OPTICS & TECHNOLOGY Selection Guide

SAVE TIME AND MONEY WITH THIS EASY TO USE TECHNICAL GUIDE FOR CHOOSING OPTICS.

Top Photonics, Optics and Imaging Products

- ✔ Competitive **PRICING**
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- ✔ Technical 24/6 **SUPPORT**
- ✔ Next Day **DELIVERY**
- ✔ Variety of **PRODUCTS**

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WELCOME to Edmund Optics®

With **over 31,200 stock products available**, Edmund Optics® has been a leading supplier of optics and optical components to industry since 1942, designing and manufacturing a wide array of multi-element lenses, lens coatings, imaging systems, and optomechanical equipment. Led by a staff of skilled optical engineers and scientists, EO is application focused and pursues new ways to implement optical technology, enabling advancements in semiconductor manufacturing, industrial metrology, and medical instrumentation. Our precision products improve efficiencies and yields and are used in test & measurement quality assurance applications, the automation of manufacturing processes, and research. Looking for a custom optic? No problem. EO's extensive global manufacturing capabilities can also deliver designs, prototypes, and volume quantities for your next optical project – contact us today to get started!

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Saturday, 10am - 1pm ET

Commitment to Service

At Edmund Optics® we specialize in creating cost effective solutions that meet our customer's specifications and timelines. Our goal is for each of your projects to be as successful as possible, and for you to have the very best experience along the way – from initial application and technical support all the way through to product delivery, product quality, and beyond.

Quality

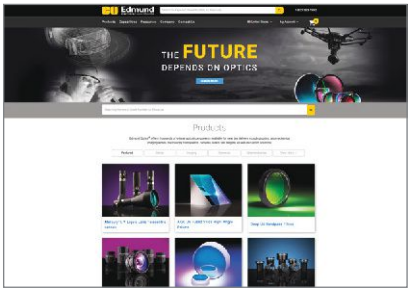
Edmund Optics® has been a trusted source for quality optics, imaging, and optomechanical components for over 75 years. Every step of the way, we are committed to ensuring product and procedural quality through a strict, global quality program monitored by experienced staff and supported by the most innovative optical testing available.

Expertise

With nearly 200 engineers around the world, Edmund Optics' technical staff is equipped with years of product and application experience. We are proud to offer 24 hour technical support 5 days a week, along with technical content, videos, and tools available on our website.

Support

Whether you need help selecting from the world's largest inventory of off-the-shelf optical components or you need assistance discussing custom options or project requirements, our industry-leading customer service and technical engineers are ready to help!



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- Over 103,000 downloadable 2D and 3D drawings, coating curves, and prescription files
- More than 31,200 products

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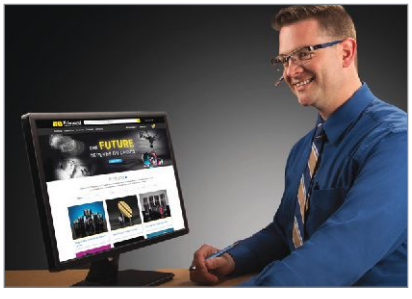

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- Quick and easy chat service
- Connect with EO Sales or Tech Support
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www.edmundoptics.com/contact

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- Order by 7PM EST (M - F) and your order **ships same day**
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- 99.99% in stock orders **ship same day**!
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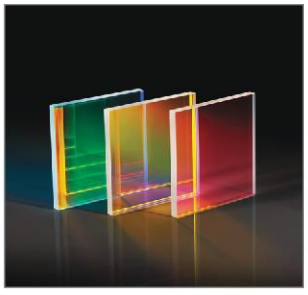
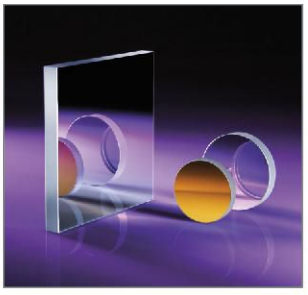
WHAT'S INSIDE

LENSES

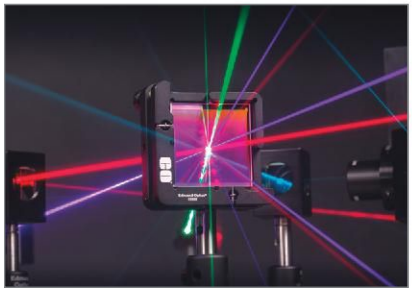


FILTERS

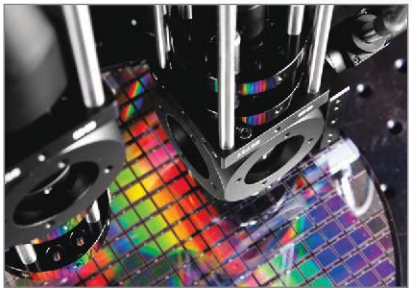


MIRRORS

OTHER OPTICS



LASERS & LASER OPTICS

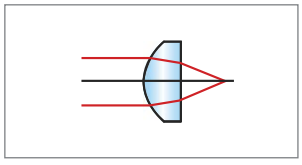


OPTOMECHANICS

IMAGING & MICROSCOPY

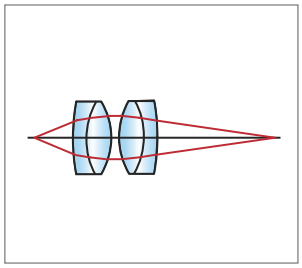
Understanding Optical System Basics

FOCUSING AND COLLIMATION (infinite/finite conjugates)



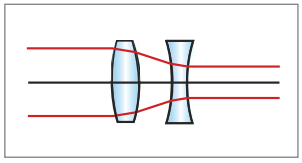
Common Applications: Autocollimators, light detection, laser collimation, and infinity corrected objectives
Single Element: Except in the case of infinity corrected objectives, this solution generally does not require use of more than one element and the image can be found at the focal point of the lens. An important function of an infinite/finite conjugate system is the throughput (flux per unit radiance or luminance) seen by the detector.

IMAGING (finite/finite conjugates)



Common Applications: Electronic imaging, relay systems, and image projection
Single Element: The simplest form of a finite/finite conjugate system is one with a single element in which the effective focal length is equal to the focal length of the single lens in the system. Some advantages of this design are its cost effectiveness and its simplicity of design.
Two Element: You can combine elements to achieve different effective focal lengths, while increasing the image performance of the system drastically. The design becomes a bit more complex, though one method of simplifying it is to place the object at the focal point of the object lens and the image at the focal point of the image lens.

IMAGE REDUCTION OR BEAM EXPANSION (infinite/infinite conjugates)



Common Applications: Telescopes and beam expanders
Two Positive Elements: Using two positive elements yields an intermediate image, which is useful for applications requiring use of a crosshair or other type of reticle. Using two positive elements will result in an inverted image.
One Positive Element and One Negative Element: Most high power laser applications utilize this form for beam expansion. One advantage of this form is that system length is greatly reduced while an erect image is maintained.

OPTICAL TOOLS AND CALCULATORS

Edmund Optics® has a variety of Optical Tools and Calculators available to help customers easily integrate our products into applications. Developed by EO's staff of experienced applications engineers, these tools feature paraxial solutions and practical considerations for a variety of common challenges customers face. Tools and Calculators available include:

Focal Length Calculator: Calculate focal lengths and principal points for any of EO's standard lenses

Simple Magnifier: Relate magnifying power, focal length, and diopters

Gaussian Beam Calculator: Model Gaussian beam propagation

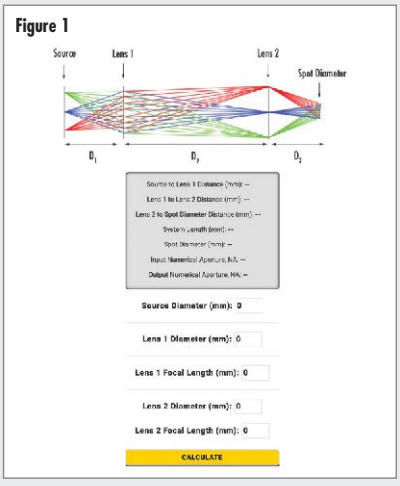
Laser Spot Size Calculator: Determine the spot size of any EO standard laser at a user-defined working distance

SAG Calculator: Determine the sag of a surface from its diameter and radius of curvature

Axicon Calculator: Determine the diameter of a ring created by a user-defined axicon

Koehler Illumination Calculator: Determine how to configure a source and two lenses into a Koehler illumination setup (*Figure 1*).

Figure 1



Visit **www.edmundoptics.com/tech-tools** to use our exciting **calculators** today!

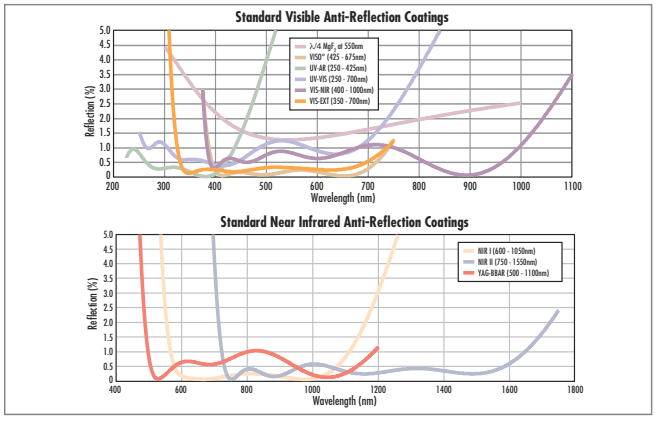
STANDARD ANTI-REFLECTION Coatings

Maximize Transmission

When light travels between media (for instance, glass and air), a portion of the light is reflected – a phenomenon known as Fresnel Reflection. Typical uncoated glass optical components will suffer approximately 8 - 10% loss from Fresnel Reflections (depending on the wavelength of light and the index of refraction of the material). Adding an antireflection (AR) coating to the optical component can reduce that transmission loss to 0.25% or less.

While an AR coating can significantly improve the performance of an optical system, using the coating at wavelengths outside the design wavelength range could potentially decrease the performance of the system.

Typical energy density limits represent a recommended energy limit, not a guaranteed threshold. For high power laser applications, coatings with a laser damage threshold specification should be utilized.



STANDARD BROADBAND ANTI-REFLECTION COATINGS

Coating Description	Specifications	Typical Energy Density Limit
λ/4 MgF_2 @ 550nm	$R_{avg} \leq 1.75\%$ 400 - 700nm (N-BK7)	10 J/cm² @ 532nm, 10ns
UV-AR [250 - 425nm]	$R_{abs} \leq 1.0\%$ 250 - 425nm $R_{avg} \leq 0.75\%$ 250 - 425nm $R_{avg} \leq 0.5\%$ 370 - 420nm	3 J/cm² @ 355nm, 10ns
UV-VIS [250 - 700nm]	$R_{abs} \leq 1.0\%$ 350 - 450nm $R_{avg} \leq 1.5\%$ 250 - 700nm	3 J/cm² @ 355nm, 10ns 5 J/cm² @ 532nm, 10ns
VIS-EXT [350 - 700nm]	$R_{avg} < 0.5\%$ 350 - 700nm	5 J/cm² @ 532nm, 10ns
VIS-NIR [400 - 1000nm]	$R_{abs} \leq 0.25\%$ 880nm $R_{avg} \leq 1.25\%$ 400 - 870nm $R_{avg} \leq 1.25\%$ 890 - 1000nm	5 J/cm² @ 532nm, 10ns
VIS 0° [425 - 675nm] VIS 45° [425 - 675nm]	$R_{avg} \leq 0.4\%$ 425 - 675nm $R_{avg} \leq 0.75\%$ 425 - 675nm	5 J/cm² @ 532nm, 10ns
YAG-BBAR [500 - 1100nm]	$R_{abs} < 0.25\%$ 532nm $R_{abs} < 0.25\%$ 1064nm $R_{avg} < 1.0\%$ 500 - 1100nm	5 J/cm² @ 532nm, 10ns
NIR I [600 - 1050nm]	$R_{avg} \leq 0.5\%$ 600 - 1050nm	7 J/cm² @ 1064nm, 10Ns
NIR II [750 - 1550nm]	$R_{abs} \leq 1.5\%$ 750 - 800nm $R_{abs} \leq 1.0\%$ 800 - 1550nm $R_{avg} \leq 0.7\%$ 750 - 1550nm	8 J/cm² @ 1064nm, 10Ns

Visit **www.edmundoptics.com/cleaning** to view our entire selection of cleaning and handling products

Edmund Optics®
Lens Tissue


Basic and Plus Optical
Component Cleaning Kits


Edmund Optics®
Lens Cleaner


Optics Cleaning
Brushes

Visit **www.edmundoptics.com/coatings** to learn more about **EO's coating capabilities**

PCV and SINGLET Lenses

EO ADVANTAGE:

- UV, Visible, NIR, and Infrared Designs
- Prices Starting at **$23.00**
- More than 3,000 Size, Focal Length, and Anti-Reflection Coating Combinations

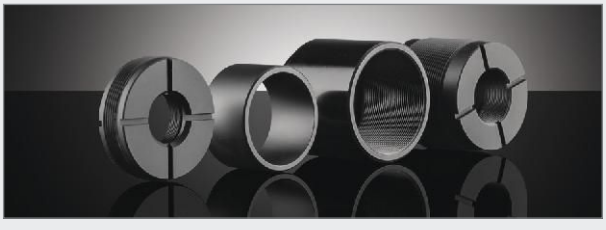
TECHSPEC® PLANO CONVEX (PCX) AND DOUBLE-CONVEX (DCX) LENS OPTIONS				
	Size Range	Focal Length Range	Wavelength Range	Coating Options
Standard PCX Lenses	1.0 - 75.0mm	0.6 - 750mm	0.4 - 1.6µm	Uncoated or 7 AR Options
UV Fused Silica PCX Lenses	5.0 - 50.0mm	9.0 - 400mm	0.2 - 2.2µm	Uncoated or 4 AR Options
Laser Line Coated PCX Lenses	5.0 - 50.0mm	7.5 - 500mm	0.405 - 1.55µm	6 AR Coating Options
Laser Grade PCX Lenses	25.4mm	35.0 - 1000nm	0.2 - 2.2µm	Uncoated or 4 AR Options
λ/20 PCX Lenses	25.0mm	50.0 - 150mm	0.2 - 2.2µm	Uncoated or 4 AR Options
Standard DCX Lenses	3.0 - 50.0mm	18.0 - 150mm	0.4 - 1.6µm	Uncoated or 7 AR Options
UV Fused Silica DCX Lenses	6.0 - 25.0mm	6.0 - 500mm	0.2 - 2.2µm	Uncoated or 4 AR Options

TECHSPEC® PLANO CONCAVE (PCV) AND DOUBLE-CONCAVE (DCV) LENS OPTIONS				
	Size Range	Focal Length Range	Wavelength Range	Coating Options
Standard PCV Lenses	3.0 - 50.0mm	-6.0 to -150mm	0.4 - 1.6µm	Uncoated or 5 AR Options
UV Fused Silica PCV Lenses	6.0 - 25.0mm	-9.0 to -250mm	0.2 - 2.2µm	Uncoated or 1 AR Option
Standard DCV Lenses	6.0 - 25.0mm	-6.0 to -100mm	0.4 - 1.6µm	Uncoated or 5 AR Options
UV Fused Silica DCV Lenses	12.0 - 25.0mm	-20.0 to -125mm	0.2 - 2.2µm	Uncoated or 1 AR Option

Volume Pricing Available

Introduction to the **Multi-Element Tube System**

The **TECHSPEC® Multi-Element Tube System** is designed to simplify prototyping optical assemblies using a diverse range of omponents and accessories to optimize design performance. This highly versatile system ensures that each system remains highly adaptable to new requirements. Featuring an enclosed, matte finish dual tube construction, the Multi-Element Tube System provides easy and accurate lens spacing and alignment, along with low internal stray light.



Visit **www.edmundoptics.com/lenses** to browse the entire selection of optical lenses

INFRARED Singlet Lenses

EO ADVANTAGE:

- Germanium (Ge), Zinc Selenide (ZnSe), Silicon (Si), and Calcium Fluoride (CaF_2) Lenses Available
- Plano Convex, Meniscus, and Aspheric Shapes
- Wide Variety of Coating Options

TECHSPEC® INFRARED LENS OPTIONS - SPHERICAL LENSES

	Size Range	Focal Length Range	Wavelength Range	Coating Options
Zinc Selenide (ZnSe) PCX Lenses	12.7 - 50.8mm	12.7 - 250mm	0.60 to 18.0µm	Uncoated or 2 AR Options
Germanium (Ge) PCX Lenses	25.0 - 50.0mm	25.0 - 250mm	2.0 to 14.0µm	Uncoated or 3 AR Options
Germanium (Ge) Meniscus Lenses	25.0 - 50.0mm	25.0 - 100mm	2.0 to 14.0µm	Uncoated or 2 AR Options
Silicon (Si) PCX Lenses	25.0mm	25.0 - 250mm	1.20 to 7.0µm	Uncoated or 3-5µm AR Coated
Calcium Fluoride (CaF_2) PCX Lenses	12.5 - 50.0mm	18.0 - 150mm	0.25 to 7.0µm	Uncoated

TECHSPEC® INFRARED LENS OPTIONS - ASPHERICAL LENSES

	Size Range	Focal Length Range	Wavelength Range	Coating Options
Zinc Selenide (ZnSe) Aspheric Lenses	12.7 - 50.8mm	6.35 - 50.8mm	0.60 to 18.0µm	Uncoated or 8-12µm AR Coated
Germanium (Ge) Aspheric Lenses	25.0 - 50.0mm	12.5 - 75.0mm	2.0 to 14.0µm	Uncoated or 3 AR Options
Germanium (Ge) Hybrid Aspheric Lenses	25.0mm	12.5 - 100mm	3.0 to 5.0µm	3-5µm AR Coated
Silicon (Si) Aspheric Lenses	25.0mm	12.5 - 50.0mm	1.20 to 7.0µm	Uncoated or 3-5µm AR Coated
Small Diameter IR Aspheric Lenses	4.5 - 8.0mm	1.47 - 5.95mm	0.90 to 13.0µm	3 AR Coating Options

