Corporate History

About Our Company

Located in Port Richey Florida, Twin Star was founded in 1998 by Bob Thomas. TwinStar operates in a company owned 16,000 square foot, world class manufacturing facility and has demonstrated consistent annual growth in sales and technology.

TwinStar is a dynamic, entrepreneurial company that understands the difference between "almost" and "just right" can cost our customers thousands of dollars in lost materials and productivity. By Striving to achieve perfection with every job, TwinStar aims to be a strategic business partner - not just a provider.

TwinStar is rooted in the belief that three conditions need to be met when manufacturing and supplying quality optical components to our customers: the Highest quality raw material, experienced and knowledgeable personnel, and the leading edge technology used in the production process. While the quality of our certified materials remains a constant, it is TwinStar's innovative ideas and technology advanced equipment that gives our customers an advantage over their competition.

TwinStar is a global leader in the fabrication and coating of precision optics and crystals. TwinStar's coating lab produces high damage coatings from the UV through the FAR IR including solderable edge metallization. TwinStar fabricates waveplates, lenses, etalons, lens ducts, laser slabs, laser rods, prisms and mirrors. Bonding and optical assembly services are also available. TwinStar also works with linear and non-linear laser crystals including YAG, KTP, LBO and Kigre glasses. TwinStar is an ISO 9001 & AS(100 certified company. TwinStar is ITAR Compliant and our export department works closely with US Customs and the DOD to eliminate delays and to ensure timely delivery of your international orders.

TwinStar's Mission Staminate
TwinStar Strives to be a value-added component and coating supplier to the optics community. TwinStar will continue to reinvest in superior technology solutions and provide world class engineering support. TwinStar employees are empowered and enriched through a policy of ongoing training and education. TwinStar will continue to offer employees a work environment that is family-oriented but demanding, friendly yet professional and most importantly, will provide a rewarding career with opportunities to expand professionally and personally. TwinStar will always provide the right solution at the right price.

Thin Film Coatings

- Single & Multi-Band Anti-Reflection
- High Reflectors
- Partial Reflectors
- Long & Short Pass Filters
- Metal Coatings
- Bandpass Filters
- Specializing in Low Loss High Damage Threshold Coatings

TwinStar leads the industry in state of the art optical coatings from the ultraviolet to the far infrared. While standard coatings are listed in our catalog, our design engineers are standing by to work with you on your custom requirements. Spectral graphs can be emailed for review and revision prior to placing an order.

Technology

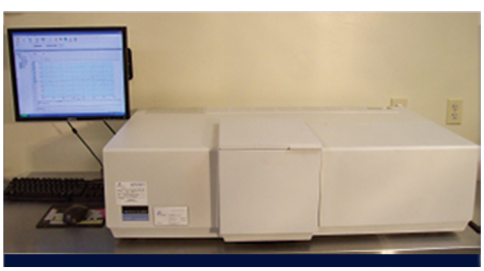
From crystals and laser rods to lens ducts, windows, mirrors and prisms,TwinStar is your one stop shopping destination for both precision fabrication and coatings that rank among the highest in the industry for laser damage threshold and durability. TwinStar utilizes several evaporation processes: Standard E-beam, Ion Assisted Deposition (IAD), Reactive IAD, and resistance evaporation - depending upon wavelength, substrate material, and coating requirements.

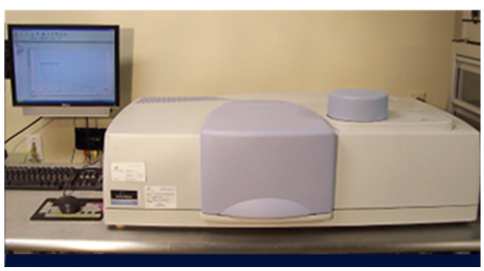
Maintenance

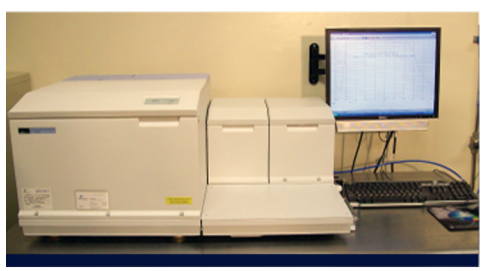
TwinStar's coating chambers utilize the very latest technology in high vacuum, deposition, and temperature control. In-house electrical and mechanical expertise, together with meticulous maintenance procedures, minimizes down-time. TwinStar's emphasis on continual improvement and consistent repeatability has resulted in regular success with even the most challenging film systems.

Metrology

TwinStar maintains a Perkin Elmer Lambda 950 spectrophotometer with Universal Reflectance Accessory and a Perkin Elmer Lambda 900. These spectrophotometers perform multiple angle S & P polarization transmission and reflection measurements. In addition, TwinStar has a Perkin Elmer Spectrum Optica GX for accurate spectral measurement in our expanded infrared coating laboratory. These instruments allow TwinStar to perform complete transmission, reflection, and absorption analysis for each order.







