

Optical Materials

1. GE 124 Fused Quartz Blank Plano-plano, 1780 mm diameter, 128 mm thick.

This is a plano-plano blank of GE 124 fused quartz, 1780 mm in diameter and 128 mm thick. This blank was cut from a larger boule so all the surfaces are saw cut finish. The twin of this piece cut from the same boule was fabricated into a 1.5 m lens for use as a test optic. A picture of the lens is shown in the 2nd item in this list. In this unfinished piece there is some damage at the edge of the blank in the area shown in the photo that extends in about 4" at the one location. The blank can be edged down to 1500-1550 mm to clear the damage. Other than the edge damage the blank is in excellent condition. The current weight of the blank is 865 kg or 1900 lbs.

Price: \$25,000 plus shipping.

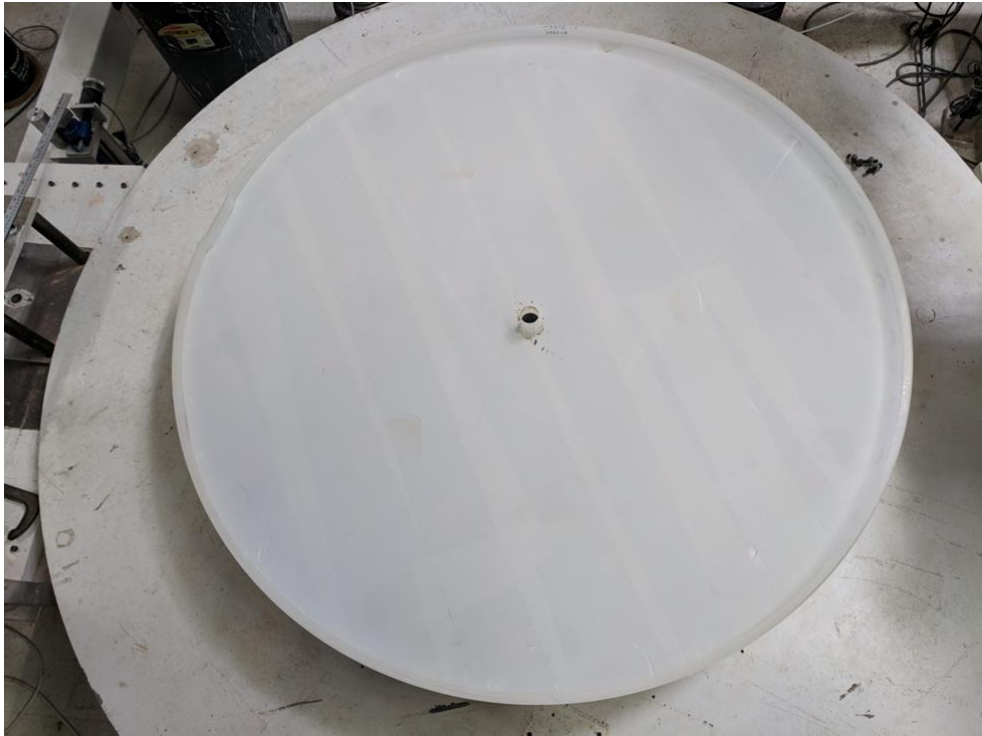


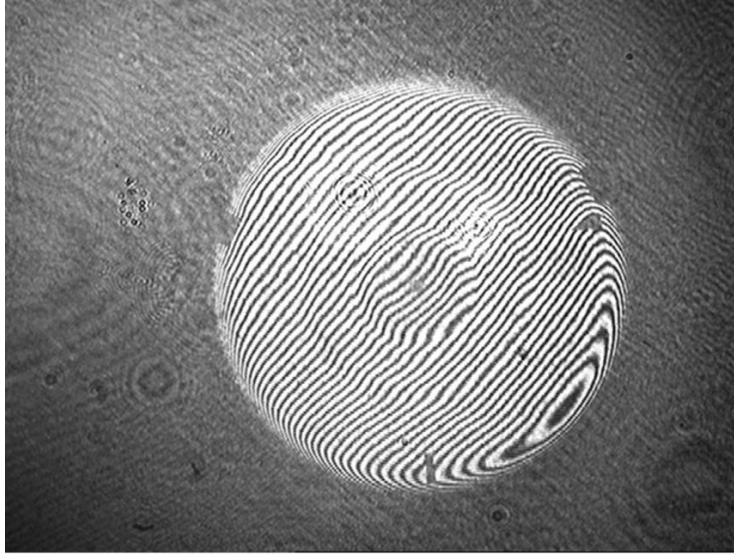


2. GE 124 Fused quartz concave-convex mirror, 1500 mm diameter, 100 mm center thickness.

This lens was made from the same boule of GE 124 fused quartz as the blank shown above in Item 1. The lens is 1500 mm in diameter and has a front concave surface radius of 7236 mm ($f/2.4$) and a rear convex surface radius of 4000 mm. The lens has a center thickness of 100 mm and an edge thickness of 70 mm. A 19 mm wide flat band has been ground at the top edge of the concave surface giving a polished front surface aperture of 1462 mm. Both sides are fully polished and spherical. There is a 50 mm hole through the center that can be used for inserting a lifting eye through the lens that bolts to a lifting plate underneath used for moving the lens. There is a notch in the edge of the lens extending across the edge that was used for alignment that is 150 mm long and extends inward 10 mm leaving a 9 mm flat in this region. It is at about the 10:00 position in the photo below. It does not extend into the polished aperture. In the photo it can be seen that the rear surface is coated with a protective layer of contact paper as it rests on a support system. In this setup the concave surface of the lens was being used as a test mirror in the test of another optic. An interferogram of the full aperture of the concave surface is shown here.