Volume Pricing Available

IR SELECTION GUIDE

Material	Usable Transmission Range (µm)	Index of Refraction	Abbe Number	Density (g/cm^3)	CTE (x 10^{-6}/°C)	dn/dT (x 10^{-6}/°C)	Knoop Hardness	Properties	Typical Applications
Calcium Fluoride (CaF_2)	0.25 - 7.0	1.434	95.1	3.18	18.85	-10.6	158.3	Low absorption; high refractive index homogeneity	Spectroscopy, Semiconductor Processing, Cooled Thermal Imaging
Chalcogenide Glass (IG6)	0.9 - 13.0	2.795	N/A	4.63	20.7	35.5	1.04	Low thermal change in refractive index and dispersion; excellent moldability	Thermal Imaging, Color Correction in the 2 - 12µm Spectrum
Germanium (Ge)	2.0 - 14.0	4.003	N/A	5.33	6.1	396	780	High index of refraction; high Knoop hardness; excellent MWIR to LWIR Transmission	Thermal Imaging, Rugged IR Imaging
Magnesium Fluoride (MgF_2)	0.12 - 7.0	1.413	106.2	3.18	13.7	1.7	415	High CTE; low index of refraction; good transmission from visible to MWIR	Broadband Applications not requiring Anti-Reflection Coatings
Barium Fluoride (BaF_2)	0.2 - 12.0	1.475	81.78	4.89	18.1	15.2	82	Broad transmission range; resistant to high energy radiation	FTIR Spectroscopy, Scintillation
Potassium Bromide (KBr)	0.25 - 26.0	1.527	33.6	2.75	43	-40.8	7	Good resistance to mechanical shock; water soluble; broad transmission range	FTIR Spectroscopy
Sapphire (Al_2O_3)	0.2 - 5.5	1.768	72.2	3.97	5.3	13.1	2200	Excellent durabilty; good MWIR transmission	IR Laser Systems, Spectroscopy, and Rugged Environmental Equipment
Silicon (Si)	1.2 - 7.0	3.422	N/A	2.33	2.55	1.6	1150	Low cost; lightweight	Spectroscopy, MWIR Laser Systems, THz Imaging
Sodium Chloride (NaCl)	0.25 - 16.0	1.491	42.9	2.17	44	-40.8	18.2	Low cost; water soluble; excellent broadband transmission; sensitive to thermal shock	FTIR Spectroscopy
Zinc Selenide (ZnSe)	0.6 - 18.0	2.403	N/A	5.27	7.1	61	120	Low absorption; high resistance to thermal shock	CO_2 Laser Systems and Thermal Imaging
Zinc Sulfide (ZnS)	0.4 - 12.0	2.631	N/A	5.27	7.6	38.7	120	Excellent transmission from visible to LWIR; harder and more chemically resistant than ZnSe	Thermal Imaging

ACHROMATIC Lenses

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Live Chat with our
Engineering Department

EO ADVANTAGE:

- In Stock and Available Now!
- More than 1,000 Additional Sizes, Focal Lengths, and AR Coating Options
- Designs Optimized for UV, Visible, and NIR Applications

Downloadable **Zemax, Drawings, Coating Curves,** and more available online for all **TECHSPEC® lenses**

TECHSPEC® ACHROMATIC LENSES

Diameter (mm)	EFL (mm)	BFL (mm)	VIS 0° Coated		VIS-NIR Coated		Volume Pricing Available
			Stock No.	Price	Stock No.	Price	
6.25	7.5	4.45	#49-936	$57.00	#49-948	$62.00	
6.25	12.5	10.36	#47-690	$57.00	#49-304	$62.00	
6.25	20	18.23	#47-692	$57.00	#49-306	$62.00	
6.25	25	23.45	#47-693	$57.00	#49-307	$62.00	
12.5	14	9.92	#47-660	$67.50	#49-321	$72.50	
12.5	25	21.47	#47-662	$67.50	#49-323	$72.50	
12.5	40	37.54	#47-665	$67.50	#49-326	$72.50	
12.5	50	47.61	#47-667	$67.50	#49-328	$72.50	
25	30	22.23	#47-633	$94.00	#49-352	$99.00	
25	50	43.53	#47-637	$94.00	#49-356	$99.00	
25	75	70.39	#47-639	$94.00	#49-358	$99.00	
25	100	95.92	#47-641	$94.00	#49-360	$99.00	
50	75	61.17	#49-292	$149.00	#49-389	$154.00	
50	100	89.94	#49-284	$149.00	#49-390	$154.00	
50	150	143.17	#49-285	$149.00	#49-391	$154.00	
50	200	194.45	#49-286	$149.00	#49-392	$154.00	

TECHSPEC® ACHROMATIC LENS OPTIONS

	Size Range	Focal Length Range	Wavelength Range	Coating Options
Aspherized Achromatic Lenses	9 - 25mm	12 - 50mm	0.4 - 0.7µm	MgF_2 or VIS 0°
Standard Achromatic Lenses	1 - 128mm	1.5 - 1900mm	0.4 - 1.0µm	MgF_2, VIS 0° or VIS-NIR
Near UV Achromatic Lenses	6.25 - 50mm	200mm	0.3 - 0.7µm	BBAR for 350 - 700nm
YAG-BBAR Achromatic Lenses	6.25 - 25mm	12.5 - 200mm	0.5 - 1.0µm	YAG-BBAR
Near Infrared Achromatic Lenses	6 - 50mm	9 - 200mm	0.7 - 1.6µm	NIR II
Negative Achromatic Lenses	6.25 - 40mm	-7.5 to -150mm	0.4 - 0.7µm	MgF_2
Triplet Achromatic Lenses	6.25 - 25mm	10 - 50mm	0.4 - 0.7µm	MgF_2
Ultraviolet Triplet Achromatic Lenses	30mm	36 - 180mm	0.2 - 2.2µm	Uncoated or MgF_2

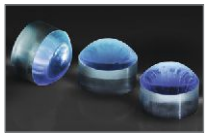
Visit **www.edmundoptics.com/lenses** to browse the entire selection of achromatic lenses

Benefits of Aspheric Lenses

- Simplify Assembly and Minimize System Weight
- Eliminate Spherical Aberration
- Improve Resolution and System Performance

Spherical Aberration
A single asphere offers the same amount of spherical aberration correction that two or more spherical lenses can accomplish. Aspheres, by their very nature, are without the spherical aberration that is inherent in traditional Plano-Convex and Double-Convex spherical lenses. A single asphere in a system design can significantly improve performance while reducing element count.

To learn more about the **Making of an Aspheric Lens,** visit **www.edmundoptics.com/making-aspheres**



ASPHERIC LENS OPTIONS

Description	Size Range	Focal Length Range	Wavelength Range
UV Fused Silica Aspheric Lenses	10 - 50mm	8 - 60mm	0.2 - 2.2µm
Achromatic Aspheric Lenses	9 - 25mm	12 - 50mm	0.4 - 0.7µm
Plastic Aspheric Lenses	10 - 25mm	9 - 75mm	0.4 - 1.2µm
Precision Aspheric Lenses	10 - 50mm	7.5 - 50mm	0.4 - 1.6µm
Aspheric Cylinder Lenses	25mm	20 - 50mm	0.4 - 1.6µm
Small Dia. Visible Lenses	1.8 - 9.9mm	0.7 - 22mm	0.4 - 1.6µm
Best Form Aspheric Lenses	25mm	25 - 100mm	0.532 - 1.064µm
Zinc Selenide Aspheric Lenses	12.7 - 50.8mm	6.35 - 50.8mm	0.6 - 16.0µm
Small Dia. IR Aspheric Lenses	3.5 - 6.5mm	1.5 - 4mm	2.0 - 14.0µm
Silicon Aspheric Lenses	25 - 50mm	25 - 50mm	1.2 - 7.0µm
Germanium Aspheric Lenses	25mm	12.5 - 100mm	2.0 -16.0µm

EO ADVANTAGE:

- Over 500 Off-The-Shelf Aspheres
- Full Prescription Data for Easy Integration into OEM Applications
- Polished, Molded, and Color-Corrected Designs Available for UV, Visible, NIR, and Infrared Applications

BEST SELLING TECHSPEC® PRECISION ASPHERIC LENSES

Diameter (mm)	NA	EFL	Uncoated		VIS Coated		Volume Pricing Available
			Stock No.	Price	Stock No.	Price	
15	0.66	11.2	#47-725	$195.00	#49-097	$215.00	
15	0.50	15.0	#47-726	$195.00	#49-098	$215.00	
15	0.40	18.7	#47-727	$195.00	#49-099	$215.00	
15	0.33	22.5	#47-728	$195.00	#49-100	$215.00	
25	0.66	18.7	#47-729	$230.00	#49-101	$250.00	
25	0.50	25.0	#47-730	$230.00	#49-102	$250.00	
25	0.40	31.2	#47-731	$230.00	#49-103	$250.00	
25	0.33	37.5	#47-732	$230.00	#49-104	$250.00	
50	0.66	37.5	#66-315	$450.00	#66-325	$490.00	
50	0.50	50.0	#66-316	$450.00	#66-326	$490.00	

Visit our website for more options and volume pricing.

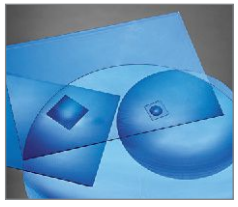
CUSTOM OPTIONS

Visit **www.edmundoptics.com/aspheres** to browse the entire selection of aspheres

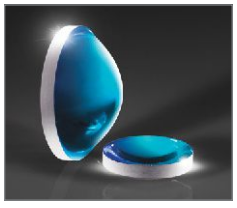
WORLD'S LARGEST SELECTION
of Off-The-Shelf Lenses

Specialty Lenses

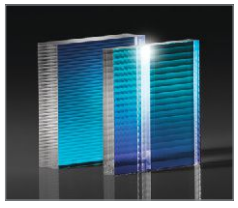
BALL LENSES
- 6 Different Substrates in a Range of Sizes from 0.3 - 10mm Diameters
- Available in High Volumes with Discounted Pricing
- Additional Shapes Available Including Half-Ball, Drum, and GRIN Lenses



FRESNEL LENSES
- Grooved, Flat Lenses
- Ideal for Light Gathering Applications
- Aspherically Contoured Fresnel Lenses Improve Image Quality



CONDENSER LENSES
- Molded Aspheric Lenses for Illumination Applications
- 5.0 to 80.0mm Diameters Available
- High Numerical Aperture Designs



MICROLENS ARRAYS
- Ideal for Beam Homogenization Applications
- Square, Cylindrical, and Fly's Eye Configurations Available
- Precision Fused Silica Substrate

Visit **www.edmundoptics.com/lenses** to browse the entire selection of lenses

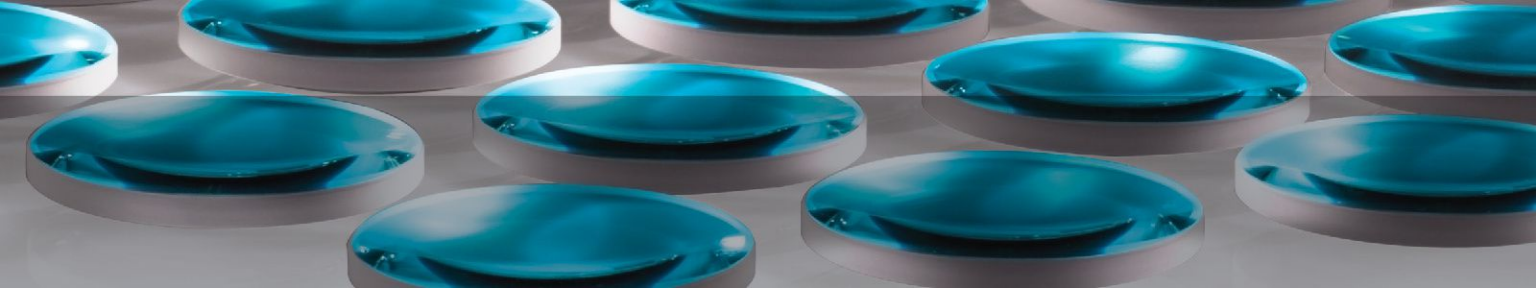
EO ADVANTAGE:
- Focuses Light in Only One Dimension
- Variety of Broadband and Laser Line Coatings Available
- Over 575 Designs

To learn more about **Cylinder Lenses,** visit **www.edmundoptics.com/cylinder-lens-overview**

TECHSPEC® BEAM SHAPING PCX CYLINDER LENSES

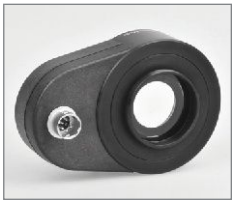
Size (mm) (Dia. or H x L)	EFL (mm)	BFL (mm)	CT (mm)	ET (mm)	Radius (mm)	Uncoated		VIS 0° Coated	NIR I Coated	NIR II Coated	Price	Volume Pricing Available
						Stock No.	Price					
12.7	50.0	48.75	1.9	1.10	25.84	#34-606	$67.50	#34-648	#34-668	#34-627	$77.50	
12.7	75.0	73.68	2.0	1.48	38.76	#34-607	$67.50	#34-649	#34-669	#34-628	$77.50	
12.7	100.0	98.68	2.0	1.61	51.68	#34-608	$67.50	#34-650	#34-670	#34-629	$77.50	
12.7 x 12.7	25.0	23.02	3.0	1.33	12.92	#34-752	$72.50	#34-986	#34-998	#35-010	$82.50	
25.4	50.0	47.14	4.3	1.00	25.84	#34-611	$72.50	#34-652	#34-672	#34-631	$87.50	
25.4	75.0	72.93	3.1	1.00	38.76	#34-612	$72.50	#34-653	#34-673	#34-632	$87.50	
25.4	100.0	97.92	3.2	1.58	51.68	#34-613	$72.50	#34-654	#34-674	#34-633	$87.50	
25.4	150.0	147.69	3.5	2.45	77.52	#34-614	$72.50	#34-655	#34-675	#34-634	$87.50	
25.4 x 25.4	25.0	17.39	11.6	1.00	12.92	#34-753	$82.50	#34-987	#34-999	#35-011	$97.50	
25.4 x 25.4	50.0	47.14	4.3	1.00	25.84	#34-754	$77.50	#34-988	#35-000	#35-012	$92.50	
25.4 x 25.4	75.0	72.93	3.1	1.00	37.76	#34-755	$77.50	#34-989	#35-001	#35-013	$92.50	

Visit **www.edmundoptics.com/cylinder-lens-app** to learn more about cylinder lenses



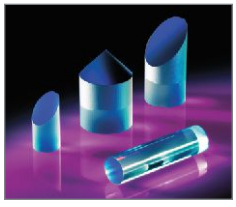
FOCUS-TUNABLE LENSES

- Replace Functionality of a Complete Lens Kit
- 3mm, 10mm or 16mm Clear Aperture Designs Available
- C-Mount or Common Filter Thread Mounts for Machine Vision Integration



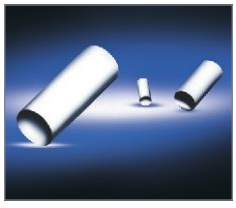
ROD LENSES

- Sizes from 1 - 15mm Diameter
- Coated and Uncoated Versions
- Ideal for Size-Critical Applications



GRIN LENSES

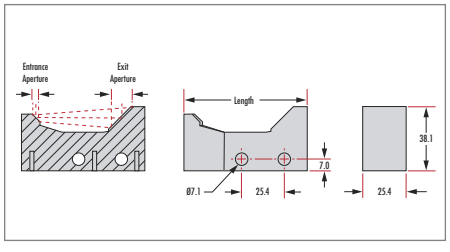
- Ideal for Fiber Coupling and Laser Diode Beam Shaping
- Comparable Performance to Conventional Aspheric Singlets
- Multiple Sizes and Wavelength Options



CYLINDER LENSES

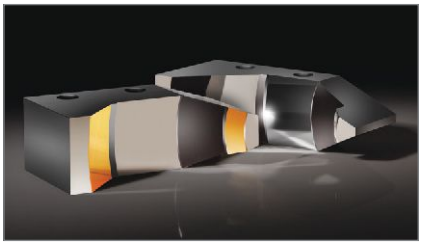
- Focuses Light in Only One Dimension
- Ideal for Creating Laser Lines and Sheets
- 2 Cylinder Lenses Can be Used to Circularize an Elliptical Laser Beam

Visit **www.edmundoptics.com/lenses** to browse the entire selection of lenses



EO ADVANTAGE:

- Broadband Performance for UV, Visible, and IR Applications
- λ/10 or λ/8 Wavefront Error
- Easy Mounting with Integrated Alignment Features



TECHSPEC® MONOLITHIC REFLECTIVE BEAM EXPANDERS (MARK I)

Expansion Power	Exit Aperture (mm)	Dimensions (mm)	UV Enhanced Aluminum	Price			Protected Aluminum	Price			Bare Gold	Price		
				1-5	6-25	26+		1-5	6-25	26+		1-5	6-25	26+
2X	8	71.0 L x 25.4 W x 38.1 H	#37-185	$469.00	$419.00	Volume Pricing Available	#37-193	$449.00	$399.00	Volume Pricing Available	#37-189	$499.00	$449.00	Volume Pricing Available
3X	12	72.6 L x 25.4 W x 38.1 H	#37-186	$469.00	$419.00		#37-194	$449.00	$399.00		#37-190	$499.00	$449.00	
5X	20	78.3 L x 25.4 W x 38.1 H	#37-188	$469.00	$419.00		#37-196	$449.00	$399.00		#37-192	$499.00	$449.00	

Visit **www.edmundoptics.com/monolithic** to learn more about our reflective beam expanders

Lab and Production Essentials

EO ADVANTAGE:

- One-stop Shopping for All Your Cleaning, Handling, and Manufacturing Supplies
- Safely Handle and Clean all of your Sensitive Optical Equipment and Components
- Experienced Product Support Engineers to Advise on Best Practices and Methods

For over 75 years, Edmund Optics® has been helping customers replenish their lab and production facilities with optical handling and cleaning supplies. With EO's industry-leading service, the proper cleaning and handling supplies are readily available and in stock for immediate delivery.

TMC LAB TABLES

Applications:
- Removes the unwanted effects of vibration

EO Advantage:
- Passive vibration isolation
- Lightweight, compact profile for easy portability
- Self-leveling design with control valves

OPTICAL COMPONENT CLEANING KITS

Applications:
- Cleaning optical components
- General maintenance of optical systems

EO Advantage:
- Storage case included
- Pre-packaged for convenience
- Variety of cleaning tools included

LENS KITS

Applications:
- An ideal complement to any engineering or R&D laboratory

EO Advantage:
- Simple lens kits include PCX, DCX, PCV, and DCV lenses
- Kits Available for a variety of sizes and coatings

LENS TISSUE

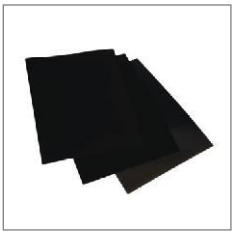
Applications:
- Used for dry cleaning or with alcohol-based solution
- Maintaining optical components to improve system lifetimes

EO Advantage:
- Traditional MIL-SPEC tissue
- 2 different sizes available
- 500 sheets per package

NORLAND ADHESIVES

Applications:
- Removes the unwanted effects of vibration

EO Advantage:
- Passive vibration isolation
- Lightweight, compact profile for easy portability
- Self-leveling design with control valves

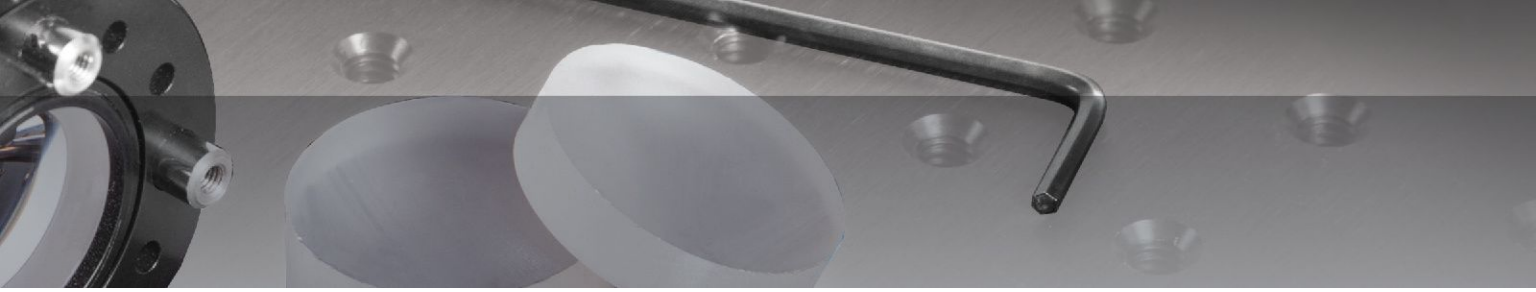


ACKTAR FOILS

Applications:
- Eliminates light reflectance where the direct coating of parts is not practical.

