rpo

Rochester Precision Optics

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Problem Solved.

Standard molded and machined lens components and assemblies for rapid prototyping and volume production.

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About RPO

Rochester Precision Optics (RPO) helps market leaders redefine what's possible — from design through prototype, fabrication and assembly of lens components and systems.

Our optical manufacturing and lens design expertises help us meet high product volumes, timeline and cost constraints. With quick turnaround and a wide range of in-house capabilities, RPO has manufactured over 350,000 optical assemblies and over 1,000,000 optical components. From design to assembly, our vertically integrated, 110,000 square foot manufacturing facility offers the capabilities you need, whether custom or standard.

- Molded glass and polymer aspheric optics
- IR molded and diamond turned aspheric optics
- Lens assemblies
- Electro-optical systems
- CNC optics manufacturing
- Precision machine shop
- Advanced in-line metrology and QC
- Supply chain management and overseas sourcing

Rochester Precision Optics

Vertically integrated for solving complex problems

- Optical assemblies — standard and custom
- Design and engineering services
- Precision molded glass aspheres
- Precision molded plastic optics
- High speed CNC optical fabrication
- Diamond turning optics
- Precision machining
- Thin film optical coatings
- Visible/UV/infrared (SWIR, MWIR, LWIR)
- Systems integration

RPO's customers create some of the most critical products on the market today — from night vision goggles to virtual reality and surgical instrumentation. RPO provides the advanced proprietary technology, vertical integration, LEAN manufacturing, and supply chain management needed to meet their high-volume demands.

Medical Devices

Life Sciences

Security

Consumer

Defense

ITAR Compliant International Traffic in Arms Regulations

CERTIFIED ISO 9001:2008 COMPANY

Ready Designs for Quick Turn Assemblies

After shipping over 300,000 assemblies, RPO spotted common customer challenges and have developed the expertise, from concept to design for manufacturability to assembly techniques, to deliver precisely and reliably. While we continue to excel in custom optical assemblies, we now offer these standard eyepiece designs.

The following designs can serve as a customizable starting point for precision eyepieces for a variety of applications and resolutions. These eyepiece assemblies can be ordered from the chart below or modified to specification. Ready-made eyepieces represent RPO's advanced optical assembly capabilities and full vertical integration. The entire product line is fabricated in house, from lens to housing.

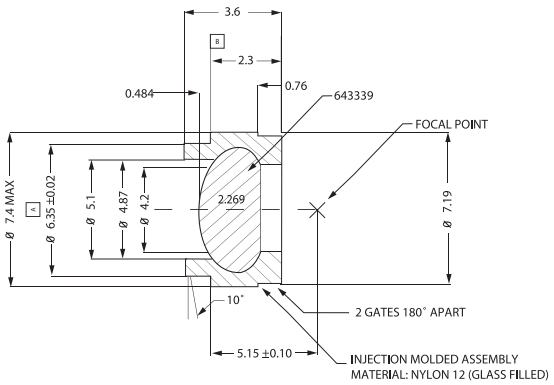
Display Type	EFL	Eye Relief	Lens Mass	Distortion	MTF at Nyquist	Relative Illumination
VGA	21 mm	22 mm	<10.0 grams	0.60%	>80%	84%
SVGA	27 mm	25 mm	<11.0 grams	0.40%	>80%	83%
SXGA	34 mm	25 mm	<21.5 grams	0.35%	>72%	82%
WUXGA	39.5 mm	25 mm	<23.0 grams	0.16%	>65%	83%

Each of our current ready designs utilize a field of view (FOV) of 32° (diagonal) and eye box diameter of 14 mm.

To address common customer challenges in mounting, we also offer injection mounted assemblies standard and custom:

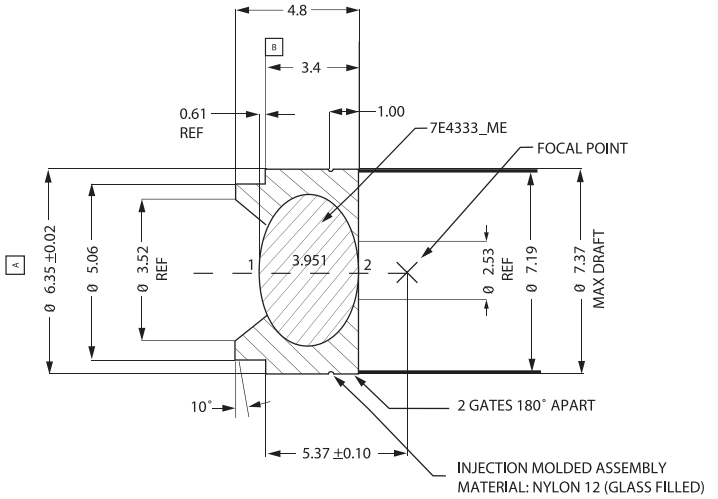
Injection Mounted Assemblies

A-365 CD Objective Lens - Glass



Optical Design Specifications	
PARAMETER	
Focal Length	4.59 mm
Numerical Aperture (NA)	0.53
Back Focal Length	3.718 mm
Clear Aperture	S1 4.87 mm, S2 3.95 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	NA
Center Thickness (CT)	2.269 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

N-414 Collimator Lens - Glass



Optical Design Specifications	
PARAMETER	
Focal Length	3.30 mm
Numerical Aperture (NA)	0.51
Back Focal Length	2.00 mm
Clear Aperture	S1 3.52 mm, S2 2.54 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.250 mm (BK-7)
Center Thickness (CT)	3.868 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

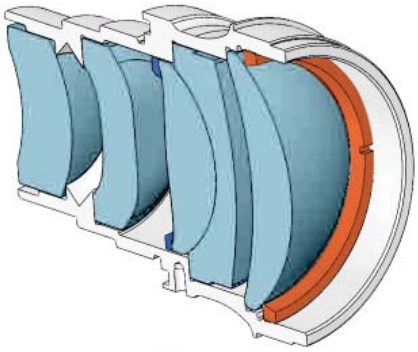
Custom Assemblies

RPO has the in-house capabilities to fabricate all your custom optical elements and assemblies. We can help you anywhere in the process, from conceptual design assistance to full assemblies, standard or custom.

