Contents

wzw-optic AG
our company

wzw-optic AG
our products

A rising star...

Since 1965 we have been producing precision optics for clients all over the world.

We actively explore the limits of technical feasability and are constantly searching for new technologies for manufacturing our high-tech optics and assemblies.
A young, highly qualified, and dynamic team as well as modern manufacturing tools are the core of our company. Appropriate metrology tools and a rigorous quality management system continually push us to improve.

wzw-optic AG
CH-9436 Balgach
Switzerland

History

- 1965: wzw was founded. Production of camera optics
- 1995: transition to a joint stock company. Design, development, and manufacture of complete assemblies. Massive investments in metrology and quality assurance
- 1998: certification according to ISO 9002
- 2001: certification according to ISO 9001:2000
- 2001: doubling of production area
- 2002: acquisition of in-house coating facility
- 2003: acquisition of various CNC machines
- 2005: move to new high-tech facility designed for assembly work

Philosophy

For the last 20 years I have been active in the world of optics and I always try – together with my team – to spoil our customers and to maintain a top level quality standard.
Growing up in a restaurant taught me to understand what customers demand. At wzw we try to teach each and every employee this conciousness for customer care. It has always been and always will be our top priority.
I thank all our customers for their faith and support over the years. Only with your help have we managed to become what we are.

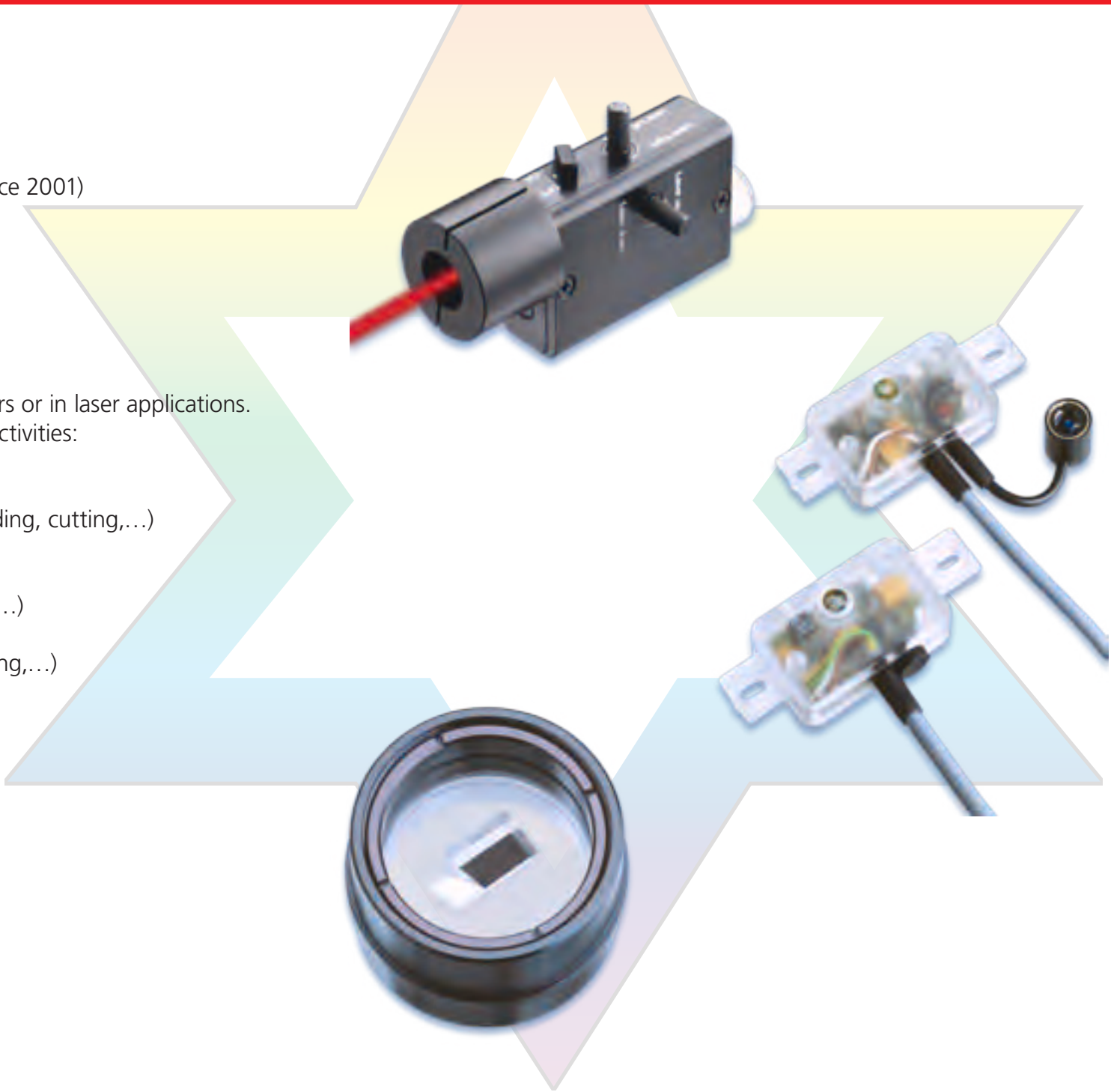
THANK YOU!

We are based in the historical village Balgach.

Willi Weder, President

Custom solutions

- Prototypes to series production
- Willingness to take on risky products
- Highly developed quality conciousness
- Flexibility (over 2'500 different products since 2001)
- Close interaction with clients



Applications

Most products made by wzw are used in lasers or in laser applications.
The following list shows a small selection of activities:

… medicine (dental care, depilation,…)
… automobile manufacturing (soldering, welding, cutting,…)
… defence (acquisition, targeting,…)
… agriculture (weed killing, lawn mowing,…)
… research (laboratory, combustion research,…)
… printing (plate exposure, scannners,…)
… paper and wood industry (alignment, cutting,…)
… and much more

Visit our website

www.wzw.ch

You will find a lot of interesting products, information, help, and more. In additon we always have interesting sales going on where we offer products with special discounts.

If you have problems with the website, please contact us. It is our declared aim to continuously improve it and to make it as user friendly as possible. For that we will appreciate your help.

Entrance page of website in 09/05.

Kindergarten

We maintain a kindergarten for employees and friends. Their children that is. Babies to teenies are cared for during working hours.

Contacts

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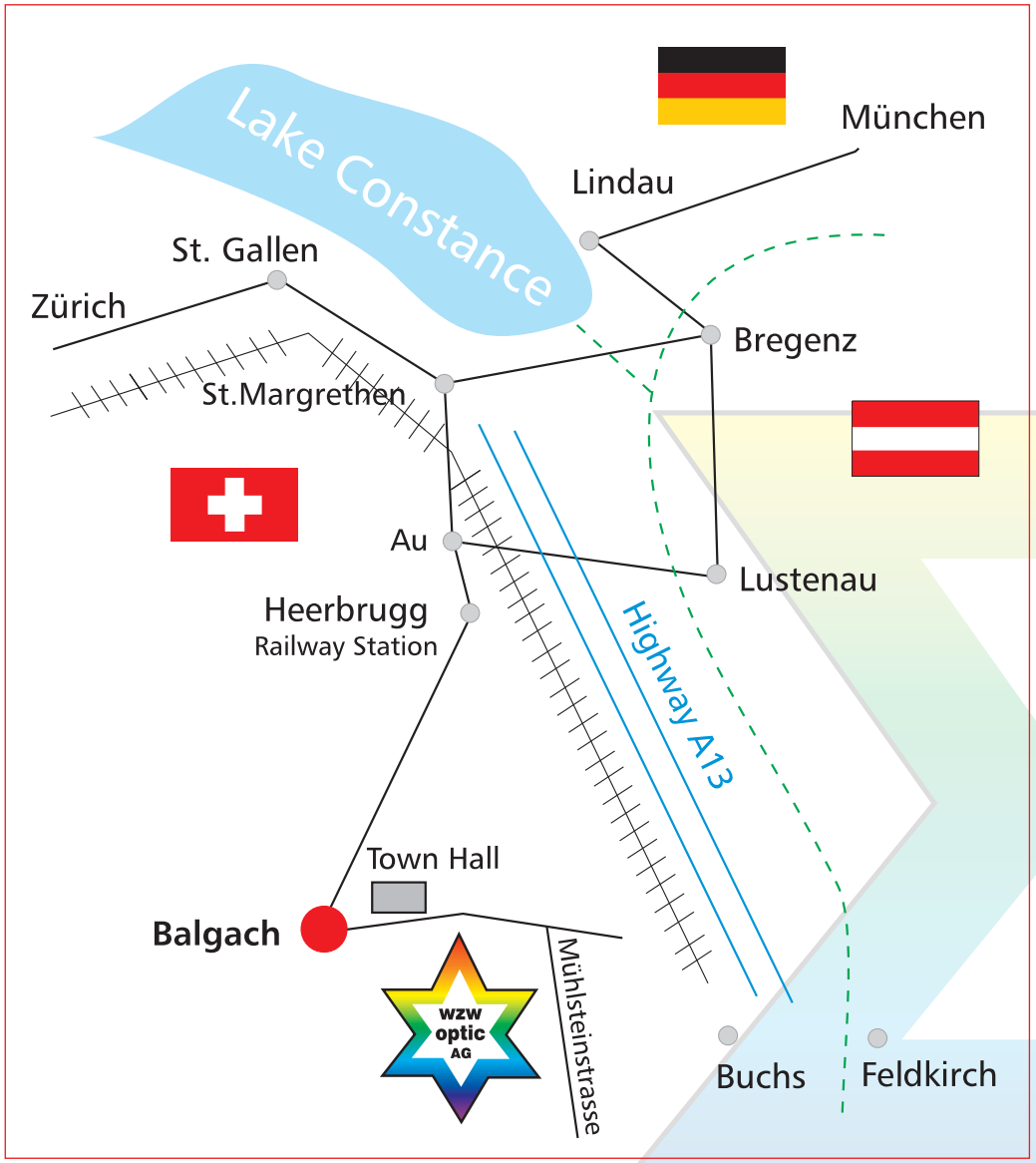
Location



Precise information on how to find us is on our homepage.

Sales Representative in Switzerland for:

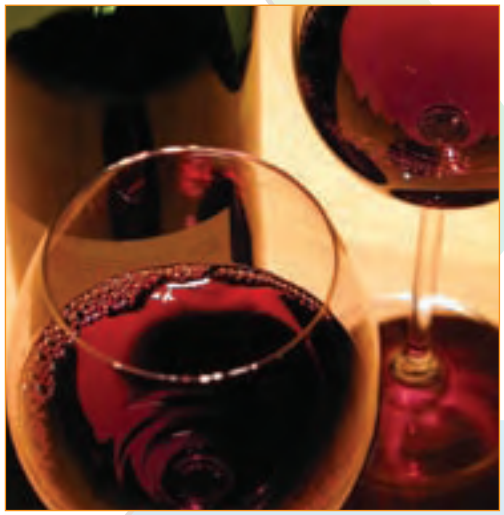
- LINOS Photonics GmbH & Co. KG www.linos.de
- DUMA Optronics Ltd. www.duma.co.il

International Sales Offices

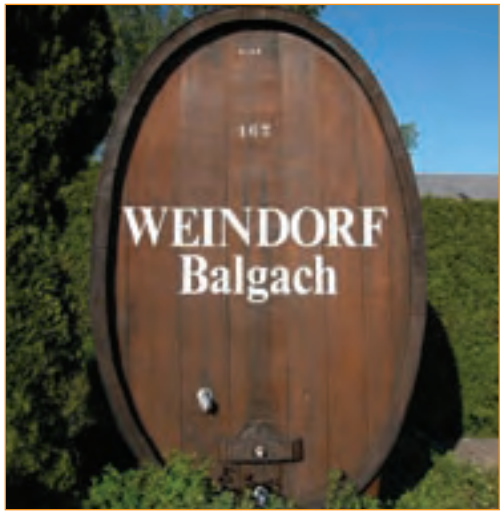
- KG Fridman AB www.fridman.com
- Dunvegan Electro-Optics Ltd. DunveganEO@aol.com
- Lahat Technologies Inc. www.lahat.co.il
- OPTICS CONCEPT info@optics-concept.com
- TET MAKINA www.tetmakina.com
- Autex, Inc. www.autex-inc.co.jp

Strengths

Other strong industries ...

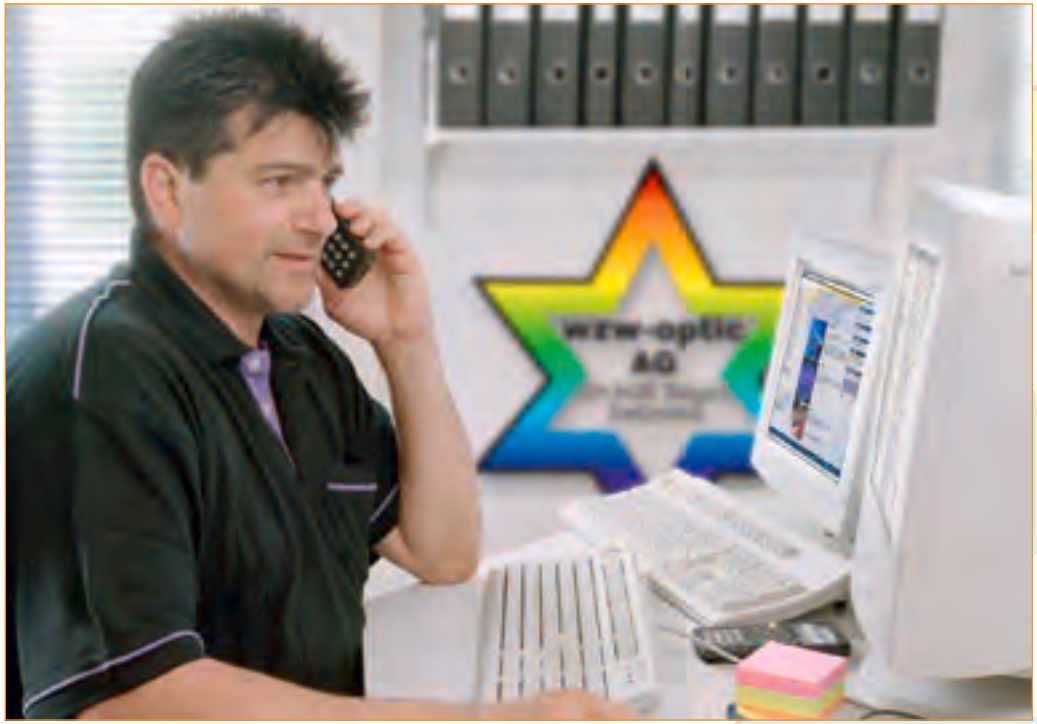


... with interesting applications of glass.



OEM service at the highest level

We offer OEM manufacturing which is accompanied by top level pre- and post- sales support. Our clients profit from short, direct communications and from our rigorous quality management system according to ISO 9001: 2000.
Rapid reaction to client's enquiries, professional order processing, reliable deliveries, and a very small defect rate explain why our customers have maintained a business relationship with us over many years.



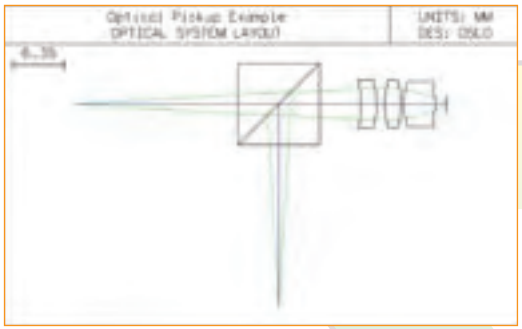
Process know-how

Whether designing a product, manufacturing prototypes or whole series, wzw possesses optimal solutions for all phases of a project. Our products range from large, complex systems to microoptical components and also include assemblies. Our customers profit from our ability to support them in all aspects of optics.
A highly developed control of all the various production processes gives us a very high degree of flexibility. This allows us to meet challenges very rapidly if necessary.

Optomechanics

We manufacture optomechanical systems with proverbial Swiss precision. These systems can be OEMs or can be designed in-house according to a customer's functional requirements. The client profits from an optimal interaction between the optical and mechanical tolerances.
In the past we have manufactured, among others, eyepieces, multichannel camera systems, and assemblies for high power lasers.

We are capable of assembling full systems and have the knowledge needed for testing and aligning them.