EO Advantage:
- Specular absorbance of 99.9%
- Extremely wide band performance from UV to IR
- Adhesive back to ease mounting to surfaces

Visit **www.edmundoptics.com/lab-production** to view our entire selection of lab products



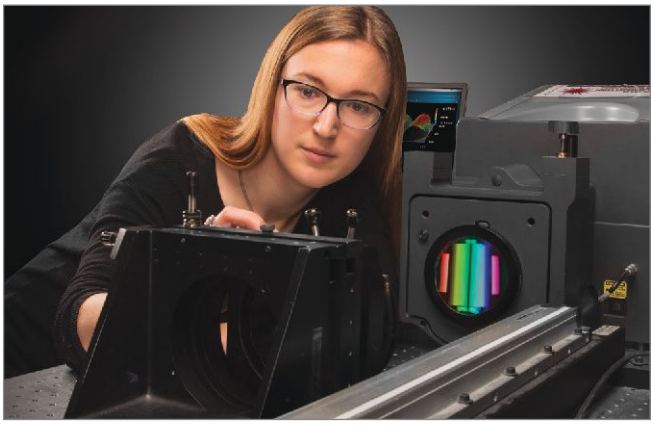
Detection and Metrology

EO ADVANTAGE:

- Complete Solutions for Your Detection and Metrology Needs
- Innovative New Products Launching Every Year
- Generous OEM Volume Discounts

Every application has its own unique requirements - in order to service them all, Edmund Optics® offers a wide variety of detection and metrology products from light measurement to optical component maintenance.

Visit **www.edmundoptics.com/testing-detection** to view all detection and metrology products



SPECTROMETERS

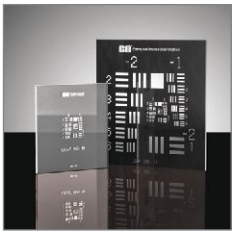
Applications:
- Detects different wavelengths or intensities of light
- Test blocked or transmitted spectral regions

EO Advantage:
- UV, VIS, and NIR spectrometers available
- Handheld and compact versions for fast measurements
- NIST Certified

USAF TARGETS

Applications:
- Imaging system calibration
- Determining minimum resolving power

EO Advantage:
- High resolution (up to 645 lp/mm)
- Negative, positive, and fluorescent versions available
- Unique field and color references available



MOKU:LAB

Applications:
- Eliminate the need for multiple laboratory devices
- All-in-one interface with more than 10 selectable instruments

EO Advantage:
- Controlled multiple devices remotely
- User friendly iPad® interface
- Share/save data instantly via email, Dropbox®, and iCloud®

OPTICAL FLATS

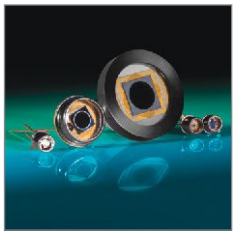
Applications:
- Determining Surface Figure
- Precision machining, metrology, and Interferometry

EO Advantage:
- Fused Silica and Zerodur® substrates available
- Up to λ/20 and 12 inch versions
- Variety of coating options

PHOTODIODES

Applications:
- Measure light signals from a variety of sources
- Low light level measurement

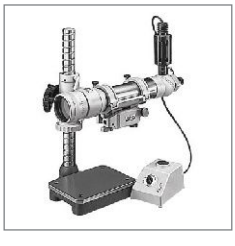
EO Advantage:
- Different sensor materials for a range of wavelengths
- Avalanche Photodiodes and Photomultiplier Tubes available
- Built in amplifier models



AUTOCOLLIMATOR

Applications:
- Measure small angular deviations in optics
- Eliminate angular errors within a system

EO Advantage:
- Options available for varying levels of precision
- Digital and analog output versions



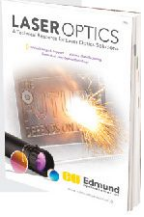
Visit **www.edmundoptics.com/measurement-tools** to view all **measurement products**

Wide Selection of Laser Optics

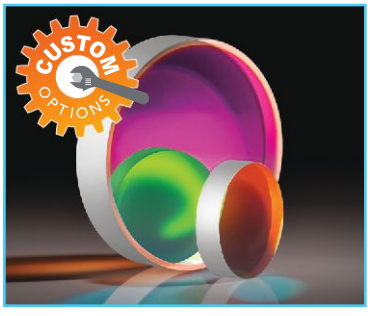
LASER OPTICS MADE BY EDMUND OPTICS®

Edmund Optics® (EO) designs and manufactures components ideal for various laser applications including medical equipment, entertainment projectors, and sensing for dynamic measurements. Utilizing high-end manufacturing, including multiple Ion Assisted Deposition coating chambers and Magnetorheological finishing (MRF), EO manufacturers high quality laser optics, from laser mirrors to laser aspheres to laser beam expanders. With a wide selection of off-the-shelf laser optics available for same day shipping, prototyping is made easy and efficient. When the time comes for volume production or for custom designs, EO delivers high volume laser optics manufactured at one of many global precision manufacturing sites.

FREE LASER OPTICS BOOK CATALOG
164 pages, 50 pages of tutorials,
wide range of precision products, and more
www.edmundoptics.com/free-catalog



NEW



EO ADVANTAGE:

- >99% Reflectivity at Design Wavelength
- λ/10 Surface Accuracy
- Excellent Cost to Performance Ratio

Substrate:	N-BK7
Diameter (mm):	25.4
Diameter Tolerance (mm):	0.0/-0.1
Thickness (mm):	6.35
Thickness Tolerance (mm):	±0.2
Clear Aperture (%):	90
Surface Flatness:	λ/10
Surface Quality:	20-10
Parallelism (arcmin):	<3
Back Surface:	Commercial Polish
Coating Specification:	R_{abs} >99% @ DWL

TECHSPEC® LOW COST LASER LINE MIRRORS

DWL (nm)	Damage Threshold @ DWL	Price – 0°				Price – 45°			
		Stock No.	1-10	11-49	50+	Stock No.	1-10	11-49	50+
488	1 MW/cm²	#11-079	$60.00	$50.00	Call For OEM Quantity Pricing	#39-989	$60.00	$50.00	Call For OEM Quantity Pricing
515	3 J/cm² @ 20ns, 20Hz	#11-084	$60.00	$50.00		#39-994	$60.00	$50.00	
532	3 J/cm² @ 20ns, 20Hz	#38-619	$60.00	$50.00		#11-073	$60.00	$50.00	
808	2.5 MW/cm²	#11-092	$60.00	$50.00		#11-002	$60.00	$50.00	
850	2.5 MW/cm²	#11-097	$60.00	$50.00		#11-007	$60.00	$50.00	
980	2.5 MW/cm²	#11-102	$60.00	$50.00		#11-013	$60.00	$50.00	
1030	5 J/cm² @ 20ns, 20Hz	#11-107	$60.00	$50.00		#11-018	$60.00	$50.00	
1064	5 J/cm² @ 20ns, 20Hz	#38-622	$60.00	$50.00		#11-075	$60.00	$50.00	

Visit **www.edmundoptics.com/LO** to browse the entire selection of laser optics

TECHSPEC® DA Fixed YAG Beam Expanders

EO ADVANTAGE:

- λ/10 Transmitted Wavefront Error
- Divergence Adjustment to Compensate for Input Beam Divergence
- Designed for Nd:YAG Wavelengths

TECHSPEC® DA (Divergence Adjustable) Fixed YAG Beam Expanders are designed for demanding laser applications including laser materials processing, medical, and research. These compact beam expanders are optimized at Nd:YAG wavelengths for high performance transmitted wavefront, with designs achieving λ/10 transmitted wavefront error. TECHSPEC® DA Fixed YAG Beam Expanders easily mount with M30 x 1 threading and provide excellent value both for single unit purchases as well as volume integration.

TECHSPEC® DA FIXED YAG BEAM EXPANDERS

Expansion Power	Design Wavelength DWL (nm)	Input Beam for <λ/10 Nominal Performance (mm)	Housing Diameter (mm)	Length (mm)	Damage Threshold, Pulsed	Stock No.	Price		
							1-9	10-24	25+
2X	266	<4	29.95	71.9	1.5 J/cm² @ 10ns, 20Hz, 266nm	#35-092	$249.00	$229.00	Call for OEM Quantity Pricing
3X	266	<4	29.95	73.4		#35-096	$249.00	$229.00	
2X	355	<4	29.95	79.1	2.5 J/cm² @ 10ns, 20Hz, 355nm	#35-093	$249.00	$229.00	
3X	355	<4	29.95	77.1		#35-097	$249.00	$229.00	
10X	355	<2.3	39.95	82.6		#35-115	$349.00	$329.00	
2X	532	<4	29.95	81.5	5 J/cm² @ 10ns, 20Hz, 532nm	#35-094	$249.00	$229.00	
3X	532	<4	29.95	79.2		#35-098	$249.00	$229.00	
10X	532	<2.3	39.95	82.4		#35-116	$349.00	$329.00	
2X	1064	<4	29.95	83.4	10 J/cm² @ 10ns, 20Hz, 1064nm	#35-095	$249.00	$229.00	
3X	1064	<4	29.95	81.1		#35-099	$249.00	$229.00	
10X	1064	<2.3	39.95	83.0		#35-117	$349.00	$329.00	

Visit **www.edmundoptics.com/laser-beam-expanders** to view our entire selection of beam expanders

TECHSPEC® Research-Grade Variable Beam Expanders

TECHSPEC® Ultra Divergence Adjustable Fixed Power Laser Beam Expanders

TECHSPEC® DA Fixed HeNe Beam Expanders

TECHSPEC® LCht Fixed YAG Beam Expanders

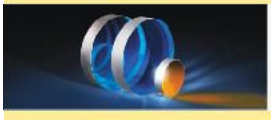
Visit **www.edmundoptics.com/beam-expander-guide** to determine the best beam expander for your application

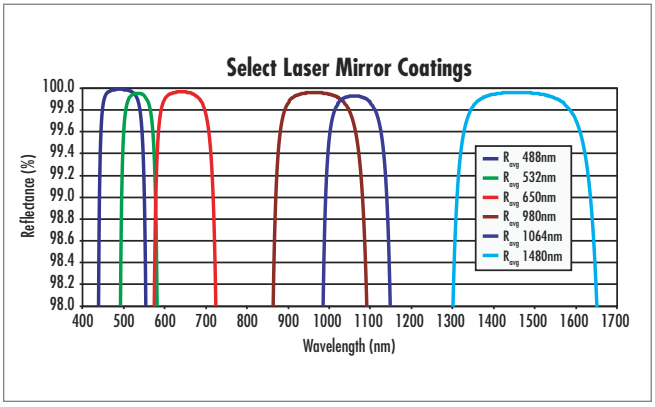
Which Mirror Works Best?

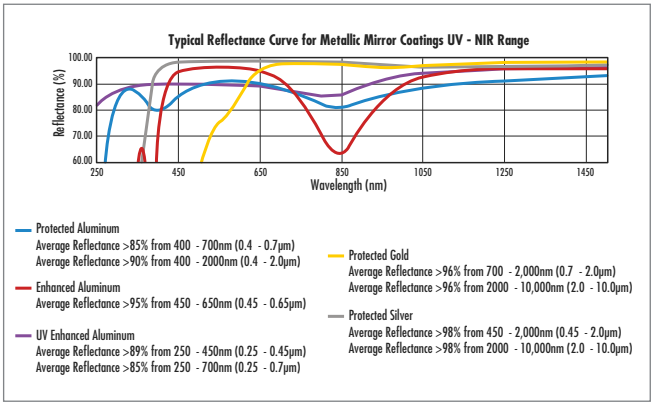
EO ADVANTAGE:

- Standard Metallic Coatings Available in Flat, Focusing, and Specialty Configurations
- Precision Dielectric Coatings Optimized for Laser Line and Broadband Applications
- High Damage Threshold Laser Mirrors Available

MIRRORS SELECTION GUIDE

	Laser Mirrors	Size Range	Surface Flatness	Substrates	Coating Options
	Laser Line Mirrors	12.5 - 50.8mm	λ/10	Fused Silica	Nd:YAG, Yb:YAG, Excimer, Argon Ion, Diode
	Low Loss Laser Mirrors	25.4mm	λ/8	Fused Silica	Nd:YAG
	Fiber Laser Mirrors	12.5 - 50mm	λ/10	Fused Silica	Fiber Laser
	Broadband Laser Mirrors	12.7 - 50.8mm	λ/10	Fused Silica	UV, VIS, IR, Laser
	Broadband IR Laser Mirrors	25 - 50mm	λ/20 @ 10.6µm	Copper	Gold
	Ultrafast Laser Mirrors	25.4mm	λ/8	Fused Silica	Ti:Sapphire, Er:Glass, Ytterbium-Doped
	Precision Flat Mirrors	**Size Range**	**Surface Flatness**	**Substrates**	**Coating Options**
	Optical Flat Mirrors	12.7 - 304.8mm	λ/10, λ/20	Fused Silica, ZERODUR®	Aluminum, Gold, Silver
	Standard Flat Mirrors	**Size Range**	**Surface Flatness**	**Substrates**	**Coating Options**
	Polished First Surface Mirrors	5 - 100mm	λ/4, λ/8, λ/10, λ/20	Fused Silica, ZERODUR®, BOROFLOAT®	Aluminum, Gold, Silver, Dielectric
	Float Glass First Surface Mirrors	5 - 408mm	4 - 6λ	Float Glass	Aluminum, Gold, Silver
	Metal Substrate Mirrors	**Size Range**	**Surface Flatness/Accuracy**	**Substrates**	**Coating Options**
	Metal Mirrors	25.4 - 76.2mm	λ/4 RMS	Copper, Aluminum, Silicon	Aluminum, Gold
	Off-Axis Parabolic Metal Mirrors	6.35 - 101.6mm	λ/2, λ/4, λ/8 RMS	Aluminum	Aluminum, UV Enhanced Aluminum, Gold, Protected SIlver

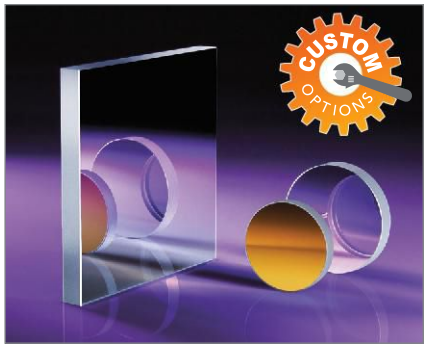




First Surface Mirrors for Every Application

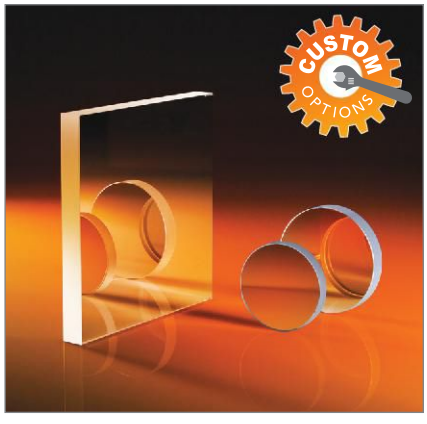
COMMON SIZES OF TECHSPEC® ENHANCED ALUMINUM FIRST SURFACE MIRRORS

Diameter (mm)	λ/4 Mirrors		λ/10 Mirrors		λ/20 Mirrors		
	Stock No.	Price	Stock No.	Price	Stock No.	Price	
10	#45-722	$42.50	#64-009	$62.50	#34-354	$97.00	Volume Pricing Available
15	#63-162	$46.00	#64-011	$67.50	#34-356	$102.00	
20	#63-163	$48.00	#64-013	$72.50	#34-358	$112.00	
25	#45-604	$53.00	#64-015	$77.50	#34-360	$117.00	
30	#63-164	$66.00	#84-411	$99.00	#34-362	$153.00	
40	#63-166	$79.00	#64-017	$120.00	#34-364	$184.00	
50	#45-607	$89.00	#64-019	$130.00	#34-366	$199.00	



COMMON SIZES OF TECHSPEC® 4 - 6λ FIRST SURFACE MIRRORS

Diameter (mm)	Enhanced Aluminum		Protected Silver		Protected Gold		
	Stock No.	Price	Stock No.	Price	Stock No.	Price	
6 x 6	#43-866	$18.00	#89-464	$21.00	#43-877	$30.00	Volume Pricing Available
10 x 10	#45-517	$18.00	#89-468	$21.00	#45-518	$30.00	
12.5 x 12.5	#43-790	$18.00	#89-471	$21.00	#43-791	$30.00	
15 x 15	#43-870	$18.00	#89-476	$21.00	#43-881	$30.00	
20 x 20	#43-872	$20.00	#89-480	$24.00	#43-883	$36.00	
25 x 25	#43-792	$20.00	#89-483	$24.00	#43-793	$36.00	
35 x 35	#45-519	$23.00	#89-489	$28.00	#45-520	$59.00	
50 x 50	#43-876	$30.00	#89-495	$36.00	#43-887	$69.00	
75 x 75	#48-452	$36.00	#36-054	$52.00	#48-457	$92.00	



TECHSPEC® RIGHT ANGLE MIRRORS

Length of Legs (mm)	Enhanced Aluminum		Protected Gold		Protected Silver		
	Stock No.	Price	Stock No.	Price	Stock No.	Price	
3.0	#49-405	$65.00	#65-844	$91.00	#89-623	$77.50	Volume Pricing Available
5.0	#45-591	$59.00	#47-027	$86.00	#89-624	$72.50	
10.0	#45-592	$65.00	#47-028	$91.00	#89-626	$77.50	
12.5	#48-384	$65.00	#48-386	$91.00	#89-627	$77.50	
15.0	#45-593	$78.00	#48-387	$105.00	#89-628	$90.00	
25.0	#45-595	$89.00	#47-030	$115.00	#89-630	$100.00	
30.0	#45-687	$120.00	#47-031	$145.00	#89-631	$130.00	
40.0	#45-688	$168.00	#65-846	$194.00	#89-633	$175.00	
50.0	#45-689	$220.00	#47-032	$245.00	#89-634	$225.00	
75.0	#47-307	$265.00	#47-308	$290.00	#89-635	$270.00	

Visit **www.edmundoptics.com/flat-mirrors** to browse the entire selection of flat mirrors

Nd:YAG Laser Line Mirrors

EO ADVANTAGE:

- Up to 6 J/cm² @ 355nm, 20ns Damage Thresholds
- UV Fused Silica Substrates for Excellent Thermal and Temporal Stability
- Low Absorption Ion Beam Sputtered (IBS) Options Available

Substrate:	Fused Silica
Surface Quality:	10-5
Surface Flatness:	λ/10
Design Polarization:	Random
Parallelism:	<3 arcmin
Clear Aperture:	>85%

Visit
www.edmundoptics.com
/laser-line-mirrors
for over 600
Laser Mirrors available in stock!
Volume pricing for OEM quantities!