Price: \$20,000 plus shipping.





3. GE 124 Fused quartz concave-convex mirror, 1060 mm diameter, 83.5 mm center thickness, 68 mm edge thickness.

Polished spherical on both sides with a concave radius on one side of 7258 mm, and a convex radius on the other side of 4500 mm with an edge thickness of 68 mm. There is a 25 mm wide flat cut onto the surface edge of the concave surface. The concave surface has a thin film of chrome over part of the surface that can be removed. Weight: 410 lbs. Price: \$8,000 plus shipping.



4. GE 124 Fused quartz plano-concave mirror, 863 mm dia, 108 mm edge thickness.

This 863 mm diameter GE 124 quartz mirror has a polished front surface having a concave radius of curvature of 4775 mm ($f/2.77$) and a rear surface that is surface generated flat. It has an edge thickness of 108 mm and a center thickness of 88 mm. Weight: 345 lbs. Price: \$8,000 plus shipping.



5. Schott SK1 Optical Glass, Diameter 502 mm, thickness 80 mm

This item is a disk of SK1 glass from Schott having a diameter of 502 mm and a thickness of 80 mm. The blank was made for the military back in 1953 and appears to be of excellent quality. The homogeneity class is unknown but is bubble free. Price: \$4,000 plus shipping.



6. 808 mm diameter concave-convex Pyrex mirror

This item is a concave-convex Pyrex mirror, polished on both sides, with an edge thickness of 50 mm and a center thickness of 100 mm. The radius of curvature of the concave side is 4780 mm and the radius of the convex side is 1200 mm. Weight 235 lbs. Price: \$3200 plus shipping.



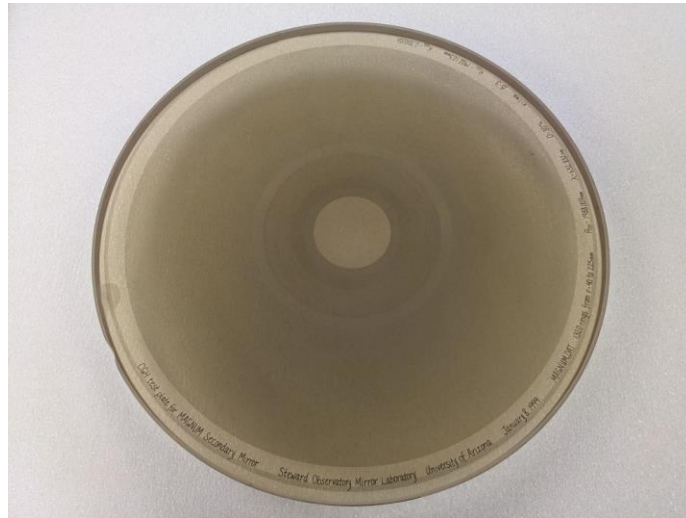
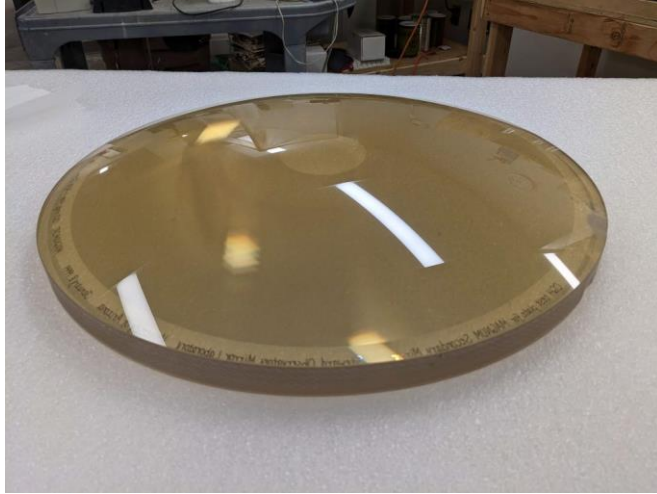
7. 752 mm diameter Hindle Sphere

This item is a Pyrex Hindle Sphere with a diameter of 752 mm, an edge thickness of 125 mm, and a center thickness of 34 mm. The radius of curvature of the concave surface is 815 mm (f/0.54). The rear surface is polished flat. The mirror is in excellent condition with a surface figure of 1 wave P-V. Test data available upon request. Weight: 235 lbs. Price: \$4000 plus shipping.