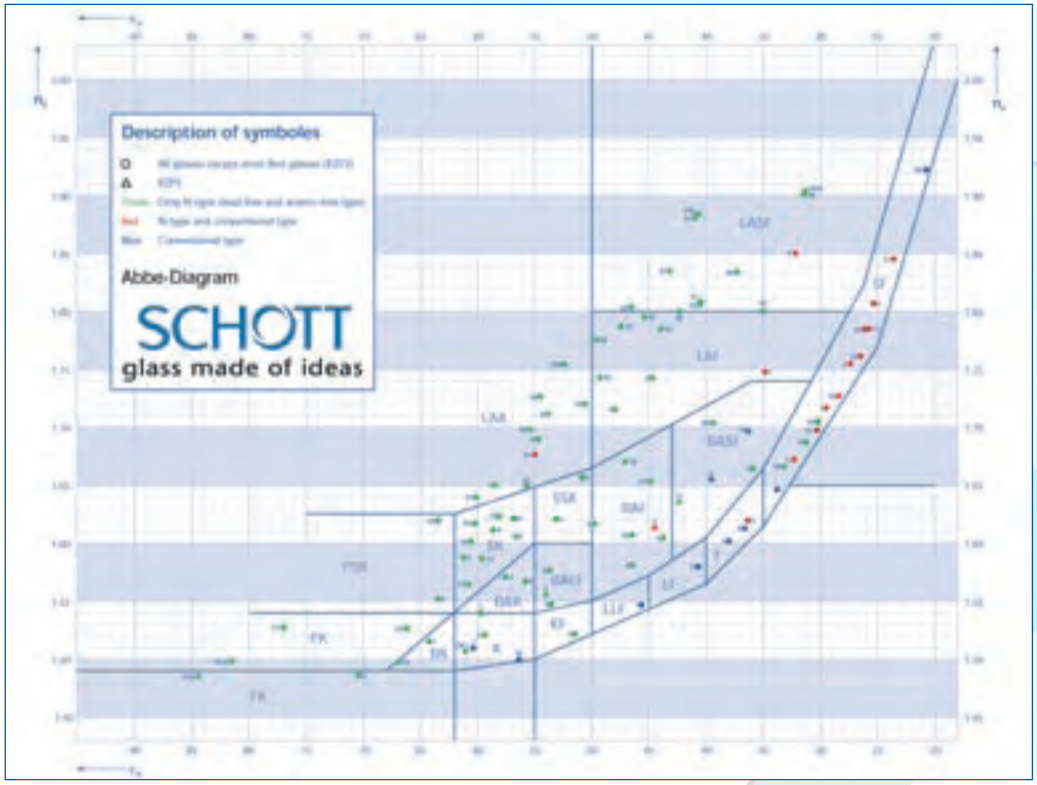
We will be happy to advise you so that you can find optimal solutions for your applications. Contact our designer Dr. Christoph Zellweger (Christoph@wzw.ch)

Some of the sights of our region.

Basics

Optical glass

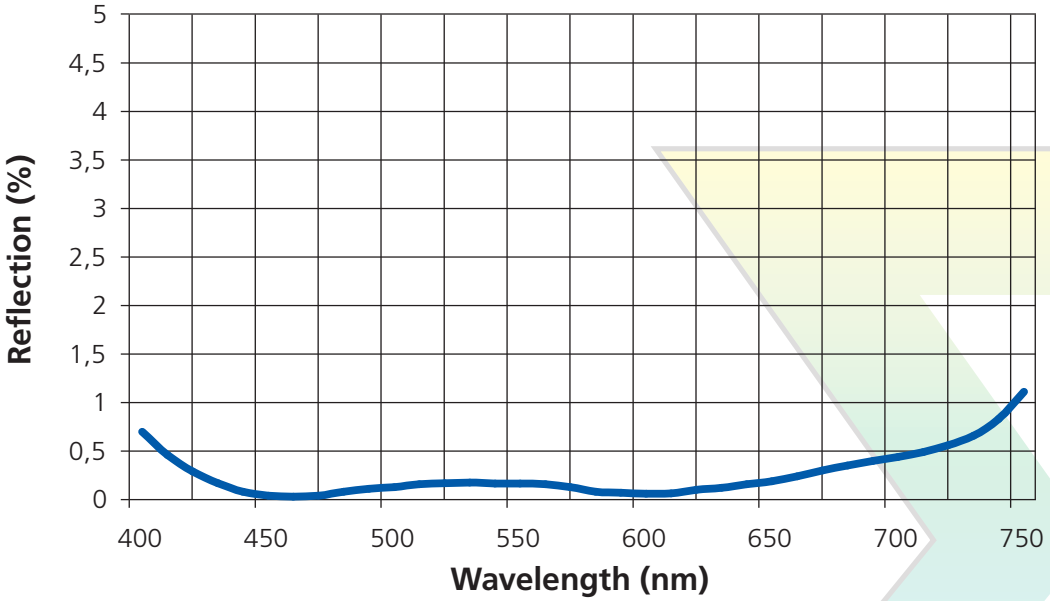
There are a couple of hundred different types of optical glass. These have different refractive indices and dispersions. The index and dispersion values are usually charted in an Abbé diagramm (see below). The different optical properties are used by designers to optimise the perfomance of optical systems. Usually different optical glasses are combined in a system.



The different glasses also have, in general, different mechanical and chemical properties. These properties can influence the manufacturing process and thus the price of an optical component. Information on the various parameters can be found in the catalogues of the various glass suppliers, for example Schott (www.schott.com) or OHARA (www.ohara-gmbh.de).

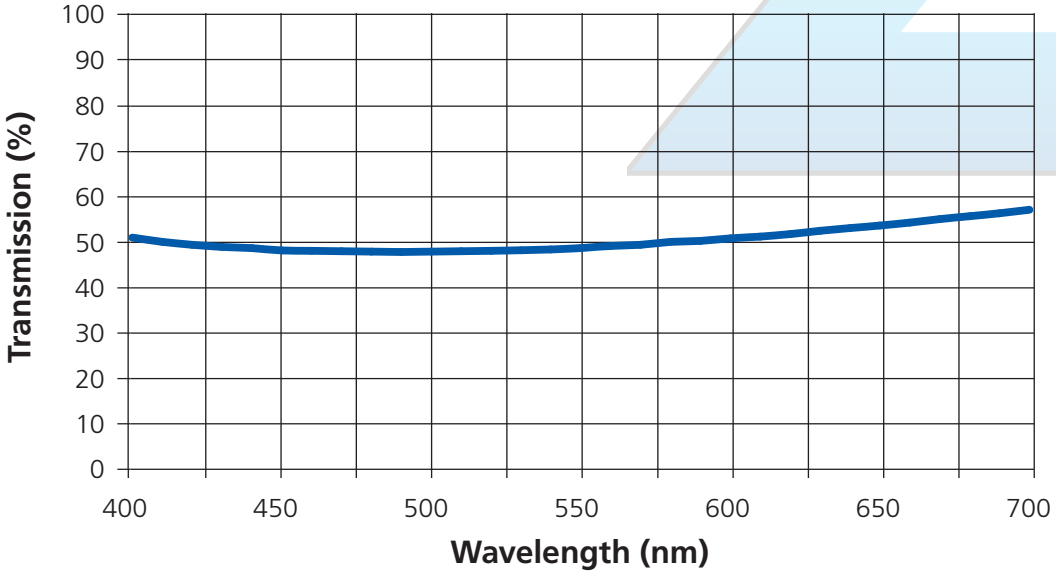
01

Broadband antireflection coating for the VIS range



LT1

Beamsplitter cube non-polarising for VIS range



Coatings

A coating often transforms a piece of polished glass into a functional element. Examples are mirrors, beamsplitters, or dichroic filters. The most common coatings however are antireflection coatings which reduce the Fresnel reflections at the air/glass interfaces.
Coatings consist of one or more thin layers of dielectric or metallic materials. These layers are deposited in vacuum chambers using various processes.
The part numbers in this catalogue often end with a coating code: "-01" which stands for a VIS antireflection coating, "-M01" is an aluminium mirror coating, "-LT01" denotes a dielectric 50% splitter coating, and the various "-RT" types describe dichroic filter coatings.

Tolerances

Optical components have tolerances in order to ensure that the combination of manufacturing process, mechanical mounting, and optical performance works properly. For the optics presented in this catalogue the following general tolerances apply unless stated otherwise.

Tolerance	Value
Thickness	+/-0.1 mm
Diameter, length, width, height	-0.1 mm
Surface figure or wavefront deformation	λ/4 at 633 nm
Angle or beam deviation	5′
Surface quality	3x 0.16

It has to be noted that the wavefront and beam deviation tolerances only apply to beams transmitted through a component.

Quality assurance

wzw possesses a large array of measuring instruments und uses many different measuring methods to ensure that tolerances are met. We are capable of measuring wavefronts down to λ/40, angles down to one arc second, and surface qualities of the highest level. In addition, we have developed numerous propriatory tools for specific high-end applications.

How to clean optical components

- Cotton or latex gloves: Gloves stop you from contaminating polished surfaces. They also protect your hands from the solvents used in cleaning.
- Optical paper: Use lint free, absorbing lens paper for cleaning.
- Cotton buds: Best used to remove particles sticking to optical surfaces.
- Dust removal: The best tool is dry, filtered nitrogen that is passed through an antistatic jet. Manual bellows and brushes have to be absolutely clean to avoid recontamination of surfaces.
- Stains: Water stains can be removed using neutral soap diluted in water. Another trick is to use "nosegrease", i.e. the excretion that appears between the nostril edges and the face. Apply it and remove with a solvent.
- Isopropanol: Only use spectroscopic quality. Evaporates more slowly than acetone.
- Acetone: Only use high purity. Achieves the best cleaning effect. Observe the security measures indicated on the container!
- Hemostat: Self locking tweezers used to hold optical paper.
- Tweezers and vacuum pick-up: Used to hold small components.
- Bright light: Halogen lamp or cold light source for checking the components.

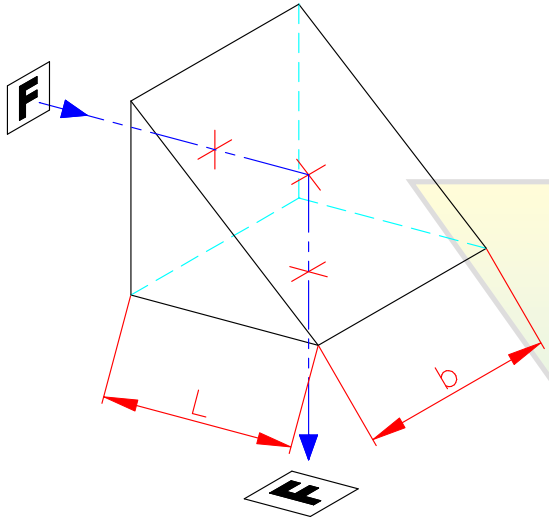
Flat optics

The high value flat optics by wzw-optic include various prisms, mirrors, reference flats, optical windows, and etalons.
These products are available from stock and offer outstanding value for money.

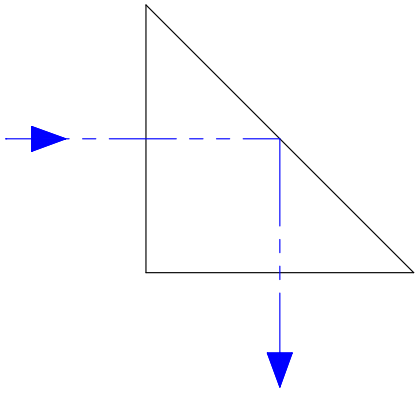
Certain components are available in **low cost** versions.

Low cost means:
Made in Asia
100% tested by wzw-optic AG
Usually available from stock

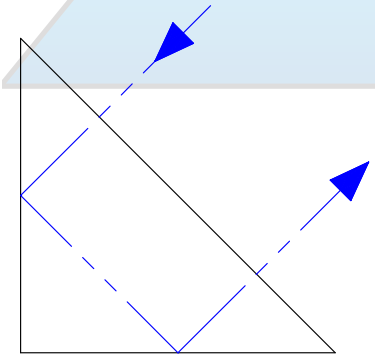
Flat optics



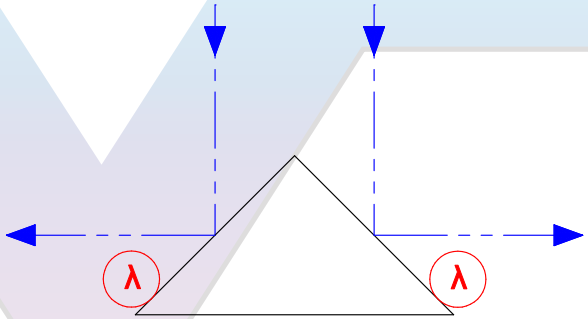
Right angle prisms:
Right angle prisms are usually used in two possible configurations. In both, the beams are reflected by total internal reflection (R = 100%). This means fewer losses than with normal mirror surfaces. However, the reflecting surfaces have to be kept dust free in order to avoid losses caused by frustrated total reflection.



90° reflection



180° retro reflection



90° reflection
only with mirror coatings
on the prism sides

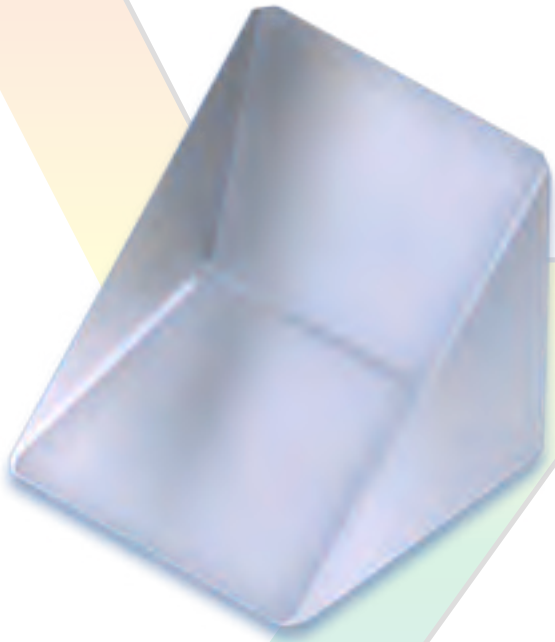
Standard

Part no.	L Length (mm)	B Width (mm)
RP0.5	0.5	0.5
RP1	1	1
RP2	2	2
RP3.2	3.2	3.2
RP5	5	5
RP10	10	10
RP12.7	12.7	12.7
RP20	20	20
RP25.4	25.4	25.4
RP30	30	30
RP50	50	50

High-end

Part no.	L Length (mm)	B Width (mm)
RP5HE	5	5
RP10HE	10	10
RP12.7HE	12.7	12.7
RP20HE	20	20
RP25.4HE	25.4	25.4
RP30HE	30	30

Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.



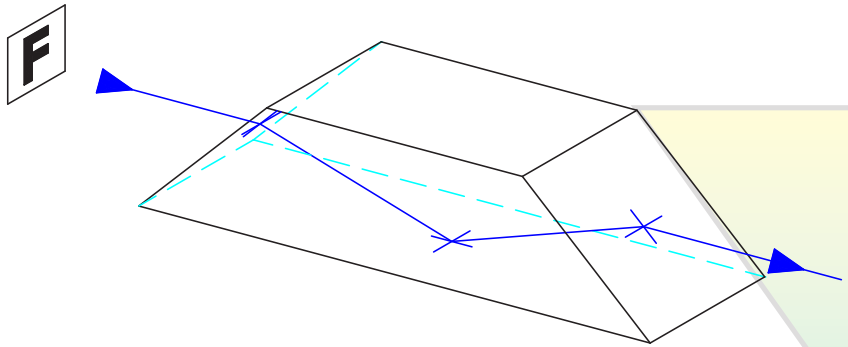
prices online
wzw.ch

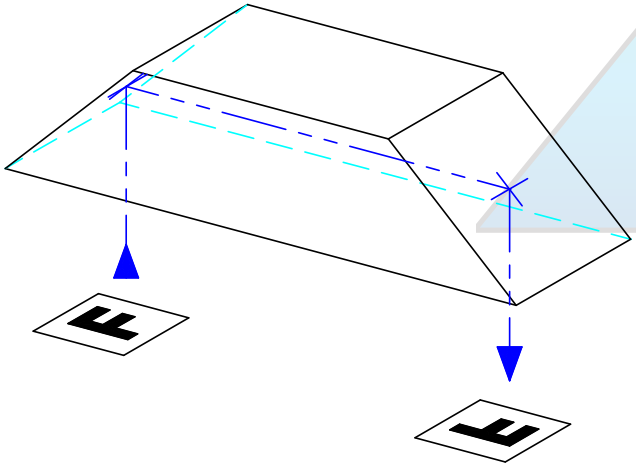
Technical data

	Standard	High-end
Material:	BK7	BK7
Flatness:	λ/4	λ/4
Angle tolerance:	±3‘	<30‘‘
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

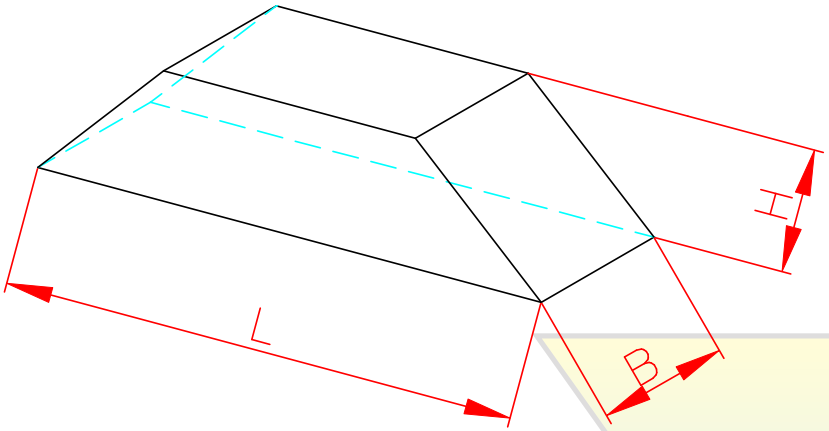
Right angle prisms 90°

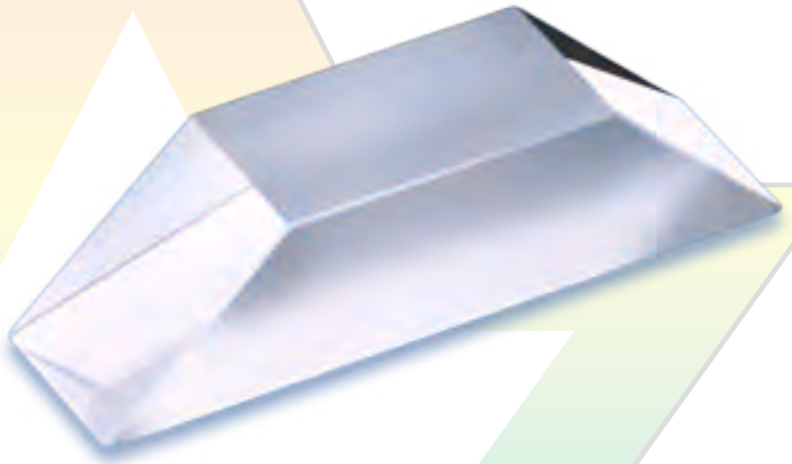
RP





Dove prisms:
Dove prisms are usually used either for image inversion or for 180° retro reflection. Of course we can offer versions with special coatings on the entry and exit surfaces.