CUSTOM OPTIONS

TECHSPEC® Nd:YAG LASER LINE MIRRORS - 4TH HARMONIC

DWL (nm)	AOI (°)	Reflection at DWL (%)	Dia. (mm)	Thickness (mm)	Damage Threshold, Pulsed	Stock No.	Price	Volume Pricing Available
266	0 - 45	99.8	6.35 +0.0/-0.1	4.00 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-832	$110.00	
266	0 - 45	99.8	12.7 +0.0/-0.1	6.35 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-833	$120.00	
266	0 - 45	99.8	19.1 +0.0/-0.1	6.35 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-834	$130.00	
266	0 - 45	99.8	25.4 +0.0/-0.1	6.35 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-835	$140.00	
266	0 - 45	99.8	38.1 +0.0/-0.1	6.35 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-838	$175.00	
266	0 - 45	99.8	50.8 +0.0/-0.1	9.53 ±0.2	2.0 J/cm² @ 266nm, 20ns, 20Hz	#38-841	$260.00	

TECHSPEC® Nd:YAG LASER LINE MIRRORS - 3RD HARMONIC

DWL (nm)	AOI (°)	Reflection at DWL (%)	Dia. (mm)	Thickness (mm)	Damage Threshold, Pulsed	Stock No.	Price	Volume Pricing Available
355	0 - 45	99.8	6.35 +0.0/-0.1	4.00 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-863	$110.00	
355	0 - 45	99.8	12.7 +0.0/-0.1	6.35 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-864	$120.00	
355	0 - 45	99.8	19.1 +0.0/-0.1	6.35 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-865	$130.00	
355	0 - 45	99.8	25.4 +0.0/-0.1	6.35 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-866	$140.00	
355	0 - 45	99.8	38.1 +0.0/-0.1	6.35 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-868	$175.00	
355	0 - 45	99.8	50.8 +0.0/-0.1	9.53 ±0.2	5.0 J/cm² @ 355nm, 20ns, 20Hz	#38-870	$260.00	

TECHSPEC® Nd:YAG LASER LINE MIRRORS - 2ND HARMONIC

DWL (nm)	AOI (°)	Reflection at DWL (%)	Dia. (mm)	Thickness (mm)	Damage Threshold, Pulsed	Stock No.	Price	Volume Pricing Available
532	0 - 45	99.8	6.35 +0.0/-0.1	4.00 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-890	$100.00	
532	0 - 45	99.8	12.7 +0.0/-0.1	6.35 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-891	$110.00	
532	0 - 45	99.8	19.1 +0.0/-0.1	6.35 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-892	$120.00	
532	0 - 45	99.8	25.4 +0.0/-0.1	6.35 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-893	$130.00	
532	0 - 45	99.8	38.1 +0.0/-0.1	6.35 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-895	$165.00	
532	0 - 45	99.8	50.8 +0.0/-0.1	9.53 ±0.2	10 J/cm² @ 532nm, 20ns, 20Hz	#38-897	$250.00	

TECHSPEC® Nd:YAG LASER LINE MIRRORS - FUNDAMENTAL WAVELENGTH

DWL (nm)	AOI (°)	Reflection at DWL (%)	Dia. (mm)	Thickness (mm)	Damage Threshold, Pulsed	Stock No.	Price	Volume Pricing Available
1064	0 - 45	99.8	6.35 +0.0/-0.1	4.00 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-901	$100.00	
1064	0 - 45	99.8	12.7 +0.0/-0.1	6.35 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-902	$110.00	
1064	0 - 45	99.8	19.1 +0.0/-0.1	6.35 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-904	$120.00	
1064	0 - 45	99.8	25.4 +0.0/-0.1	6.35 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-905	$130.00	
1064	0 - 45	99.8	38.1 +0.0/-0.1	6.35 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-907	$165.00	
1064	0 - 45	99.8	50.8 +0.0/-0.1	9.53 ±0.2	15 J/cm² @ 1064nm, 20ns, 20Hz	#38-909	$250.00	

Concave, Convex, Parabolic, and More!

EO ADVANTAGE:

- Large Spherical and Parabolic Mirrors Available
- Convex Mirrors Diverge Light Without Adding Chromatic Aberration
- Off-Axis Parabolic Mirrors Focus to an Unrestricted Focal Point

SPECIALTY MIRROR OPTIONS

Focusing Mirrors	Size Range	Surface Accuracy	Substrates	Coating Options
Off-Axis Parabolic Mirrors	6.35 - 101.6mm	λ/2, λ/4 RMS, λ/8	Float Glass, Aluminum	Aluminum, UV Enhanced Aluminum, Gold, Protected Silver
Precision Parabolic Mirrors	76.2 - 412.8mm	λ/8	BOROFLOAT®	Aluminum, Gold
Precision Spherical Mirrors	25.4 - 317.5mm	λ/4, λ/8	BOROFLOAT®	Aluminum, Gold

TECHSPEC® 50Å OFF-AXIS PARABOLIC MIRRORS

90° Off-Axis Mirrors			Protected Aluminum		UV Enhanced Aluminum		Protected Gold	
Diameter (mm)	EFL (mm)	PFL (mm)	Stock No.	Price	Stock No.	Price	Stock No.	Price
6.35	6.35	3.2	#37-282	$150.00	#37-288	$165.00	#37-294	$195.00
6.35	12.7	6.35	#37-283	$150.00	#37-289	$165.00	#37-295	$195.00
6.35	25.4	12.7	#37-284	$150.00	#37-290	$165.00	#37-296	$195.00
6.35	50.8	25.4	#37-285	$150.00	#37-291	$165.00	#37-297	$195.00
6.35	76.2	38.1	#37-286	$150.00	#37-292	$165.00	#37-298	$195.00
6.35	101.6	50.8	#37-287	$150.00	#37-293	$165.00	#37-299	$195.00
12.7	12.7	6.35	#37-258	$160.00	#37-264	$175.00	#37-270	$255.00
12.7	25.4	12.7	#37-259	$160.00	#37-265	$175.00	#37-271	$255.00
12.7	50.8	25.4	#37-260	$160.00	#37-266	$175.00	#37-272	$255.00
12.7	76.2	38.1	#37-261	$160.00	#37-267	$175.00	#37-273	$255.00
12.7	101.6	50.8	#37-262	$160.00	#37-268	$175.00	#37-274	$255.00
12.7	203.2	101.6	#37-263	$160.00	#37-269	$175.00	#37-275	$255.00
25.4	25.4	12.7	#87-406	$200.00	#37-232	$210.00	#37-241	$260.00
25.4	50.8	25.4	#87-407	$200.00	#37-233	$210.00	#37-242	$260.00
25.4	76.2	38.1	#37-226	$200.00	#37-234	$210.00	#37-243	$260.00
25.4	101.6	50.8	#87-408	$200.00	#37-235	$210.00	#37-244	$260.00
25.4	127.0	63.5	#37-227	$250.00	#37-236	$210.00	#37-245	$360.00
25.4	152.4	76.2	#37-228	$200.00	#37-237	$210.00	#37-246	$260.00
25.4	177.8	88.9	#37-229	$345.00	#37-238	$385.00	#37-247	$445.00
25.4	203.2	101.6	#37-230	$200.00	#37-239	$210.00	#37-248	$260.00
50.8	50.8	25.4	#87-409	$365.00	#37-306	$390.00	#37-308	$445.00
50.8	76.2	38.1	#37-984	$365.00	#37-993	$390.00	#37-989	$445.00
50.8	101.6	50.8	#87-410	$365.00	#37-307	$390.00	#37-309	$445.00
50.8	152.4	76.2	#37-985	$365.00	#37-994	$390.00	#37-990	$445.00
50.8	177.8	88.9	#37-987	$365.00	#37-995	$390.00	#37-991	$445.00
50.8	190.6	95.3	#37-988	$365.00	#37-996	$390.00	#37-992	$445.00

Visit **www.edmundoptics.com/oap** to browse the entire selection of off-axis parabolic mirrors

Full Spectrum of Substrates Available

EO ADVANTAGE:

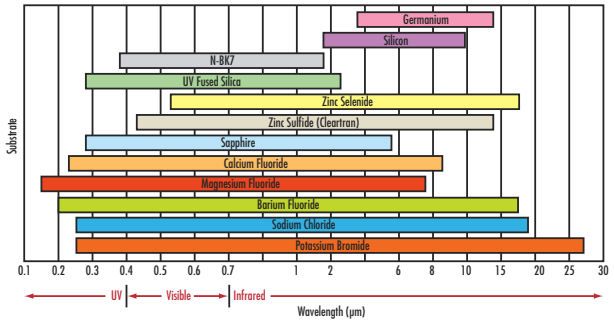
- More than 15 Different Substrates Available Off-The-Shelf
- Wide Selection of Substrates and Coatings for UV, Visible, and Infrared Wavelengths
- Laser Line and Broadband Anti-Reflection Coatings Available

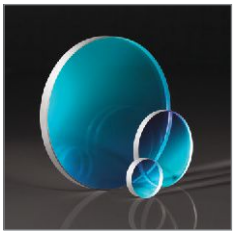
BARIUM, CALCIUM, AND MAGNESIUM FLUORIDE

- Low absorption and high damage threshold from 0.2 - 7µm
- Spectroscopy, semiconductor processing, and cryogenically cooled thermal imaging applications

EO Advantage:
- 5 - 50mm sizes
- λ/2 surface flatness
- <1arcmin parallelism

Substrate Comparison Chart





FUSED SILICA

- Low coefficient of thermal expansion and excellent transmission from UV to IR
- Interferometry, laser instrumentation, spectroscopy, and industrial applications

EO Advantage:
- 5 - 100mm sizes (UV grade) and 1" - 8" sizes (standard)
- UV, excimer and standard grade substrate
- High power laser line and broadband AR coatings

GERMANIUM

- High index of refraction and knoop hardness with transmission in the mid and long wave IR
- Thermal imaging, FLIR, and rugged IR applications

EO Advantage:
- 10 - 75mm diameter sizes
- λ/20 @ 10.6µm surface flatness
- <1 arcmin parallelism
- 3 - 5µm, 3 - 12µm, and 8 - 12µm AR coating options

N-BK7

- Low-cost substrate for Visible/NIR applications
- Machine vision, microscopy, and industrial applications

EO Advantage:
- 5 - 75mm sizes
- <1 arcmin parallelism
- MgF_2, VIS 0°, VIS-NIR, and NIR I broadband coating options
- 7 Laser Line coatings between 405 - 1550nm

SILICON

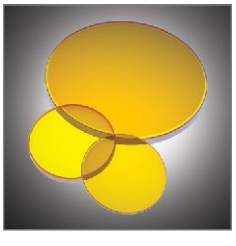
- Low cost and low density substrate for weight sensitive IR applications
- Spectroscopy, mid IR laser systems, and THz imaging applications

EO Advantage:
- 10 - 50mm sizes
- Optical grade substrate
- <3 arcmin parallelism
- 3 - 5µm AR coating

SAPPHIRE

- Extremely hard and durable with good transmission from UV to IR
- IR laser systems, spectroscopy and rugged environmental equipment

EO Advantage:
- 2.5 - 75mm diameter sizes
- <3.5 arcmin parallelism
- Multiple standard AR coating options available



ZINC SELENIDE AND ZINC SULFIDE

- Low absorption coefficient and high resistance to thermal shock
- CO_2 laser systems and thermal imaging applications

EO Advantage:
- 10 - 75mm diameter sizes
- λ/20 @ 10.6µm surface flatness
- Broadband AR coatings

Visit **www.edmundoptics.com/windows** to browse the entire selection of windows

RECOMMENDED Windows

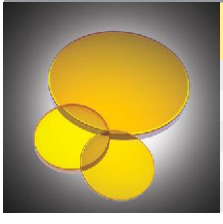
RECOMMENDED ULTRAVIOLET WINDOWS - UNCOATED

Diameter (mm)	Fused Silica Substrate	Price	CaF_2 Substrate	Price	MgF_2 Substrate	Price
5	#45-463	$50.00	#48-853	$90.00	#64-092	$100.00
10	#45-308	$50.00	#47-681	$95.00	#87-703	$125.00
12.5	#45-309	$50.00	#47-682	$105.00	#64-093	$170.00
20	#45-464	$55.00	#63-207	$115.00	#87-704	$225.00
25	#45-311	$60.00	#47-683	$120.00	#64-094	$250.00

RECOMMENDED VISIBLE WINDOWS - MgF_2 COATED

Diameter (mm)	N-BK7 Substrate	Price	B270 Substrate	Price	BOROFLOAT® Substrate	Price
5	#45-574	$47.50	#32-946	$27.50	#83-369	$21.50
10	#45-256	$47.50	#32-947	$27.50	#83-370	$21.50
12.5	#45-257	$47.50	#32-948	$28.50	#83-372	$21.50
15	#45-576	$50.00	#32-949	$28.50	#83-373	$21.50
25	#45-258	$55.00	#32-951	$32.50	#83-375	$24.50

RECOMMENDED INFRARED WINDOWS - UNCOATED

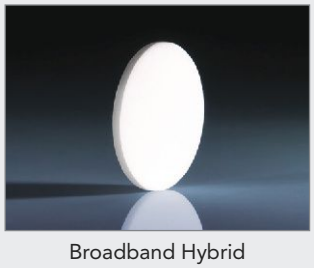


Diameter (mm)	Sapphire Substrate	Price	Germanium (Ge) Substrate	Price	ZnSe Substrate	Price
10	#43-366	$34.00	#68-734	$125.00	#68-490	$149.00
12.5	#68-157	$41.00	#68-735	$150.00	#68-491	$159.00
20	#43-368	$60.00	#68-736	$175.00	#68-492	$249.00
25	#43-369	$82.50	#68-737	$180.00	#68-493	$259.00
50	#45-817	$325.00	#68-740	$425.00	#68-496	$599.00

RECOMMENDED LASER LINE WINDOWS -ANTI-REFLECTION COATED

Diameter (mm)	266nm	Price	1030nm	Price	1064nm	Price
12.7	#38-918	$90.00	#39-717	$90.00	#38-982	$90.00
19.1	#38-921	$100.00	#39-719	$110.00	#38-984	$100.00
25.4	#38-923	$110.00	#39-720	$250.00	#38-985	$110.00
38.1	#38-925	$135.00	#39-722	$100.00	#38-988	$135.00
50.8	#38-928	$250.00	#39-724	$135.00	#38-990	$250.00

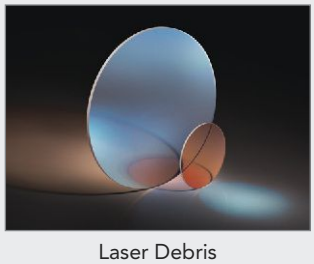
Visit **www.edmundoptics.com/windows** to view our entire selection of windows



Broadband Hybrid Diffusers

Gorilla® Glass Windows

TECHSPEC® Ultra-Thin N-BK7 Windows



Laser Debris Shields

Choose the Right Filter for Your Application

EO ADVANTAGE:

- Over 3,500 Filters In Stock and Available Now
- Designs Optimized for the Most Demanding Applications
- Downloadable Coating Curves for all TECHSPEC® Filters

BANDPASS FILTERS

Bandpass Filters selectively transmit a portion of the spectrum, while rejecting all other wavelengths. Our Bandpass Interference Filters are available in a variety of bandwidth options.

TECHSPEC® BANDPASS INTERFERENCE FILTERS

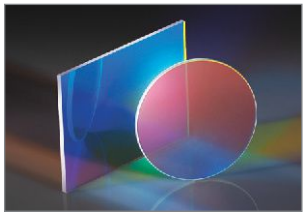
	Center Wavelength Range	Optical Densities	Size Range
Fluorescence Bandpass Filters	340 - 832nm	≥6	12.5 - 50mm
Hard Coated Bandpass Filters	250nm - 2µm	≥4	12.5 - 50mm
Traditional Coated Bandpass Filters	193nm - 10.6µm	≥3, ≥4	12.5 - 50mm
Laser Line Clean-Up Filters	325 - 1064nm	≥6	12.5 - 25mm
Multi-Bandpass Filters	432 - 700nm	≥6	12.5 - 50mm

NOTCH FILTERS

Notch Filters selectively reject a portion of the spectrum, while transmitting all other wavelengths. Featuring dielectric coatings to reflect the laser wavelength, Notch Filters are available with different levels of blocking and transmission ranges.

TECHSPEC® NOTCH FILTERS

	Center Wavelength Range	Optical Densities	Size Range
Standard Notch Filters	355 - 1064nm	≥4, ≥6	12.5 - 50mm
Multi-Line Nd:YAG Notch Filters	355 - 1064nm	≥6	12.5 - 50mm

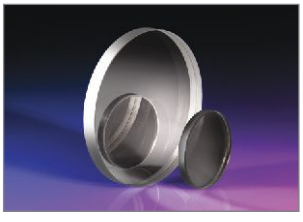


EDGE AND DICHROIC FILTERS

Longpass Filters transmit wavelengths greater than the cut-on wavelength, while Shortpass Filters transmit wavelengths shorter than the cut-off wavelength. Dichroic Filters perform the same function, while guaranteeing that the rejected wavelengths are reflected.

TECHSPEC® EDGE AND DICHROIC FILTERS

	Cut-On/Off Wavelength Range	Optical Densities	Size Range
High Performance Fluorescence Dichroic Filters	409 - 850nm	N/A	12.5 - 35.6mm
Longpass Filters	266nm - 7.3µm	≥2, ≥4	12.5 - 50mm
Shortpass Filters	400 - 1600nm	≥2, ≥4	12.5 - 50mm
Fluorescence Dichroic Filters	403 - 801nm	N/A	12.5 - 35.6mm
Dichroic Filters	400 - 1200nm	N/A	12.5 - 50mm
Variable Edge Filters	300 - 845nm	≥4	15 - 60mm
Hot and Cold Mirrors	N/A	N/A	12.5 - 127mm
Color Glass Longpass Filters	285 - 1000nm	N/A	12.5 - 50mm
Mounted Edge Filters	400 - 1100nm	≥2	M22.5 x 0.5 - M77.0 x 0.75



NEUTRAL DENSITY FILTERS

Neutral Density (ND) Filters are designed to reduce transmission evenly across a portion of the spectrum. They can be designed for any portion of the UV, VIS or IR spectrum, and are commonly used to prevent over exposure of cameras and other detectors.

