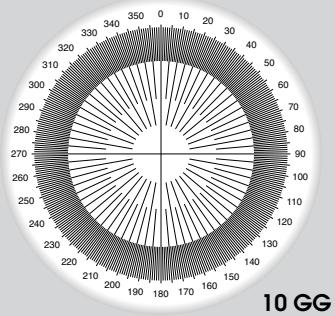
Eyepieces p.21
Microscope tubes p.22



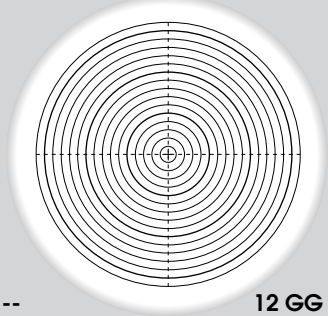
05 GG --/06 GG --



07 GG --



10 GG --

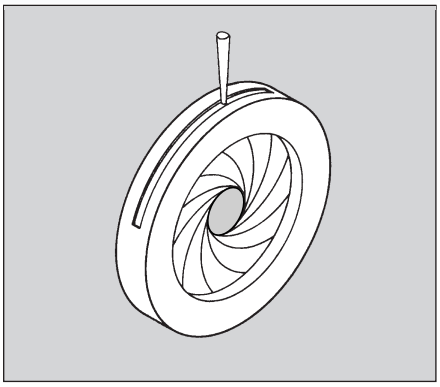


12 GG --

9.4 Iris diaphragms

Iris diaphragms are commonly used in optical systems to control light-throughput or f/number. The diaphragms in our range have blackened brass bodies and blackened steel leaves. The **IZ** fully closing types have two sets of leaves that overlap on closing thus completely blocking the beam. As the sets of leaves are longitudinally separated, these are best used with well-collimated light.

Catalogue No.	Maximum aperture (mm)	Minimum aperture (mm)	Outside diameter (mm)	Thickness (mm)	Pin length (mm)	Number of leaves
05 IC 10	5	0.7	10	4.5	10	6
08 IC 15	8	0.7	14.8	4.5	10	8
12 IC 20	12	0.8	19.8	5.0	11	10
15 IC 24	15	0.8	24	5.0	10	12
18 IC 28	18	0.8	28	5.0	12	12
20 IC 30	20	0.8	30	5.5	12	12
22 IC 33	22	0.8	33	5.5	12	14
25 IC 37	25	0.8	37	5.5	12	14
28 IC 40	28	1.2	40	5.5	12	16
34 IC 49	34	1.0	49	6.5	12	14
37 IC 53	37	1.2	53	6.0	12	16
42 IC 58	42	1.2	58	6.5	12	18
50 IC 70	50	2	70	7.5	12	16
58 IC 80	58	3	80	8.0	12	18
75 IC 100	75	4	100	9.0	15	20
120 IC 165	120	6	165	15	30	18
225 IC 300	225	12	300	18	30	18
Fully closing iris diaphragms						
12 IZ 21	12	0	21	6	11	10
25 IZ 38	25	0	38	6	13	14
37 IZ 54	37	0	54	7.5	13	16



See also:

TubeMount iris diaphragms p.58
Iris diaphragms in holders (post-mounted) p.84

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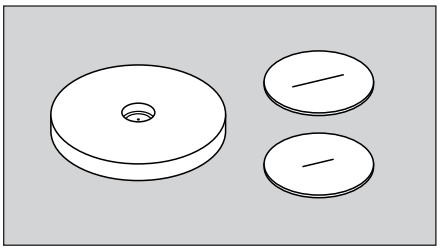
9.5 Precision apertures

Our precision apertures are prepared in copper foil by an electroforming process, which allows very precise control of size and shape, and thins the substrate around the aperture leaving a sharp well-defined edge.

The foil is blacked one side to reduce reflections. Pinholes are supplied in mounts 16mm dia. 1.5mm thick; slits are unmounted foils 10mm dia.