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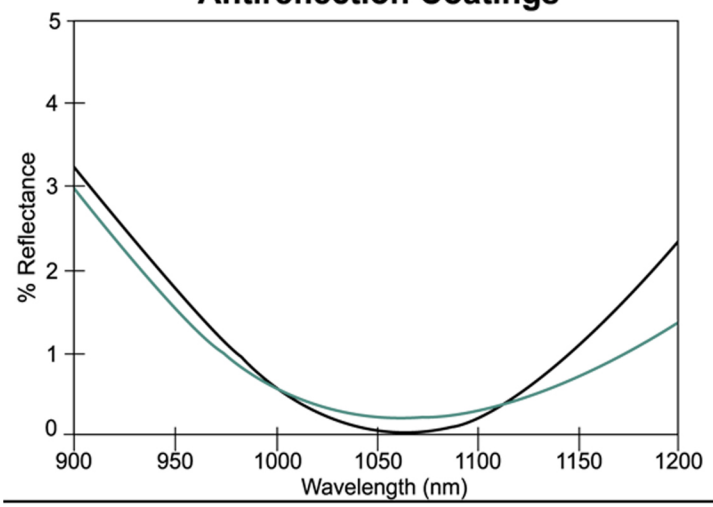
Nd:YAG Coatings (1064nm)

Antireflection Coatings



Standard:

R < 0.25% per side
Damage threshold > 15 J/ cm², 10 nsec pulse.

1 Side	2 Side
12001	12002

Ultra-low reflection (ULR):

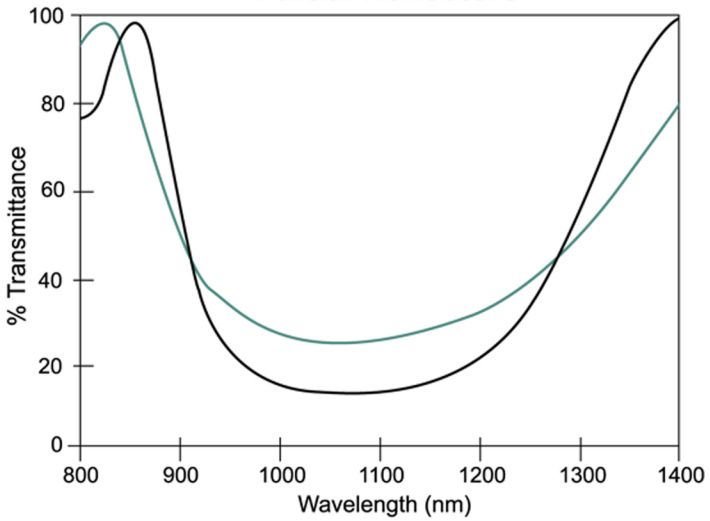
R < 0.1% per side on any substrate (non standard) Damage threshold > 35 J/ cm², 10 nsec pulse

1 Side	2 Side
12021	12022

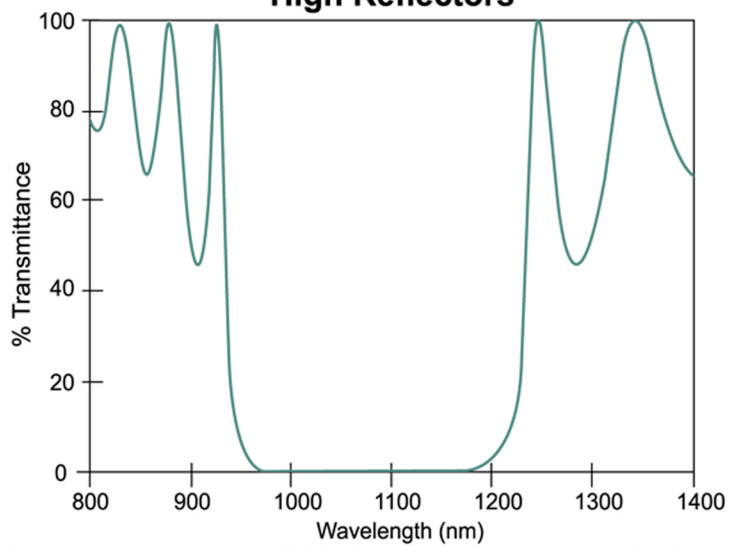
Other reflectances are available as non-standard items. Damage threshold > 35 J/ cm², 10 nsec pulse.

Standard R (%)	Part number
90 ± 1	12003
80 ± 2	12004
70 ± 2	12005
60 ± 2.5	12006
50 ± 2.5	12007
40 ± 2.5	12008
30 ± 2	12009
20 ± 2	12010
10 ± 1	12011

Partial Reflectors



High Reflectors



HR coatings: Standard parts are available at 0˚ and 45˚, please specify polarization.