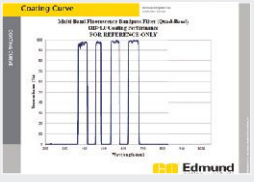
TECHSPEC® NEUTRAL DENSITY (ND) FILTERS

	Wavelength Range	Optical Densities	Size Range
Reflective ND Filters	UV, VIS, NIR, and IR	0.1 - 5.0	12.5 - 50mm
Absorptive ND Filters	VIS	0.1 - 4.0	12.5 - 50x50mm
Non-Reflective ND Filters	VIS and NIR	0.3 - 3.0	12.5 - 25mm
ND Filter Film	VIS	0.1 - 4.0	12.5 - 100x300mm
Circular and Linear Variable ND Filters	VIS	0.04 - 4.0	25 - 100mm
Mounted ND Filters	VIS and NIR	0.1 - 3.0	M22.5 x 0.5 - M77.0 x 0.75

Visit **www.edmundoptics.com/filters** to browse the entire selection of filters

Narrow Band to Wide Band Filters Available

Download **free online filter curves** for all TECHSPEC® Filters at **www.edmundoptics.com/filters**



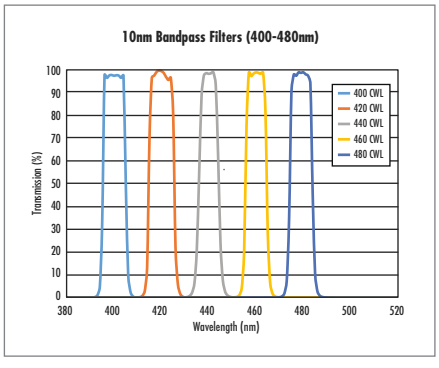
TECHSPEC® 25mm HARD COATED OD 4 BANDPASS FILTERS

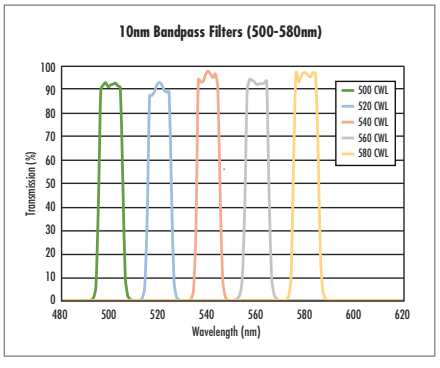
Center Wavelength CWL (nm)	Blocking Range (nm)	Full Width Half Max FWHM (nm)			Price
		10	25	50	
400	200 - 1200	#65-132	#86-652	#84-781	$205.00
450	200 - 1200	#65-140	#86-653	#84-782	$205.00
500	200 - 1200	#65-149	#86-654	#84-783	$205.00
550	200 - 1200	#65-159	#86-655	#84-784	$205.00
600	200 - 1200	#65-163	#86-656	#84-785	$205.00
650	200 - 1200	#65-170	#86-657	#84-786	$205.00
700	200 - 1200	#88-012	#86-658	#84-787	$205.00
750	200 - 1200	#88-013	#86-659	#84-788	$205.00
800	200 - 1200	#65-179	#86-660	#84-789	$205.00
850	200 - 1200	#86-090	#86-661	#84-790	$205.00

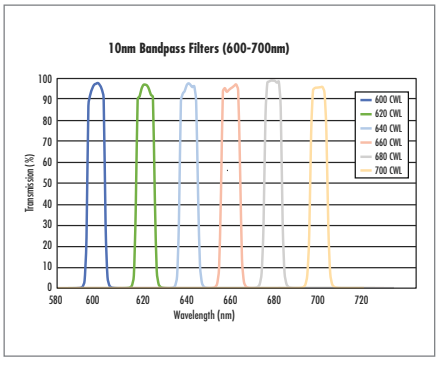
Volume Pricing Available

Over 450 OD 4 Bandpass Filters Available on Our Website **in 10nm, 25nm, 50nm and Laser Line Designs.**

CUSTOM OPTIONS







Visit **www.edmundoptics.com/bandpass-filters** to browse the entire selection of bandpass filters

Edge Filters for Spectral Sorting

TECHSPEC® OD 4 LONGPASS FILTERS

Cut-On Wavelength (nm)	Rejection Band (nm)	Transmission Band (nm)	25mm Diameter	Price
400	200 - 390	408 - 1650	#62-981	$220.00
450	200 - 440	458 - 1650	#62-982	$220.00
500	200 - 490	508 - 1650	#62-983	$220.00
550	200 - 539	560 - 1650	#62-984	$220.00
600	200 - 588	610 - 1650	#62-985	$220.00
650	200 - 637	660 - 1650	#62-986	$220.00
700	200 - 686	710 - 1650	#62-987	$220.00
750	200 - 735	765 - 1650	#66-234	$220.00
800	200 - 785	815 - 1650	#66-235	$220.00
850	200 - 835	865 - 1650	#66-236	$220.00
900	200 - 880	915 - 1650	#66-237	$220.00
950	200 - 930	965 - 1650	#66-238	$220.00
1000	200 - 980	1020 - 1650	#66-239	$235.00

Volume Pricing Available

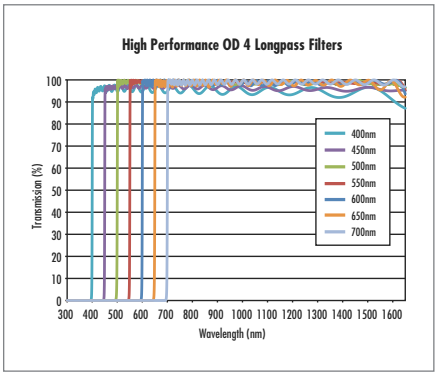
Visit our website for our complete selection of **OD 2 and OD 4 Edge Filter Designs Available Off-the-Shelf in 12.5mm, 25mm, and 50mm Diameters**

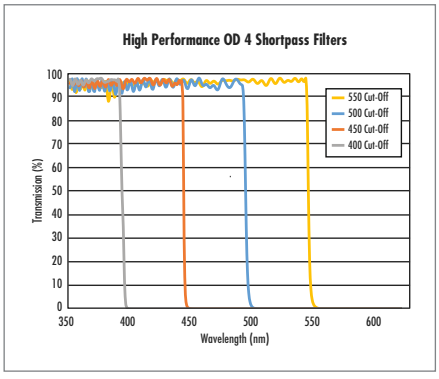
CUSTOM OPTICS

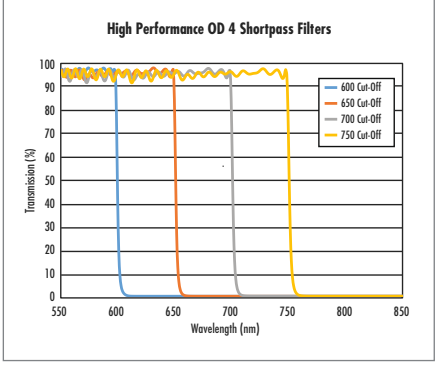
TECHSPEC® OD 4 SHORTPASS FILTERS

Cut-Off Wavelength (nm)	Transmission Band (nm)	Rejection Band (nm)	25mm Diameter	Price
400	300 - 392	410 - 610	#84-702	$220.00
450	300 - 441	460 - 660	#84-704	$220.00
500	300 - 490	512 - 715	#84-706	$220.00
550	350 - 539	562 - 825	#84-708	$220.00
600	350 - 587	614 - 900	#84-710	$220.00
650	350 - 636	665 - 960	#84-712	$220.00
700	400 - 685	715 - 1050	#84-714	$220.00
750	400 - 740	775 - 1125	#64-332	$220.00
800	400 - 790	825 - 1190	#64-333	$220.00
850	400 - 840	880 - 1190	#64-334	$220.00
900	425 - 890	930 - 1250	#64-335	$220.00
950	450 - 939	980 - 1325	#64-336	$220.00
1000	465 - 988	1035 - 1400	#64-337	$235.00

Volume Pricing Available







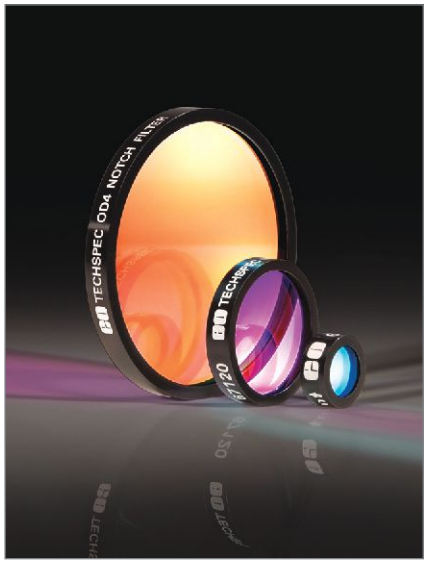
Visit **www.edmundoptics.com/filters** to browse the entire selection of filters

Notch Filters for Laser Rejection

TECHSPEC® OD 4 NOTCH FILTERS

Center Wavelength (nm)	Full Width Half Maximum (nm)	Transmission Range (nm)	12.5mm Diameter	Price
355	17.8	325 - 475	#67-106	$235.00
405	20.2	325 - 540	#67-107	$235.00
488	24.4	365 - 650	#67-108	$235.00
514.5	25.7	385 - 685	#67-109	$235.00
532	26.6	400 - 700	#67-110	$235.00
632.8	31.6	475 - 845	#67-111	$235.00
785	39.2	585 - 1045	#67-112	$235.00
808	40.0	600 - 1070	#86-700	$235.00
830	42.0	625 - 1100	#86-701	$235.00
980	49.0	735 - 1300	#67-113	$235.00
1030	51.5	800 - 1400	#39-383	$235.00
1064	53.2	800 - 1400	#67-114	$235.00

Volume Pricing Available

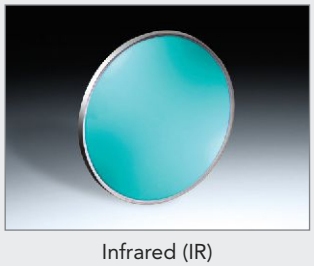


TECHSPEC® OD 6 NOTCH FILTERS

Center Wavelength (nm)	Full Width Half Maximum (nm)	Transmission Range (nm)	12.5mm Diameter	Price
355	26	280 - 700	#39-386	$435.00
405	9	350 - 1200	#86-119	$435.00
532	17	350 - 1200	#86-120	$435.00
632.8	25	350 - 1200	#86-121	$435.00
785	39	350 - 1200	#86-122	$435.00
1064	73	400 - 1200	#86-123	$435.00

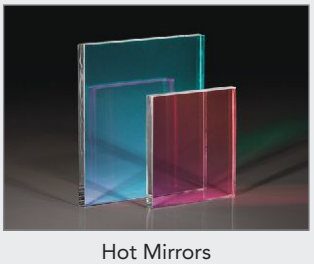
Volume Pricing Available

Visit www.edmundoptics.com/filters to view our entire selection of filters



Infrared (IR) Bandpass Filters

Ultra-Thin Notch Filters



Hot Mirrors

Ultra Narrow Bandpass Filters

Understanding Neutral Density Filters

Neutral Density (ND) filters are designed to reduce transmission evenly across a portion of a specific spectrum. ND filters are typically defined by their Optical Density (OD) which describes the amount of energy blocked by the filter. A high optical density value indicates very low transmission, and low optical density indicates high transmission.

$$T\,(\%) = 10^{-OD} \times 100$$

$$OD = -\log\left[\frac{T}{100}\right]$$

ND filters can be stacked to achieve a custom optical density. To calculate the final system OD, simply add the OD of each filter together.

Example 1: What is the transmission if OD 0.3 and OD 1.5 filters are stacked?

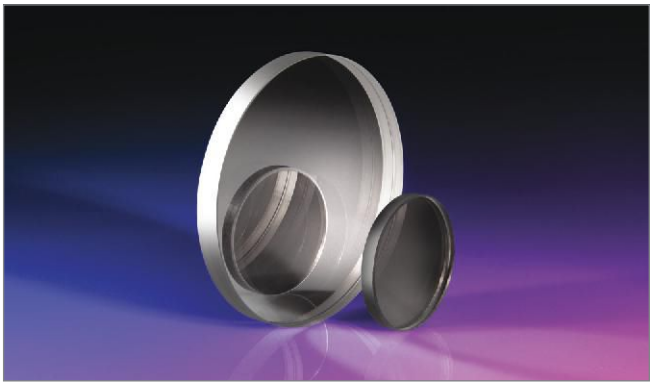
$$OD_{total} = 0.3 + 1.5 = 1.8$$

$$T = 10^{-1.8} \times 100 = 1.58\%$$

Example 2: How can I build a filter with 0.5% Transmission?

$$OD = -\log(0.5\%/100) = -\log(0.005) = 2.3$$

OD_{total} of 2.3 could be created by stacking OD 0.3 + OD 2.0 or OD 1.0 + OD 1.3.



Neutral Density Filter Types

There are two types of ND filters: reflective and absorptive. Reflective ND filters consist of thin film optical coatings, typically metallic, that have been applied to a glass substrate. The coating can be optimized for specific wavelength ranges such as UV-VIS or NIR. The thin film coating primarily reflects light back toward the source. Special care should be taken to ensure the reflected light does not interfere with the system setup. Absorptive ND filters utilize a glass substrate to absorb light by a specific percentage.

EO ADVANTAGE:

- Spectrally Flat Transmission Profile
- UV, VIS, NIR Versions Available
- Over 380 Filters to Choose From

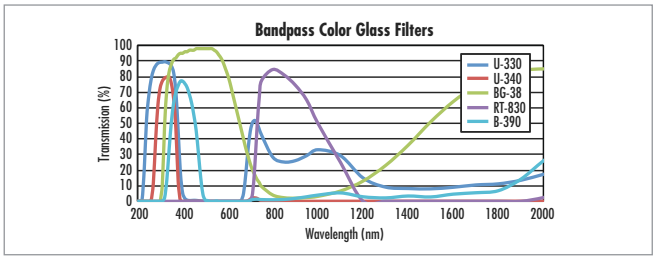
TECHSPEC® REFLECTIVE NEUTRAL DENSITY FILTERS

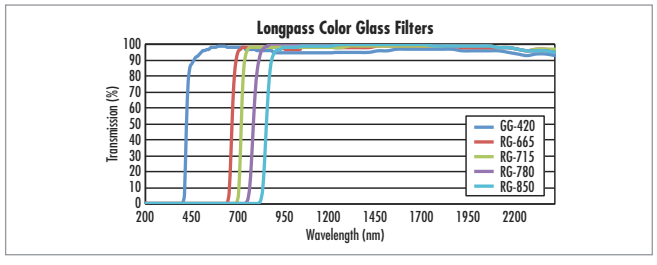
Optical Density	Diameter (mm)	Transmission	Absorptive	Price	UV-VIS	Price	UV-NIR	Price	VIS	Price	NIR	Price
0.3	25	50.0%	#46-212	$37.50	#47-205	$99.50	#88-270	$140.00	#63-386	$115.00	#47-528	$95.00
0.5	25	32.0%	#48-089	$37.50	#47-206	$99.50	#88-271	$140.00	#63-387	$115.00	#47-529	$95.00
1.0	25	10.0%	#48-090	$37.50	#47-207	$99.50	#88-272	$140.00	#63-390	$115.00	#47-530	$95.00
1.3	25	5.0%	#63-463	$37.50	#47-208	$99.50	#88-273	$140.00	#63-391	$115.00	#47-531	$95.00
1.5	25	3.2%	#48-091	$37.50	#47-209	$99.50	#88-274	$140.00	#63-392	$115.00	#47-532	$95.00
2.0	25	1.0%	#48-092	$37.50	#47-210	$99.50	#88-275	$140.00	#63-393	$115.00	#47-533	$95.00

Wide Variety of Hoya and Schott Filter Glass

EO ADVANTAGE:

- Over 70 Substrates Available Off-The-Shelf
- Custom Sizes Available
- UV, VIS, and IR Ranges



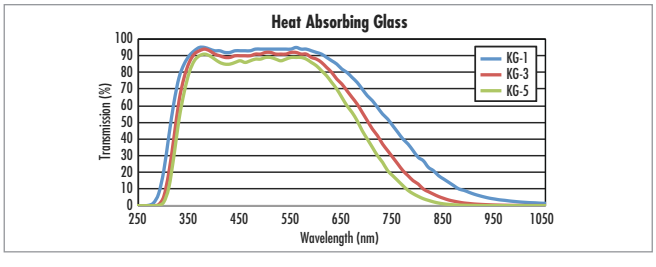


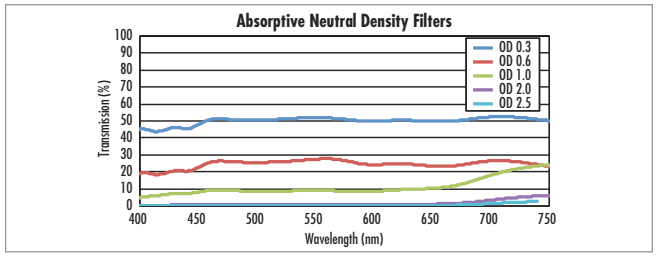
BANDPASS COLOR GLASS FILTERS

Glass No.	Range	Glass Manufacturer	Center λ (nm)	Thickness	1" Diameter	Price	Volume Pricing Available
U-330	UV	Hoya	330	2.5	#46-437	$61.50	
U-340	UV	Hoya	340	2.5	#46-439	$61.50	
B-390	UV-VIS	Hoya	390	2.5	#48-635	$47.50	
BG-38	VIS	Schott	470	3.0	#46-433	$34.50	
RT-830	IR	Hoya	830	2.5	#46-443	$47.50	

LONGPASS COLOR GLASS FILTERS

Glass No.	Range	Glass Manufacturer	Cut-On λ (nm)	Thickness	1" Diameter	Price	Volume Pricing Available
GG-420	VIS	Schott	420	3.0	#46-426	$32.50	
RG-665	VIS	Schott	665	3.0	#45-070	$32.50	
RG-715	IR	Schott	715	3.0	#46-065	$32.50	
RG-780	IR	Schott	780	3.0	#32-757	$32.50	
RG-850	IR	Schott	850	3.0	#32-759	$32.50	





HEAT ABSORBING GLASS

Glass No.	Range	Glass Manufacturer	Thickness	25mm Diameter	Price	Volume Pricing Available
KG-1	VIS	Schott	3.0	#45-646	$29.50	
KG-3	VIS	Schott	3.0	#49-088	$35.00	
KG-5	VIS	Schott	3.0	#49-093	$40.00	

ABSORPTIVE NEUTRAL DENSITY FILTERS

Optical Density	Transmission (%)	Glass No.	Thickness	Glass Manufacturer	25mm Diameter	Price	Volume Pricing Available
0.3	50	ND-50	2.5	Hoya	#46-212	$37.50	
0.6	25	ND-25	2.5	Hoya	#46-214	$37.50	
1.0	10	ND-0.3	1.0	Hoya	#48-090	$37.50	
2.0	1	ND-0.3	2.0	Hoya	#48-092	$37.50	
2.5	0.3	ND-0.3	2.5	Hoya	#46-216	$37.50	

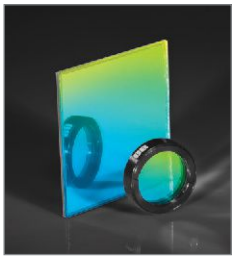
Visit **www.edmundoptics.com/filters** to browse the entire selection of color glass filters

POLARIZERS

Full Spectrum of Polarizers Available

EO ADVANTAGE:

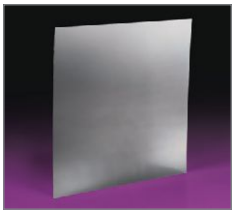
- Linear, Circular, and Elliptical Polarizers Available Off-the-Shelf
- Wide Selection of Substrates for UV, Visible, and Infrared Wavelengths



WIRE GRID POLARIZERS

Applications:
- Demanding environments
- Broadband applications
- Infrared applications
- Uncollimated light sources

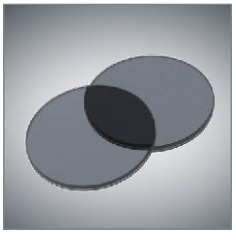
EO Advantage:
- Mounted and unmounted versions available
- Fully documented with 3D models and technical drawings online



DICHROIC FILM POLARIZERS

Applications:
- Imaging
- Inspection

EO Advantage:
- Inexpensive
- Large customizable sheets available
- High Extinction Ratio



DICHROIC POLARIZERS

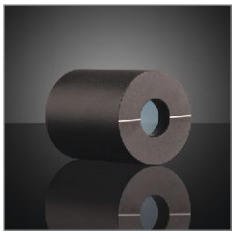
Applications:
- Industrial imaging
- Laboratory experiments

EO Advantage:
- High Extinction Ratio
- <4 arcmin Parallelism
- Diameters from 6.25-50.8mm

THIN-FILM POLARIZERS

Applications:
- Ultrafast laser applications
- High energy laser applications

EO Advantage:
- Ti:Sapphire, Nd:YAG, and HeNe compatible
- Accepts wide Angles of Incidence
- High Damage Thresholds



GLAN POLARIZERS

Applications:
- Laser applications
- Broad Wavelength Range

EO Advantage:
- λ/2 Transmitted Wavefront Error
- High Extinction Ratio
- Glan - Thompson, Taylor, and Laser Configurations

POLYMER WAVEPLATES (RETARDERS)

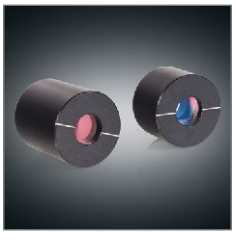
Applications:
- Transform between linear and circular polarization
- Wide acceptance angle

EO Advantage:
- True Zero Order Waveplate Performance
- λ/4 and λ/2 Retardance
- Multiple Wavelengths Available

HIGH ENERGY QUARTZ WAVEPLATES

Applications:
- Laser applications
- Q-Switching lasers

EO Advantage:
- Damage Threshold up to >20 J/cm^2 @ 1064nm
- UV to NIR Design Wavelengths Available
- λ/10 Transmitted Wavefront Accuracy



WOLLASTON POLARIZERS

Applications:
- Laboratory experiments
- Applications requiring both polarization states

EO Advantage:
- λ/4 Transmitted Wavefront Error
- High Extinction Ratio
- Wavelengths ranging from 190 - 4000nm

ACHROMATIC WAVEPLATES

Applications:
- Optical isolation
- Tunable lasers, broad spectrum light sources

EO Advantage:
- Multiple Wavelength Ranges Available
- Flat Response Over Each Broad Spectral Range
- λ/4 and λ/2 Retardance

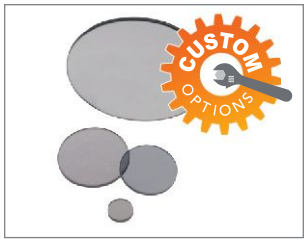
Visit **www.edmundoptics.com/polarizers** to browse the entire selection of polarizers

ITOS
A Division of EDMUND OPTICS®

Polarizer Capabilities
Edmund Optics® (EO) acquired ITOS GmbH, a company that has been producing optical components, including filters and polarizers, since 1993. This division of Edmund Optics provides added polarization capabilities, allowing for a wider range of custom and standard product offerings.