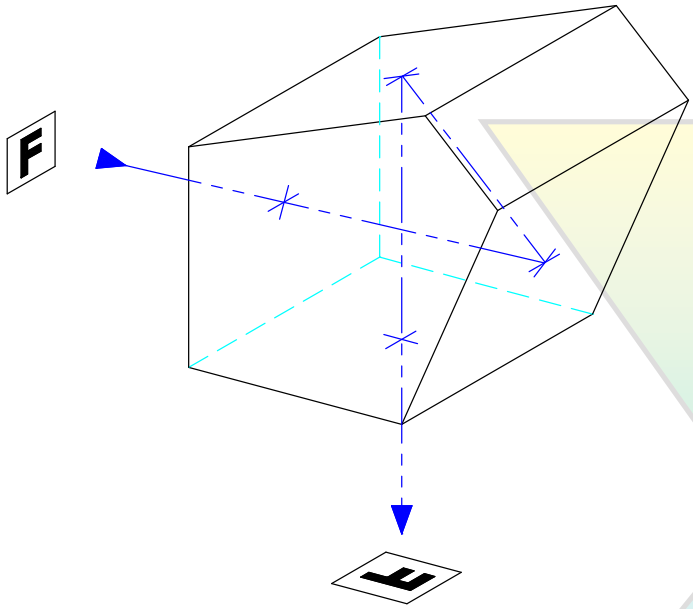
prices online
wzw.ch

Part no.	L Length (mm)	H Height (mm)	B Width (mm)
D10x10x40	40	10	10
D20x20x82	82	20	20
D30x30x124	124	30	30

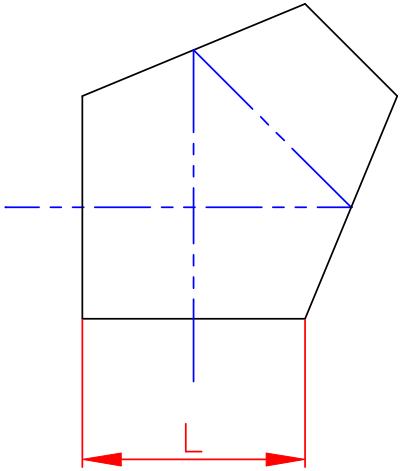
Other dimensions, tolerances, coatings, and materials on request.

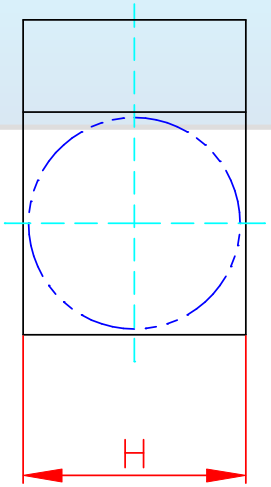
Technical data

Material:	BK7
Flatness:	λ/4
Angle tolerance:	±3‘
Surface quality:	3x0.16
Clear aperture:	>90%



Penta prisms:
Pentaprisms are used in the same way as right angle prisms for 90° beam deviation with one important advantage. The deviation is 90° even if the prism is not aligned perfectly. In addition, there is no image inversion because two reflections occur.





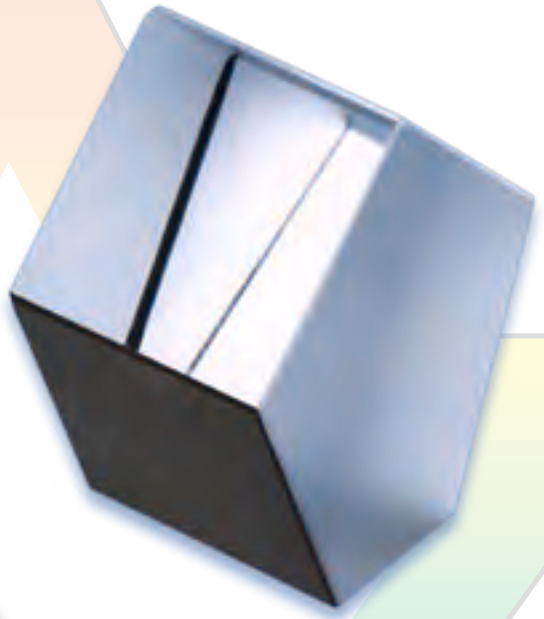
Standard

Part no.	L Length (mm)	B Width (mm)
PEP6	6	6
PEP10	10	10
PEP12.5	12.5	12.5
PEP16	16	16
PEP20	20	20
PEP30	30	30

High-end

Part no.	L Length (mm)	B Width (mm)
PEP6HE	6	6
PEP10HE	10	10
PEP12.5HE	12.5	12.5
PEP16HE	16	16
PEP20HE	20	20
PEP30HE	30	30

Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.



prices online
wzw.ch

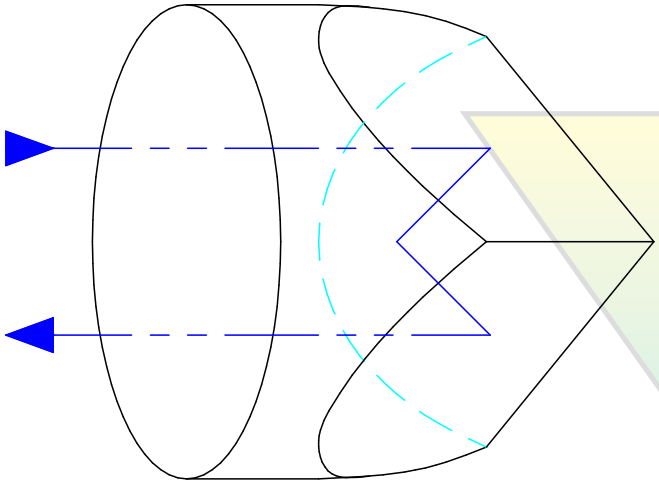
Technical data

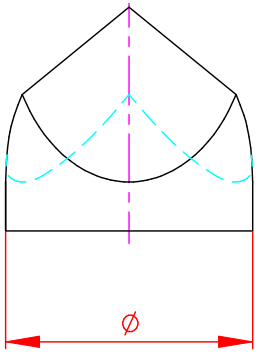
	Standard	High-end
Material:	BK7	BK7
Wavefront distortion:	λ/4	λ/4
Deviation tolerance:	3‘	30‘‘
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

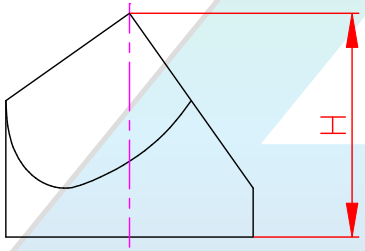
Coating

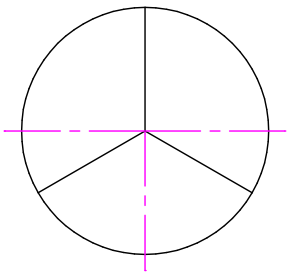
Entry and exit faces: Broadband antireflection coating.
Reflecting surfaces: Protected aluminium or silver or dielectric mirrors.

Penta prisms
PEP









Corner cube reflectors:
Corner cubes reflect a beam back towards its source even if the beam arrives at an oblique incidence angle. The standard prisms have an acceptance angle of about +/-25°. This can be increased by applying a rear surface mirror coating. Depending on the application, this should be protected with varnish.

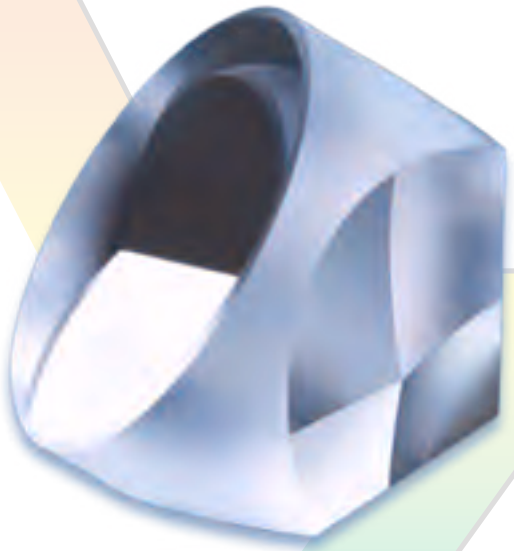
Standard

Part no.	Ø Diameter (mm)	H Height (mm)
SOTD3	3	2.5
SOTD7.16	7.16	6.1
SOTD10	10	8.5
SOTD12.7	12.7	11.6
SOTD15	15	11.3
SOTD25.4	25.4	19,85
SOTD38.1	38.1	28.5

High-end

Part no.	Ø Diameter (mm)	H Height (mm)
SOTD3HE	3	2.5
SOTD7.16HE	7.16	6.1
SOTD10HE	10	8.5
SOTD12.7HE	12.7	11.6
SOTD15HE	15	11.3
SOTD25.4HE	25.4	19,85
SOTD38.1HE	38.1	28.5

Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.



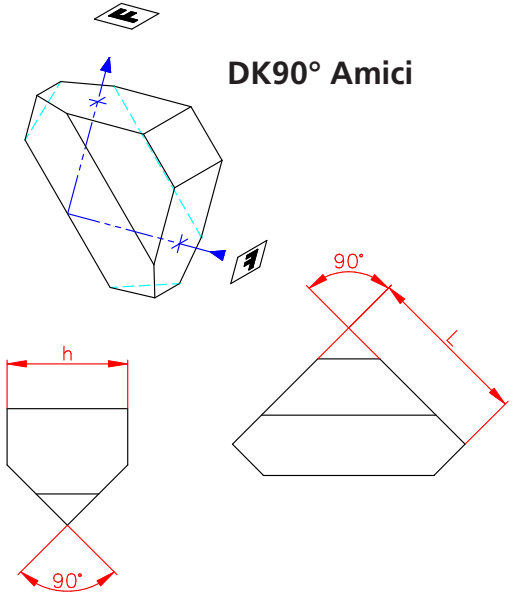
prices online
wzw.ch

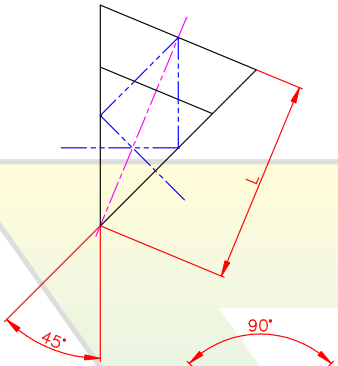
Technical data

	Standard	High-end
Material:	BK7	BK7
Wavefront distortion:	λ/4	λ/4
Deviation tolerance:	30''	3''
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

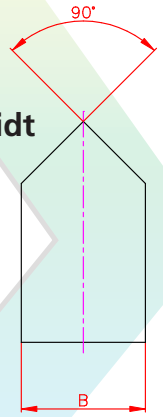
Corner cube reflectors
SOT

DK90° Amici

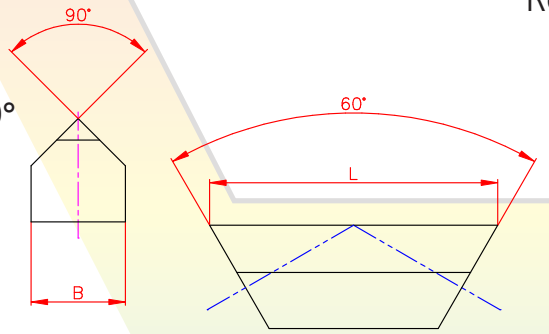




DK45° Schmidt



DK120°



Roof prisms:
The roof of these prisms is repsonsible for image inversion. If it is damaged (chips, scratches) there will be missing or unclear regions in the image. As with many other prisms, total internal reflection occurs at the roof sides and therefore these should be protected from dust.

90° standard roof prisms (Amici)

Part no.	L Length (mm)	B Width (mm)
DK90Gx9	12.3	9
DK90Gx10	12.8	10
DK90Gx11	15	11
DK90Gx13	12	13
DK90Gx17	23	17
DK90Gx23	31.5	23
DK90Gx30	52.5	30
DK90Gx75	102.5	75
DK90Gx90	120.5	90

120° standard roof prisms

Part no.	L Length (mm)	B Width (mm)
DK120Gx7	21.4	7
DK120Gx10	30.6	10
DK120Gx14	42.8	14
DK120Gx16	48.9	16

120° high-end roof prisms

Part no.	L Length (mm)	B Width (mm)
DK120Gx7HE	21.4	7
DK120Gx10HE	30.6	10
DK120Gx14HE	42.8	14
DK120Gx16HE	48.9	16

90° high-end roof prisms (Amici)

Part no.	L Length (mm)	B Width (mm)
DK90Gx9HE	12.3	9
DK90Gx10HE	12.8	10
DK90Gx11HE	15	11
DK90Gx13HE	12	13
DK90Gx17HE	23	17
DK90Gx23HE	31.5	23
DK90Gx30HE	52.5	30

45° standard roof prisms (Schmidt)

Part no.	L Length (mm)	B Width (mm)
DK45Gx14	23.02	14

45° high-end roof prisms (Schmidt)

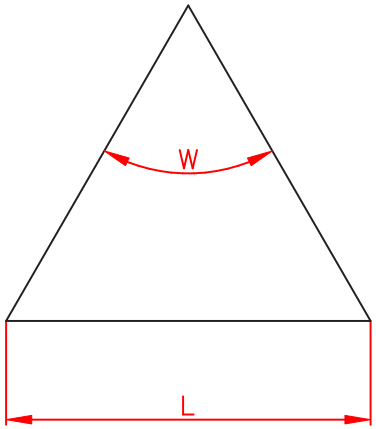
Part no.	L Length (mm)	B Width (mm)
DK45Gx14HE	23	14

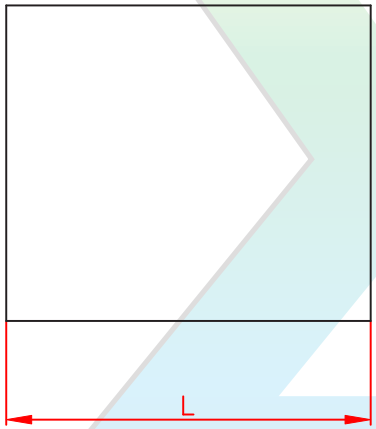
Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.

prices online
wzw.ch

Technical data

	Standard	High-end
Material:	BK7	BK7
Wavefront distortion:	λ/4	λ/4
Deviation tolerance:	30''	3''
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%





Equilateral prisms:
The Dark Side of the Moon … Spectral dispersion is nowadays mainly used in femtosecond oscillators, for example for pulse dispersion before an amplifier stage.
Prisms with sharp edges or made out of high index materials with special coatings or in special geometries for use under Brewster angle are available on request.

Computer aided design and production.

prices online
wzw.ch

Part no.	L Length (mm)	W Angle (°)	Material
DIP10BK7	10	60	BK7
DIP10SF15	10	60	SF15
DIP30BK7	30	60	BK7
DIP30SF10	30	60	SF10
DIP30Q	30	60	Quarz
DIP80F2	80	60	F2

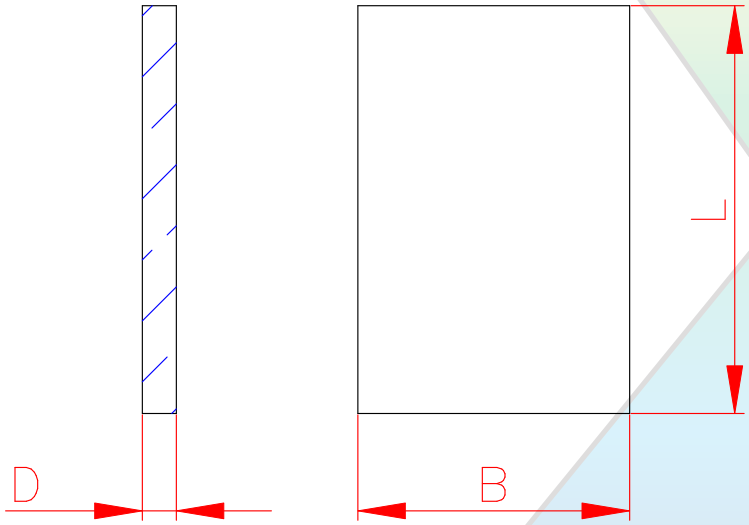
Other dimensions, tolerances, coatings, and materials on request.

Technical data

Surface figure:	λ/4
Angle tolerance:	±3‘
Surface quality:	3x0.16
Clear aperture:	>90%

Equilateral prisms

DIP



Leading edge high-end metrology.