8. 511 mm diameter Zerodur Concave-Convex Mirror

This item is a concave-convex Zerodur mirror, 511 mm in diameter, edge thickness of 26 mm and center thickness of 49 mm. The radius of the concave side is 1988 mm and the radius of the convex side is 843 mm. A flat band 4 mm wide is ground on the edge of the concave surface. The mirror is polished on both sides. There are two small chips, one on the edge and one on the edge of the convex surface that have been stoned out and a thin film chrome coating on the concave side that can be removed. Weight: 45 lbs. Price: \$2200 plus shipping.



Optical Flats

1. 32" Diameter Zerodur High Precision Optical Flat, mounted.

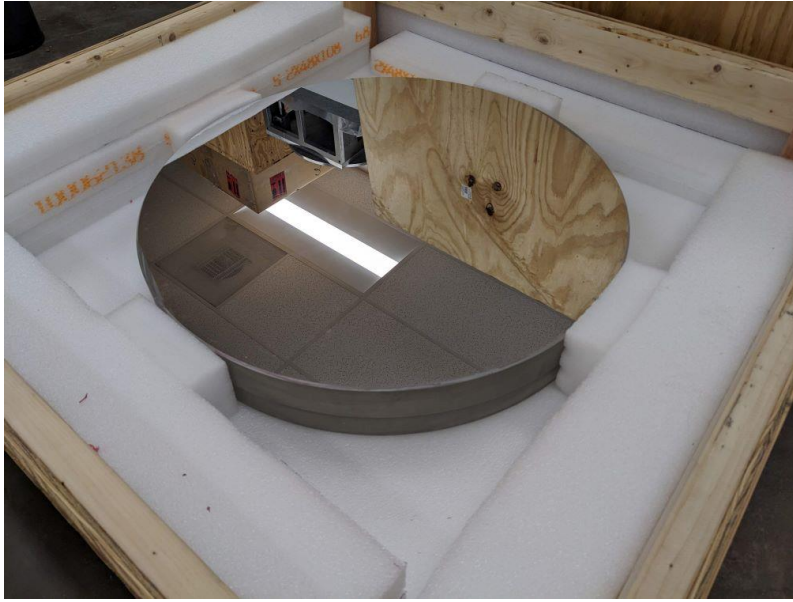
This item is a high quality Zerodur optical flat, 32 in. in diameter and 5 in. thick. It comes with a sling mount that is mounted on wheels as shown in the photos. The center height of the mounted mirror is 51 in. The mirror's surface was figured and tested by Zygo. The figure quality of the surface over a clear aperture of 30 in is: Irregularity 0.09λ P-V with a power error of 0.36λ P-V tested at 633 nm. Test data is available upon request. Weight: 400 lbs. Price: \$25,000 plus shipping.





2. 30" diameter fused quartz coated, high precision optical flat.

This mirror is a high quality optical flat 30" in diameter and 5" thick made from GE 124 fused quartz, having an aluminum coating with an SiO overcoat. The outer diameter has a step that was used for mounting purposes. There is some slight cosmetic damage on the optical coating that does not affect its optical performance. The mirror was figured by Zygo Corporation where the specification was for the front surface to have $< 0.5 \lambda$ power and $< 0.1 \lambda$ irregularity measured at 633 nm. However, we do not have available the actual test data from Zygo. The rear surface is ground flat. The weight is 350 lbs. Price: \$19,000 plus shipping.