With our Class 10,000 clean room assembly facilities and dedicated program cells, we are a valued partner for high-volume assemblies, eyepieces and objectives.

- Precision assembly
- Vertical integration
- Design support
- Build-to-print
- Rapid prototyping — as little as 4 weeks
- High-volume production
- Glass/plastic hybrid lenses
- Private-label production
- In-house machine shop

Custom eyepieces and optical assemblies



RPO's expertise in precision assemblies, glass and plastic hybrid designs, and high-volume production can cut cost, reduce weight, and improve performance.

Innovative Private-Label Products

In an exclusive partnership with a market-leading night vision provider, RPO manufactures hybrid glass and plastic eyepieces for handheld or headmounted goggles that:

- Reduce weight by 50%
- Replace existing components
- Improve performance

RPO collaborates with manufacturers and distributors to design and fabricate lenses, assemblies and eyepieces.

Molded Glass Aspheres

Proprietary PGM technology
for volume production

Rochester Precision Optics utilizes Precision Glass Molding (PGM) technology for rapid production of aspheric lenses. The proprietary approach provides significant cost and lead time advantages for high volume production. Today at RPO, we are producing custom molded aspheres for market-leading, high-volume applications in sizes from 1 mm to 60 mm.

Aspheric Glass Molding and Overview

The highly repeatable PGM process produces an optic that has a freeform edge and is centered to the customer specified finished diameter. RPO's vertical integration allows for in-house manufacturing and thin film coating. When necessary, RPO has the ability to add mechanical mounting features that are similar to plastic injection molding. These molded lenses can have spherical, aspheric, bi-aspheric and plano surfaces.

Precision Glass Molding Tolerances

Feature	Standard Quality	Precision Quality
Center Thickness	+/- 0.025 mm	+/- 0.012 mm
Diameter	+0/- 0.030 mm	+0/- 0.010 mm
Surface Deviation Power-Irregularity (Fringes)	5 - 2	3 - 1 (size/geometry dependent)
ETD (Wedge)	0.05 mm	0.01 mm
Axis Alignment	5 minutes	2.5 minutes
Scratch-Dig	60-40	40-20 20-10 up to 7 mm diameter
AR Coating	Single layer R < 1.5% per side*	Multi layer R < 0.5% per side*
Index of Refraction (Nd)	+/- 0.001	+/- 0.0005
Abbe Number (Vd)	+/- 0.8%	+/- 0.5%
Sag	+/- 0.015	+/- 0.010

*Minimum value for design wavelength

Lens and tool optical surface specifications (spherical or aspherical) are typically given in terms of fringes of surface departure from an ideal surface, which also includes irregularity of the surface in fringes.

Check **rpoptics.com** for our most recent tolerances and products.

RPO Standard Glass Types

Molding can be accomplished with a large range of glasses, and unlike many molders, RPO is not restricted to low transformation temperature (Tg) glasses. This large selection of glass offers the optical designer more freedom when designing multi-lens systems.

Table 1-2 lists current optical grade glass types that have been demonstrated in the RPO molding process. The glasses have gone through a molding verification process for their reaction to the temperature cycling and the effects on the tooling surfaces. The dispersion (Vd) and index (Nd) data show the after-molding values for these specific glasses. RPO is verifying new glasses regularly to expand its glass molding capabilities, and the latest list can also be found on our website at www.rpoptics.com and in optical design packages Code V and ZEMAX.

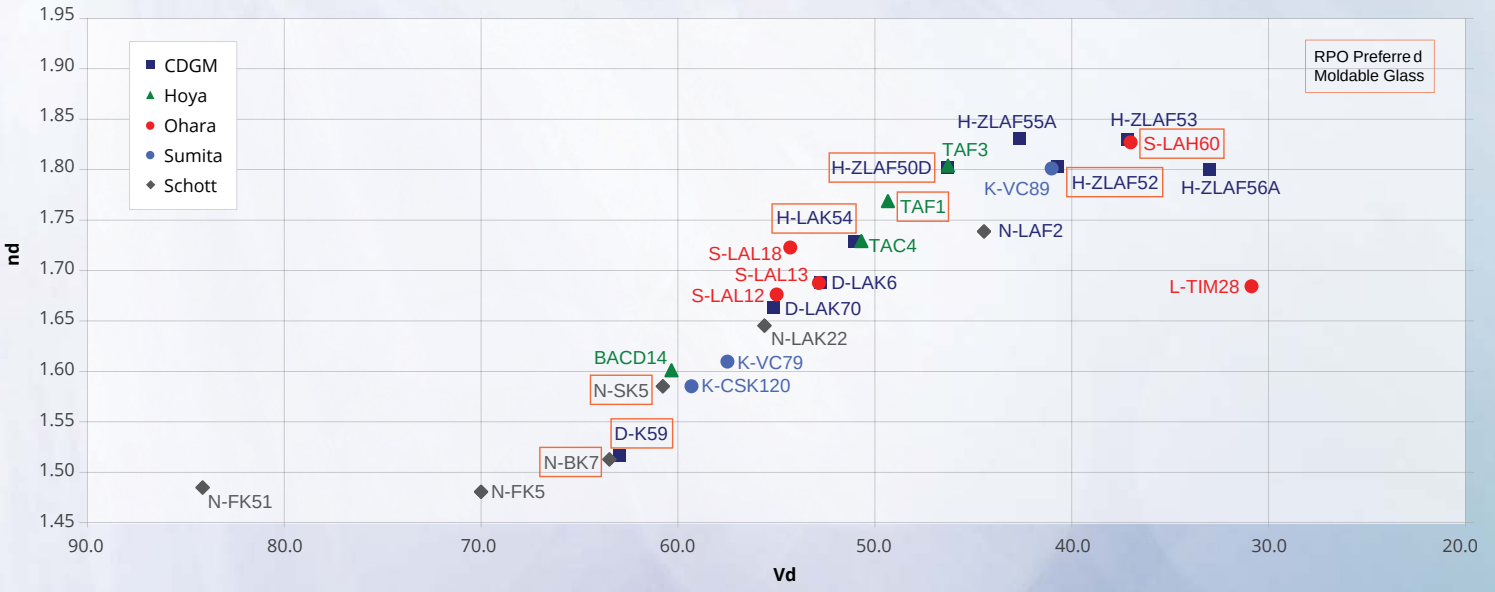
Don't see your glass type here?
Give us a call **585-292-5450**