Material: BK7

Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
W5x5x2	5	5	2
W10x5x2	10	5	2
W15x10x2	15	10	2
W20x15x2	20	15	2
W30x20x2	30	20	2
W50.8x50.8x3	50.8	50.8	3
W80x80x10	80	80	10

Material: Fused silica

Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
W7x5x1Q	7	5	1
W20x15x2Q	20	15	2
W30x20x2.5Q	30	20	2.5
W80x80x4Q	80	80	4
W80x80x10Q	80	80	10

Material: Saphire

Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
W28x28x2SAP	28	28	2

Other dimensions, tolerances, and materials on request.
The standard versions are also available as **low cost** versions.

prices online
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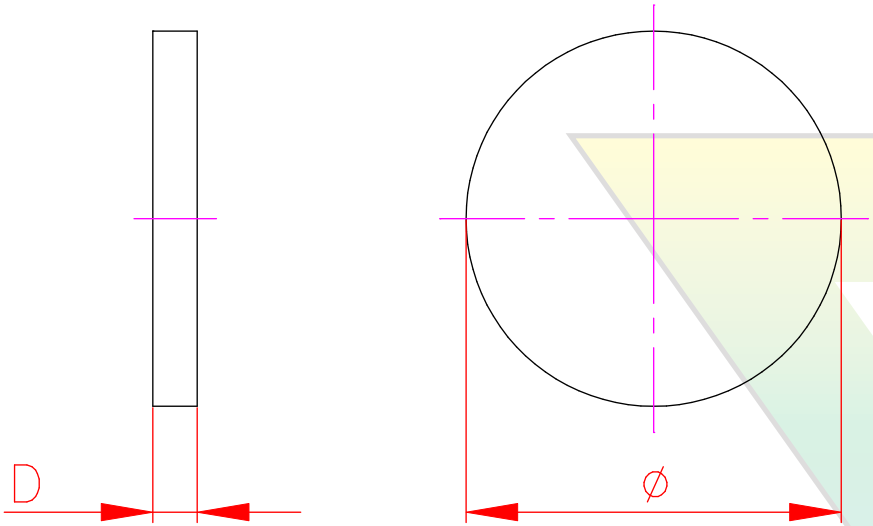
Technical data

Surface figure:	λ/4
Parallelism:	<3‘
Surface quality:	3x0.16
Clear aperture:	>90%

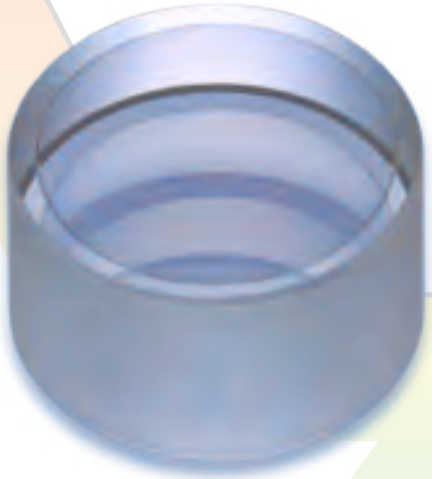
Rectangular flats
W



Leading edge CNC manufacturing systems.

Material: BK7

Part no.	Ø Diameter (mm)	D Thickness (mm)
RS4.5x0.4	4.5	0.4
RS10x1	10	1
RS12.7x1	12.7	1
RS12.7x3	12.7	3
RS25.4x1	25.4	1



Material: Fused silica

Part no.	Ø Diameter (mm)	D Thickness (mm)
RS4.5x0.4Q	4.5	0.4
RS10x1Q	10	1
RS12.7x1Q	12.7	1
RS12.7x3Q	12.7	3
RS25.4x1Q	25.4	1

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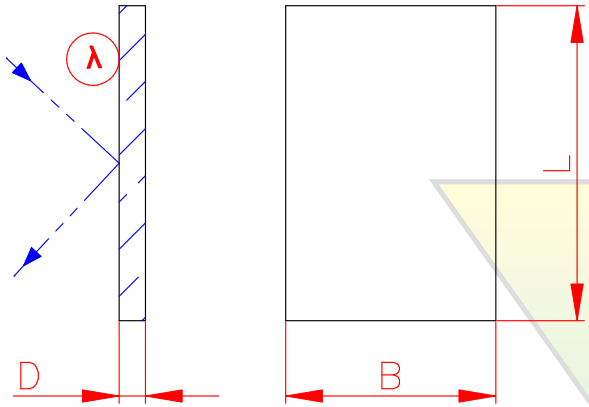
Material: Saphire

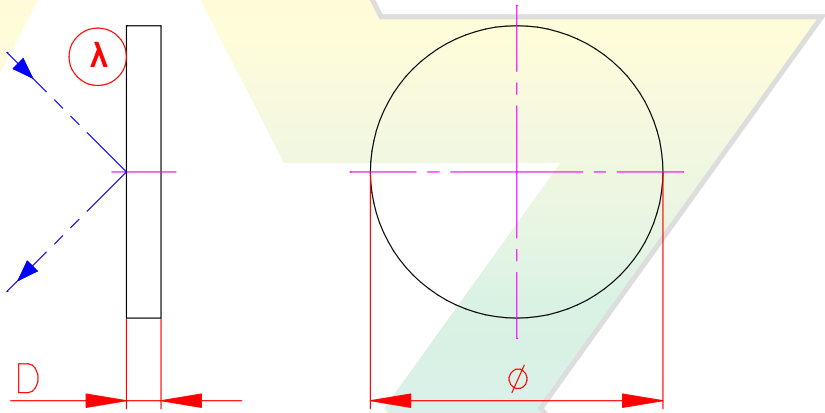
Part no.	Ø Diameter (mm)	D Thickness (mm)
RS10x1SAP	10	1
RS12.7x3SAP	12.7	3
RS19x2SAP	19	2
RS25x3SAP	25	3
RS25.4x1SAP	25.4	1

Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.

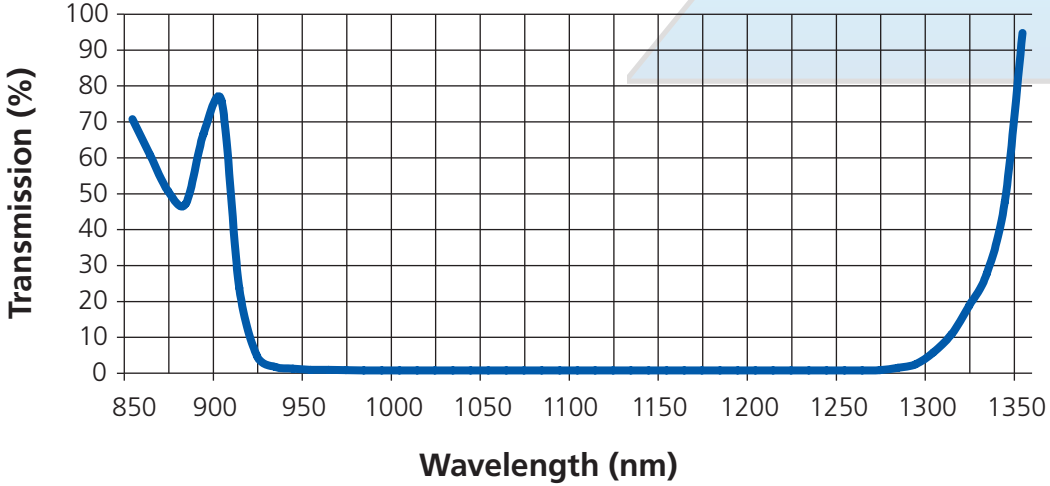
Technical data

Surface figure:	λ/4 (up to 4λ for saphire)
Parallelism:	<3'
Surface quality:	3x0.16
Clear aperture:	>90%

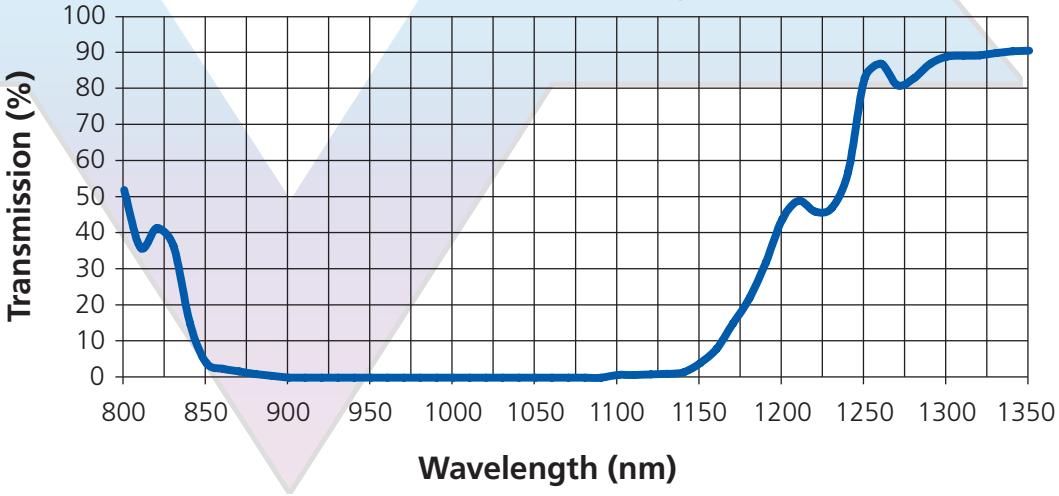




M15
High reflectance dielectric coating
for 0° incidence angle



M15B
High reflectance dielectric coating
for 45° incidence angle



These coatings can be used in high power systems such as Q-switched laser resonators.

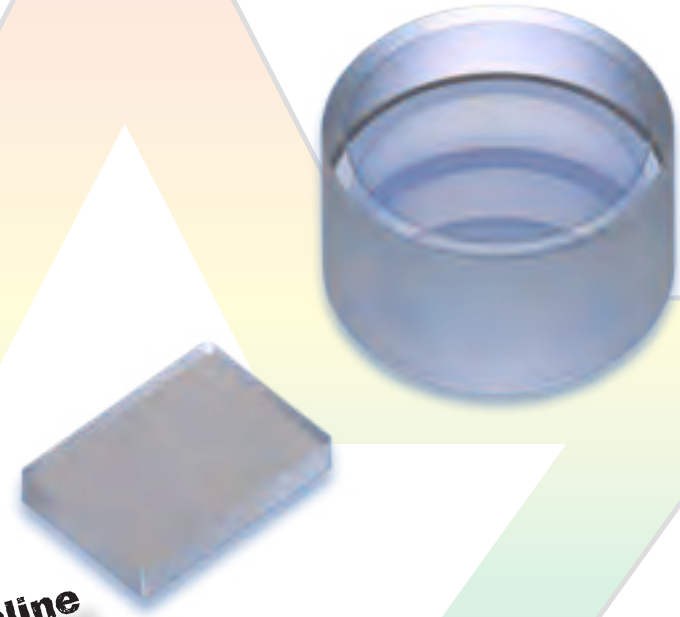
Rectangular

Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
SHR5x5x1.1M15B	5	5	1.1
SHR20x10x6M15B	20	10	6
SHR25x12.7M15B	25	12.7	1.1
SHR30x20x1.1M15B	30	20	1.1
SHR35x12.7x8M15	35	12.7	8

Round

Part no.	Ø Diameter (mm)	D Thickness (mm)
SHRD12.7x1.1M15	12.7	1.1
SHRD12.7x6.3M15	12.7	6.3
SHRD12.7x9.5M15	12.7	9.5
SHRD12.7x9.5M15B	12.7	9.5
SHRD25.4x9.5M15B	25.4	9.5
SHRD25.4x9.5M15	25.4	9.5

Other dimensions, tolerances, coatings, and materials on request.



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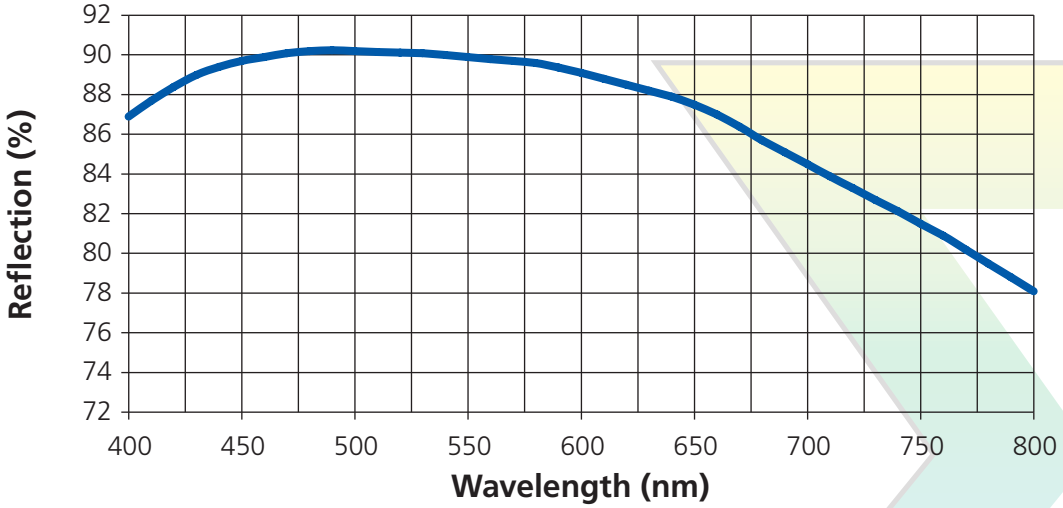
Technical data
BK7 or fused silica in top laser grade

Coating

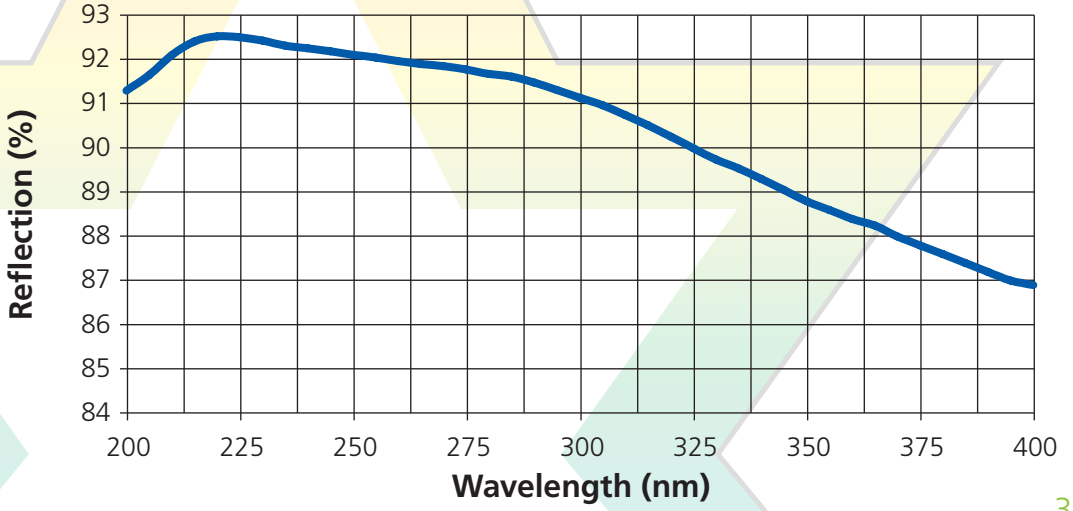
M15
R>99.9% at 1064nm, 0°

M15B
R>99.9% at 1064nm, 45°

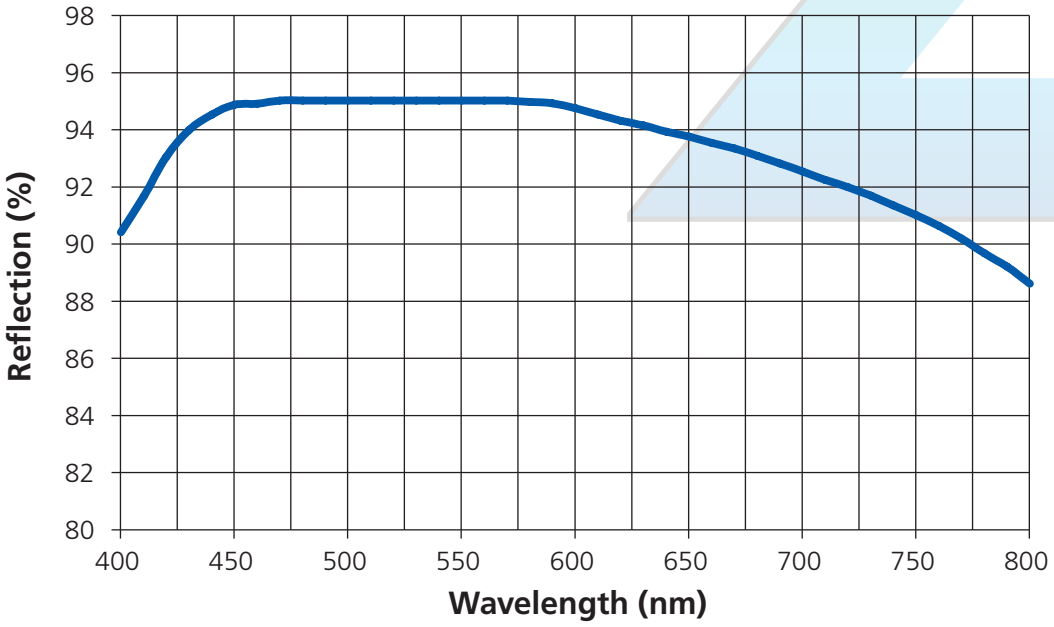
M01
Protected aluminium at 45° incidence angle



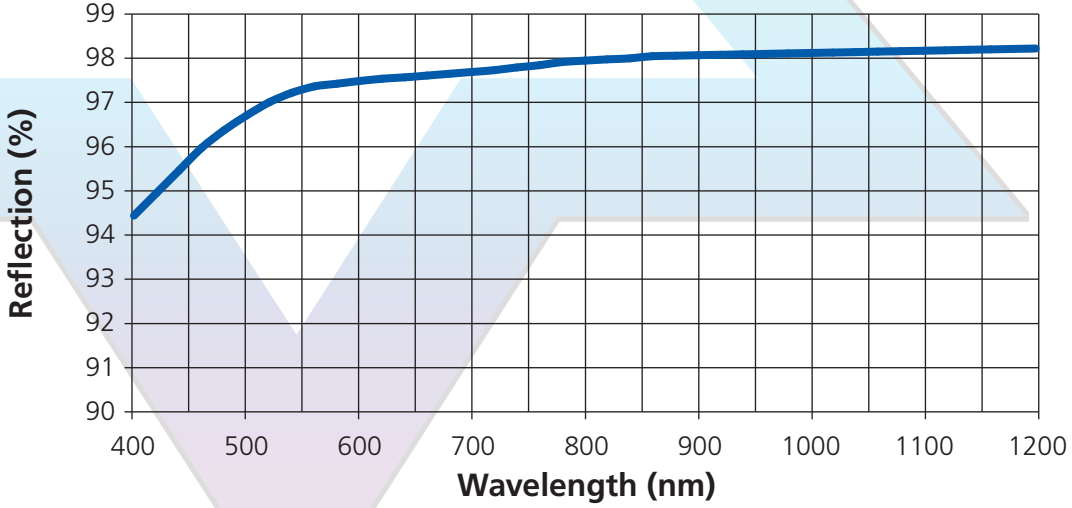
M03
UV enhanced aluminium at 45° incidence angle



M05
Enhanced aluminium at 45° incidence angle



M11
Protected silver coating



Aluminium coated mirrors have a quartz protective coating. This increases the reflectivity and the hardness of the coating.