R_R > 99.5%, R_P > 99.25% and R_S > 99.75%
Damage threshold > 35 J/ cm², 10 nsec pulse.

HR at 0˚	HR at 45˚	Pol.
	12114	R
12012	12115	S
	12116	P

These coatings are available from stock on our standard substrates (see page 27-28 & 33-36). For other substrates or custom coating specifications please call TwinStar.

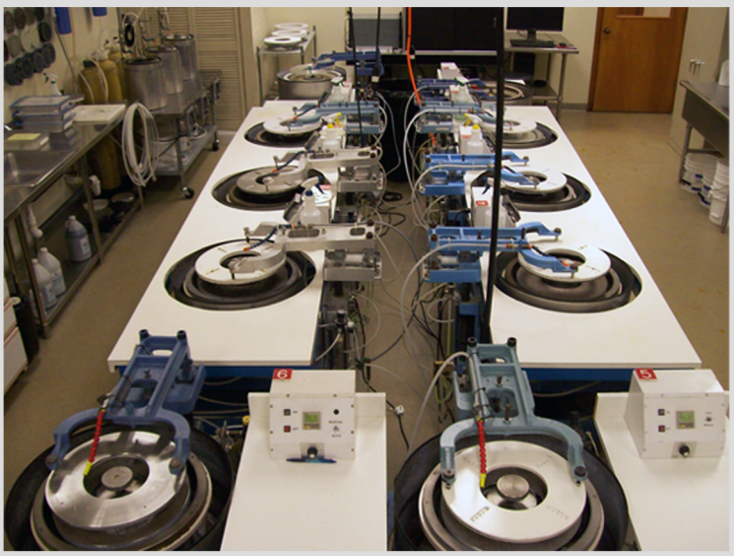
Laser Optics

- Multiple Order Waveplates
- Multiple Wavelength Waveplates
- Zero Order Waveplates
- Harmonic Waveplates
- Birefringent Filter Plates
- Polarization Rotators
- Etalons
- Air Gapped Etalons
- Flat/Parallels
- Wedged Substrates
- Spherical Mirror Substrates
- Interferometer Flats and Wedges
- Prisms
- Windows
- Spherical Lenses
- Unstable Resonator Output Couplers

Quality Laser Optics

TwinStar offers the optics community an extensive line of custom optical products. Our full service manufacturing facility allows TwinStar to fabricate, polish and coat a variety of UV to IR substrates with unique shapes and sizes.

From prototype development to production runs our knowledgeable staff, coupled with our State-of-the Art equipment, allows TwinStar to manufacture optics to your exacting specifications and tolerances.



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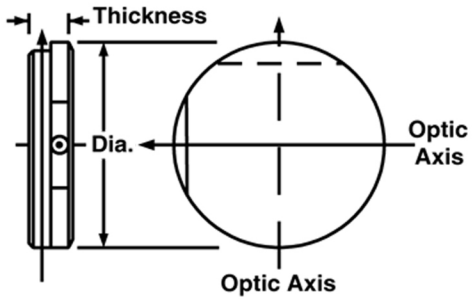
Zero Order Waveplates (1/4, 1/2)

Diameter (Inches)

Specifications:

Material..... Crystal Quartz
Parallelism..... Less than 0.5 arc seconds
Surface Quality..... 10/5
Retardation Tolerance..... λ/600
Transmitted Wavefront..... λ/4
Diameter Tolerance..... +.000" ,-.005"
Clear Aperture..... Central 90% of diameter



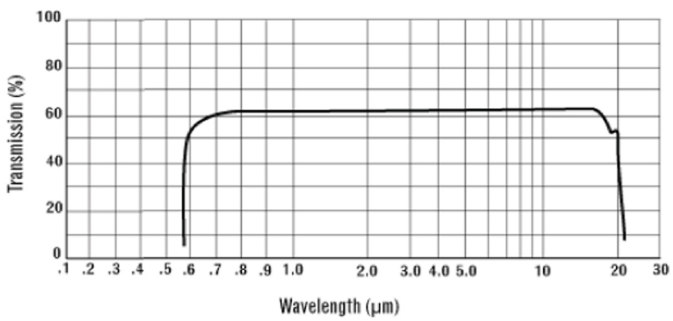
Optic axis is normal to polished flat on plates
(two plates optically contacted, app. 2 mm thick)