Table 1-2

Glass Type	Manufacturer	Vd	Nd
H-ZLAF55A_mold	CDGM	42.73	1.830000
H-ZLAF53_mold	CDGM	36.95	1.829200
S-LAH60_mold*	Ohara	36.79	1.827266
H-ZLAF52_mold*	CDGM	40.70	1.801298
K-VC89_mold	Sumita	40.71	1.804597
H-ZLAF56A_mold	CDGM	33.02	1.799999
TAF3_mold	Hoya	46.25	1.799800
H-ZLAF50D_mold*	CDGM	46.27	1.798700
TAF1_mold*	Hoya	49.27	1.767000
N-LAF2_mold	Schott	44.54	1.738772
TAC4_mold	Hoya	50.71	1.728999
H-LAK54_mold*	CDGM	51.10	1.728497
S-LAL18_mold	Ohara	54.27	1.723761

Glass Type	Manufacturer	Vd	Nd
D-LAK6_mold	CDGM	52.80	1.689442
S-LAL13_mold	Ohara	52.86	1.688895
L-TIM28_mold	Ohara	30.86	1.684030
S-LAL12_mold	Ohara	54.97	1.673298
D-LAK70_mold	CDGM	55.14	1.665254
N-LAK22_mold	Schott	55.51	1.646725
K-VC79_mold	Sumita	57.30	1.605145
BACD14_mold	Hoya	60.23	1.598511
K-CSK120_mold	Sumita	59.19	1.5833
N-SK5_mold*	Schott	60.73	1.583930
D-K59_mold*	Schott	63.10	1.514796
N-BK7_mold*	Schott	63.65	1.512595
N-FK5_mold	Schott	69.96	1.484390

* Indicates preferred material choices for molding. Contact RPO for any materials selected other than preferred.



IR Optics Material Considerations

Athermal Designs for Multiband IR Lenses

RPO is uniquely positioned to supply athermalized achromatic lenses for multiband infrared systems. Choosing the optimal materials for such systems is difficult because of the few glass types available. RPO's design engineers have recently developed broadband IR design techniques that forego the traditional Abbe glass chart and account for both dispersion and thermal effects (γ). This approach simplifies finding the best choice of materials for multiband doublets and triplets.

IR Optics Utilizing Chalcogenides

Infrared molded glass aspheric optics combine the benefits of moldable infrared chalcogenide glasses and the sophistication of Rochester Precision Optics molding technology. Due to the rapid growth of the infrared industry and the near universal use of germanium in IR systems, the demand for germanium has greatly increased. This demand has resulted in higher prices and limited supply. Molding with chalcogenides can reduce costs by an order of magnitude for high-volume production. IR glass offers excellent part-to-part uniformity, with lower manufacturing and material costs.

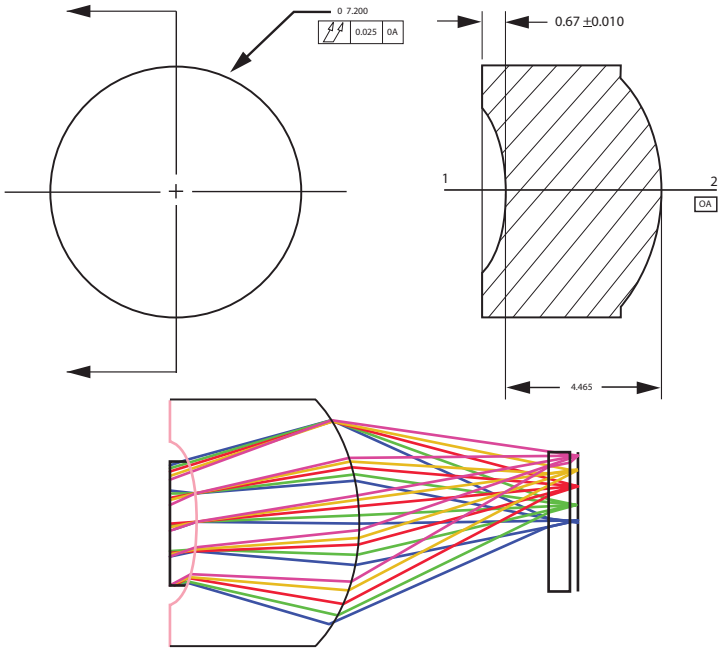
Thermal Glass Selection

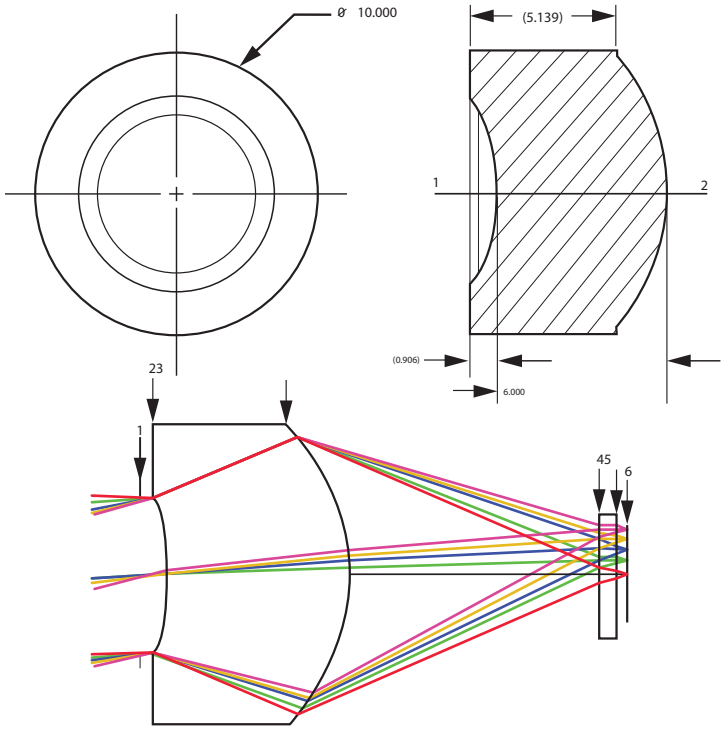
The glass offers a low thermal change in refractive index (32.2 X 10 -6/°C for IRG26), which is a benefit to optical systems designers in avoiding thermal defocusing.