Standard

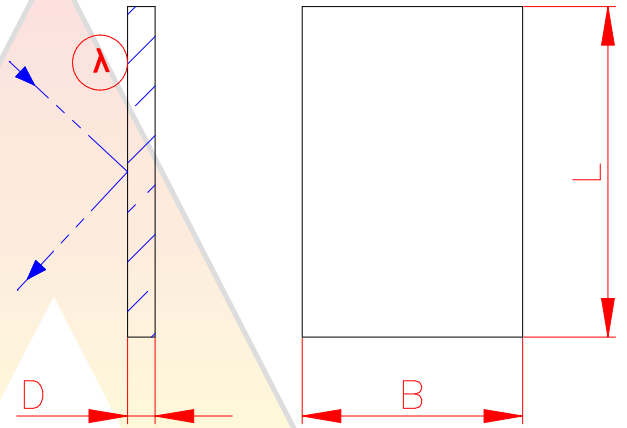
Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
S1x1x1-M01	1	1	1
S2x2x2-M01	2	2	2
S8x6x2-M01	8	6	2
S10x8x1.5-M01	10	8	1.5
S18x12x2.5-M01	18	12	2.5
S45x45x5-M01	45	45	5
S50x50x10-M01	50	50	10
S70x70x6-M01	70	70	6
S75x45x5-M01*	75	45	5
S80x80x10-M01	80	80	10
S223x223x12-M01	223	223	12

High-end

*One corner has 5 mm chamfer, material is thermally stable borofloat.

Part no.	L Length (mm)	B Width (mm)	D Thickness (mm)
S1x1x1HE-M01	1	1	1
S2x2x2HE-M01	2	2	2
S8x6x2HE-M01	8	6	2
S10x8x1.5HE-M01	10	8	1.5
S18x12x2.5HE-M01	18	12	2.5
S45x45x5HE-M01	45	45	5
S50x50x10HE-M01	50	50	10
S70x70x6HE-M01	70	70	6
S75x45x5HE-M01*	75	45	5
S80x80x10HE-M01	80	80	10

Other dimensions, tolerances, coatings, and materials on request.
The standard versions are also available as **low cost** versions.



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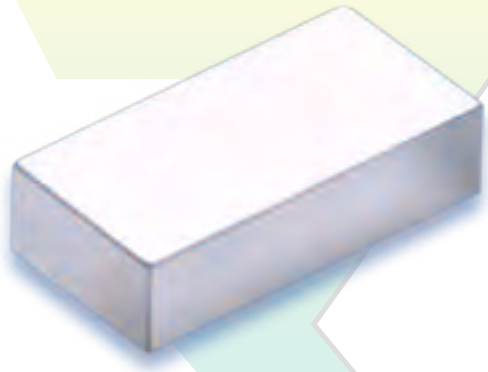


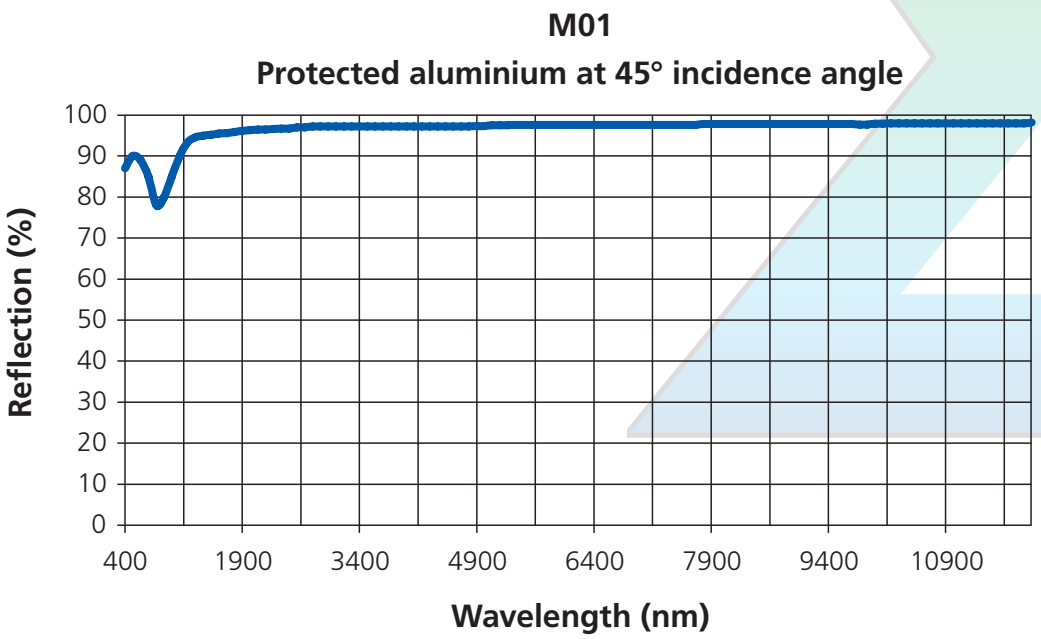
Technical data

	Standard	High-end
Material:	BK7, B270 or Float	BK7, B270 or Float
Surface figure:	λ/4	λ/10
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

Coating
See "M01" curve

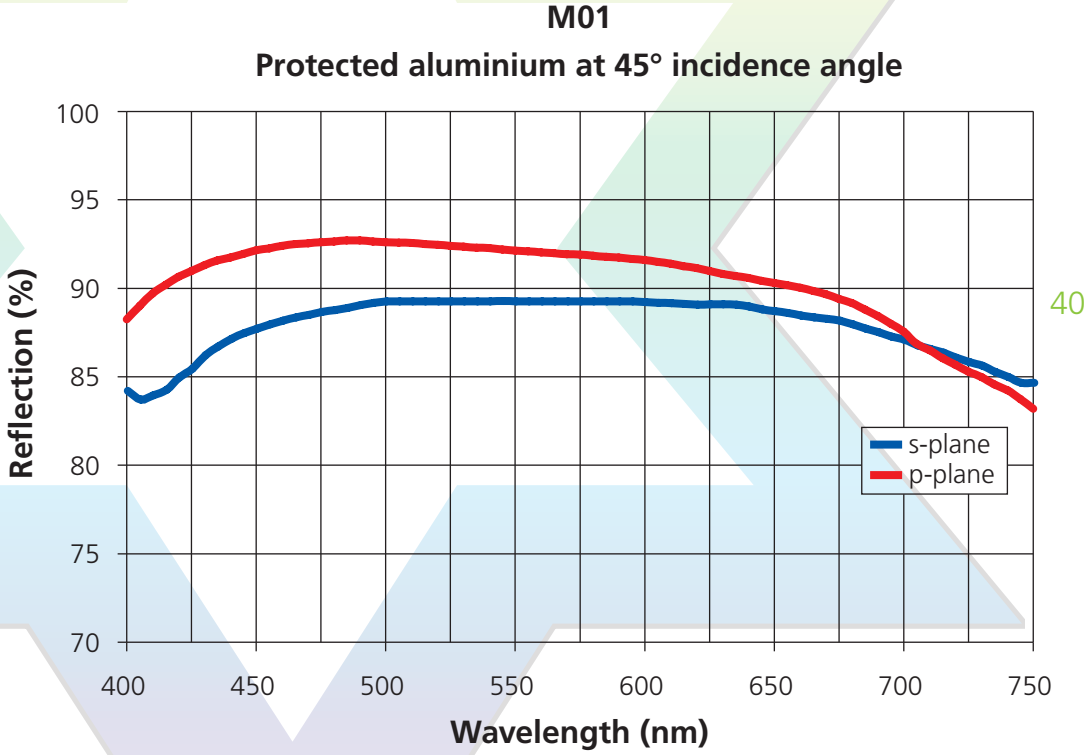
Aluminium coated mirrors have a quartz protective coating. This increases the reflectivity and the hardness of the coating.

Aluminium mirrors with a special protective coating are well suited for applications at wavelengths above 1'100nm.



The reflectivity increases substantially above 1'900nm and reaches values around 98%.

Metallised mirrors have a slightly polarising effect for oblique incidence angles. The larger the incidence angle, the larger the effect.



Apart from the mirrors offered here, we can of course offer all kinds of silver and gold coated mirrors.
Silver mirrors have higher reflectivities but scratch more easily. Gold mirrors have the highest reflectivitiy for infrared wavlengths.

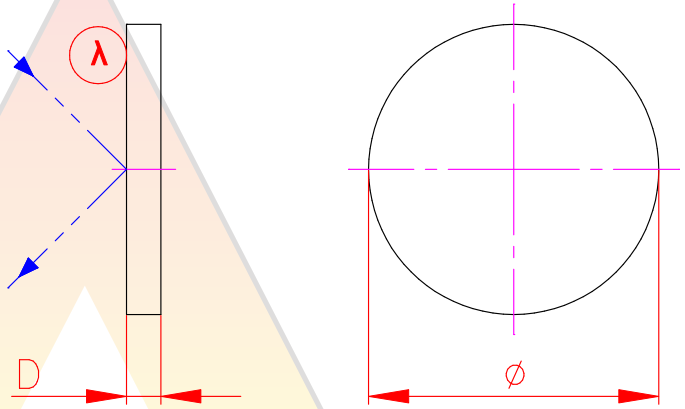
Standard

Part no.	Ø Diameter (mm)	D Thickness (mm)
SD3.8x0.6-M01	3.8	0.6
SD10x2-M01	10	2
SD12.7x2.5-M01	12.7	2.5
SD22.4x3-M01	22.4	3
SD25.4x5-M01	25.4	5
SD50x10-M01	50	10
SD100x10-M01	100	10
SD150x12-M01	150	12

High-end

Part no.	Ø Diameter (mm)	D Thickness (mm)
SD3.8x0.6HE-M01	3.8	0.6
SD10x2HE-M01	10	2
SD12.7x2.5HE-M01	12.7	2.5
SD22.4x3HE-M01	22.4	3
SD25.4x5HE-M01	25.4	5
SD50x10HE-M01	50	10
SD100x10HE-M01	100	10
SD150x12HE-M01	150	12

Other dimensions, tolerances, coatings (see also pages 38 and 40), and materials on request.
The standard versions are also available as **low cost** versions.



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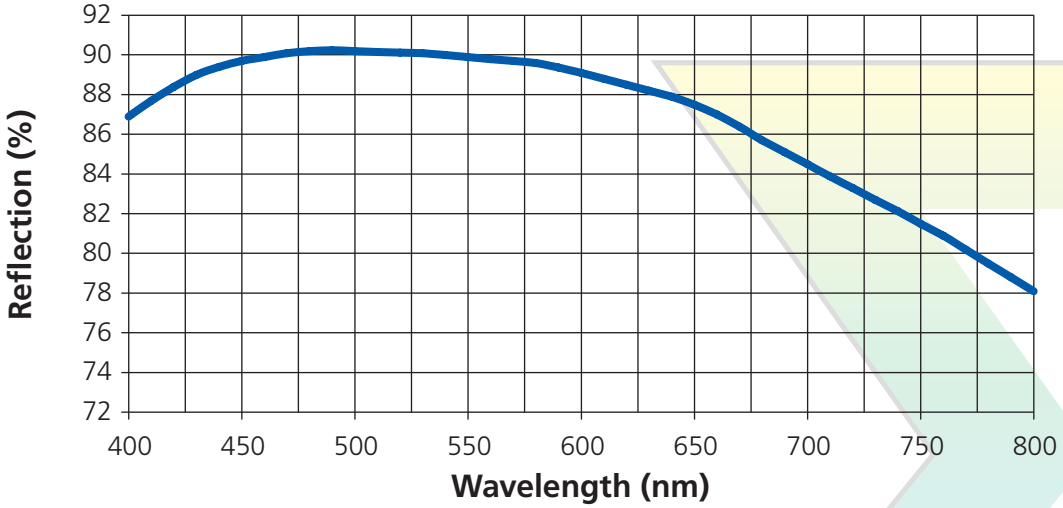
Technical data

	Standard	High-end
Material:	BK7, B270 or Float	BK7, B270 or Float
Surface figure:	λ/4	λ/10
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

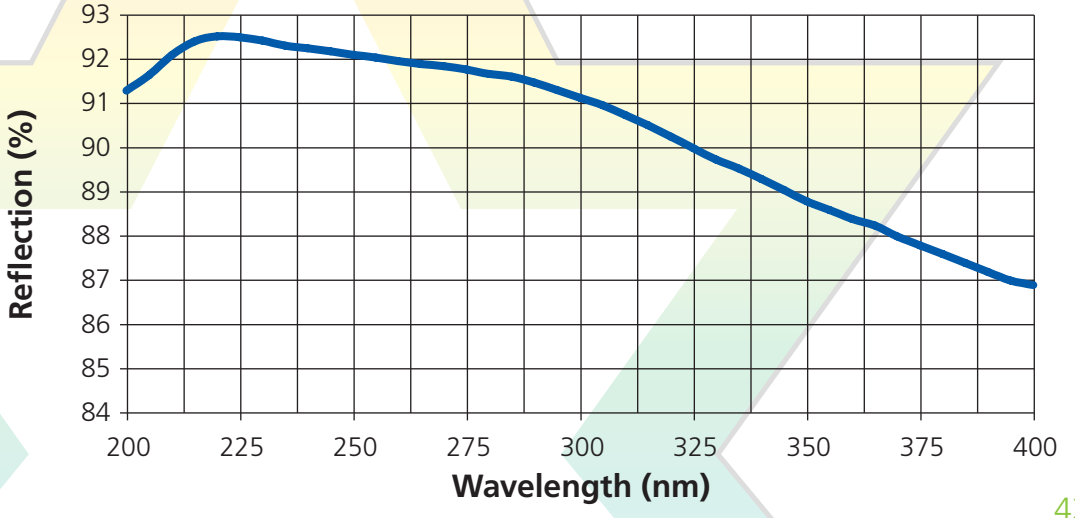
Coating
See "M01" curve

Round mirrors
SD

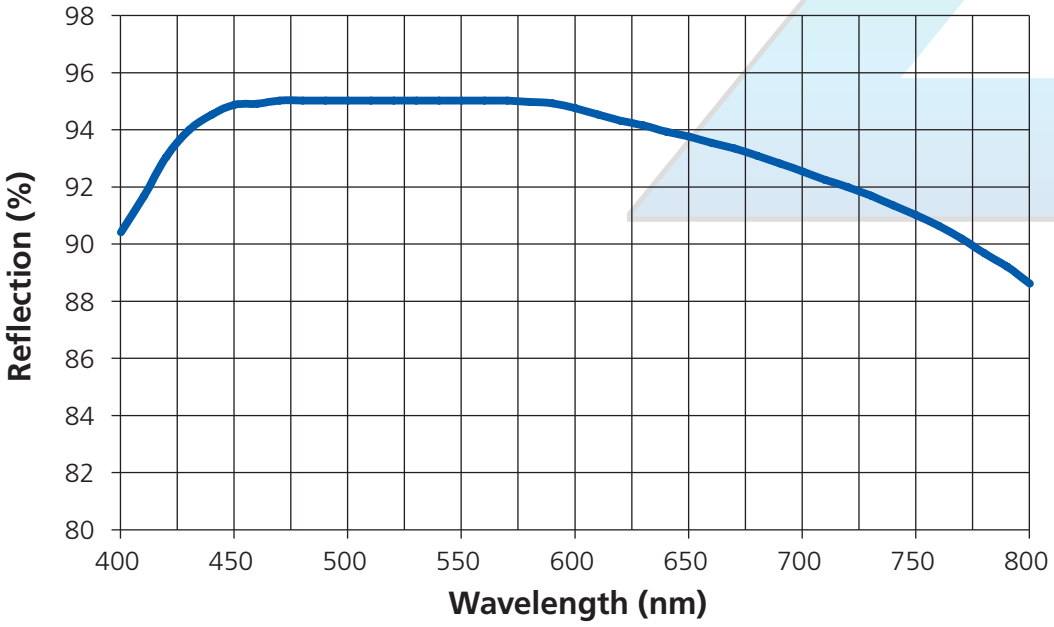
M01
Protected aluminium at 45° incidence angle



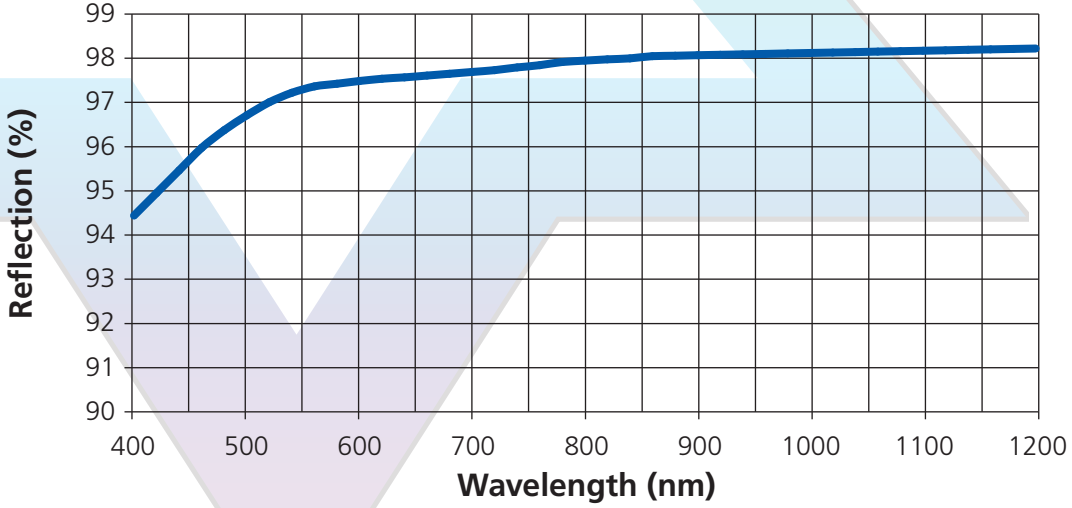
M03
UV enhanced aluminium at 45° incidence angle



M05
Enhanced aluminium at 45° incidence angle



M11
Protected silver coating



Aluminium coated mirrors have a quartz protective coating. This increases the reflectivity and the hardness of the coating.

