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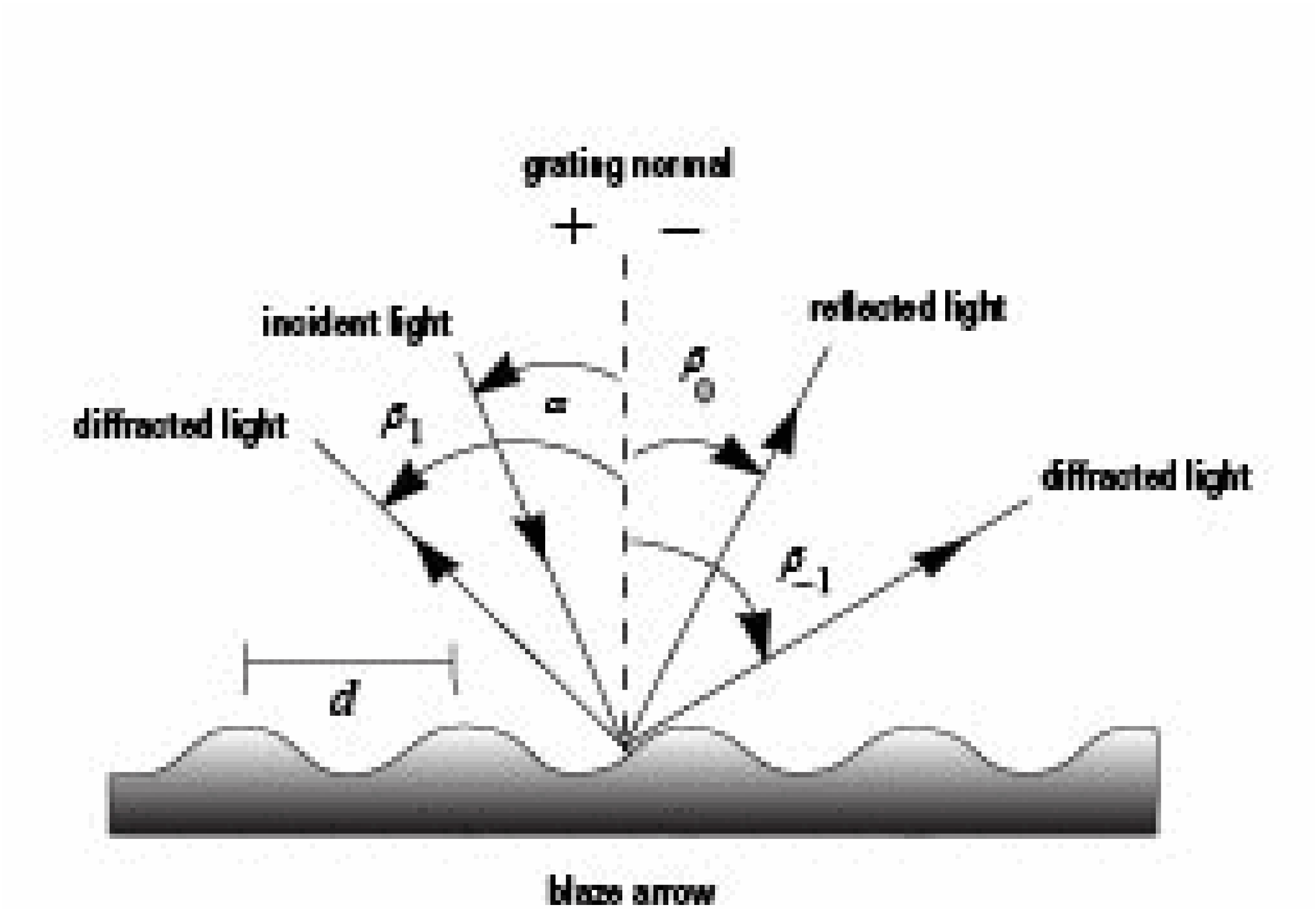
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Build to Order Plane Holographic Diffraction Gratings

A holographic diffraction grating has a sinusoidal groove shape, created by recording interference fringe fields in photoresist material. Since the grooves are symmetric, they do not have a preferred blaze direction. The range of useful diffraction efficiency is controlled by varying the modulation (the ratio of groove depth to groove spacing). The lower the modulation, the shorter the wavelength limit to which the grating can be used, but the peak efficiency may be lowered as well. Holographic gratings contain no periodic errors or "ghosts" as they are generated optically.