Infrared (IR) Optics

From rapid prototype to high-volume production, RPO leads in IR optics. Available standard and custom designs are just the start — check our website for the latest, or call to discuss your needs.

Infared Lenses

Wide Field of View IR Singlet	Optical Design Specifications	
	PARAMETER	
	EFL	4.00 mm
	Numerical Aperture (NA)	0.42
	OD	7.2 mm
	CA	3.33 mm
	Working Distance	4.72 mm
	Design Wavelength (µm)	8-12
	AR Range (µm)	8-12
	Glass	IRG26
	MTF Performance (40 c/mm)	0.35 on-axis 0.18 @ 28°

Narrow Field of View IR Singlet	Optical Design Specifications	
	PARAMETER	
	EFL	6.50 mm
	Numerical Aperture (NA)	0.4
	OD	10 mm
	CA	5.25 mm
	Working Distance	8.34 mm
	Design Wavelength (µm)	8-12
	AR Range (µm)	8-12
	Glass	IRG26
	MTF Performance (40 c/mm)	0.35 on-axis 0.18 @ 11°

Molded Glass Collimating Optics

Rochester Precision Optics produces aspheric lenses in a wide range of focal lengths and numerical apertures, which provide diffraction limited performance. Standard catalog lenses are offered with three broadband anti-reflection coatings covering wavelengths from 400nm to 1600nm. Custom coatings can also be provided for your specific application.

Standard Mounted Assemblies

Lens Code	NA	EFL (mm)	CA (mm)	OD (mm)
A280	0.15	18.40	5.50	6.50
A260	0.16	15.29	5.8	6.50
A220	0.26	11.00	5.50	7.20
A635	0.31	4.50	2.80	3.00
A170	0.30	6.16	3.70	4.70
A375	0.30	7.50	4.50	6.51
A397	0.30	11.00	6.59	7.20
A110	0.40	6.24	5.00	7.20
N150	0.50	2.00	2.00	3.00
A240	0.50	8.00	8.00	9.94
A390	0.53	4.60	4.89	6.00
N435	0.55	5.30	5.83	7.33
A230	0.55	4.51	4.95	6.330
A658	0.60	2.59	3.12	4.40
N330	0.62	3.10	5.40	6.325

Injection Mounted Assemblies

Lens Code	NA	EFL (mm)	CA (mm)	Mounting
N414	0.51	3.30	3.52	6.35
A365	0.53	4.59	4.87	6.35

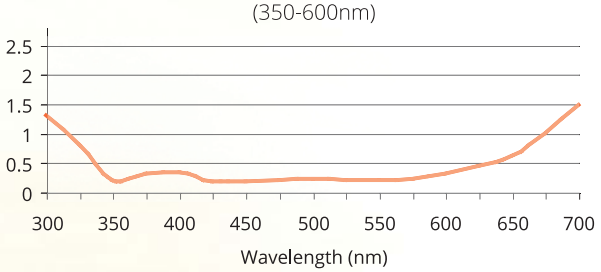
Short Wavelength Visible Lenses

Lens Code	NA	EFL (mm)	CA (mm)	OD (mm)
A610	0.60	4.00	4.80	6.325
A671	0.60	4.02	4.85	6.325

Standard Product Multilayer Broadband Coatings (MLBB)

(Please contact sales for custom coatings)

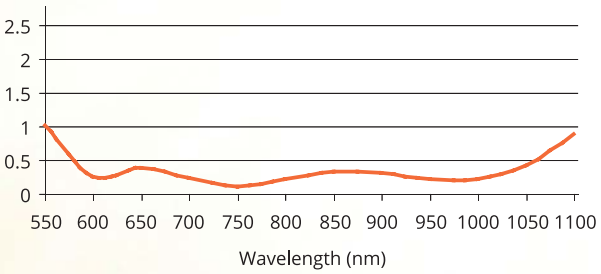
Standard A-Coating
(350-600nm)



MLBB – A coating RMAX

<1%, from 400nm - 600nm

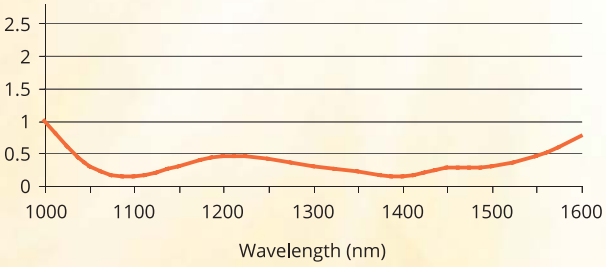
Standard B-Coating
(600-1050nm)



MLBB – B coating RMAX

<1%, from 600nm - 1050nm

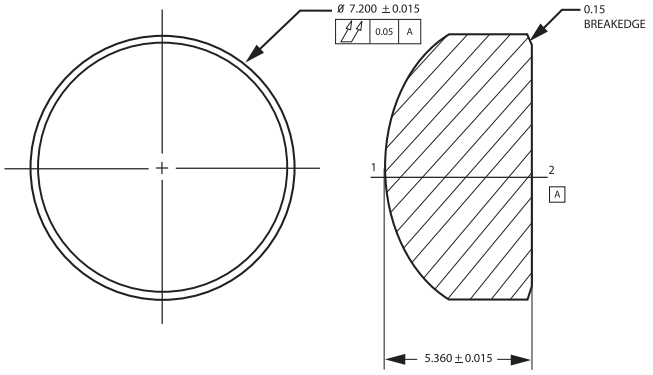
Standard C-Coating
(1050-1550nm)