Specification

Circularity/straightness:*

<25µm	0.5µm
25-63µm	1µm
100µm	1.5µm
>100µm	2µm

Centration:*

To foil edge	20µm
To mount	100µm

*Manufacturer's data

Pinholes (in 16mm mount)

Catalogue No.	Aperture dia. (µm)	Foil thickness (µm)
025 HP 16	2.5 ± 0.5	9
04 HP 16	4 ± 0.5	8
06 HP 16	6 ± 0.5	7
10 HP 16	10 ± 0.5	8
16 HP 16	16 ± 1	15
25 HP 16	25 ± 1	11
40 HP 16	40 ± 1.5	16
63 HP 16	63 ± 1.5	7
100 HP 16	100 ± 2	14

Slits (unmounted 10mm foils)

Catalogue No.	Width (µm)	Length (mm)	Foil thick. (µm)
05 HS 10	5 ± 0.5	3	16
10 HS 10	10 ± 0.5	3	13
25 HS 10	25 ± 1	5	17
50 HS 10	50 ± 1.5	5	17
100 HS 10	100 ± 2	7.5	22
200 HS 10	200 ± 2.5	7.5	22
500 HS 10	500 ± 3	7.5	22

9.6 Standard and high-power apertures

Customise

These apertures are laser-drilled in discs 9.53mm dia. and are available unmounted or in two mount sizes.

The **standard** range are in 302 stainless steel 12.5µm thick, except the 1µm and 2µm which are in a 2.5-5µm patch on an 0.1mm backing.

High power apertures are in copper, gold plated on one side, flat poly black (98% emissivity) on the other, and typically withstand 100-200MW/cm^2 for a 10ns pulse (700nm). Thickness is 0.15mm, thinned to 25µm around the aperture.

Options available

- Special sizes and mounts
- Black one or both sides
- Closer tolerance or calibration
- Thicker substrate (0.15mm)

Specification

Centration:*

To foil edge	50µm
To mount	150µm

Pinhole roundness:*

1-15µm	0.5µm
20-50µm	1µm
≥75µm	2µm

Slit straightness* 2µm

*Manufacturer's data

Standard series pinholes

Catalogue No. Foil 9.53mm dia.	Catalogue No. Mounted 16mm dia.	Catalogue No. Mounted 25mm dia.	Aperture dia. (µm)
01 HL 10	01 HL 16	01 HL 25	1 +0.5, -0
02 HL 10	02 HL 16	02 HL 25	2 ± 0.5
03 HL 10	03 HL 16	03 HL 25	3 ± 0.5
05 HL 10	05 HL 16	05 HL 25	5 ± 1
10 HL 10	10 HL 16	10 HL 25	10 ± 1
15 HL 10	15 HL 16	15 HL 25	15 ± 1.5
20 HL 10	20 HL 16	20 HL 25	20 ± 2
25 HL 10	25 HL 16	25 HL 25	25 ± 2
35 HL 10	35 HL 16	35 HL 25	35 ± 2
50 HL 10	50 HL 16	50 HL 25	50 ± 3
75 HL 10	75 HL 16	75 HL 25	75 ± 3
100 HL 10	100 HL 16	100 HL 25	100 ± 4
150 HL 10	150 HL 16	150 HL 25	150 ± 6
200 HL 10	200 HL 16	200 HL 25	200 ± 6
300 HL 10	300 HL 16	300 HL 25	300 ± 8
400 HL 10	400 HL 16	400 HL 25	400 ± 10
600 HL 10	600 HL 16	600 HL 25	600 ± 10
800 HL 10	800 HL 16	800 HL 25	800 ± 10
1000 HL 10	1000 HL 16	1000 HL 25	1000 ± 10

Standard series slits

Catalogue No. Foil 9.53mm dia.	Catalogue No. Mounted 16mm dia.	Catalogue No. Mounted 25mm dia.	Slit length (mm)	Slit width (µm)
025 HM 10	025 HM 16	025 HM 25	1	2.5 +1,-0.5
05 HM 10	05 HM 16	05 HM 25	3	5 ± 1
10 HM 10	10 HM 16	10 HM 25	3	10 ± 1
25 HM 10	25 HM 16	25 HM 25	3	25 ± 2
50 HM 10	50 HM 16	50 HM 25	3	50 ± 2
100 HM 10	100 HM 16	100 HM 25	3	100 ± 4

High power pinholes

Catalogue No. Foil 9.53mm dia.	Catalogue No. Mounted 16mm dia.	Catalogue No. Mounted 25mm dia.	Aperture dia. (µm)
05 HG 10	05 HG 16	05 HG 25	5 ± 1
10 HG 10	10 HG 16	10 HG 25	10 ± 1
25 HG 10	25 HG 16	25 HG 25	25 ± 2
50 HG 10	50 HG 16	50 HG 25	50 ± 3
100 HG 10	100 HG 16	100 HG 25	100 ± 4

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