- Extremely high diffraction efficiency
- More accurate periodicity and less ghosting than ruled gratings
- Special size, substrate and coating options



Master Grating Options

Plane holographic gratings are listed in order of groove frequency, with the lowest blaze angle listed first. Blaze wavelengths listed are for the first-order Littrow configuration. The maximum ruled area is groove length x ruled width. Click on a Master Grating Code (last 4 digits of a grating's part number) below to view master grating efficiency curves. Use the request a quote to get a quote based on your requirements. For additional diffraction grating options and custom capabilities, please see the Features section.

Master Grating Code	Grooves per mm	Nominal Blaze Wavelength (1st Order Littrow, nm)	Recommended Spectral Region	Maximum Ruled Area (Groove Length x Ruled Width, mm)	Standard Parts Availability	Overstock Availability	Request a Quote
468H	4968	370	200 nm - 400 nm	102 x 102			Quote
058H	4320	350	270 nm - 450 nm	102 x 102		Yes	Quote
551H	4320	275	160 nm - 400 nm	84 x 84		Yes	Quote
510H	3600	200	130 nm - 500 nm	102 x 102	Yes	Yes	Quote
520H	3600	250	150 nm - 500 nm	102 x 102		Yes	Quote
530H	3600	300	180 nm - 500 nm	102 x 102		Yes	Quote