MLBB – C coating RMAX

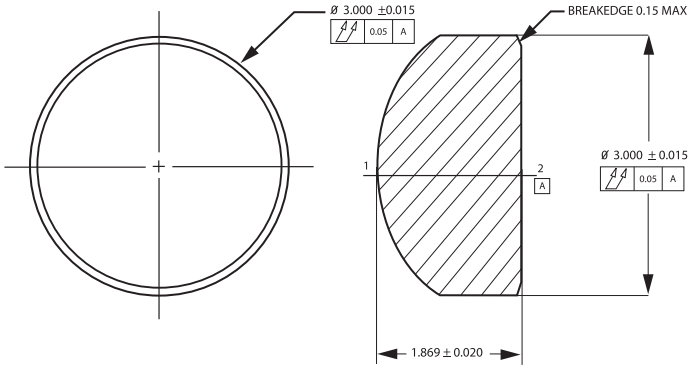
<1%, from 1050nm - 1600nm

A-110 Collimator Lens - Glass



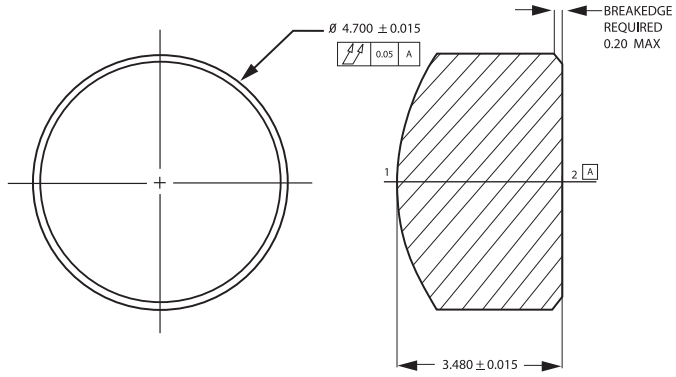
Optical Design Specifications	
PARAMETER	
Focal Length	6.24 mm
Numerical Aperture (NA)	0.40
Back Focal Length	3.394 mm
Clear Aperture	S1 5.00 mm, S2 2.92 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	5.36 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

N-150 Collimator Lens - Glass



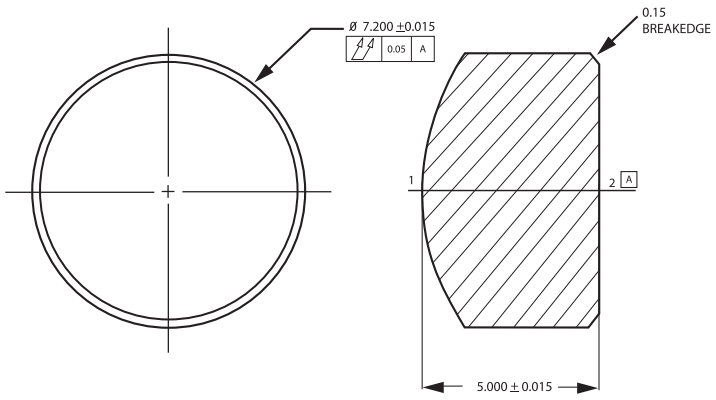
Optical Design Specifications	
PARAMETER	
Focal Length	2.00 mm
Numerical Aperture (NA)	0.50
Back Focal Length	1.10 mm
Clear Aperture	S1 2.00 mm, S2 1.15 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.25 mm (BK-7)
Center Thickness (CT)	1.869 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-170 Collimator Lens - Glass



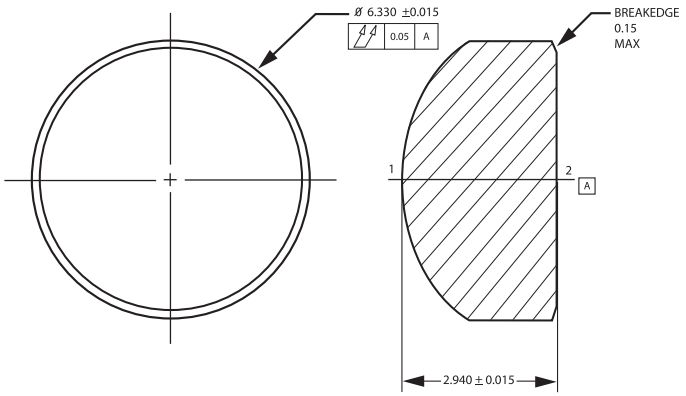
Optical Design Specifications	
PARAMETER	
Focal Length	6.16 mm
Numerical Aperture (NA)	0.30
Back Focal Length	4.25 mm
Clear Aperture	S1 3.70 mm, S2 2.57 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	3.480 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-220 Collimator Lens - Glass



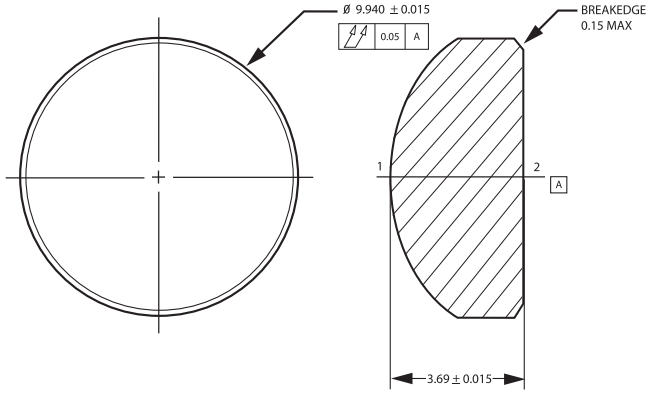
Optical Design Specifications	
PARAMETER	
Focal Length	11.00 mm
Numerical Aperture (NA)	0.26
Back Focal Length	7.95 mm
Clear Aperture	S1 5.50 mm, S2 4.14 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.250 mm (BK-7)
Center Thickness (CT)	5.00 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-230 Collimator Lens - Glass



