

Optical Surfaces' on-axis parabolic mirror production has been used by generations of customers. Our heritage goes back to the production of large astronomical telescope optics of over 1 metre for the Royal Greenwich Observatory and other discerning customers. During the course of the past 40 years, we have supplied many high quality mirrors for science, defence and space research

The on-axis mirror offers some advantages over its cousin, the off-axis parabola:

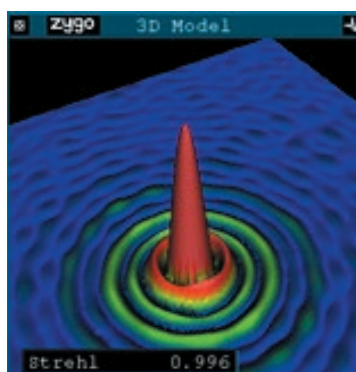
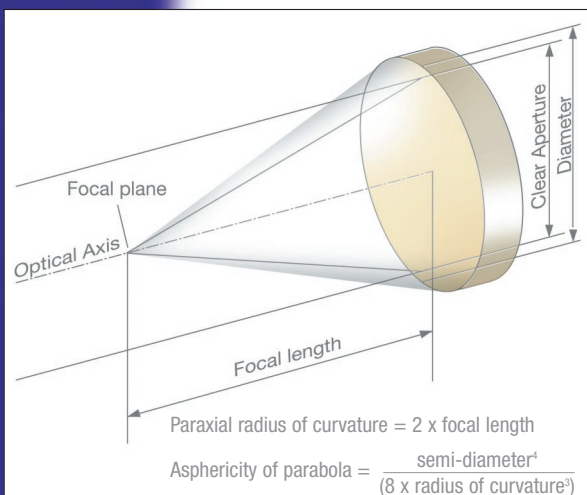
- The f-number that can be achieved is higher ("faster") therefore more energy can be concentrated.
- It has 3-D rotational symmetry resulting in a lower price for a given specification.
- Generally, (except for extreme f-numbers) alignment will be less critical, thus easier.
- In view of the above, surface roughness and slope errors of low value are easier to achieve.

All mirrors undergo rigorous testing with modern interferometry. Using the latest industry standard Zygo software, we measure typically 30000 data points (this varies according to the image size being acquired). These are then analysed to produce an OPD contour map of the optic with additional characteristics shown as required. These always include p-v and RMS surface accuracy, and may include other parameters such as slope error, Strehl Ratio, PSF plot or simulated image, according to customer preference.

Each mirror is accompanied by a test report showing that tolerances have been achieved.

The report gives recorded focal length, OPD map and interferogram, measured diameter and thickness. Other characteristics can be shown if required.

Standard mirrors are offered with Aluminium plus Magnesium Fluoride coating. A range of specialist coatings are also available, depending on diameter. Options are shown on the reverse of this data sheet. Spectral curves are available for each coating run if requested.



PSF plot showing, Strehl ratio of 0.996



Interferogram of lambda/12 mirror with central hole.

Options:

- Back of mirror polished perpendicular to optical axis to help alignment.
- Holes, blind holes, cut outs, truncation, laybacks, grooves round edge, lightweighting.
- Coating: gold, silver, dielectric for high power lasers, single stack for femto-sec use.
- Mounting – we advise purchasing your mirror in an Optisurf mount. We can then ensure stress free mounting and will produce test results in the mount.

The standard range:

The table indicates the normal limits to our production of on-axis paraboloids. The f-number column shows that the lower limit is around f1.0, which is imposed by increasing asphericity. However, faster mirrors – to f0.5 – have been made where the required surface accuracy is lower. The upper f-number limit results from the factor of air turbulence which inflates testing time and the resulting measurement uncertainty.

With the advantage of our adaptable tooling methods, it is possible at little or no extra cost to specify mirrors between the focal lengths or for different diameters and thicknesses to those given below.

Diameter:	100	125	152	205	254	305	356	406	457	500	600	800
Aperture:	90	110	140	190	230	290	330	380	431	475	570	740
Edge Thickness:	17	20	25	33	42	50	62	75	75	84	100	135
Focal length	f #	f #	f #	f #	f #	f #	f #	f #	f #	f #	f #	f #
100	1.1	0.9										
150	1.7	1.4	1.1	0.8								
200	2.2	1.8	1.4	1.1	0.9							
300	3.3	2.7	2.1	1.6	1.3	1.0						
400	4.4	3.6	2.9	2.1	1.7	1.4	1.2					
500	5.6	4.5	3.6	2.6	2.2	1.7	1.5	1.3				
600	6.7	5.5	4.3	3.2	2.6	2.1	1.8	1.6	1.4			
750	8.3	6.8	5.4	3.9	3.3	2.6	2.3	2.0	1.7	1.6		
1000	11.1	9.1	7.1	5.3	4.3	3.4	3.0	2.6	2.3	2.1	1.8	
1250	13.9	11.4	8.9	6.6	5.4	4.3	3.8	3.3	2.9	2.6	2.2	
1500	16.7	13.6	10.7	7.9	6.5	5.2	4.5	3.9	3.5	3.2	2.6	2.0
1750	19.4	15.9	12.5	9.2	7.6	6.0	5.3	4.6	4.1	3.7	3.1	2.4
2000	22.2	18.2	14.3	10.5	8.7	6.9	6.1	5.3	4.6	4.2	3.5	2.7
2500			17.9	13.2	10.9	8.6	7.6	6.6	5.8	5.3	4.4	3.4
3000				15.8	13.0	10.3	9.1	7.9	7.0	6.3	5.3	4.1
4000					17.4	13.8	12.1	10.5	9.3	8.4	7.0	5.4

Material:	fine-annealed pyrex with one face bubble selected. Zerodur, ULE are optional.
Diameter tolerance:	+0/-1mm
Thickness tolerance:	+0/-2mm
Focal length:	+/-1%
Surface accuracy:	lambda/10 p-v@633nm across entire clear aperture for f#1 or slower lambda/5 p-v@633nm across entire clear aperture for faster than f#1
Surface quality:	60/40 to MIL-O-13830 Rev H in which 60=60microns and 40=0.40mm
Coating:	Al+MgF12 to MIL-M-13508 for abrasion and adhesion
Spectral curves:	supplied free if requested at time of order
Micro-roughness:	<1.2nm rms. Measurements of roughness are not included in price.
Testing:	autocollimation against certified reference flat using Zygo GPI or LUPI. Small blank area in centre is unavoidable due to central obstruction.