3. 24" diameter, 3" thick Zerodur High Precision Optical Flat

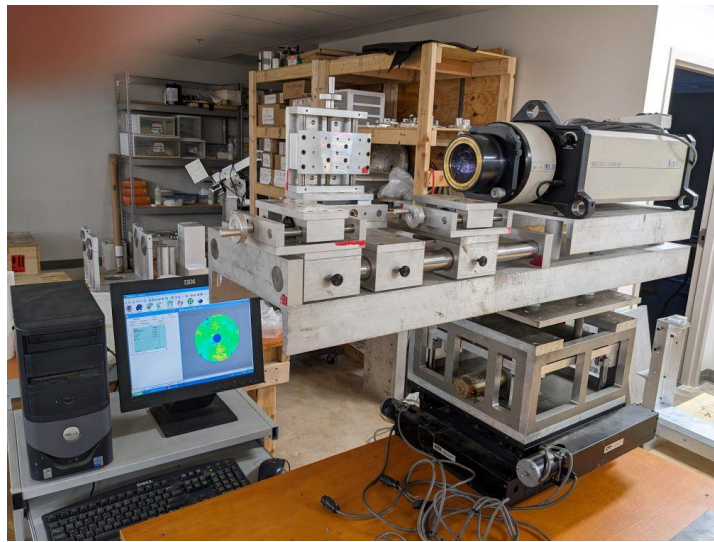
This is a Zerodur, high precision optical flat, 24" in diameter and 3" thick, polished on both sides. The optically flat surface quality is very good with some minor scattered cosmetic damage. On the edge of the rear surface there is a chip approximately 1.25" long and 0.75" wide as shown in the photograph (7:00 position) that has been completely stoned out. The optical surface was figured by Zygo Corporation and has a figure quality of < 0.1 wave P-V irregularity and < 0.5 wave P-V power. Weight: 140 lbs. Price: \$8,500 plus shipping.



Test Equipment

1. 100 mm MiniFiz Interferometer and Intelliwave software.

This is a phase-measuring 100 mm aperture interferometer from Phase Shift Technologies (now 4D Technology). It is in working order but needs new switches on the hand controller. The system includes a complete Dell computer acquisition system running Intelliwave software, Version 4.5.2.2. An optional three-axis stage is available as shown in the photo comprised of a stepper motor driven 2-axis Daedal stage and a large 12 v DC motor driven vertical stage. The transmission sphere shown in the photo is not included but is available as an option as shown below. Price: \$3000 for the interferometer, \$4500 for interferometer and stage, plus shipping.



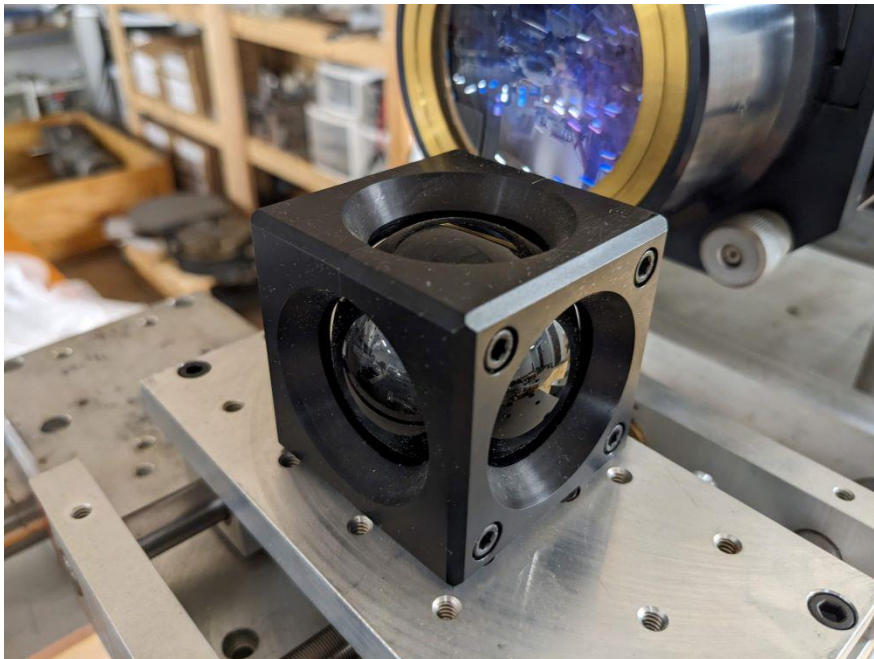
2. 100 mm aperture, f/1.5 Transmission spheres.

There are two transmission spheres available, one from CVI and the other from K Laser. Both are bayonet mounted suitable for most common Fizeau interferometers such as the MiniFiz shown above. They are both better than $\lambda/10$ wave P-V at f/1.5. Both are in excellent condition. High precision calibration of the lens can be performed with the calibration ball shown below. Price: \$3000 each plus shipping.



3. 50 mm Calibration Ball

This is a high precision ball made from opaque optical glass that is figured better than 5 nm rms over any 30 mm. The ball comes mounted in an open cube with 6 measuring ports. The ball can also be finger rotated within the cube. Averaging over 6 or more apertures can reduce the calibration error to better than 2 nm rms. Price: \$500 plus shipping.



4. Mitutoyo 200" Inside Micrometer

This inside micrometer, measuring in inches, is a complete set of the Mitutoyo 140-164. The set is in excellent condition and comes in the original case. Price: \$2000 plus shipping.

Accuracy: $\pm\{.00012+.00005n+(.00004 \times R/2)\}$, n=Number of rods R=Maximum measuring length (200 inches).