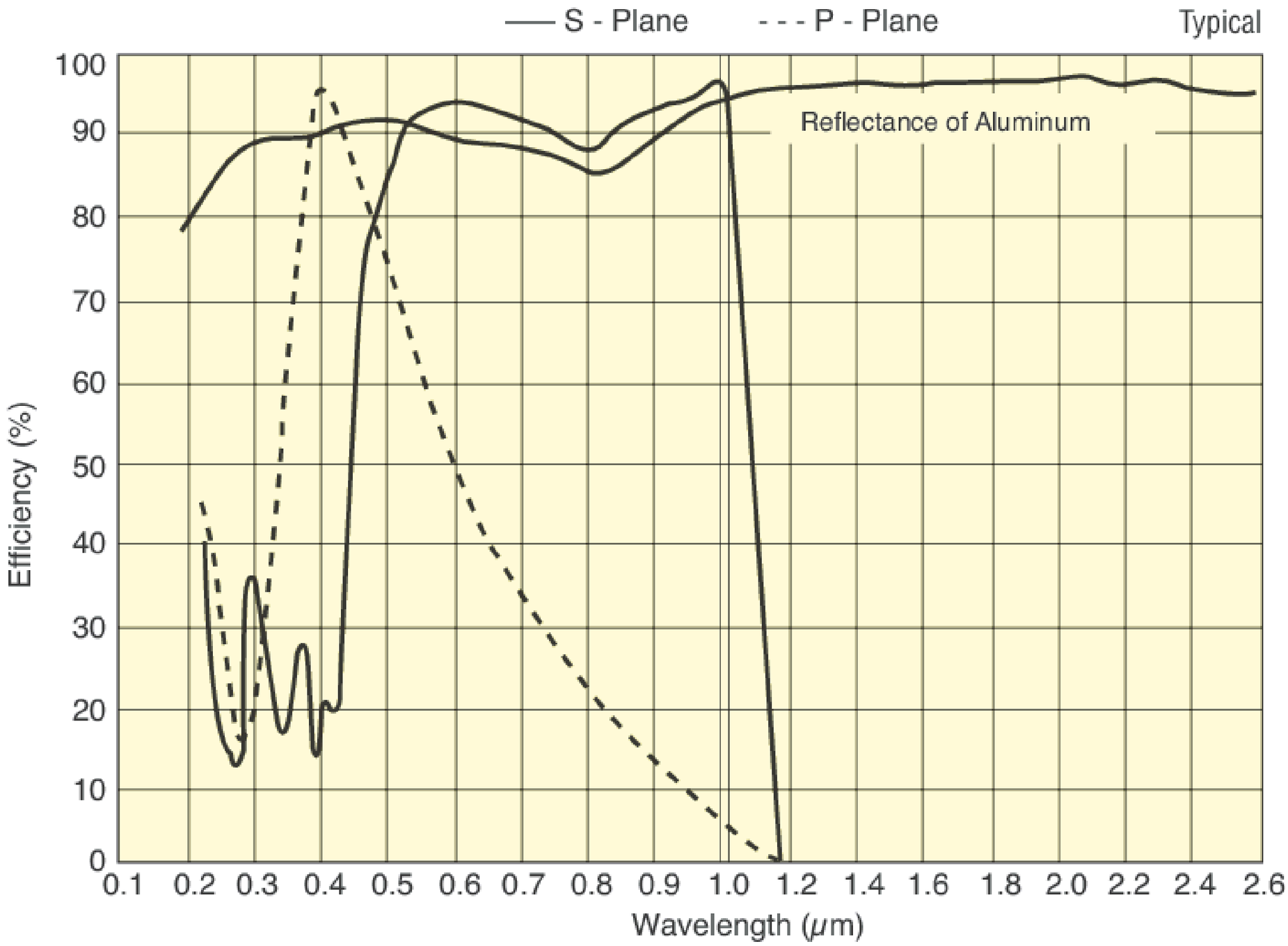
Master Grating Code	Grooves per mm	Nominal Blaze Wavelength (1st Order Littrow, nm)	Recommended Spectral Region	Maximum Ruled Area (Groove Length x Ruled Width, mm)	Standard Parts Availability	Overstock Availability	Request a Quote
445H	2991	270	200 nm - 600 nm	102 x 102		Yes	Quote
400H	2400	250	190 nm - 800 nm	102 x 102		Yes	Quote
410H	2400	250	150 nm - 800 nm	102 x 102	Yes		Quote
420H	2400	270	200 nm - 800 nm	102 x 102	Yes	Yes	Quote
430H	2400	300	250 nm - 800 nm	102 x 102	Yes	Yes	Quote
059H	2000	475	300 nm - 950 nm	102 x 102		Yes	Quote
320H	1800	450	250 nm - 900 nm	102 x 102	Yes	Yes	Quote
330H	1800	500	350 nm - 900 nm	102 x 102		Yes	Quote
300H	1800	250	190 nm - 900 nm	102 x 102	Yes	Yes	Quote
310H	1800	300	200 nm - 900 nm	102 x 102	Yes	Yes	Quote
233H	1760	550	650 nm - 1.1 µm	102 x 102		Yes	Quote
136H	1714	550	650 nm - 1.1 µm	102 x 102		Yes	Quote
106H	1596	770	400 nm - 1.2 µm	102 x 102		Yes	Quote
237H	1500	510	250 nm - 1.3 µm	102 x 102		Yes	Quote
239H	1500	600	250 nm - 1.3 µm	102 x 102		Yes	Quote
240H	1500	460	250 nm - 1.3 µm	102 x 102		Yes	Quote
229H	1350	650	300 nm - 1.5 µm	102 x 102		Yes	Quote
143H	1312	650	300 nm - 1.5 µm	102 x 102		Yes	Quote
200H	1201.6	250	190 nm - 800	102 x 102	Yes	Yes	Quote
205H	1201.6	210	190 nm - 800	102 x 102		Yes	Quote
210H	1200	450	300 nm - 1.2 µm	64 x 64	Yes	Yes	Quote
220H	1200	700	400 nm - 1.2 µm	102 x 102	Yes	Yes	Quote
230H	1200	800	500 nm - 1.2 µm	110 x 110		Yes	Quote
548H	1150	620	300 nm - 1.65 µm	102 x 102			Quote
544H	1100	900	400 nm - 1.7 µm	110 x 110		Yes	Quote
241H	1050	600	500 nm - 1.8 µm	102 x 102			Quote
243H	1050	800	600 nm - 1.8 µm	102 x 102		Yes	Quote
244H	1050	900	650 nm - 1.8 µm	102 x 102		Yes	Quote
245H	1050	1000	650 nm - 1.7 µm	102 x 102		Yes	Quote
246H	1050	1100	650 nm - 1.8 µm	102 x 102		Yes	Quote
248H	1033	1450	1.25 µm - 1.45 µm	Φ70			Quote
253H	1033	1275	1.25 µm - 1.45 µm	Φ70			Quote
112H	1000	230	200 nm - 400	102 x 102		Yes	Quote
262H	950	1000	500 nm - 1.75 µm	102 x 102		Yes	Quote
268H	900	800	400 nm - 1.7 µm	102 x 102		Yes	Quote
269H	900	800	400 nm - 1.7 µm	102 x 102		Yes	Quote
175H	750	1200	850 nm - 2.3 µm	102 x 102		Yes	Quote
313H	600	250	200 nm - 700	102 x 102		Yes	Quote
302H	300	230	200 nm - 700	102 x 102		Yes	Quote
305H	150	250	200 nm - 700	62 x 62			Quote
471H	75	270	200 nm - 700	102 x 102			Quote
282H	30	250	200 nm - 700	102 x 102			Quote