Diameter (Inches)				
Wavelength (nm)	**.500"**	**.750"**	**1.00"**	**1.50"**
248.0 1/4	WZQ248-50	WZQ248-75	WZQ248-10	WZQ248-15
248.0 1/2	WZH248-50	WZH248-75	WZH248-10	WZH248-15
266.0 1/4	WZQ266-50	WZQ266-75	WZQ266-10	WZQ266-15
266.0 1/2	WZH266-50	WZH266-75	WZH266-10	WZH266-15
308.0 1/4	WZQ308-50	WZQ308-75	WZQ308-10	WZQ308-15
308.0 1/2	WZH308-50	WZH308-75	WZH308-10	WZH308-15
354.7 1/4	WZQ354-50	WZQ354-75	WZQ354-10	WZQ354-15
354.7 1/2	WZH354-50	WZH354-75	WZH354-10	WZH354-15
441.6 1/4	WZQ441-50	WZQ441-75	WZQ441-10	WZQ441-15
441.6 1/2	WZH441-50	WZH441-75	WZH441-10	WZH441-15
488.0 1/4	WZQ488-50	WZQ488-75	WZQ488-10	WZQ488-15
488.0 1/2	WZH488-50	WZH488-75	WZH488-10	WZH488-15
514.5 1/4	WZQ514-50	WZQ514-75	WZQ514-10	WZQ514-15
514.5 1/2	WZH514-50	WZH514-75	WZH514-10	WZH514-15
532.0 1/4	WZQ532-50	WZQ532-75	WZQ532-10	WZQ532-15
532.0 1/2	WZH532-50	WZH532-75	WZH532-10	WZH532-15
632.8 1/4	WZQ632-50	WZQ632-75	WZQ632-10	WZQ632-15
632.8 1/2	WZH632-50	WZH632-75	WZH632-10	WZH632-15
694.3 1/4	WZQ694-50	WZQ694-75	WZQ694-10	WZQ694-15
694.3 1/2	WZH694-50	WZH694-75	WZH694-10	WZH694-15

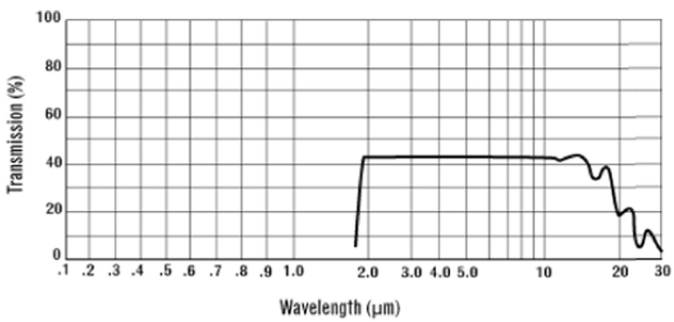
*For anti-reflection coatings, add AR to the end of the part number.

IR Materials

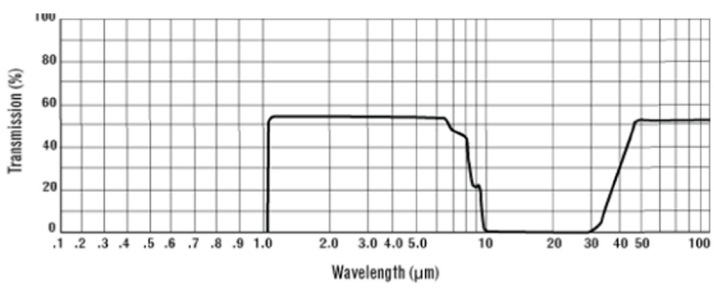
ZnSe



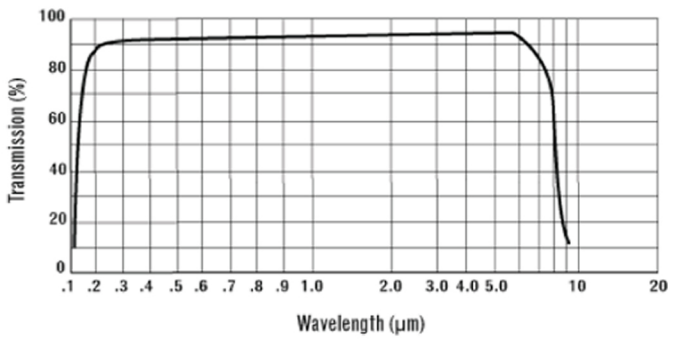
Ge



Si



CaF2

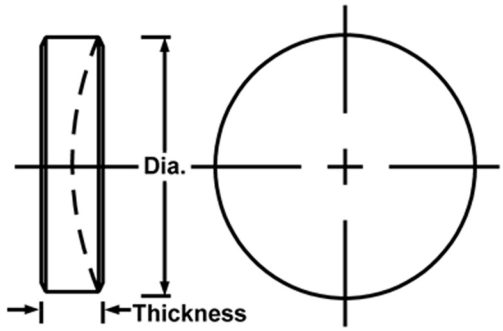


Spherical Mirror Substrates - Plano Concave

(.750" - 1.50" Diameter)

Specifications:

Material	Schlieren grade fused silica
Surface Quality	10/5
Surface Accuracy	1/4 @ 632.8nm
Radius Tolerance	± 1%
Diameter Tolerance	+ .000",-.005"
Thickness Tolerance	± .010"
Clear Aperture	Central 90% of diameter