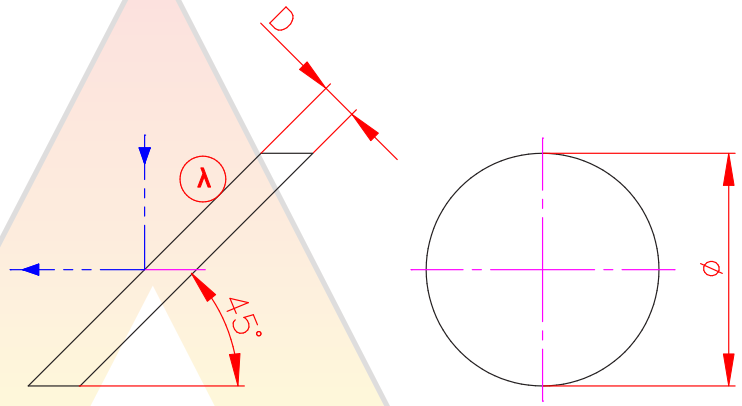
Standard

Part no.	Ø Diameter (mm)	D Thickness (mm)
SL4x1-M01	4	1
SL6x2-M01	6	2
SL10x2-M01	10	2
SL12.7x2-M01	12.7	2
SL14x1-M01	14	1
SL18x3-M01	18	3
SL22.4x3.5-M01	22.4	3.5
SL25.4x4-M01	25.4	4
SL40x6-M01	40	6

High-end

Part no.	Ø Diameter (mm)	D Thickness (mm)
SL4x1HE-M01	4	1
SL6x2HE-M01	6	2
SL10x2HE-M01	10	2
SL12.7x2HE-M01	12.7	2
SL14x1HE-M01	14	1
SL18x3HE-M01	18	3
SL22.4x3.5HE-M01	22.4	3.5
SL25.4x4HE-M01	25.4	4
SL40x6HE-M01	40	6

Other dimensions, tolerances, coatings (see also pages 40), and materials on request.
The standard versions are also available as **low cost** versions.



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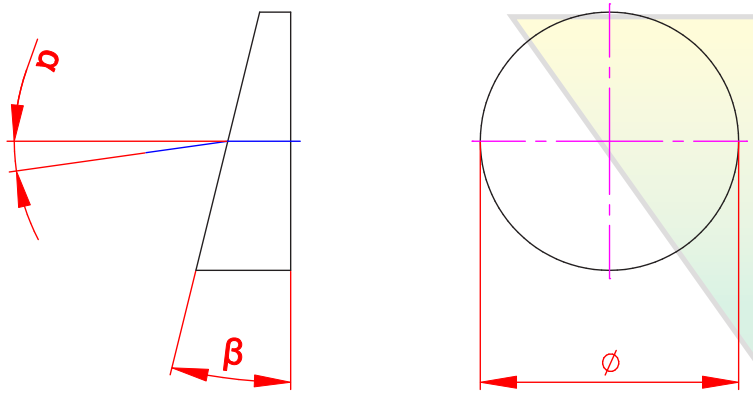
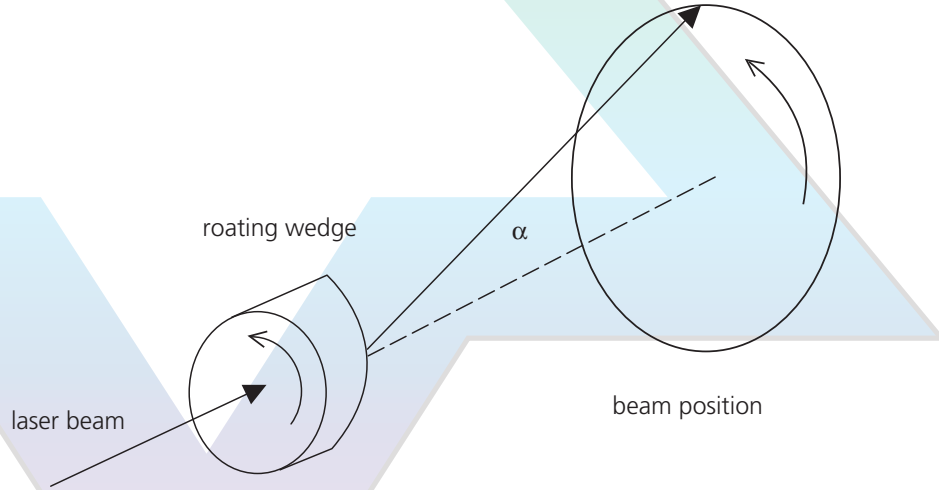
Technical data

	Standard	High-end
Material:	BK7, B270 or Float	BK7, B270 or Float
Surface figure:	λ/4	λ/10
Surface quality:	3x0.16	3x0.16
Clear aperture:	>90%	>90%

Coating
See "M01" curve



Two rotating wedges can be used to scan an optical beam. The figure shows the effect of one rotating wedge: the beam rotates around a cone. The apex angle is 2α, given by $\alpha = \gamma - \beta$, where β is the wedge angle and $\sin(\gamma) = n \cdot \sin(\beta)$, with $n = 1.52$ for BK7.



If a second wedge with its own rotation is added, any point within the combined cone can be targeted.

Traditional know-how for unsurpassed precision.

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Part no.	Ø Diameter (mm)	β Wedge angle (°)	α Beam angle (°)
KED25x1.93G	25	1	1.56
KED25x3.86G	25	2	3.52
KED25x7.66G	25	4	7.4
KED25x11.35G	25	6	11.21
KED25x14.85G	25	8	14.51
KED25x18.13G	25	10	18.08

Other dimensions, tolerances, coatings, and materials on request.

Technical data

Material:	BK7
Surface figure:	λ/4
Surface quality:	3x0.16
Angle tolerance:	±3'
Centre thickness:	±0.2
Clear aperture:	>90%

Wedges
KED

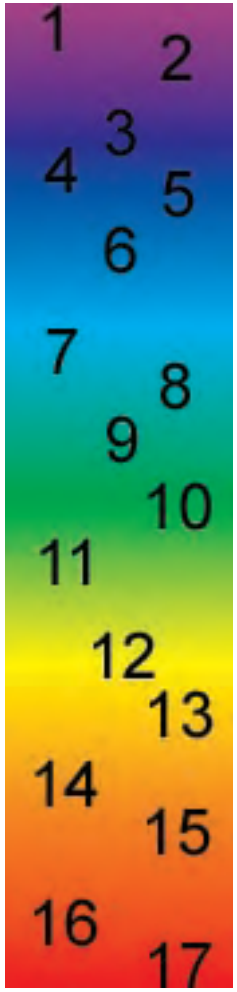
Filters, Etalons

Color glass filters
We stock various rectangular and round color glass filters (RG, VG, OG, UG, KG, …) and neutral densitiy filters. See www.schott.com for the specifications of glass types.

Etalons
We stock various rectangular and round etalons.

An etalon is a frequency or wavelength filter. The pass wavelengths are given by the optical thickness of the etalon. Half the pass wavelength has to be an integer multiple of optical thickness. Other parameters like finess and free spectral range depend on the optical properties of the etalon. We will be happy to assist you: Christoph@wzw.ch

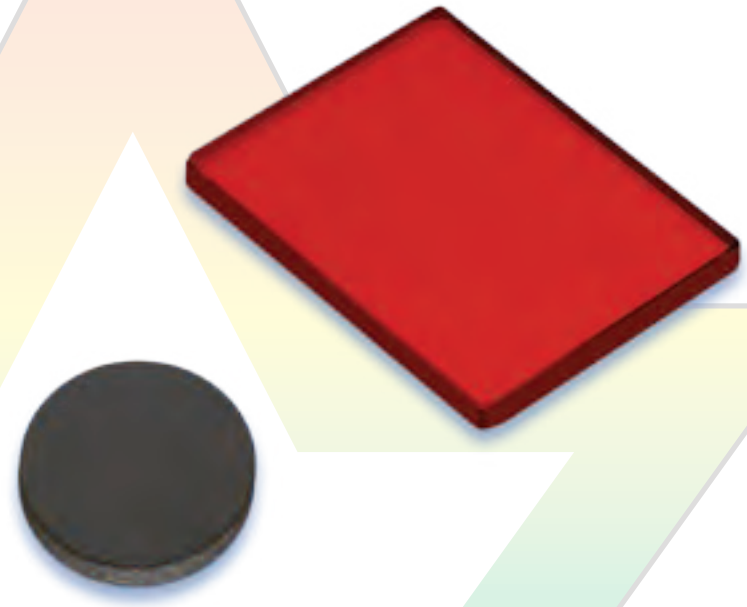
The color values given are for 0° incidence. At 45° all values move by about 10% towards shorter wavelengths, i.e. red to orange.



Standard size: 50x50x1.1 mm

Color	
Pink	1
Lilac	2
Dark blue	3
Dark lavender	4
Blue	5
Light blue	6
Cyan	7
Turquoise	8
Dark green	9
Green	10
Light green	11
Yellow	12
Amber	13
Orange	14
Dark orange	15
Red	16
Dark red	17

Other sizes on request.



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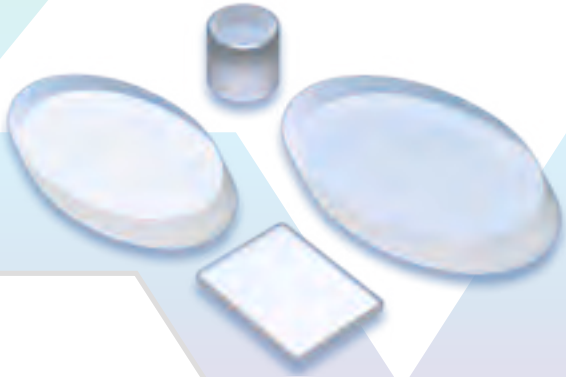
Dichroic filters

Material:	Hard interference coating on temperature stable borofloat
Incidence angle:	0°
Surface quality:	3x0.25
Clear aperture:	>90%

These filters have very pure colors and a rugged design.

Beamsplitters

Beamsplitters:
We offer beamsplitter cubes and plates. The latter can be rectangular, round, or elliptical.
The beamsplitter cubes come in four groups: non-polarising and dielectric for broad wavelength ranges, dielectric non-polarizing for specific wavelengths, or polarising. Each of these groups has application specific advantages.
The beamsplitter plates represent a cost effective way of splitting light.



Beamsplitter cubes

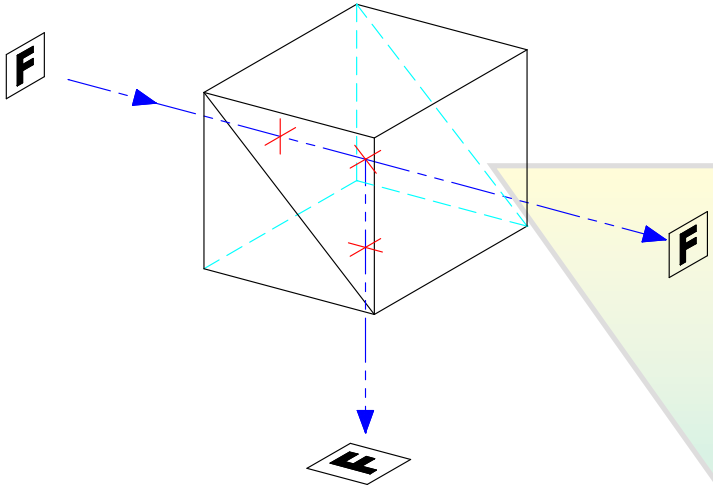
Beamsplitter plates

Beamsplitters

Beamsplitter cubes

STR-LT1

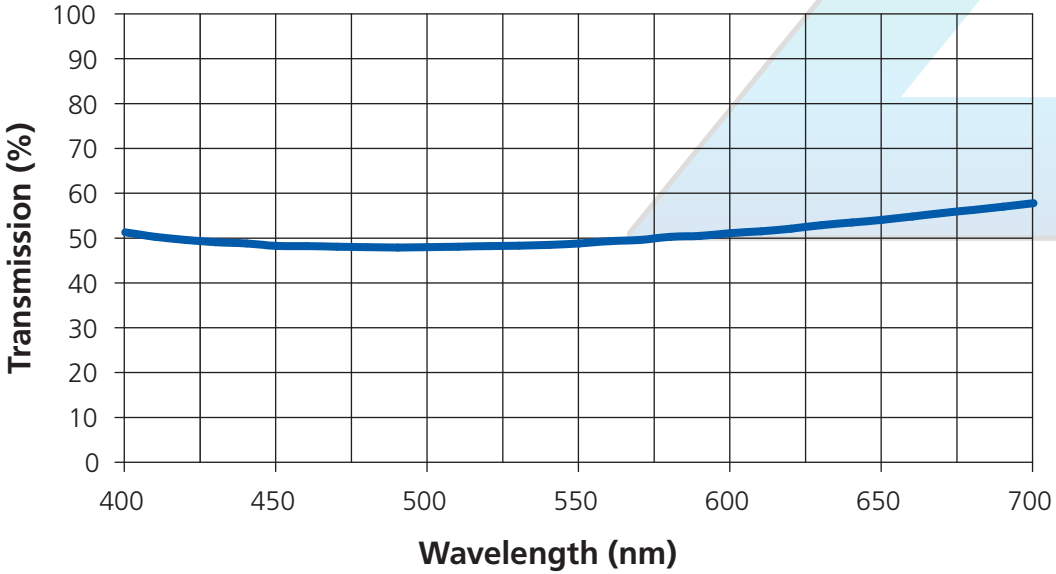
dielectric for VIS



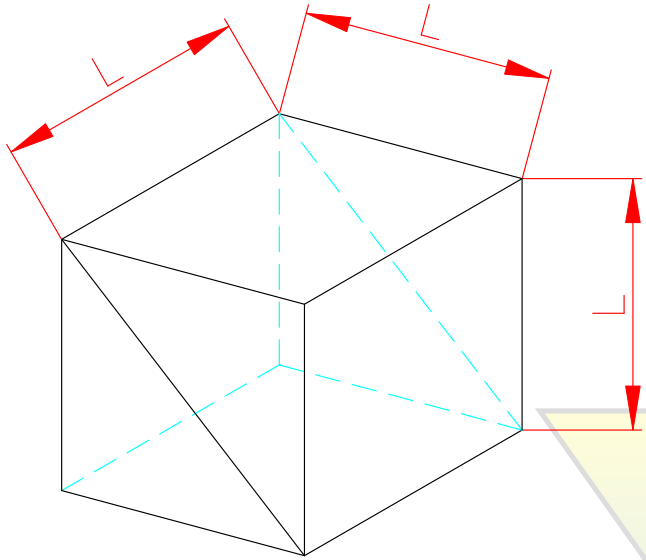
These beamsplitter cubes have a polarising effect. Typical values are Tp = 90% and Ts = 10%. For this reason the cubes are not always suitable for laser beams. Dielectric non-polarising cubes can be found under STR-LT59, STR-LT129, and STR-LT130.

LT1

Beamsplitter cube dielectric for VIS



STR-LT1: 50% splitting for the whole VIS range.



Part no.	L Length (mm)
STR3-LT1	3
STR5-LT1	5
STR10-LT1	10
STR12.7-LT1	12.7
STR20-LT1	20
STR25.4-LT1	25.4
STR30-LT1	30

Other sizes, tolerances, and splitting ratios on request.