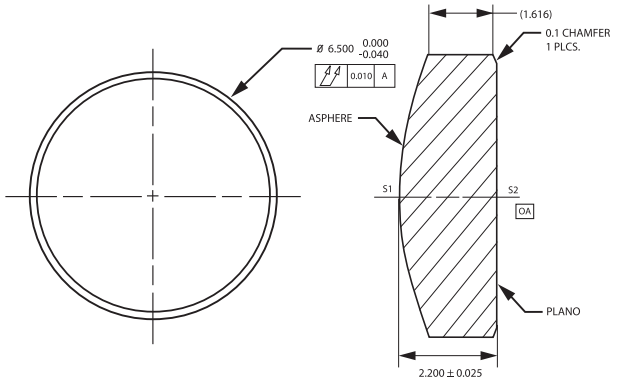
Optical Design Specifications	
PARAMETER	
Focal Length	4.51 mm
Numerical Aperture (NA)	0.55
Back Focal Length	2.91 mm
Clear Aperture	4.89 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.250 mm (BK-7)
Center Thickness (CT)	2.940 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-240 Collimator Lens - Glass



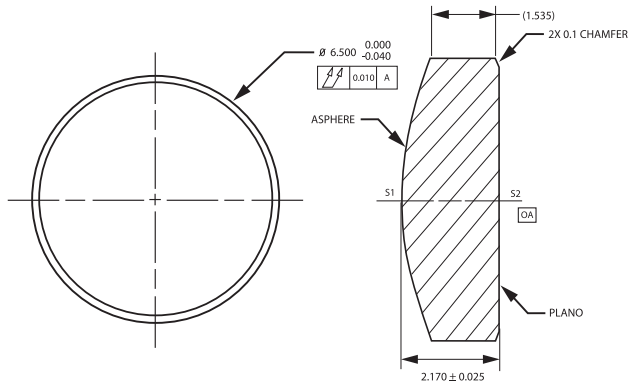
Optical Design Specifications	
PARAMETER	
Focal Length	8.00 mm
Numerical Aperture (NA)	0.50
Back Focal Length	5.918 mm
Clear Aperture	S1 8.00 mm, S2 6.70 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.250 mm (BK-7)
Center Thickness (CT)	3.690 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-260 Collimator Lens - Glass



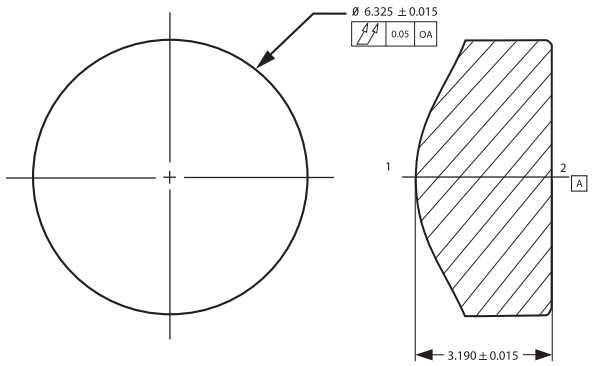
Optical Design Specifications	
PARAMETER	
Focal Length	15.29 mm
Numerical Aperture (NA)	0.16
Back Focal Length	14.09 mm
Clear Aperture	S1 5.8 mm, S2 4.20 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.25 mm (BK-7)
Center Thickness (CT)	2.200 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-280 Collimator Lens - Glass



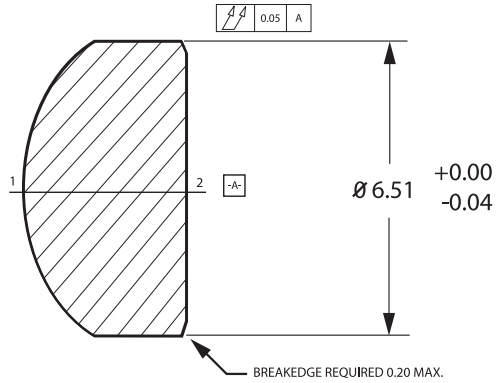
Optical Design Specifications	
PARAMETER	
Focal Length	18.40 mm
Numerical Aperture (NA)	0.15
Back Focal Length	17.13 mm
Clear Aperture	S1 5.50 mm, S2 5.30 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.25 mm (BK-7)
Center Thickness (CT)	2.170 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

N-330 Collimator Lens - Glass



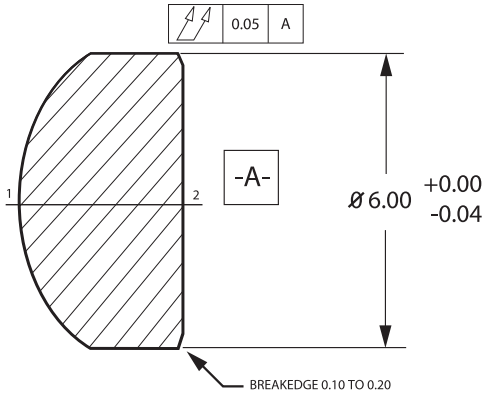
Optical Design Specifications	
PARAMETER	
Focal Length	3.10 mm
Numerical Aperture (NA)	0.62
Back Focal Length	1.760 mm
Clear Aperture	S1 5.40 mm, S2 4.20 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	NA
Center Thickness (CT)	3.190 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-375 Collimator Lens - Glass



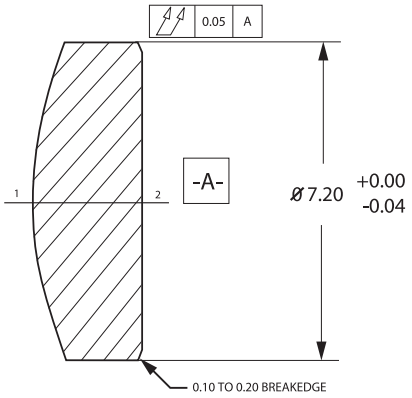
Optical Design Specifications	
PARAMETER	
Focal Length	7.50 mm
Numerical Aperture (NA)	0.30
Back Focal Length	5.90 mm
Clear Aperture	S1 4.50 mm, S2 3.70 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	2.75 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-390 Collimator Lens - Glass