Diameter x Thickness					
Radius (cm)	**.750"x.250"**	**.750" x .375"**	**1.00" x .250"**	**1.00" x .375"**	**1.50" x .375"**
2.5 cm	MC5-02	MC6-02	MC7-02	MC8-02	—
5.0 cm	MC5-05	MC6-05	MC7-05	MC8-05	—
7.5 cm	MC5-07	MC6-07	MC7-07	MC8-07	—
10.0 cm	MC5-10	MC6-10	MC7-10	MC8-10	—
15.0 cm	MC5-15	MC6-15	MC7-15	MC8-15	—
20.0 cm	MC5-20	MC6-20	MC7-20	MC8-20	—
25.0 cm	MC5-25	MC6-25	MC7-25	MC8-25	MC9-25
30.0 cm	MC5-30	MC6-30	MC7-30	MC8-30	MC9-30
40.0 cm	MC5-40	MC6-40	MC7-40	MC8-40	MC9-40
50.0 cm	MC5-50	MC6-50	MC7-50	MC8-50	MC9-50
60.0 cm	MC5-60	MC6-60	MC7-60	MC8-60	MC9-60
75.0 cm	MC5-75	MC6-75	MC7-75	MC8-75	MC9-75
80.0 cm	MC5-80	MC6-80	MC7-80	MC8-80	MC9-80
90.0 cm	MC5-90	MC6-90	MC7-90	MC8-90	MC9-90

Diameter x Thickness					
Radius (M)	**.750"x.250"**	**.750" x .375"**	**1.00" x .250"**	**1.00" x .375"**	**1.50" x .375"**
1.0 M	MC5-1M	MC6-1M	MC7-1M	MC8-1M	MC9-1M
2.0 M	MC5-2M	MC6-2M	MC7-2M	MC8-2M	MC9-2M
3.0 M	MC5-3M	MC6-3M	MC7-3M	MC8-3M	MC9-3M
4.0 M	MC5-4M	MC6-4M	MC7-4M	MC8-4M	MC9-4M
5.0 M	MC5-5M	MC6-5M	MC7-5M	MC8-5M	MC9-5M
7.0 M	MC5-7M	MC6-7M	MC7-7M	MC8-7M	MC9-7M
8.0 M	MC5-8M	MC6-8M	MC7-8M	MC8-8M	MC9-8M
10.0 M	MC5-9M	MC6-9M	MC7-9M	MC8-9M	MC9-9M

Nd: YAG Slabs

TwinStar specializes in the manufacturing Custom Laser Slabs.

Nd:YAG Slabs
Composite YAG Slabs
Nd:Glass Slabs
Zig-Zag
Custom Designs

Specifications:

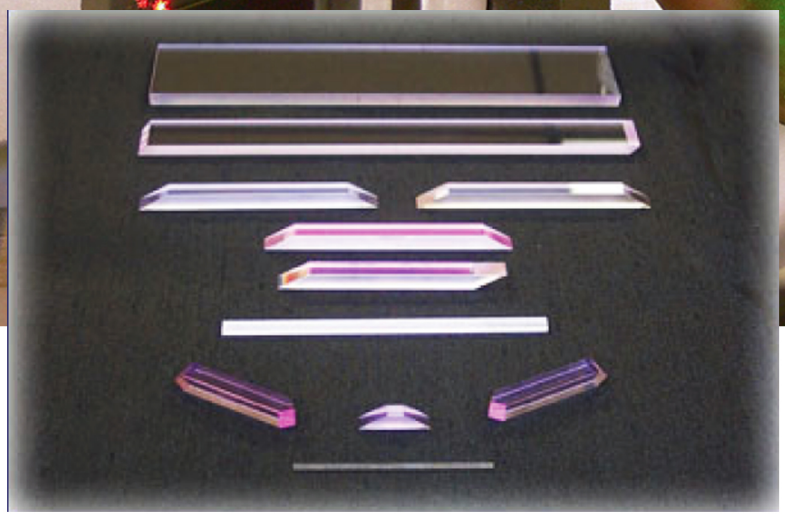
10/5 surface finishes on End faces

20/10 surface finishes Pump Faces

Less than 10 arc sec. parallelism of end and Pump Faces

Pyramidal error < 5 arc minutes

Lambda/10 flatness



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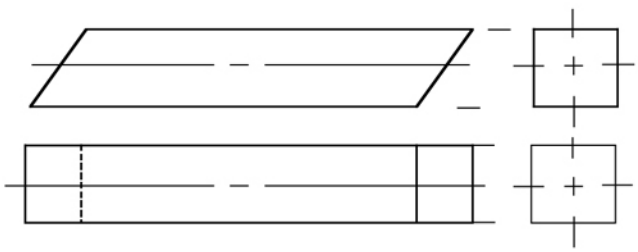
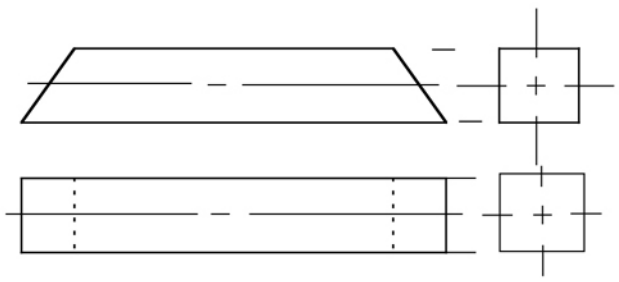
Nd:YAG Laser Slabs