Features

Blazed Holographic Grating Construction

Holographic diffraction gratings typically have a sinusoidal surface profile generated optically by recording an interference pattern onto a photoresist-coated substrate. The photoresist is then coated with a vacuum deposited metal layer to produce a master grating, which may be used as a mold to produce replicated gratings. The final product typically consists of a substrate, a resin bonding layer, a patterned metal reflective layer, and a protective over coating. Holographic blazed gratings are generated by bombarding a holographically produced master with an angled beam of ions to etch the sinusoidal surface profile into a symmetric triangular profile. Holographic gratings are ideal for use in spectroscopy systems requiring very high resolution.





Plane Holographic Reflection Grating, 1800 g/mm, high modulation, 350-900 nm recommended spectral range, aluminum coating

Diffraction Efficiency and Polarization Effects

Holographic diffraction gratings can have very high diffraction efficiency, even above that of flat aluminum reflectors, at the design wavelengths and orientation. Diffraction efficiency is highly dependent on polarization state. Planar holographic gratings typically feature narrower spectral bandwidth, and have their peak efficiency at a shorter wavelength for P-polarization compared to S-polarization. For laser cavity applications this property may be used to feed back light from a specifically chosen wavelength and polarization state back into the laser gain medium to control the output of the laser. Conversely, applications such as spectrometers designed to operate using unpolarized light may require the use two gratings in conjunction with a polarizing beamsplitter to obtain optimum results.

Optimum Grating Orientation

Like their ruled counterparts, holographic gratings are most efficient when used in the Littrow configuration, or aligned so that the diffraction angle of the dominant diffraction order is coincident with the input beam, effectively behaving as a retroreflector at a specific wavelength. This geometry is especially useful for applications using a diffraction grating inside a laser cavity to select a particular wavelength. Only the exact chosen wavelength will reflect into the laser cavity. Holographic gratings are particularly useful because they have peak efficiency only at a particular polarization, allowing them to be used as a substitute for a Brewster window to control the laser output polarization.