Optical Design Specifications	
PARAMETER	
Focal Length	4.60 mm
Numerical Aperture (NA)	0.53
Back Focal Length	2.70 mm
Clear Aperture	S1 4.89 mm, S2 3.52 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	3.102 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

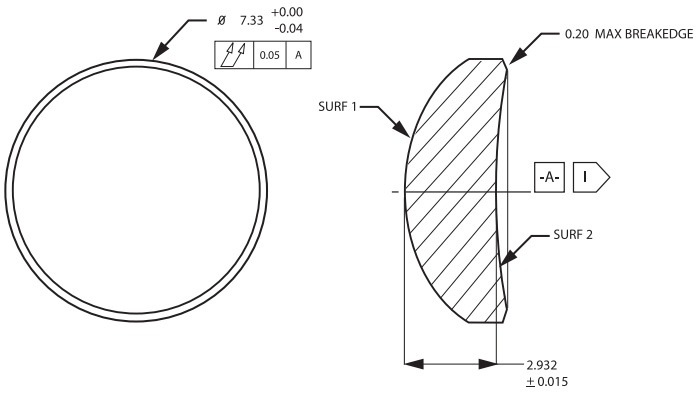
A-397 Collimator Lens - Glass



Optical Design Specifications

PARAMETER	
Focal Length	11.00 mm
Numerical Aperture (NA)	0.30
Back Focal Length	9.70 mm
Clear Aperture	S1 6.59 mm, S2 6.05 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	2.200 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

N-435 Collimator Lens - Glass

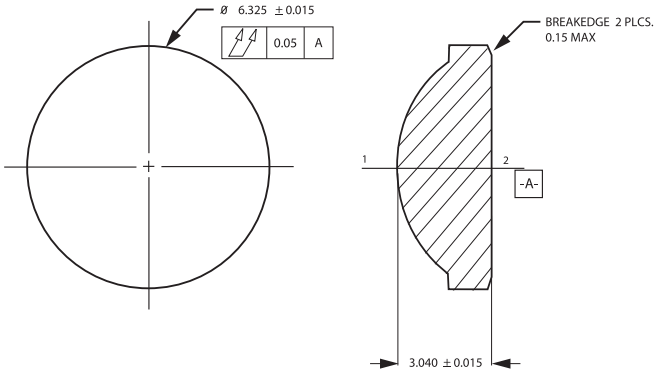


Optical Design Specifications

PARAMETER	
Focal Length	5.30 mm
Numerical Aperture (NA)	0.55
Back Focal Length	3.59 mm
Clear Aperture	S1 5.83 mm, S2 4.46 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK7)
Center Thickness (CT)	2.932 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

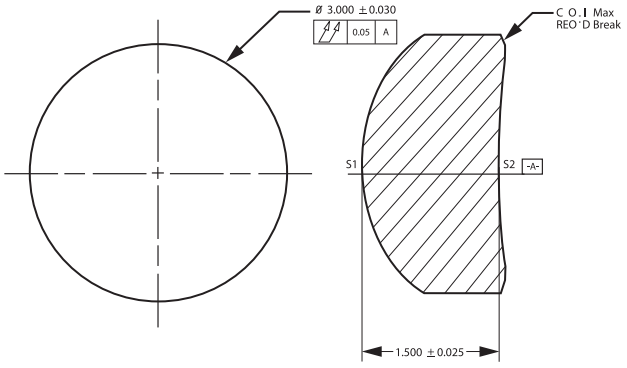
Short Wavelength Visible Lenses

A-610 Collimator Lens - Glass



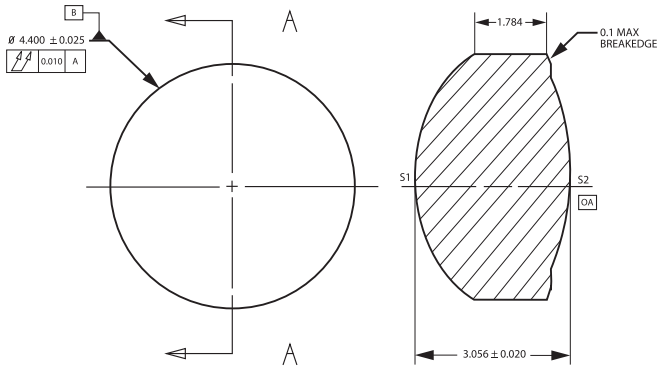
Optical Design Specifications	
PARAMETER	
Focal Length	4.00 mm
Numerical Aperture (NA)	0.60
Back Focal Length	2.73 mm
Clear Aperture	S1 4.80 mm, S2 3.43 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	1.20 mm (K-3)
Center Thickness (CT)	3.040 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-635 Collimator Lens - Glass



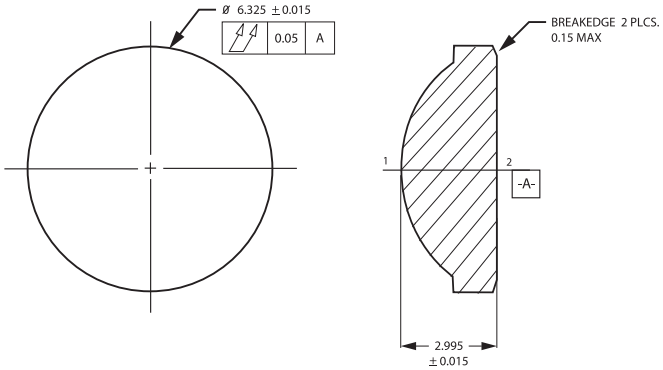
Optical Design Specifications	
PARAMETER	
Focal Length	4.50 mm
Numerical Aperture (NA)	0.31
Back Focal Length	3.536 mm
Clear Aperture	S1 2.80 mm, S2 2.50 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.275 mm (BK-7)
Center Thickness (CT)	1.500 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-658 Collimator Lens - Glass



Optical Design Specifications	
PARAMETER	
Focal Length	2.59 mm
Numerical Aperture (NA)	0.60
Back Focal Length	1.19 mm
Clear Aperture	S1 3.12 mm, S2 1.90 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	NA
Center Thickness (CT)	3.056 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

A-671 Collimator Lens - Glass



Optical Design Specifications	
PARAMETER	
Focal Length	4.02 mm
Numerical Aperture (NA)	0.60
Back Focal Length	2.40 mm
Clear Aperture	S1 4.85 mm, S2 3.43 mm
Axial Wavefront Distortion	≤ .10 Waves (RMS) at 632.8nm
Window Thickness	0.250 mm (Borosilicate)
Center Thickness (CT)	2.995 mm
RoHS Compliant	YES
AR Coating Options	A Coating 400-600nm B Coating 600-1050nm C Coating 1050-1550nm

Molded Plastic Optics

Freeform and aspheric plastic optics offer significant cost, weight and assembly advantages. Our fully integrated plastic optics division has the expertise and equipment to meet high-volume, tight-tolerance demands.