Specifications:

Flatness	1/10 @ 632.8nm (Dia. Cross Sect.)
Surface Quality	10/5 or better
Parallelism	Less than 10 seconds
Perpendicularity	Less than 5 minutes
Length	Less than 6 inches
End Configuration	Flat, angled, or Brewster
Clear Aperature	Central 95%

TwinStar specializes in the manufacturing and repolishing of custom laser slabs per customer specifications. Call our sales department for a price quote and delivery.
1.1% Nd concentration available

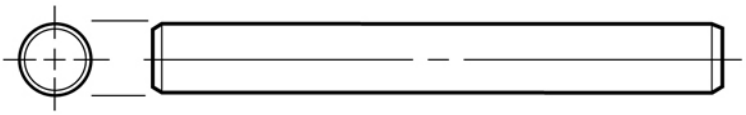




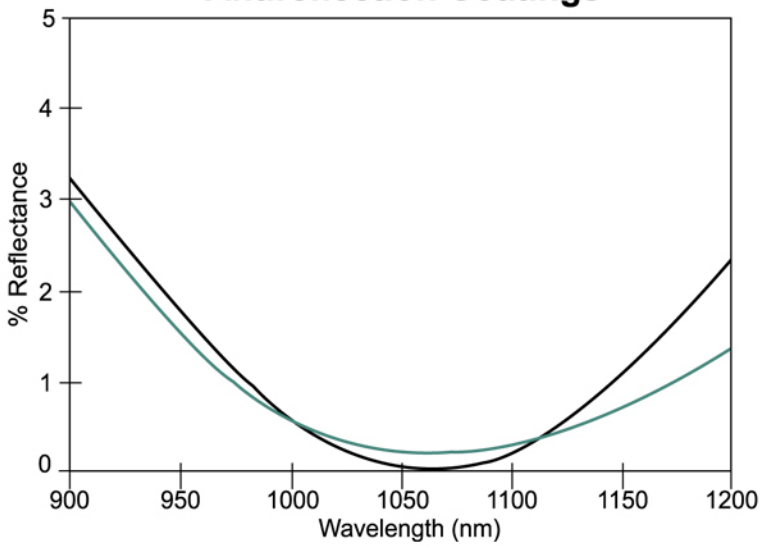
Replacement Nd:YAG Laser Rods

Specifications:

Flatness	1/10 @ 632.8nm
Surface Quality	10/5 or better
Parallelism	Less than 10 seconds
Perpendicularity	Less than 5 minutes
Clear Aperature	Central 95%



Antireflection Coatings



Standard:

R < 0.25% per side
Damage threshold > 20 J/ cm², 10 nsec pulse.

Both Sides
11001

Ultra-low reflection (ULR):

R < 0.1% per side on any substrate (non standard) Damage threshold > 35 J/ cm², 10 nsec pulse

Both Sides
11021

Laser Glasses

TwinStar is an Authorized Distributor of Kigre Glasses, which gives us the unique ability to "front-end" the process by acquiring the required glasses. TwinStar will custom fabricate and coat Kigre's material to your specifications.

KIGRE, INC.

Q-98

TA Neodymium-doped athermal phosphate laser glass of exceptional optical quality offering high gain and athermal behavior. The result is higher repetition rates with minimum beam divergence.

QE-7S QE-7

Erbium-doped phosphate laser glass which is four times more efficient than the Erbium -doped silicate laser glass developed in the 1960's. Best yet its unique "eye safe" operating wavelength of 1.535 microns makes it ideal for specialized medical apparatus as well as field-safe range finding.

QX/Nd, QX/Er, & QX/Yb

QX Phosphate glass laser materials exhibited a chemical durability which is comparable to silicate glasses. These high performance laser glasses are designed to withstand high thermal loading and thermal shock conditions in both strengthened and unstrengthened configurations.

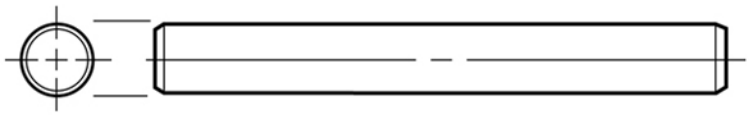
MM-2

High Gain Short Length 1.54um laser material for use in the next generation of EDWAs and EDFAs. Designed specifically for telecommunications applications.