Catalog Part Number System

All standard Richardson gratings have a part number according to the following format:

AA BBB CC DD - EEE x

- **AA** indicates the type of grating (e.g., diced, plano, grism).
- **BBB** indicates the size of the grating substrate.
- **CC** indicates the substrate material
- **DD** indicates the type of coating
- **EEE** indicates the master grating groove parameters
- **x** indicates the master grating type (e.g., ruled, holographic, echelle)

Please see Diffraction Grating Part Number System for additional information.

Grating Size Options

Grating size is usually dictated by the desired throughput, which is a function of the source and detector characteristics, the resolution of the optical system, and the required data-acquisition rate. The ruled area of each plane grating is shown in the specification table as the "Maximum Ruled Area" which is the groove length followed by the ruled width (for example, 65 x 75 mm indicates a groove length of 65 mm and a ruled width of 75 mm). This determines the largest size allowed from the size options table below.

The dimensions of the ruled area and the substrate may be altered from the regular catalog sizes at an additional cost. Special elongated grating shapes are available (e.g., for echelles and laser tuning gratings).

Size Code BBB	Substrate Dimensions (mm)	Ruled Area (mm)
108	16.5 x 58 x 10	12 x 52
004	30 x 30 x 10	26 x 26
066	28.5 x 58 x 10	23 x 52
107	40 x 40 x 10	36 x 36
060	25 x 100 x 16	20 x 96
067	50 x 50 x 10	46 x 46
022	30 x 110 x 16	26 x 102
006	58 x 58 x 10	52 x 52
009	68.6 x 68.6 x 9.1	64 x 64
119	68 x 68 x 6	64 x 64
114	50 x 100 x 16	46 x 96
033	76 x 76 x 16	70 x 70
010	76 x 85 x 16	70 x 79
013	90 x 90 x 16	84 x 84
015	110 x 110 x 16	102 x 102
017	110 x 135 x 25	102 x 128
020	135 x 165 x 30	128 x 154

Size Code BBB	Substrate Dimensions (mm)	Ruled Area (mm)
025	110 x 220 x 30	102 x 204
027	135 x 220 x 35	128 x 204
028	165 x 220 x 35	154 x 206

Grating Substrate Material Options

The standard substrate material for small and medium-sized gratings is specially annealed borosilicate crown glass. Low expansion material can be supplied on request. Float glass may be used for small, diced gratings. In addition, replicas may be furnished on metal substrates, such as copper or aluminum, for applications with extreme thermal conditions. The substrate material codes CC are given below:

Substrate Material Code CC	Substrate Material
AL	Aluminum
BF	Borosilicate float or equivalent
BK	BK-7 glass or equivalent
CU	Copper
FL	Float glass
FS	Fused silica or equivalent
LE	Low-expansion glass
SP	Special glass (unspecified)
TB	BK-7, transmission grade
TF	Fused silica, transmission grade
UL	Corning ULE® glass
ZD	Schott Zerodur®

Diffraction Grating Coating Options

All reflection gratings include a standard aluminum (Al) reflectance coating (Coating Code "01"). Gratings can also be replicated in gold (Au), or overcoated with magnesium fluoride (MgF_2) or silver (Ag), to enhance reflectivity in certain spectral regions. The coating material codes DD are shown below:

Coating Code DD	Coating Material	Application
01	Aluminum (Al)	General purpose applications.
02	Gold (Au)	Offers higher reflectivity in the infrared.
03	Magnesium Fluoride (MgF_2)	Used to prevent oxidation of aluminum (Al) coatings, which helps maintain high reflectivity in the ultraviolet over time.
06	Protected Silver (Ag)	Offers higher reflectivity in the visible and near infrared. Silver is protected from tarnishing by a dielectric coating, which helps maintain reflection over time.

Custom Diffraction Gratings

Newport is pleased to discuss special and unusual applications that are not addressed by our build to order catalog diffraction gratings. In some instances, none of the hundreds of master gratings we have in stock meet specifications, so a new master may be required. Please see Custom Diffraction Gratings for additional information on our capabilities.

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