- 1 mm to 150 mm in diameter
- Precision and Ultra Precision Tolerances for spherical and aspheric lenses 10 mm to 25 mm in diameter
- Wide variety of materials including:
  - Polycarbonate
  - Cyclic Olefin Polymer – Includes Zeonex and Zeonor
  - Cyclic Olefin Co-polymer – Trade name Topas
  - Polystyrene
  - Acrylic
  - Optical Polyesters like OKP4
- Rapid prototypes, precision diamond turned and molded
- Advanced automation and inspection
- 3D measuring of aspheric optical surfaces
- Freeform, diffractive, Fresnel lens and lens array optics available
- 24/7 attended operation with other machines running lights out for low cost
- Laser etched barcoding below 2 mm x 2 mm to improve traceability

Don't see your polymer type here?
Give us a call **585-292-5450**

Polymer Materials and Polymer Selection

Abbreviation	Common Name	nd	vd	Comment
COP *	ZEONEX	1.53	56	Preferred Crowns, grades E48R and K26R
PS *	Styrene	1.59	31	Almost Preferred Flint, low cost, PS1600
PF *	Op. Polyester	1.61-1.64	26-21	Preferred Flints grades OKP1 and OKP4, high cost
PMMA	Acrylic	1.49	57	Index change with weather, poor coatings
PC	Polycarbonate	1.58	30	High birefringence, use for impact resistance
COP	TOPAS, APEL	1.52-1.54	56	Alternative to ZEONEX, APEL currently being evaluated
PMMI	Polycrymid	1.53	46	High abrasion resistance
PMP	TPX	1.47	52	Transmission from UV to terahertz
PSU	Polysulfone	1.63	23	High heat and chemical resistance
PEI	ULTEM	1.64		Lowest thermal expansion, hard to mold
CAP	Tenite	1.42		A Cellulosic, poor thermal properties, easy processing
SAN	SAN	1.57	35	High in haze
NAS	Not all Styrene	1.55	40	Low cost alternatives to PMMA, easy processing
HDPE	HDPE			Thermal IR use only, used for milk bottles

* Indicates preferred material choices for molding. Contact RPO for any materials selected other than preferred.

Rapid Prototyping with CNC Manufacturing

For optical lenses, RPO provides a broad range of excellence in traditional optics utilizing state-of-the-art high-speed Computer-Numerically Controlled (CNC) equipment to perform lens grinding, polishing and centering. From prototypes to high volume, your optics are produced with utmost accuracy, precise performance, and unsurpassed quality control. A large selection of glass types are in stock for rapid prototyping at affordable prices.

Precision Machining

Our in-house machine shop is equipped with extensive CNC capabilities to support our ability to make optical lens barrels, eyepieces, retainers, lens cells spacers, optical test fixtures, mounts and lens tooling. We strive to always make our parts error-free and delivered on time.

Thin Film Coatings

RPO offers a wide range of standard, durable, single-layer, broadband and dual band antireflection coatings. In addition, we will custom design and implement high-efficiency antireflection coatings (HEAR), beamsplitter, balance filters, short and long wave pass filters, and metal and dichroic mirrors for use in the UV, VIS and SWIR regions on a variety of substrates. We also provide coating process development, and optical and non-optical materials research.

Single Point Diamond Turning (SPDT)

RPO has extensive experience and equipment for diamond turning and deterministic grinding of any material. This expertise is offered as build-to-print services and provides prototypes to high-volume production. Our diamond turning facility is staffed with toolmakers with 15+ years of experience in diamond turning and optical tool surface generation.

- 10 multi axis diamond machine centers
  - Infrared optics
  - Carbides
  - Polymers
  - Non-ferrous materials
- Machine feedback resolution: 8 nanometers
- Machining ability: diamond turning, diamond grinding, diamond flycutting
- Shapes: rotational and non-rotationally symmetric surfaces, aspheres, cylinders, acylinders, array patterns
- Form accuracy capability: ¼ λ to ½ λ
- Surface finishes: 10 – 40 Å RMS
- Profilometric and interferometric measurement capabilities

Expert Engineering at Every Step

Design, Prototype, Production

Expert-level personnel at every step:

- Optical and mechanical designers and engineers
- Engineering and lab technicians
- Material scientists and embedded software developers

Collaborate in the software you use:

- ZEMAX, Code V, LightTools
- SolidWorks, CAD
- MSC Marc Mentat, Nastran
- MATLAB, Mathematica

Fully integrated from design to fabrication and assembly

- Molded glass and polymer aspheric optics
- IR molded and diamond turned aspheric optics
- Standard and custom lens assemblies
- Electro-optical systems
- CNC optics manufacturing
- Precision machine shop
- Advanced in-line metrology and QC

Discovery Service

Don't know where to start? Problem solved.

$2950 / 20 hours Discovery Service

- Lens design troubleshooting
- Optical engineering
- Manufacturability

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Continuous Improvement & Innovation

- LEAN manufacturing to reduce lead times and costs
- DARPA-MGRIN award to commercialize IR fused doublet and large format singlet (>100mm) with chalcogenide glass
- STTR phase II award to commercialize a chalcogenide quantum cascade laser fast axis collimator, to mass produce and coat chalcogenide lenses, achieving diffraction limited performance

Looking for a custom lens or assembly?
Early involvement with our engineering team can ensure you achieve cost and performance goals.

Rochester Precision Optics

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