Kigre Glass Laser Rods

Specifications:

Flatness ..... 1/8 @ 632.8nm
Surface Quality ..... 10/5 or better
Parallelism ..... Less than 10 seconds
Perpendicularity ..... Less than 5 minutes
Clear Aperature ..... Central 95%

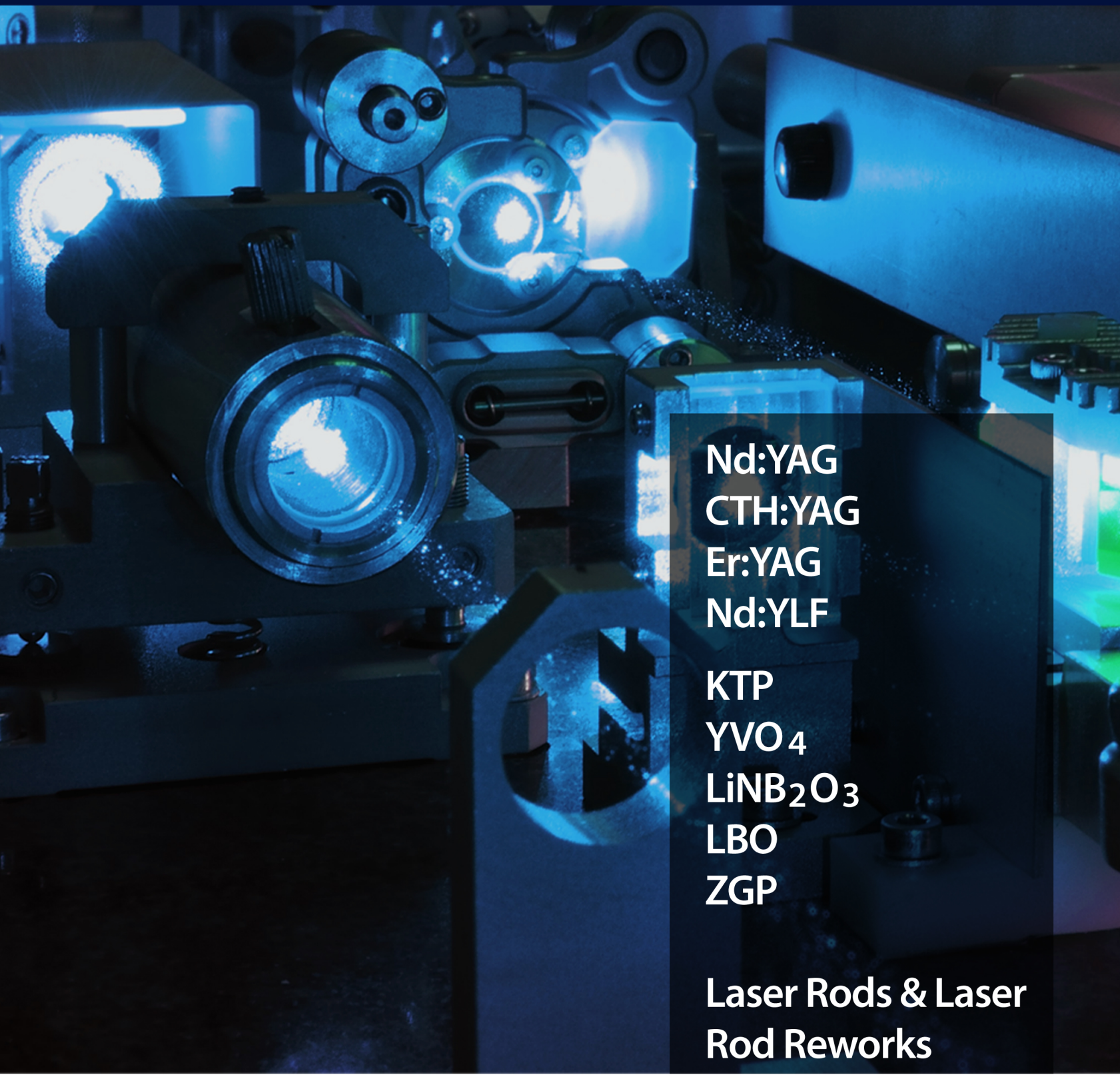


	Flat & Parallel	Tilt
Diameter		
6.35 mm (.250”) 9.52 mm (.375”)	NF25 NF37	NT25 NT37
12.7 mm (.500”) 19.5 mm (.750”)	NF50 NF75	NT50 NT75
25.4 mm (1.00”) 38.1 mm (1.50”)	NF10 NF15	NT10 NT15
50.8 mm (2.00”)	NF20	NT20

Er:Glass
Nd:Glass
(Small/Large Diameters/Lengths)