Dichroic Linear Glass Polarizers

EO ADVANTAGE:
- Wavelength Ranges from the UV to NIR
- Wide Range of Extinction Ratio Options
- Low Cost and High Efficiency Versions



LINEAR GLASS POLARIZING FILTERS
- Ideal for OEM, Prototyping, and Lab Applications
- Low Cost
- Mounted Versions Available

TECHSPEC® HIGH CONTRAST GLASS LINEAR POLARIZERS
- Ideal for a Broad Range of Industrial Applications
- AR Coating Minimizes Loss of Light from Reflections

NIR LINEAR POLARIZERS
- Ideal for Applications Using Low Power NIR Lasers and LEDs
- Commonly Used in Telecommunication Applications

LINEAR GLASS POLARIZERS *Specified for polarized light

	Linear Glass Polarizing Filters			TECHSPEC® High Contrast Glass Linear Polarizers			NIR Linear Polarizers			
Substrate:	B270			B270			B270			
Wavelength Range (nm):	400 - 700			400 - 700			750 - 850		1000 - 2000	
Extinction Ratio (@ Wavelength):	100:1			10,000:1			>1,000:1			
Diameter Tolerance (mm):	+0.0/-0.2			+0.0/-0.2			+0.0/-0.2			
Thickness (mm):	6.25 - 25.4mm: 2.0 ±0.2 35.00 - 70.00mm: 2.4 ±0.2			2.0 ±0.2			2.0 ±0.2			
Transmission, Avg. (%):	30			25 ±2			30 ±3			
Polarization Axis Mark:	None			±2°, white mark along edge			–			
Operating Temperature (°C):	60 (max.)			-25 to 65 typical			-25 to 65		-25 to 80	
AR Coating:	None			R_{avg} <0.5% @ 400 - 700nm			Narrowband Multi-Layer		None	
	Dia. (mm)	**Stock No.**	**Price**	**Dia. (mm)**	**Stock No.**	**Price**	**DWL (nm)**	**Dia. (mm)**	**Stock No.**	**Price**
	9.0	#43-783	$36.00	10.0	#47-314	$127.50	750 - 850	12.5	#48-891	$261.25
	12.5	#43-784	$36.00	12.5	#47-215	$133.00	750 - 850	25.0	#48-892	$331.55
	20.0	#43-785	$36.00	20.0	#47-315	$153.00	750 - 850	50.0	#48-894	$474.05
	25.0	#54-926	$36.00	25.0	#47-216	$163.00	1000 - 2000	12.5	#48-887	$160.00
	25.4	#54-926	$36.00	25.4	#47-316	$163.00	1000 - 2000	25.0	#48-888	$331.55
	50.0	#43-787	$46.50	50.0	#47-217	$199.00	1000 - 2000	50.0	#48-890	$474.05

Visit **www.edmundoptics.com/polarization** to view the entire selection of polarization products and additional size options.

Beamsplitter Configurations

To learn more about selecting the right **beamsplitter,** visit
www.edmundoptics.com/select-beamsplitter

Beamsplitters are optical components used to split incident light at a designated ratio into two separate beams. Additionally, beamsplitters can be used in reverse to combine two different beams into a single one. Beamsplitters are often classified according to their construction: cube or plate.

STANDARD BEAMSPLITTERS are commonly used with unpolarized light sources, such as natural or polychromatic, in applications where polarization state is not important. They are designed to split unpolarized light at a specific Reflection/Transmission (R/T) ratio with unspecified polarization tendencies.

POLARIZING BEAMSPLITTERS are designed to split light into reflected S-polarized and transmitted P-polarized beams. They can be used to split unpolarized light at a 50/50 ratio, or for polarization separation applications such as optical isolation (Figure 1).

NON-POLARIZING BEAMSPLITTERS split light into a specific R/T ratio while maintaining the incident light's original polarization state. For example, in the case of a 50/50 non-polarizing beamsplitter, the transmitted P and S polarization states and the reflected P and S polarization states are split at the design ratio. These beamsplitters are ideal for maintaining polarization in applications utilizing polarized light (Figure 2).

DICHROIC BEAMSPLITTERS split light by wavelength. Options range from laser beam combiners designed for specific laser wavelengths to broadband hot and cold mirrors for splitting visible and infrared light. This type of beamsplitter is commonly used in fluorescence applications.

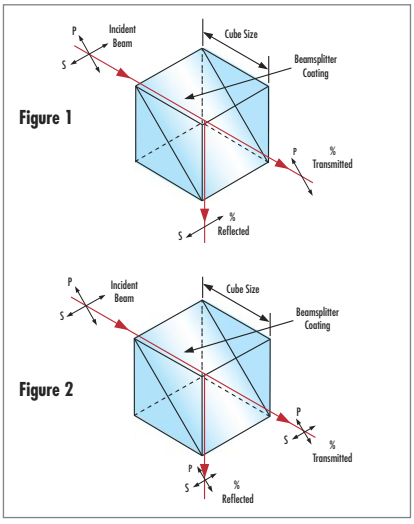


PLATE BEAMSPLITTERS

Plate beamsplitters are available in a wide range of sizes, coatings, and substrates and offer a lightweight solution for a wide range of applications. Designed for 45° angle of incidence, these beamsplitters are available for applications from UV through Infrared.

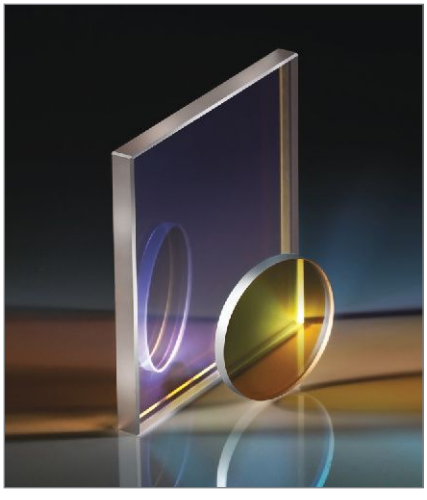


PLATE BEAMSPLITTERS			
	Size Range	Wavelength Range	R/T Ratio
Plate Beamsplitters	12.5 - 356mm	400 - 700nm	25/75, 30/70, 40/60, 50/50, 70/30, 75/25
UV Plate Beamsplitters	10 - 50mm	250 - 450nm	30/70, 50/50, 70/30
Elliptical Plate Beamsplitters	12.5 - 50mm	400 - 1100nm	50/50
Visible and NIR Plate Beamsplitters	12.5 - 75mm	400 - 1100nm	20/80, 30/70, 40/60, 50/50, 60/40, 70/30, 80/20
Infrared Plate Beamsplitters	25.4 - 50.8mm	2 - 14µm	50/50
Broadband Polarizing Plate Beamsplitters	12.5 - 25mm	420 - 670nm	Reflect S / Transmit P
Laser Line Non-Polarizing Plate Beamsplitters	25.4mm	355 - 1095nm	50/50
Polka-Dot Beamsplitters	12.7 - 50.8mm	250 - 2000nm	50/50, 30/70, 70/30
Pellicle Beamsplitters	25.4 - 152.4mm	400 - 700nm	8/92, 40/40, 33/67, 50/50
Fluorescence Dichroic Filters	12.5 - 35.6mm	409 - 801nm	N/A
Dichroic Laser Beam Combiners	12.5 - 50mm	427 - 659nm	N/A
λ/10 Wedged Plate Beamsplitters	25 & 50mm	400 - 700nm	30/70, 50/50, 70/30
Nd:YAG Harmonic Separator	12.7 & 25.4mm	266 - 1064nm	N/A

Visit **www.edmundoptics.com/beamsplitters** to browse the entire selection of beamsplitters

CUBE BEAMSPLITTERS

Easy System Alignment

EO ADVANTAGE:

- Standard, Non-Polarizing, Polarizing, and Laser Line Designs
- Uncoated Prisms In Stock for Quick Customization
- No Beam Shift

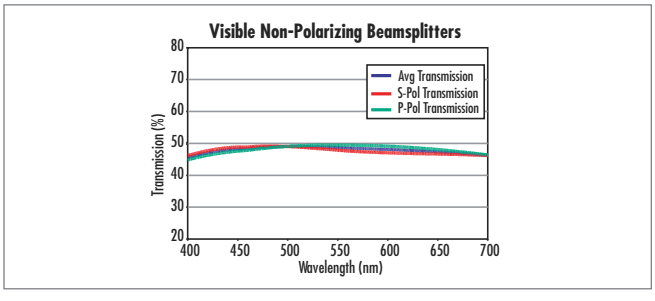
TECHSPEC® Cube Beamsplitters are available for optimal performance in the Visible or Infrared (IR) Spectrum with anti-reflection coating options designed for popular laser wavelengths or broad wavelength ranges. Standard Cube Beamsplitters, which are used in many illumination assemblies, split light by a percentage of overall intensity with slight polarization dependencies. Polarizing Cube Beamsplitters, which are ideal for semiconductor or photonics instrumentation, split unpolarized light into S-Polarization and P-Polarization states. Non-Polarizing Cube Beamsplitters split light without affecting the incident light's polarization states.

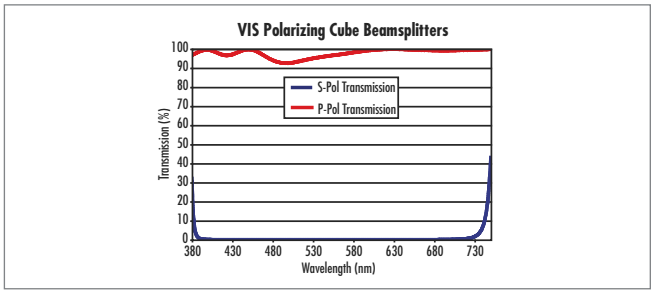
CUBE BEAMSPLITTERS

	Size Range	Wavelength Range	R/T Ratio
Standard Cube Beamsplitters	5 - 50mm	400 - 700nm	30/70, 50/50, 70/30
Broadband Polarizing Cube Beamsplitters	5 - 50mm	420 -1100nm	Reflect S / Transmit P
High Energy Polarizing Cube Beamsplitters	12.7 - 25.4mm	355 - 1064nm	Reflect S / Transmit P
Laser Line Polarizing Cube Beamsplitters	5 - 50mm	532 - 1064nm	Reflect S / Transmit P
Laser Line Non-Polarizing Cube Beamsplitters	5 - 25mm	532 - 1064nm	50/50
Wire Grid Polarizing Cube Beamsplitters	10 - 25.4mm	400 - 700nm	Reflect S / Transmit P
Broadband Non-Polarizing Cube Beamsplitters	5 - 50mm	400 - 1620nm	50/50
Lateral Displacement Beamsplitters	10 - 20mm	430 - 1080nm	50/50

TECHSPEC® CUBE BEAMSPLITTERS

Cube Size (mm)	50/50 Standard, 400 - 700nm		Non-Polarizing, 430 - 670nm		Polarizing, 420 - 680nm		Volume Pricing Available
	Stock No.	Price	Stock No.	Price	Stock No.	Price	
5.0	#32-600	$140.00	#47-007	$185.00	#48-998	$285.00	
10.0	#32-601	$145.00	#47-121	$190.00	#48-999	$295.00	
20.0	#32-504	$170.00	#47-122	$220.00	#49-001	$350.00	
25.0	#32-505	$190.00	#47-009	$225.00	#49-002	$390.00	
50.0	#32-704	$425.00	#49-004	$540.00	#65-603	$880.00	





Visit **www.edmundoptics.com/cube-beamsplitters** to browse the entire selection of cube beamsplitters

PRISMS

Find the Prism You Need

INSTRUMENTATION PRISMS

Applications:
- Controls both image rotation and orientation
- Used in direct view image scopes

EO Advantage:
- Roof angle tolerances <5 arcsec
- Uncoated and BBAR coated options
- N-BK7 substrate for excellent performance in the visible region

WEDGE PRISMS

Applications:
- Ideal for beam steering
- Tunable lasers and anamorphic imaging

EO Advantage:
- 0.5° - 15.0° nominal beam deviation
- N-BK7 and UV fused silica substrates
- Uncoated, VIS 0˚, UV-VIS, VIS-NIR, and Nd:YAG laser line AR coatings available

DISPERSION PRISMS

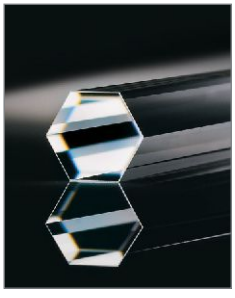
Applications:
- Disperse light into component wavelengths
- Spectroscopic instruments and applications

EO Advantage:
- 5 - 50mm sizes
- Equilateral, Littrow, and Brewster configurations
- Standard and Ultrafast designs

DOVE & RHOMBOID PRISMS

Applications:
- Displace or rotate images
- Interferometry, binoculars and laser instrumentation

EO Advantage:
- 0.5 - 50mm sizes
- N-BK7 substrate
- Uncoated, VIS 0˚ AR coating and protected aluminum metallic coating options



LIGHT PIPES

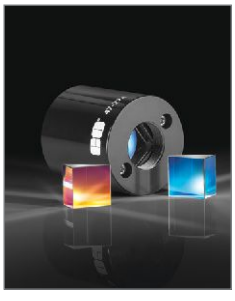
Applications:
- Homogenize non-uniform light sources
- LED illuminators, micro projectors and laser speckle reducers

EO Advantage:
- 2 - 20mm entrance/exit aperture sizes, 25 - 300mm lengths
- N-BK7 and UV fused silica substrates
- Low, standard and high NA versions
- Hexagonal entrance/exit apertures

RIGHT ANGLE PRISMS

Applications:
- Deviate line of sight by 90˚
- Endoscopy, microscopy, laser alignment and medical instrumentation

EO Advantage:
- 0.18 - 75mm sizes
- N-BK7, N-SF11, UV fused silica, and IR substrates
- Standard to high tolerance offerings (±5 arcmin to ±15 arcsec angle tolerance)
- Wide range of surface accuracies from λ/20
- Uncoated, multiple anti-reflection, and metallic coating options



ANAMORPHIC PRISMS

Applications:
- Convert elliptical beams into circular beams
- Laser diode beam expanders

EO Advantage:
- Mounted and unmounted designs
- 2X to 6X Magnification
- Multiple AR coating options

CORNER CUBE PRISMS

Applications:
- Useful for alignment due to 180˚ beam reflection
- Interferometry, boresighting, rangefinding and laser tracking

EO Advantage:
- 6.35 - 127.0mm sizes
- N-BK7 and UV fused silica substrates
- ±1 arcsec to ±30 arcsec beam deviations
- Uncoated, VIS 0˚, aluminum, silver and gold coating options
- Unmounted, mounted and hollow versions

Visit **www.edmundoptics.com/prisms** to browse the entire selection of prisms

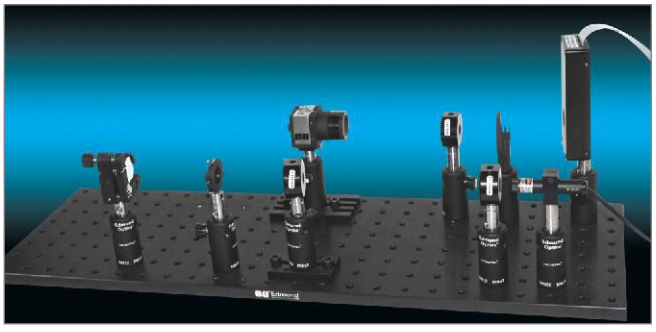
Your Source for Prisms

TECHSPEC® λ/20 UV FUSED SILICA RIGHT ANGLE PRISMS			
Length of Legs (mm)	Length of Hypotenuse (mm)	Stock No.	Price
5.0	7.1	#35-900	$205.00
10.0	14.1	#35-901	$225.00
12.5	17.7	#35-903	$230.00
15.0	21.2	#35-904	$240.00
20.0	28.3	#35-905	$255.00
25.0	35.4	#35-906	$285.00

TECHSPEC® MOUNTED N-BK7 CORNER CUBE RETROREFLECTORS					
Diameter of Corner Cube (mm)	Diameter of Mount (mm)	Height of Corner Cube (mm)	Height of Mount (mm)	Internal Silver Coated	
				Stock No.	Price
7.16	25.40	7.92	14.27	#49-079	$220.00
12.70	31.75	11.73	18.08	#45-203	$280.00
25.40	38.10	20.62	26.98	#45-188	$320.00
38.10	50.80	31.06	37.41	#45-190	$375.00
50.80	63.50	39.95	46.30	#45-192	$445.00
63.50	76.20	49.83	56.18	#49-080	$510.00
76.20	88.90	58.72	65.07	#49-081	$610.00