Technical data

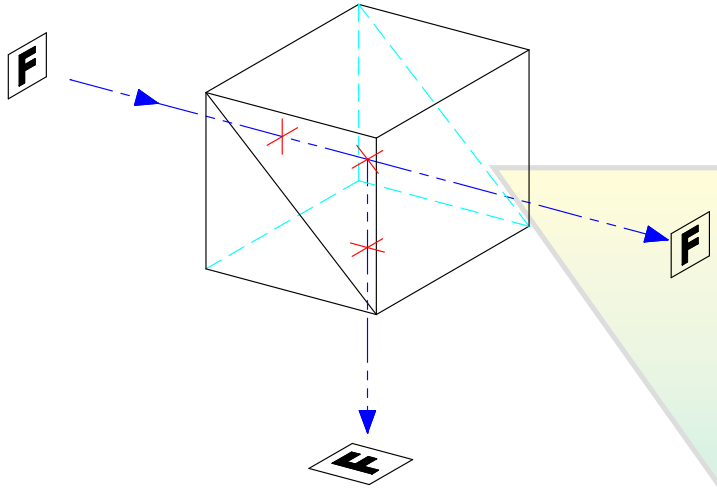
Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
450 – 650nm; R:T=50:50+/-5%
Absorbtion <0.5%

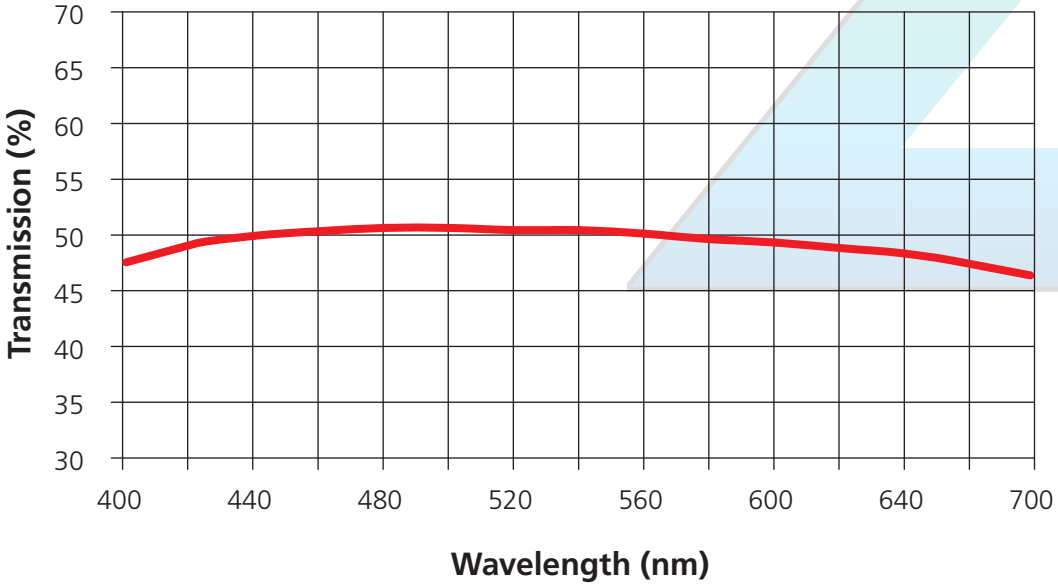
All sides broadband antireflection coated
R <0.5% for 450 – 650nm

Beamsplitter cubes
STR-LT1
dielectric for VIS

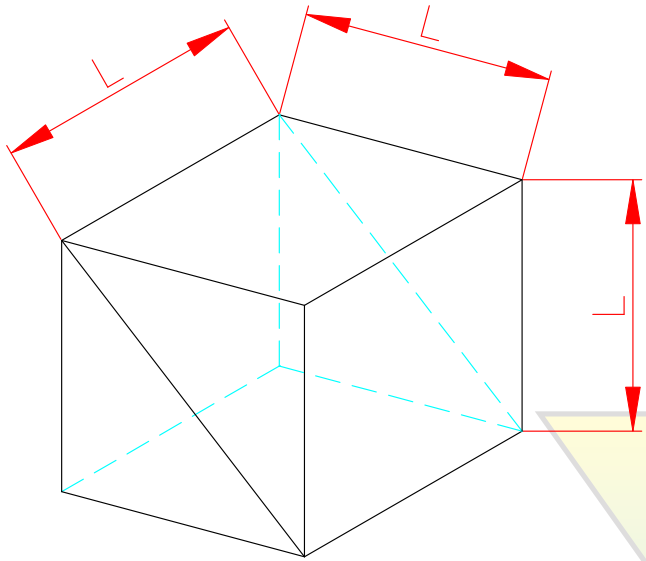


LT2

Beamsplitter cube non-polarising for VIS



STR-LT2: 50% splitting for the whole VIS range without any significant polarisation effect.



Part no.	L Length (mm)
STR1-LT2	1
STR2-LT2	2
STR3-LT2	3
STR5-LT2	5
STR10-LT2	10
STR12.7-LT2	12.7
STR20-LT2	20
STR25.4-LT2	25.4
STR30-LT2	30

Other sizes, tolerances, and splitting ratios on request.

prices online
wzw.ch

Technical data

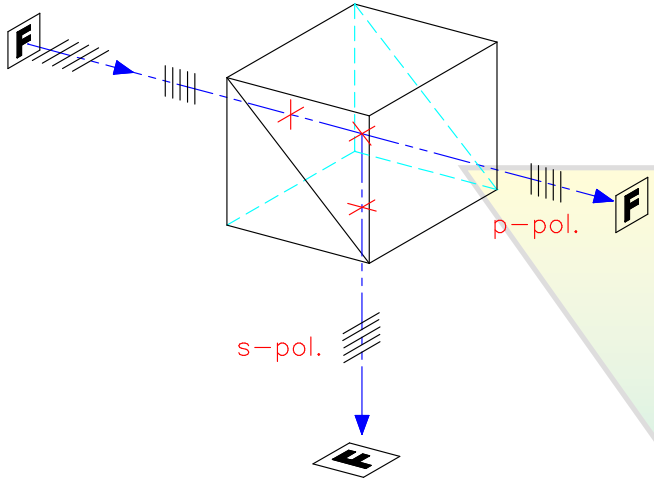
Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
450 – 650nm; R:T = 47:47+/-5%
Absorbtion <10%
I Ts-Tp I <4%

All sides broadband antireflection coated
R < 0.5% for 450 – 650nm

Beamsplitter cubes
STR-LT2
non-polarising for VIS

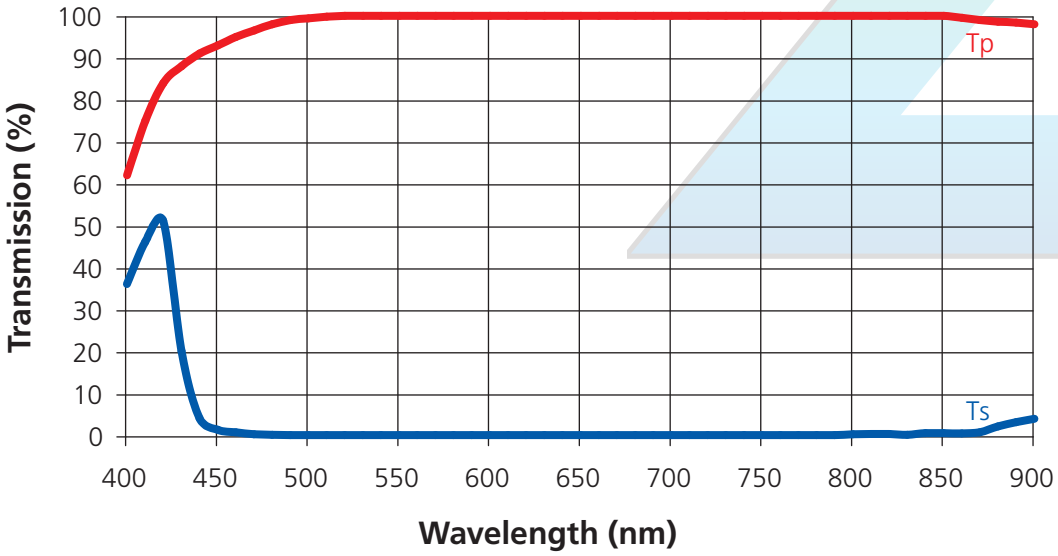


The user of our ultra broadband polarisiers is advised to align the cubes carefully in the optical path. The large bandwidth and the high extinction ratio have a strong angular dependence.

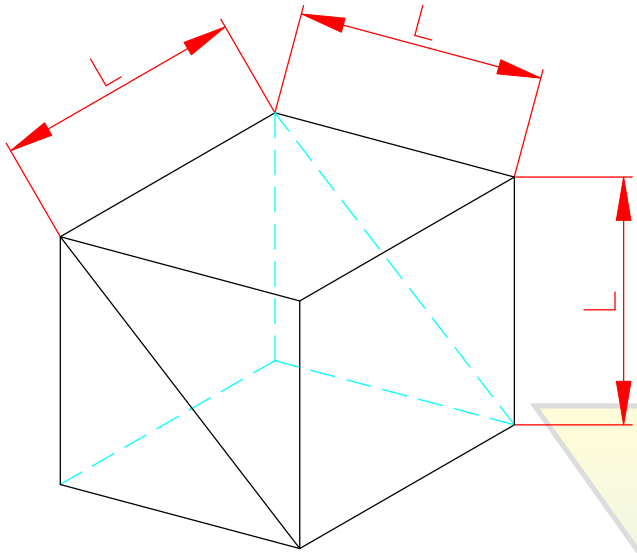
Definition extinction ratio:
The extinction ratio Ex is defined here as Ex=Tp/Ts. On request we can provide Ex according to other definitions.

SOPOL

Beamsplitter cube polarising for VIS to NIR



SOPOL coating by wzw: ultra broadband polariser for 450-850nm with an extinction ratio up to 5000:1.



Part no.	L Length (mm)
STR1-SOPOL	1
STR2-SOPOL	2
STR5-SOPOL	5
STR10-SOPOL	10
STR12.7-SOPOL	12.7
STR20-SOPOL	20
STR25.4-SOPOL	25.4
STR30-SOPOL	30

Other sizes and tolerances on request.

prices online
wzw.ch

Technical data

Material:	optical glass, fine annealed
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Tp >95% for 470 – 900nm
Tp >97% for 600 – 850nm
Tp >98% for 650 – 820nm

Extinction ratio
Ex=1:100 for 470 – 900nm
Ex=1:2000 for 500 – 820nm
Ex=1:5000 for 600 – 800nm

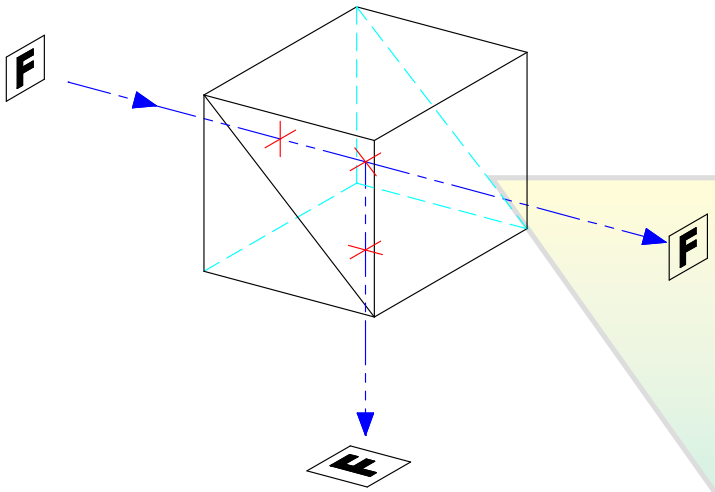
All sides broadband antireflection coated
Rabs <1% for 460 – 800nm
Rave <0.4% for 470 – 800nm

Beamsplitter cubes
STR-SOPOL
polarising for VIS to NIR

Beamsplitter cubes

STR-LT34

dielectric for NIR

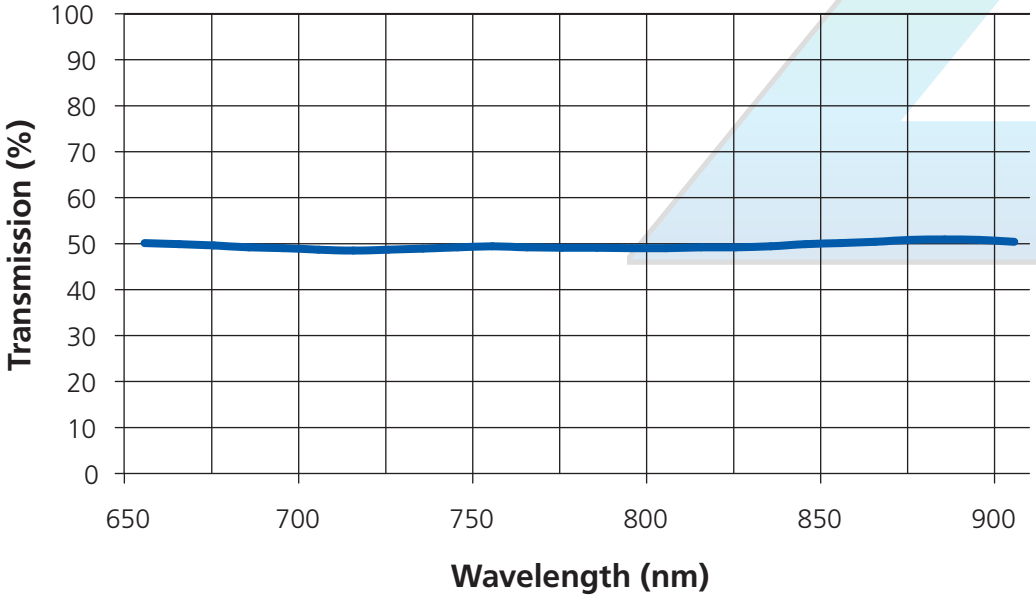


These beamsplitter cubes have a polarising effect. Typical values are Tp = 90% and Ts = 10%. For this reason the cubes are not always suitable for laser beams. Dielectric non-polarising cubes can be found under STR-LT59, STR-LT129, and STR-LT130.

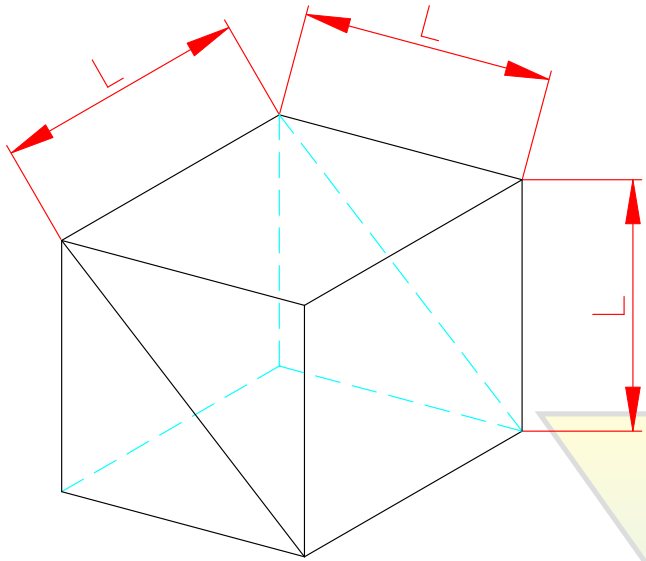
56

LT34

Beamsplitter cube dielectric for NIR



STR-LT34: 50% splitting for a broad NIR range.



Part no.	L Length (mm)
STR5-LT34	5
STR10-LT34	10
STR12.7-LT34	12.7
STR20-LT34	20
STR25.4-LT34	25.4

Other sizes, tolerances, and splitting ratios on request.

Technical data

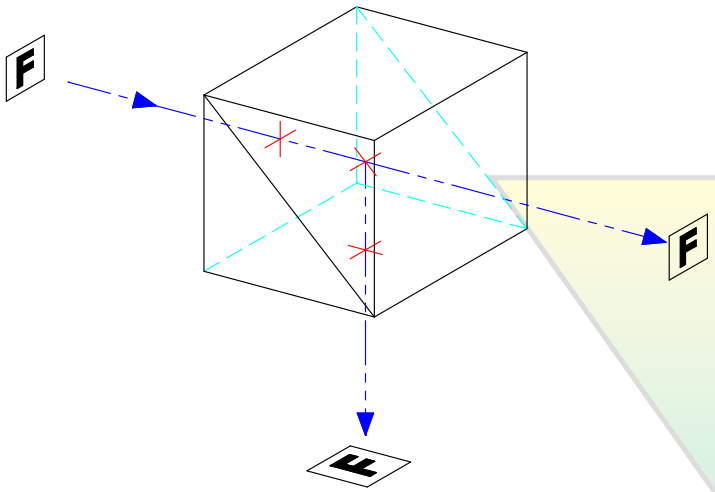
Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10’
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

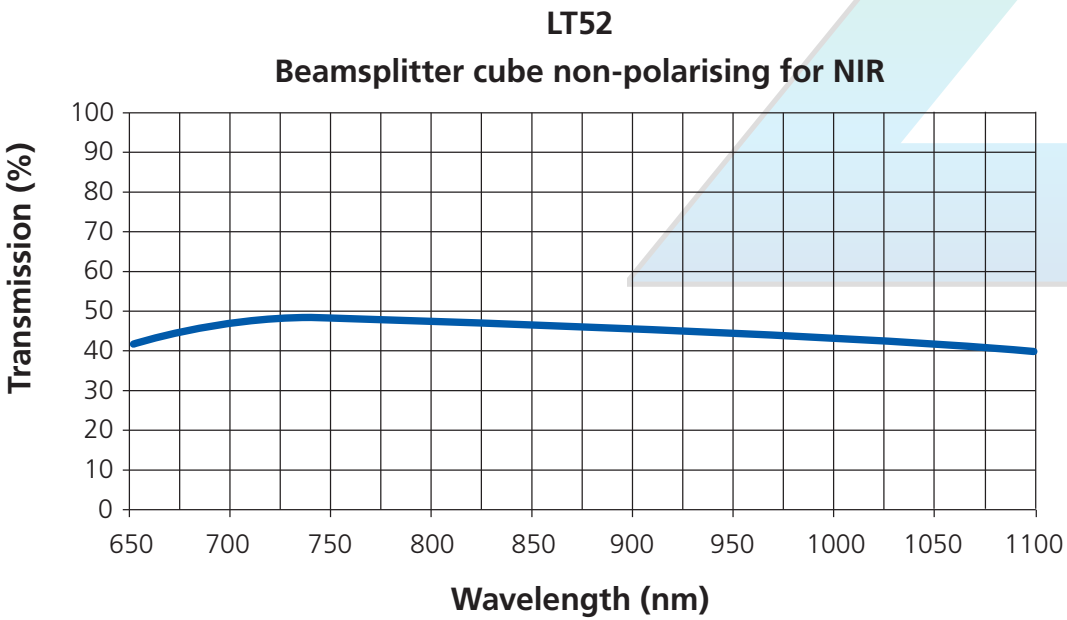
Beamsplitter
650 – 900nm; R:T=50:50+/-5%
Absorbtion <0.5%

All sides broadband antireflection coated
R <0.6% for 650 – 900nm

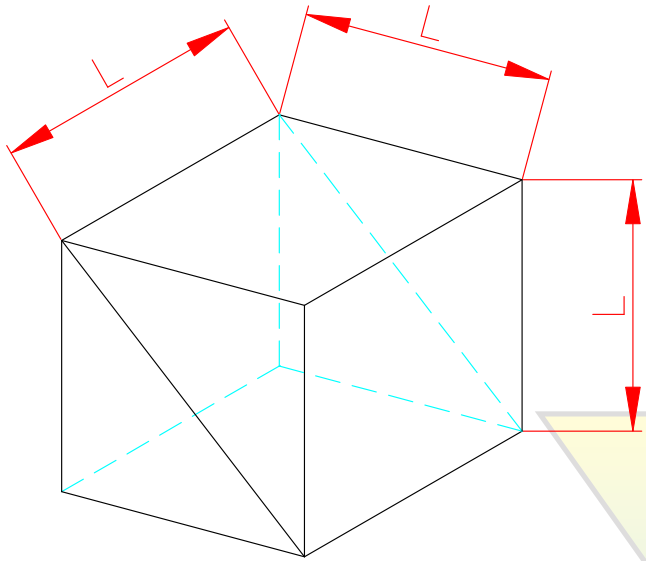
Beamsplitter cubes
STR-LT34
dielectric for NIR



Product of the year 2006



STR-LT52: 50% splitting for the whole NIR range.