Kigre QX/Yb doped Slabs
Special Melts

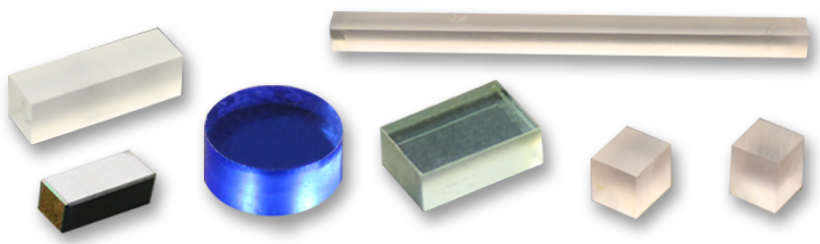
Laser Crystals



Nd:YAG
CTH:YAG
Er:YAG
Nd:YLF

KTP
YVO_4
$LiNB_2O_3$
LBO
ZGP

Laser Rods & Laser Rod Reworks



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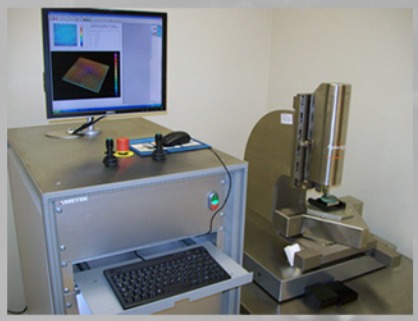
YAG	LiNB03	KTP	TGG
Nd:YLF & Ho:YLF	KNBO3	FAP	GSGG
YVO4	Alexandrite	YAP	YSGG
LaALO3	ZGP	YALO	Nd:Gallate
LiCAF	Ruby	LMA	Cobalt Spinel
LiSAF	Sapphire	LNA	Cr4+:YAG
LiSGaF	LBO	GGG	Tm:Glass

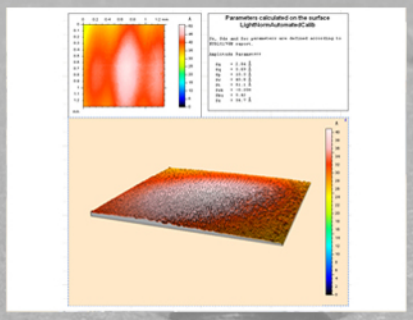
Metrology



Sub-Angstrom Surface Profilometer

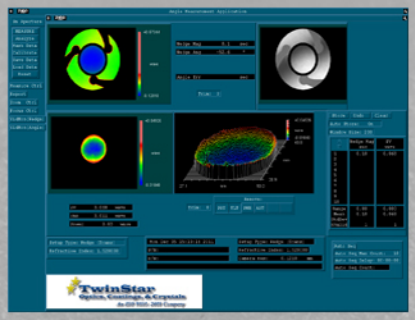
Phase Measuring 1064nm Interferometer

Phase Measuring Interferometer
Flatness/Wedge/TWF

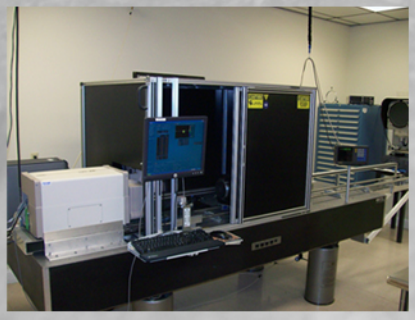


Surface Roughness Measurement

Three Stage Ellipsometer
Polarization / Retardance



Interferometer Measurement



Phase Measuring Interferometer
Flatness/TWF/Wedge/Radius

Angle Measurements

Measuring Microscope
Scratch / Dig

Commitment To Quality

TwinStar is committed to providing our customers with the highest quality products and services and that means maintaining a Quality Assurance system that is among the best in the industry. TwinStar's AS9100 & ISO 9001, ITAR (M21837), SAM, CCR, OASIS, and ORCA registrations demonstrate our commitment to excellence. Regularly calibrated metrology equipment on site includes: UV/Vis/NIR & IR spectrophotometers, 633 & 1064nm interferometers, polarimeters, three stage ellipsometer, and X-ray orientation. Six Sigma Black Belts as well as Green Belts are on staff to improve processes and reduce defect rates.

Certificate of Registration

nqa global assurance

This is to certify that the Quality Management System of:

TwinStar Optics, Coatings, & Crystals

6741 Commerce Avenue
Port Richey, FL 34668

applicable to:

Fabrication and Coating of Optical Components for Lasers and Vision Systems

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001:2008 and AS 9100:2009

and in accordance with the requirements of AS9104A.

Certificate Number: 14155
EAC Code: 19
First Issued: May 2, 2012
Valid Until: May 2, 2015

For and on behalf
of NQA, USA, Acton, MA 01720

ANAB ACCREDITED

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This approval is subject to the company maintaining its system to the required standard, which will be monitored by NQA, USA, an accredited organization under the Aerospace Registrar Management Program.

Notes