TECHSPEC® LIGHT PIPE HOMOGENIZING RODS									
Light Pipes for:	High NA Sources			Standard NA Sources			Low NA Sources		
Aperture, A	Length	Stock No.	Price	Length	Stock No.	Price	Length	Stock No.	Price
2.0mm	25.0mm	#48-582	$95.00	50.0mm	#63-080	$105.00	75.0mm	#63-081	$120.00
6.0mm	50.0mm	#63-086	$85.00	75.0mm	#49-403	$95.00	150.0mm	#63-087	$115.00
8.0mm	50.0mm	#63-088	$95.00	100.0mm	#49-404	$105.00	150.0mm	#63-089	$120.00
15.0mm	100.0mm	#84-532	$140.00	150.0mm	#84-533	$160.00	300.0mm	#84-534	$190.00
20.0mm	125.0mm	#84-535	$165.00	200.0mm	#84-536	$190.00	300.0mm	#84-537	$245.00

English and Metric Bench Plates



EO ADVANTAGE:

- Black Anodized Aluminum Construction
- Ideal for Optical Experiments and Test Configurations
- English and Metric Versions Available

ENGLISH AND METRIC BENCH PLATES

English Bench Plates					Metric Bench Plates				
Dimensions (inches)	Weight (lbs)	No. of Holes	Stock No.	Price	Dimensions (mm)	Weight (kg)	No. of Holes	Stock No.	Price
6 x 3	0.8	18	#56-929	$76.00	150 x 75	0.4	18	#34-344	$76.00
6 x 6	1.5	36	#56-930	$86.00	150 x 150	0.8	36	#56-936	$86.00
8 x 4	1.5	32	#56-931	$94.00	200 x 100	0.7	32	#34-345	$94.00
8 x 8	3.0	64	#56-932	$110.00	200 x 200	1.4	64	#34-346	$110.00
12 x 6	3.3	72	#56-933	$143.00	300 x 150	1.5	72	#56-937	$143.00
12 x 12	6.8	144	#53-830	$185.00	300 x 300	3.1	144	#54-638	$185.00
18 x 12	10.0	216	#56-934	$235.00	450 x 300	4.5	216	#56-938	$235.00
18 x 18	15.0	324	#56-935	$325.00	500 x 500	6.9	400	#87-212	$325.00
24 x 4	4.0	96	#03-638	$180.00	600 x 100	1.8	96	#34-347	$180.00
24 x 8	8.5	192	#03-639	$265.00	600 x 200	3.9	192	#54-640	$265.00
24 x 12	13.5	288	#03-640	$370.00	600 x 300	6.1	288	#54-641	$370.00
24 x 24	27.0	576	#03-679	$565.00	600 x 600	12.2	576	#87-213	$565.00
36 x 4	6.5	144	#03-641	$225.00	–	–	–	–	–
36 x 8	13.0	288	#03-642	$361.00	–	–	–	–	–
36 x 12	20.0	432	#03-643	$470.00	–	–	–	–	–
36 x 24	40.0	864	#03-680	$895.00	900 x 600	18.2	864	#87-214	$895.00

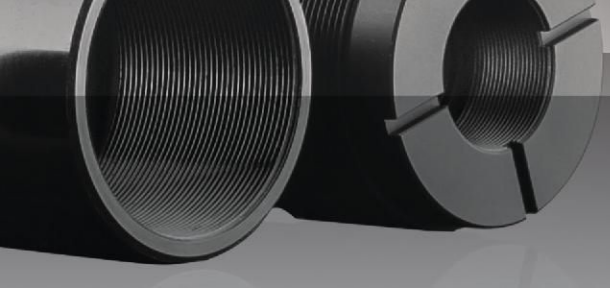
Visit **www.edmundoptics.com/optomechanics** to view our entire selection of mounts, posts, and adapter plates

TECHSPEC®
Post Holders

TECHSPEC®
90˚ Angle Brackets

Optical
Rails

Composite Breadboard
Laboratory Tables



TUBE AND CAGE Systems

EO ADVANTAGE:

- Decrease setup time and increase system portability
- Wide array of fixed, self-centering, and adjustable mounting options
- Versatile, modular components for ease of system integration

INTRODUCTION TO THE **CAGE SYSYEM KIT**

The **TECHSPEC® Cage System Components Kit** is the perfect introduction to the TECHSPEC® Optical Cage System: a collection of plates, rods, mounts, and additional optomechanical components designed to simplify optical system construction. The kit includes many of the most popular components of the TECHSPEC® Optical Cage System to get you started using the components in your optical designs. Step-by-step instructions and parts lists are available to show you how to use the TECHSPEC® Cage System Components Kit to create common optical systems.

TECHSPEC® Cage System Components Kit	#87-314	$1,499.00

TECHSPEC® CAGE SYSTEM OPTICAL MOUNTING PLATES

- **Specialized Plates Designed to Hold and Position Optics**
- **Filter Holder Plate with Interchangeable Filter Holder**
- **X-Y Micro Positioning Plate with RMS Mounting Thread**

TECHSPEC® C-MOUNT TUBE SYSTEM HELICOID BARRELS

- **Compatible With 12.5mm, 15mm, and 25mm Diameter Optics**
- **Male and Female C-Mount Threads**
- **Provides Linear Travel Without Rotating Optical Components**

TECHSPEC® C-MOUNT EXTENSION TUBE

- **Used for Adding a Fixed Tube Extention to Systems**
- **Tubes Feature Male/Female Threads at Opposite Ends**
- **Multiple Tube Length Options with 5 to 111.5mm Available**

TECHSPEC® CAGE SYSTEM SPHERES

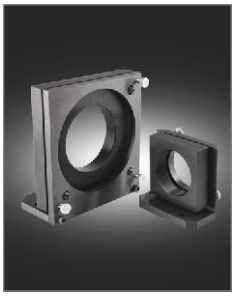
- **Ideal for Intersecting Multiple Optical Paths**
- **Sphere with 43mm Port Integrates a Large Optic**
- **Cover Disks Block Unused Optical Paths**

OPTOMECHANICS

Find the Optomechanics You Need

OPTIC MOUNTS

- Mounts for 5mm to 76.2mm Diameter Optics
- Fixed and Translating Options Available
- Metric and English Mounting Holes for Easy Integration



OPTICAL CELL ASSEMBLIES

- Robust Mounts for 1" to 12.5" Diameter Optics
- Pitch and Roll Adjustment Via Precision Screws
- Angled Base for Stand-Alone Mounting

THREE-SCREW ADJUSTABLE MOUNTS

- Mount up to 112mm Diameter Optics
- Nylon Tipped Screws to Prevent Damage to Optics
- Ideal for Unique Components, like Corner Cubes and Laser Tubes

FILTER WHEELS

- Manual and Motorized Versions
- 12.5mm and 25.4mm Compatible Options
- Mounts up to 12 filters

BAR-TYPE MOUNTS

- English and Metric Mounting Configurations Available
- Ideal for Circular or Square Optical Components
- Mount up to 110mm Diameter Optics

POLARIZER MOUNTS

- 360˚ Vernier Scale for Aligning Polarization Axis
- Course and Fine Movements Available
- Mounts for Reflective, Dichroic, and Crystalline Polarizers

KINEMATIC MIRROR MOUNTS

- Fine Resolution Screws Provide Precision Tip and Tilt of the Mount Surface
- Square Mounting Surface for Direct Mirror Adhesion
- 1" to 6" Mounting Plates Available

PRECISION PRISM BEAMSPLITTER HOLDERS

- Permits Precise 360˚ Rotation of the Prism
- Mounts up to 30mm Prisms
- ±3˚ Fine Rotation Angle

Visit **www.edmundoptics.com/optomechanics** to browse the entire selection of optomechanics

IRIS DIAPHRAGMS

- Zero Aperture Series Provides Total Light Extinction
- Mounted Version Features a Tapped Hole for Easy Post Mounting
- High Heat Resistance

HIGH PERFORMANCE STANDARD SERIES IRIS DIAPHRAGMS

- Precision Design and Assembly for Optimum Performance Reliability
- Variety of Leaf Materials Available
- Removable Pins for Convenient OEM Integration

STAINLESS STEEL IRIS DIAPHRAGMS

- Stainless Steel and Brass Construction for Stability
- Ideal for Flow Control Applications
- Mounted Version Features a Tapped Hole for Easy Post Mounting

TECHSPEC® HIGH PERFORMANCE MOTORIZABLE IRISES

- Fast Accurate Repeatable Motion
- Dual Control Gear and Lever Mechanics
- Removable Pin for OEM Integration

PRECISION PINHOLES

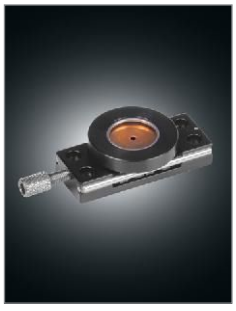
- Available in Aperture Mounts for a Secure Mechanical Support
- Pinhole Sized Ranging from 1 to 1,000 Microns
- Ideal for Leak Detection, Laser Aperturing, and Spatial Filtering Applications

PRECISION AIR SLITS

- New Mounted Version Provides Secure Mechanical Support
- Used in Optical Systems and Educational Efforts
- Ideal for Spectrophotometer Image Analysis

HIGH POWER APERTURES

- Ceramic, Copper, Gold-Plated Copper, Molybdenum, and Tungsten Constructions
- One Side Blackened for Absorption on Metallic Constructions
- Ideal for Use with High Power Lasers



MOTORIZED SHUTTERS

- Available in C or T-Mount Versions
- Simple On/Off Operation with TTL Input
- Compact Size for Integration into Optical Systems

Visit **www.edmundoptics.com/optomechanics** to browse the entire selection of optomechanics

Your Application in Motion

Using TECHSPEC® Precision Stages

Designed for cross-compatibility, TECHSPEC® Precision Stages can be combined to provide the multi-axis linear, angular and rotational motion needed for many applications. These durable stages are available in a range of sizes and mounting configurations. Use the compatibility chart below to easily build up multi-axis stage configurations. Stages listed horizontally in the "Top Stage" row mount on top of the stages listed in the "Bottom Stage" column.

Compatible
Not Applicable
Not Compatible

Bottom Stage \ Top Stage	40mm Linear	40mm Vertical	40mm Tip/Tilt	40mm Goniometer	70mm Rotary
40mm Linear					
40mm Vertical					
40mm Tip/Tilt					
40mm Goniometer					
70mm Rotary					

TECHSPEC® Stages are designed for cross-compatibility.

Visit the EO website for our complete selection of sizes and configurations.

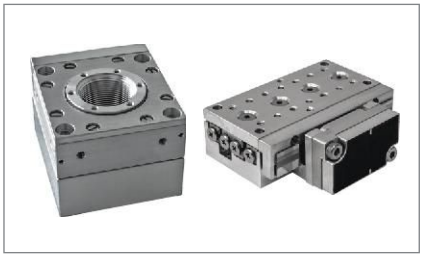
To learn more about **translation stage specifications,** visit **www.edmundoptics.com/translation-specs**

TECHSPEC® CROSSED ROLLER BEARING STAGES

- **Linear, Rotary, Vertical, Tip-Tilt, and Goniometer Stages Available**
- **30mm, 40mm, 70mm, and 125mm Sizes**
- **Cross Compatible for Multiple Sizes and up to 6 Axes of Motion**

ZABER™ HIGH PRECISION MOTORIZED STAGES

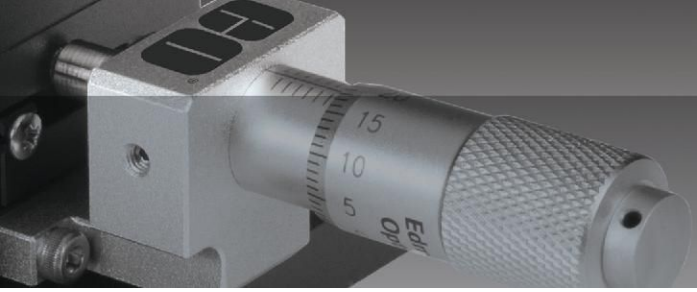
- **High Accuracy (50nm Resolution) Designs**
- **25mm to 200mm Travel Options**
- **Easily Configurable into XY or XYZ**



PIEZO POSITIONING STAGES

- **Ultra-Fine Control (1µm Repeatability)**
- **Linear and Rotary Versions**
- **Up to 50mm Travel**

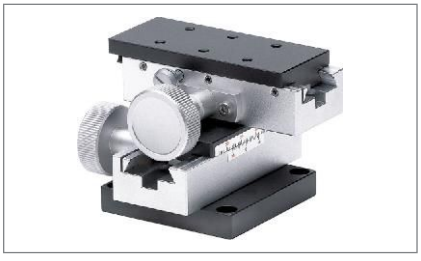
Visit **www.edmundoptics.com/stages** to browse the entire selection of translation stages and slides



SPECIALTY TRANSLATION Stages

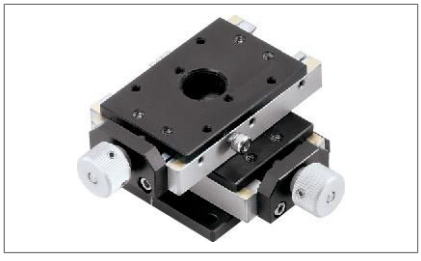
EO ADVANTAGE:

- From Micrometer Precision through Long Travel Positioning
- Linear, Rotary, and Multi Axis Stages Available
- Compatible with English and Metric Configurations



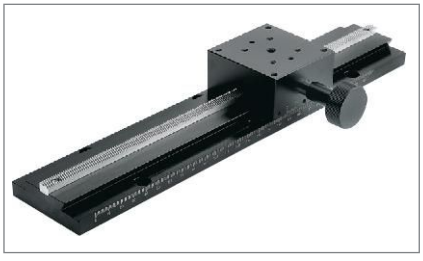
RACK AND PINION STAGES

- **Smooth Movement for Long Travel**
- **X, XY, and XYZ Configurations**
- **19 Designs to Choose From**



LEADSCREW DRIVE STAGES

- **Precision Movement**
- **Large Load Capacity**
- **X, XY, and XYZ Configurations**

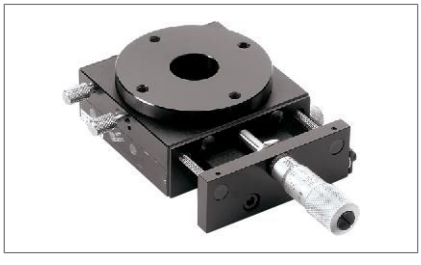


LONG TRAVEL LINEAR STAGES

- **Up to 24" of Travel**
- **English and Metric Versions**
- **Vernier Scale for Added Precision**

LAB JACKS

- **Wide Platform (up to 8" x 8")**
- **High Load Capacity (up to 55 lbs)**
- **Large Travel Range (up to 9.5")**



LINEAR-ROTARY POSITIONING STAGE

- **Linear and Rotary Movement in Compact Form Factor**
- **Micrometer Driven Precision Linear Movement**
- **Continuous Fine and Course Rotation Over 360°**

IN-LINE PRECISION STAGE MECHANISM

- **Metric Accessories Mounted with Top and Bottom Mounting Holes**
- **19mm In-Line Travel**
- **Load Capacity up to 3kg**

Visit **www.edmundoptics.com/stages** to browse the entire selection of translation stages and slides

LASERS and LASER Systems

EO offers Laser Products from INDUSTRY LEADING MANUFACTURERS:

LUMENTUM COHERENT Z-LASER

EO ADVANTAGE:

- Wide Range of High Performance Lasers In Stock
- Industry Leading Alignment
- Low Noise

STANDARD LUMENTUM HELIUM-NEON LASERS

Output Power (mW)	Beam Diameter (mm)	Beam Divergence (mrad)	Polarization	Laser Class - CDRH	Longitudinal Mode Spacing, Nominal (MHz)	110V		220V	
						Stock No.	Price	Stock No.	Price
0.5	0.48	1.7	Random	II	1090	#34-891	$1,095.00	#61-382	$1,095.00
0.5	0.48	1.7	500:1	II	1090	#61-315	$1,195.00	#61-360	$1,195.00
0.8	0.48	1.7	Random	IIIa	1090	#61-337	$1,050.00	#61-373	$1,050.00
0.8	0.48	1.7	500:1	IIIa	1090	#61-338	$1,095.00	#61-374	$1,095.00

COHERENT HIGH PERFORMANCE OBIS LASER SYSTEMS

Wavelength (nm)	Beam Diameter (mm)	Beam Divergence (mrad)	Polarization	Laser Class - CDRH	Color	40mW		50mW		100mW	
						Stock No.	Price	Stock No.	Price	Stock No.	Price
405	0.8	≤1	100:1	IIIb	Violet	N/A	–	#87-455	$4,550.00	#87-456	$4,995.00
532	0.7	≤1.2	100:1	IIIb	Green	N/A	–	#12-344	$5,900.00	#12-347	$8,400.00
640	0.8	≤1.3	100:1	IIIb	Red	#87-465	$130.00	N/A	–	#87-466	$2,550.00

Visit **www.edmundoptics.com/intro-lasers** to learn more about the fundamentals of lasers

LASER DIODE Modules

Violet, Blue, Red, and NIR Wavelengths Available

EO ADVANTAGE:

- Priced Right for Your Application
- Spot, Crosshair, or Line Outputs
- TTL Modulation up to 10kHz

Laser Diode Modules are used in a variety of applications that require small sizes in addition to low power consumption with long operating lifetimes. Available in a range of wavelengths and output powers, laser diode modules are ideal for applications such as life science, industrial, or scientific instrumentation, in addition to laser line generation or machine vision. Red diodes are commonly used due to their ease of sight in dark environments. Green lasers provide greater contrast on materials such as hot metal or wood, in addition to appearing brighter to the human eye than red.

BEST SELLING FOCUSABLE LASER DIODE MODULES

Output Power (mW)	405nm			532nm			635nm			1064nm		
	CDRH Class	Stock No.	Price	CDRH Class	Stock No.	Price	CDRH Class	Stock No.	Price	CDRH Class	Stock No.	Price
1	II	#37-023	$325.00	II	#37-026	$295.00	II	#37-029	$115.00	II	#37-041	$295.00
5	IIIa	#37-024	$335.00	IIIa	#37-027	$310.00	IIIbw	#37-030	$125.00	IIIa	#37-042	$310.00
10	IIIb	#37-025	$350.00	IIIb	#37-028	$325.00	IIIb	#37-031	$135.00	IIIb	#37-043	$325.00

Visit **www.edmundoptics.com/lasers** to find everything you need for your laser system

Coherent® High Performance OBIS™ Laser Systems

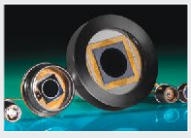
Fiber Coupled Laser Systems

Coherent® Diamond C-Series CO_2 Lasers

Instrumentation Lasers

Coherent® LaserCheck Handheld Laser Power Meter

To learn more about the principles of **Silicon Detectors,** visit **www.edmundoptics.com/silicon-detectors**



EO ADVANTAGE:

- Portable Hand Held Power Meter
- Measure Laser Power from 0.5µW to 1W
- 400 - 1064nm Wavelength Range

Controls & indicators: power/wavelength display select switch, wavelength select increment and decrement buttons, sample/hold button, 3 digit LCD with units indicator, attenuator position indicator, attenuator position control slide and over-range tone generator. Automatic functions: power range, wavelength correction, peak sample & hold, shut-off, over-range detect, and attenuator position detect. Additional features include an over-range indication, pocket clip, and storage case. **Note:** Battery is not replaceable.

HANDHELD LASER POWER METER

Description	Stock No.	Price
Handheld Laser Power Meter	#12-394	$450.00

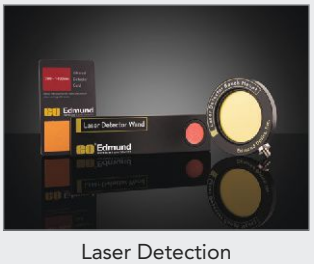
Spectral Response:	400 - 1064nm
Accuracy:	8%
Max. CW Power*:	10mW; 1W with built-in attenuator
Max. CW Power Density*:	0.5W/cm², 30W/cm² with attenuator
Min. Full Scale Power:	9.99µW
Min. Power Resolution:	0.01µW
Min. Detectable Power:	0.5µW
Aperture Size:	8.0mm
Measurement Display:	3 digit LCD with power unit indicator

Built-in Range Step Attenuator:	1mm thick; NG-10 Schott filter glass
Wavelength Selection Display:	400 to 999 (for 400 to 999nm) 000 to 064 (for 1000 to 1064nm)
Peak Sample Time:	2 s
Meas. Hold Display Time:	10 s
Battery Life:	180,000 samples at 12 s/sample
Size (Max. Dimensions):	6.59" L x 0.92" W x 0.78" T
Weight:	1.54oz.

Visit **www.edmundoptics.com/laser-measurement** to browse all laser measurement & detection products

EO Laser Power and Energy Meters

Coherent® Lasercam™ Beam Profiler



Laser Detection Cards

Photodiode Receiver Module

MICROSCOPE Objectives

Focus on the Smallest Details with High Performance

To learn more about the **InfiniTube™ Standard Systems,** visit **www.edmundoptics.com/infinitube**

EO ADVANTAGE:

- Infinity Corrected Objectives Can be Easily Integrated into High Magnification Imaging Systems
- Highly Toleranced Offering Superior Image Quality
- Wide Range of Working Distance and Magnification Options

MITUTOYO M-PLAN APO INFINITY CORRECTED OBJECTIVES

Type	Wavelength Range (nm)	5X		10X		20X		50X		100X	
		Stock No.	Price	Stock No.	Price	Stock No.	Price	Stock No.	Price	Stock No.	Price
Standard Series	435 - 655	#46-143	$705.00	#46-144	$885.00	#46-145	$2,055.00	#46-146	$2,675.00	#46-147	$3,495.00
High Resolution Series	435 - 655	#34-247	$4,750.00	#58-236	$8,125.00	–	–	#58-237	$5,725.00	#58-238	$6,175.00
Long Working Distance Series	435 - 655	–	–	–	–	#46-398	$3,095.00	#46-399	$3,425.00	#46-401	$4,795.00
NIR Series	480 -1800	#46-402	$1,625.00	#46-403	$1,850.00	#46-404	$3,325.00	#46-405	$4,095.00	#46-406	$5,395.00
NIR High Resolution Series	480 -1800	–	–	–	–	–	–	#56-982	$8,945.00	#56-983	$10,750.00
NUV Series	355 - 620	–	–	#86-176	$3,095.00	#46-407	$6,395.00	#46-408	$6,550.00	–	–

Additional Magnifications and Designs on our website.

Edmund Optics® Partners with
LEADING MICROSCOPE OBJECTIVE MANUFACTURERS:

Mitutoyo Nikon OLYMPUS

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TARGETS

Test system resolution, distortion, depth of field and contrast with a wide selection of targets

MICROSCOPY

High magnification lenses can be integrated with cameras to capture small, highly detailed fields of view

LENSES

Edmund Optics® designed imaging lenses optimized for even the toughest applications

CAMERAS

EO Partners with top camera manufacturers to offer a wide selection of sensor sizes and interfaces

ILLUMINATION

Improve imaging system performance by using the right illumination configurations

From **DESIGN** to **PROTOTYPE** to **VOLUME PRODUCTION**

Imaging Lens Assemblies

- Over 800 Standard Imaging Lenses in Stock
- M12, C-Mount, Factory Automation, Telecentric Lenses, and More
- Global In-Region Engineering Support & Service
- Volume Manufacturing & Designs Optimized for Integration

Visit **www.edmundoptics.com/imaging-assemblies** to learn more about EO's Imaging Capabilities

CAMERAS

EO offers cameras from INDUSTRY LEADING MANUFACTURERS:

Allied Vision BASLER FLIR TELEDYNE DALSA Everywhereyoulook

EO USB 3.0 CMOS MACHINE VISION CAMERAS

Model Number:	EO-2223	EO-23122	EO-32122	EO-4010	EO-50232
Camera Sensor Format:	⅔"	1/1.2"	1/1.8"	1"	⅔"
Imaging Device:	CMOSIS CMV2000	Sony IMX249	Sony IMX265	CMOSIS CMV4000	Sony IMX264
Pixels (H x V):	2048 x 1088	1920 x 1200	2056 x 1542	2048 x 2048	2456 x 2054
Monochrome Camera	#33-522 $1,095.00	#33-526 $825.00	#37-316 $750.00	#37-547 $2,095.00	#34-855 $1,360.00
Color Camera	#33-523 $1,095.00	#33-527 $825.00	#37-317 $750.00	#37-546 $2,095.00	#34-856 $1,360.00
NIR Camera	#37-326 $1,395.00	N/A –	N/A –	#37-325 $2,995.00	N/A –

BASLER ACE GIGABIT ETHERNET CAMERAS

Model Number:	acA720-290gm/c	acA1920-48gm/c	acA2040-35gm/c	acA3088-16gm/c	acA4112-8gm/c
Type of Sensor:	½.9" CMOS	⅔" CMOS	1/1.8" CCD	1/1.8" CMOS	1.1" CMOS
Imaging Device:	Sony IMX287	ON Semi PYTHON 2000	Sony IMX265	Sony IMX178	Sony IMX304
Pixels (H x V):	720 x 540	1920 x 1200	2048 x 1536	3088 x 2064	4096 x 3000
Monochrome Camera	#11-492 $450.00	#35-913 $650.00	#35-915 $1,325.00	#37-205 $595.00	#37-211 $2,450.00
Color Camera	#11-493 $450.00	#35-914 $650.00	#35-916 $1,325.00	#37-206 $595.00	#37-212 $2,450.00

Visit **www.edmundoptics.com/cameras** to browse the entire selection of cameras

Allied Vision Mako Power over Ethernet (PoE) Cameras

Dalsa Genie™ Nano Power Over Ethernet (PoE) Cameras

PixeLINK® USB 3.0 Autofocus Liquid Lens Cameras

FLIR Blackfly® USB 3.0 Cameras

FIXED FOCAL LENGTH Lenses

Better Optics = Better Performance

EO ADVANTAGE:

- Designed For Factory Automation and Instrumentation Applications
- Multiple Focal Lengths, Anti-Reflection Coatings, and Resolving Powers Available
- Performance to Infinity with No Maximum Working Distance

UC SERIES

- Small Sensor Format
- 7 MegaPixels (Up to 1/1.8" Format)
- 4mm to 25mm Focal Length
- C-Mount
- Ultra-Compact (UC) Series

www.edmundoptics.com/uc-series

C SERIES

- Medium Sensor Format
- 5 MegaPixels (Up to 2/3" Format)
- 3.5mm to 100mm Focal Length
- C-Mount
- Compact (C) Series

www.edmundoptics.com/c-series

HP SERIES (2/3" FORMAT)

- Medium Sensor Format
- 5 - 9 MegaPixels (Up to 2/3" Format)
- 8.5mm to 35mm Focal Length
- C-Mount
- High Performance (HP) Series

www.edmundoptics.com/hp-series

HP SERIES (1" FORMAT)

- Large Sensor Format
- 6 - 16 MegaPixels (Up to 4/3" Format)
- 12mm to 50mm Focal Length
- C-Mount
- High Performance (HP) Series

www.edmundoptics.com/hp-series

LF SERIES

- Large Sensor Format
- 29+ MegaPixels (Up to 35mm Format)
- 28mm to 100mm Focal Length
- F-Mount
- Large Format (LF) Series

www.edmundoptics.com/lf-series

SWIR SERIES

- Large Sensor Format
- 1 MegaPixel (Up to 25.6mm Image Circle)
- 25mm to 100mm Focal Length
- C-Mount, F-Mount, and M42 x 1.0 Options
- Short-Wave Infrared (SWIR) Lenses

www.edmundoptics.com/swir-series

Visit **www.edmundoptics.com/fixed-focal** to browse the complete selection of fixed focal length lenses

FIXED FOCAL LENGTH Lenses

One Core Design, Four Unique Solutions

TECHSPEC® C SERIES FIXED FOCAL LENGTH LENSES

Focal Length (mm)	Max. Sensor Format	Field of View on Max Sensor (mm)	Working Distance (mm)	Stock No.	Price
3.5	1/1.8"	41.2 - 102.8°	0 - ∞	#89-410	$520.00
4.5	1/1.8"	72.0 - 74.6°	25 - ∞	#86-900	$520.00
6	1/1.8"	110.3 - 62.1°	75 - ∞	#67-709	$415.00
8.5	2/3"	246.9 - 60.8°	100 - ∞	#58-000	$310.00
12	2/3"	159.4 - 41.1°	100 - ∞	#58-001	$310.00
16	2/3"	61.4 - 30.9°	100 - ∞	#59-870	$310.00
25	2/3"	35 - 19.8°	100 - ∞	#59-871	$310.00
35	2/3"	39.3 - 14.3°	165 - ∞	#59-872	$310.00
50	2/3"	42.5 - 8.5°	250 - ∞	#59-873	$415.00
100	2/3"	52.9 - 4.0°	750 - ∞	#86-410	$520.00

Volume Pricing Available

Visit **www.edmundoptics.com/imaging** to view our entire selection of imaging lenses

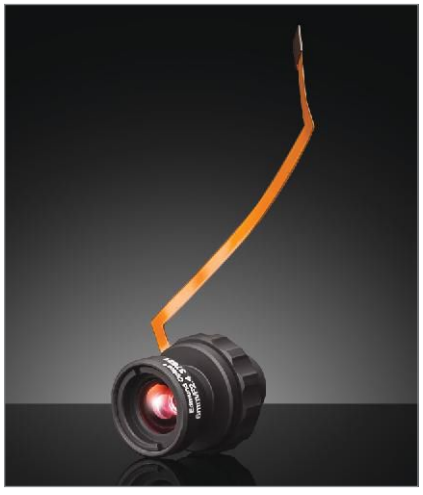
TECHSPEC® UCi Series
Fixed Focal Length Lenses

TECHSPEC® HPi Series
Fixed Focal Length Lenses

TECHSPEC® HPr Series
Fixed Focal Length Lenses

TECHSPEC® C Series VIS-NIR
Fixed Focal Length Lenses

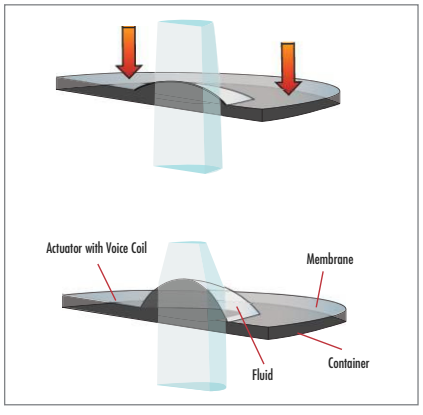
TECHSPEC® Liquid Lens M12 Imaging Lenses



EO ADVANTAGE:

- Integrated Liquid Lens for a Quick Autofocus Solution
- High Light Throughput f/2.4 Designs
- Ideal for Barcode Reading, Rapid Automation, Package Sorting, and Security

TECHSPEC® Liquid Lens M12 Imaging Lenses feature integrated liquid lens, allowing for fast electronic focus, superior image performance, and a quick autofocus solution not found in conventional imaging lenses. Liquid lens technology utilizes cells containing optical grade liquid which changes shape within milliseconds when voltage or current are applied, allowing for fast autofocus in machine vision applications. TECHSPEC® Liquid Lens M12 Imaging Lenses incorporates a 2-piece housing design for easy access and replacement of the included liquid lens. The liquid lens can also be rotated 180° inside the imaging lens for quickly accessing the liquid lens control cable.



TECHSPEC® LIQUID LENS M12 IMAGING LENSES

Focal Length	Aperture (f/#)	Working Distance (mm)	Maximum Sensor Format	Optimized Camera Sensor Format	Distortion (%)	Length (mm)	Outer Diameter (mm)	Stock Number	Price
6.0mm	f/2.4	100 - ∞	½"	⅓"	<10	27.20	18.0	#37-521	$395.00
8.0mm	f/2.4	150 - ∞	½"	½"	<10	28.40	23.0	#37-522	$395.00
12.0mm	f/2.4	150 - ∞	1/1.8"	½"	<3.5	34.50	27.0	#37-523	$395.00
16.0mm	f/2.4	220 - ∞	1/1.8"	1/1.8"	<1.3	31.60	27.0	#37-524	$395.00

Volume Pricing Available

Visit **www.edmundoptics.com/imaging** to view our entire selection of imaging lenses

TECHSPEC® Rugged Blue Series M12 µ-Video™ Lenses

TECHSPEC® Red Series M12 µ-Video™ Imaging Lenses

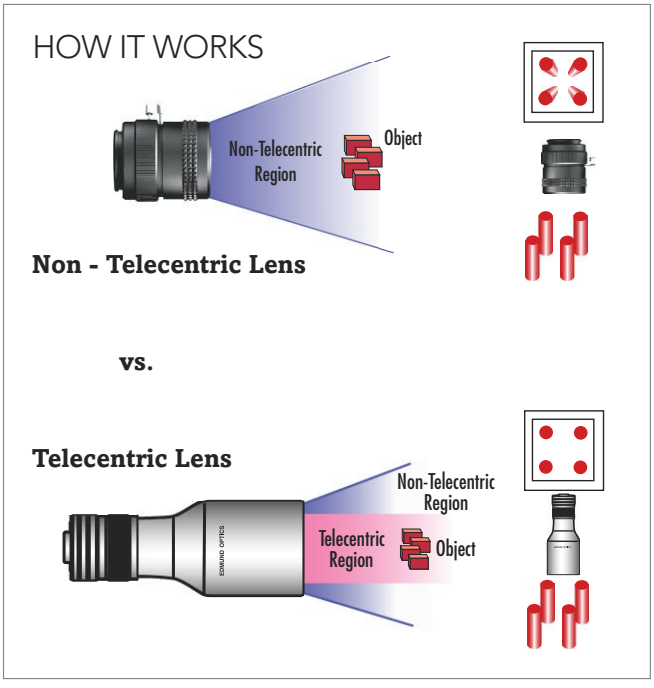
TECHSPEC® Blue Series M12 Imaging Lenses

TECHSPEC® HEO Series M12 µ-Video™ Imaging Lenses

Why Use Telecentric Lenses?

EO ADVANTAGE:

- No Perspective Error (Parallax), Constant Magnification within Depth of Field
- Ideal for Measurement and Gauging Applications
- Modifications and Customization Available



CompactTL™

- Medium Sensor Format
- 2 MegaPixels (Up to ⅔" Format)
- 0.5X to 8X Magnification
- f/9 Maximum Aperture
- C-Mount
- In-Line Illumination Versions Available

www.edmundoptics.com/compact-tl

MercuryTL™

- Small Sensor Format
- 3 MegaPixels (Up to ½" Format)
- 0.15X to 0.75X Magnification
- f/10 Nominal Aperture
- C-Mount
- Integrated Liquid Lens for Quick Autofocus

www.edmundoptics.com/mercury-tl

TitanTL™

- Medium and Large Sensor Formats
- 14 MegaPixels (Up to 35mm Format)
- 0.38X to 0.377X Magnification
- f/8 Maximum Aperture
- C-Mount, F-Mount, M42, and M58 Options
- Large Field of View Options Available

www.edmundoptics.com/titan-tl

Visit **www.edmundoptics.com/telecentric-lenses** for more telecentric options and content

Why Use Telecentric Illumination?

EO ADVANTAGE:

- Telecentric Illumination Creates a High Contrast Silhouette
- Collimated Light Rays Eliminate Blurred Edges Caused by Diffuse Deflection
- Ideal for Measurement Applications Requiring High Contrast

Left image shows blurry edges from the standard backlight system. Right image show a clear edge silhouette from the telecentric illuminator system.

TECHSPEC® TELECENTRIC BACKLIGHT ILLUMINATORS

Beam Diameter (mm)	Adjustable Aperture	Length (mm)	Max Front Diameter (mm)	Mounting Flange Diameter (mm)	Bolt Circle on Mounting Flange	Light Mount ID (mm)	Stock No.	Price
242	No	498.5	266	298.5	8x ϕ8mm Thru in ϕ280mm	8	#35-425	$4,495.00
182	No	385.0	208	260	8x ϕ8mm Thru in ϕ240mm	8	#35-426	$2,825.00
N 138	No	329.5	160	200	8x ϕ8mm Thru in ϕ180mm	8	#35-427	$1,925.00
118	No	267.4	150	200	8x ϕ8mm Thru in ϕ180mm	8	#35-428	$1,750.00
60	No	151.5	79	–	–	8	#35-429	$925.00
52	Yes	193.8	65	–	–	8	#62-760*	$750.00

COMPATIBLE ADVANCED ILLUMINATION HIGH INTENSITY COAXIAL LED SPOT LIGHT ILLUMINATORS

Color	Wavelength	Stock No.	Price
White	–	#11-024	$595.00
Blue	470nm	#11-025	$595.00
Green	530nm	#11-026	$595.00
Amber	590nm	#11-027	$595.00
Red	625nm	#11-028	$595.00
24V Power Supply		#66-855	$95.00

Visit **www.edmundoptics.com/illumination** to view our entire selection of illumination products

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High Intensity Ring Lights

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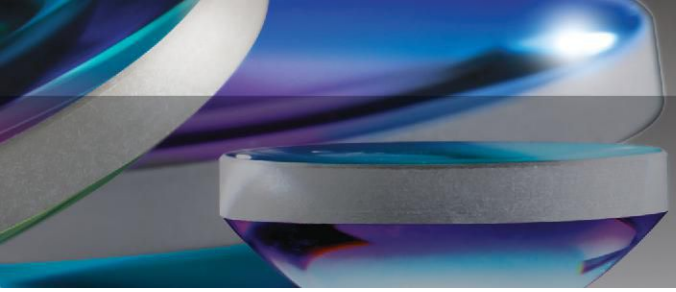

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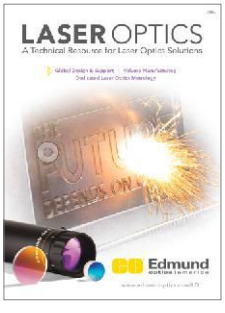

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More Imaging Solutions - Over 800 Imaging Lenses in stock for immediate delivery.

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Designed exclusively for our imaging, machine vision, and inspection customers, the Imaging Optics catalog features over 1,700 unique stock imaging lenses, cameras, filters, illumination, and more. Plus, we've included over 40 pages of technical content to help optimize your imaging system performance.

Laser Optics Catalog
New for 2019, this 164-page catalog is a technical resource for laser optics solutions. Containing over 50 pages of tutorials, a wide range of precision products, plus equations and terminology, this valuable resource was designed to help you understand the complexities of laser optics.

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$115.00	$92.00	
$115.00	$92.00	
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