Part no.	L Length (mm)
STR5-LT52	5
STR10-LT52	10
STR12.7-LT52	12.7
STR20-LT52	20

Other sizes, tolerances, and splitting ratios on request.

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
700 – 1100nm; R:T = 46:46+/-7%
Absorption <10%

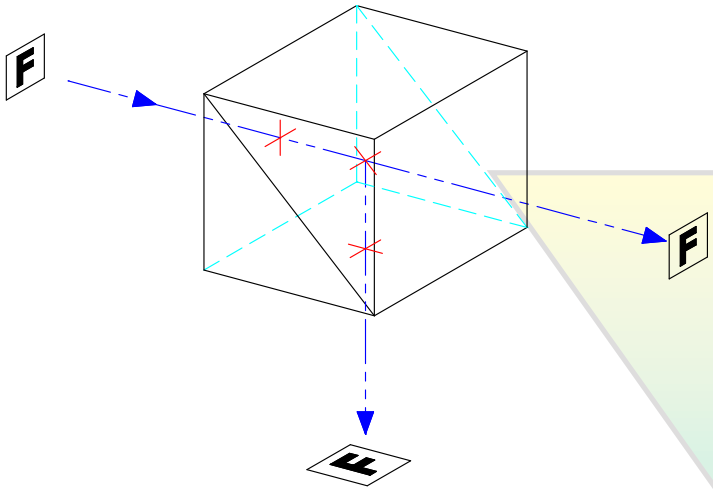
All sides broadband antireflection coated
R <1% for 700 – 1100nm

Beamsplitter cubes
STR-LT52
non-polarising for NIR

Beamsplitter cubes

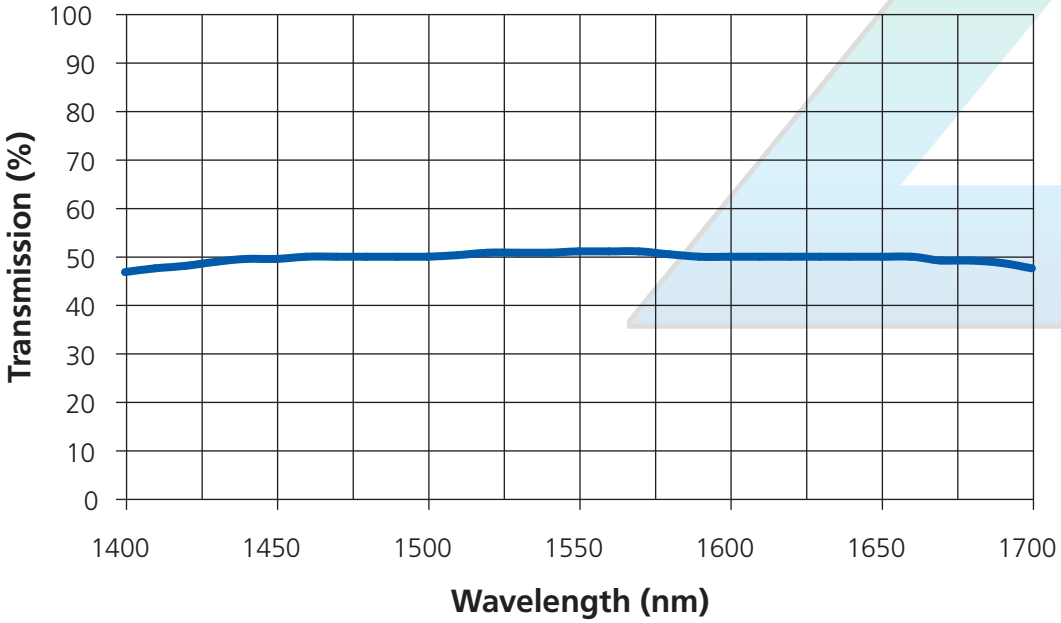
STR-LT54

non-polarising for IR



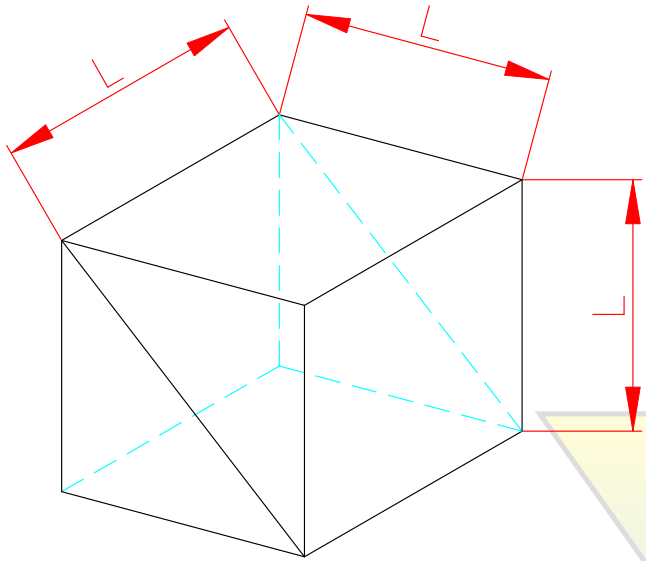
LT54

Beamsplitter cube non-polarising for IR



STR-LT54: 50% splitting for a broad IR range without any significant polarisation effect.

We manufacture beamsplitters with all kinds of properties: various splitting ratios, exotic geometries, and complex systems with multiple beam paths.



Part no.	L Length (mm)
STR5-LT54	5
STR10-LT54	10
STR12.7-LT54	12.7
STR20-LT54	20

Other sizes, tolerances, and splitting ratios on request.

prices online wzw.ch

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
1400 – 1700nm; R:T=50:50+/-5%
Absorbtion <1%

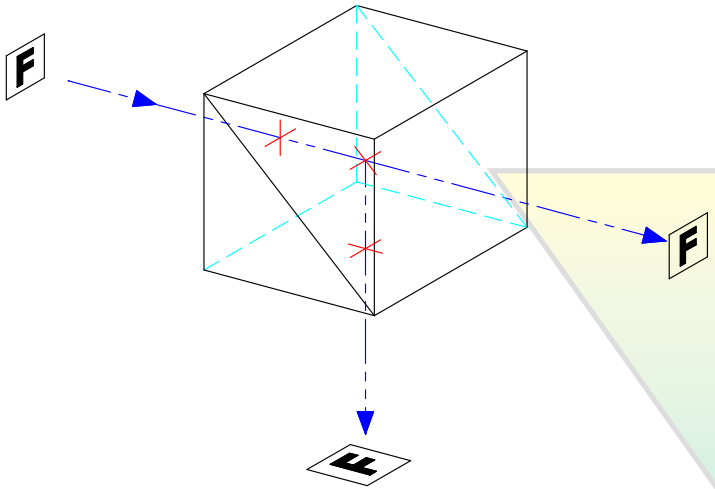
All sides broadband antireflection coated
R <0.6% for 1400 – 1700nm

Beamsplitter cubes
STR-LT54
non-polarising for IR

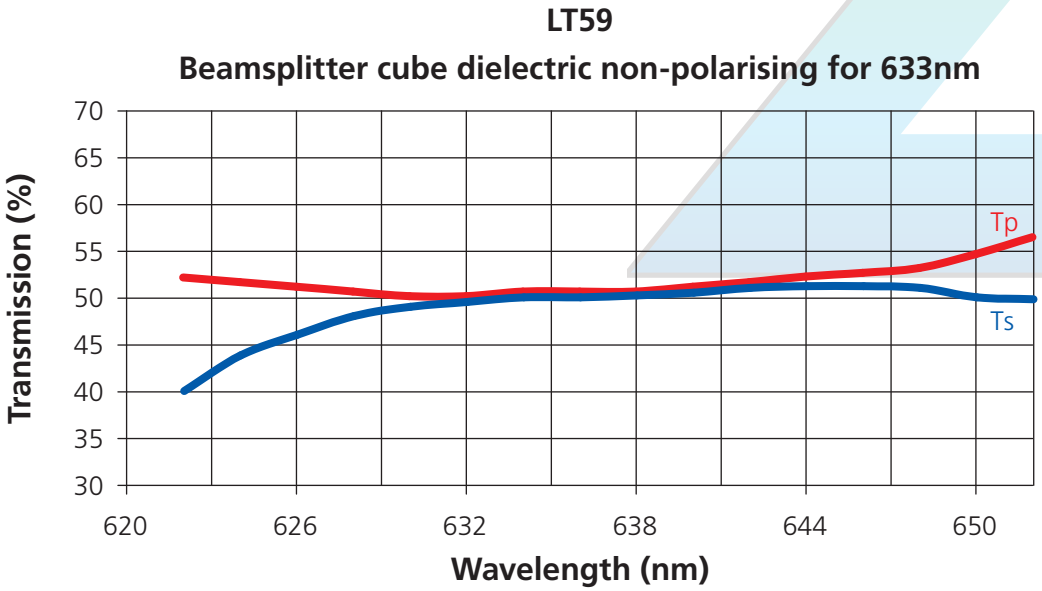
Beamsplitter cubes

STR-LT59

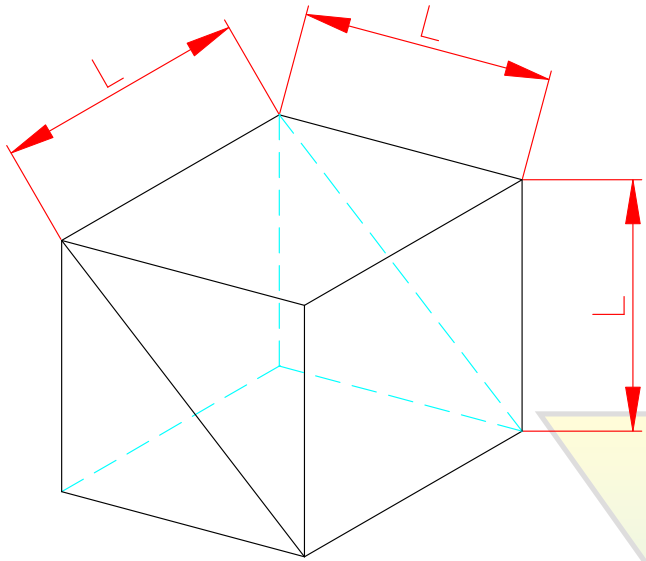
dielectric non-polarising
for 633nm



Dielectric non-polarising cubes exhibit a strong angular dependence of the splitting ratio. In order to meet the specifications the user is advised to align the cubes perpendicularly to the incoming beam.



STR-LT59: 50% polarisation neutral splitting optimised for 633nm.



Part no.	L Length (mm)
STR5-LT59	5
STR10-LT59	10
STR12.7-LT59	12.7
STR20-LT59	20

Other sizes, tolerances, and splitting ratios on request.

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Transmission
50%+/-5% for s- and p-polarisation at 633nm
R:T=50:50+/-5% with I Ts-Tp I <5%
Absorbtion <0.5%

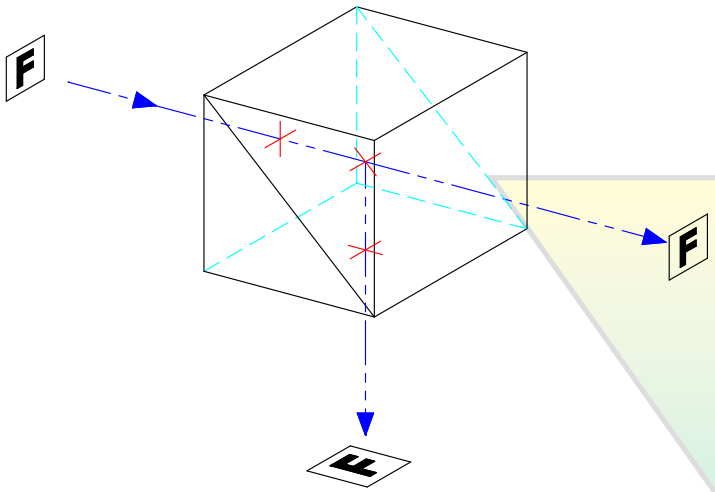
All sides broadband antireflection coated
R <0.3% at 633nm

Beamsplitter cubes
STR-LT59
dielectric non-polarising
for 633nm

Beamsplitter cubes

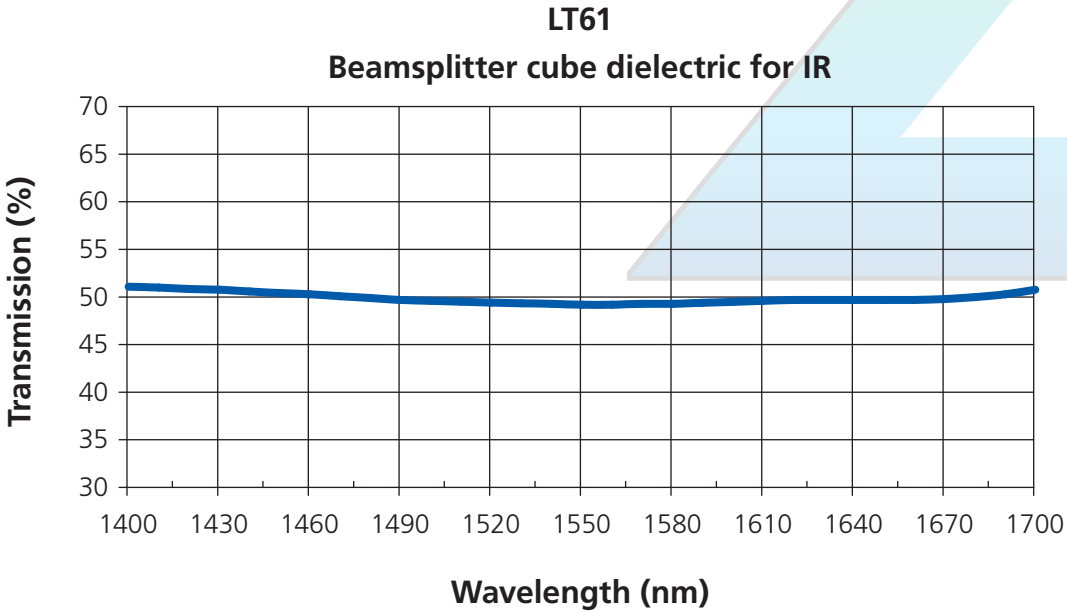
STR-LT61

dielectric for IR

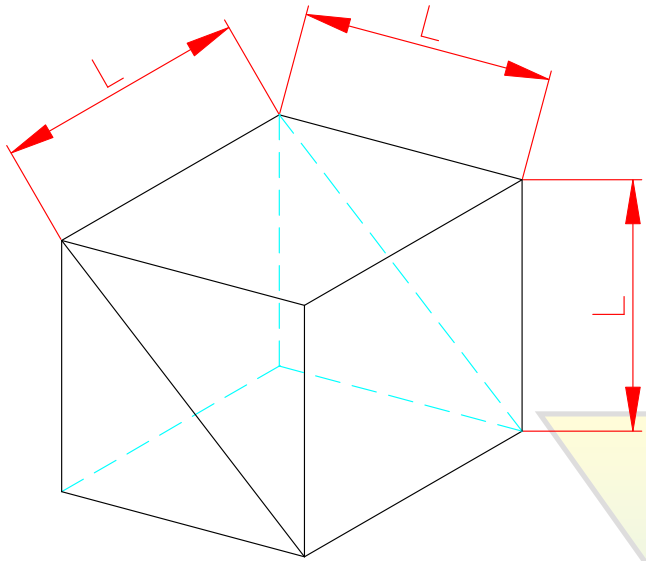


These beamsplitter cubes have a polarising effect. Typical values are Tp = 90% and Ts = 10%. For this reason the cubes are not always suitable for laser beams. Dielectric non-polarising cubes can be found under STR-LT59, STR-LT129, and STR-LT130.

64



STR-LT61: 50% splitting for a broad IR range.



Part no.	L Length (mm)
STR5-LT61	5
STR10-LT61	10
STR12.7-LT61	12.7
STR20-LT61	20

prices online wzw.ch

Other sizes, tolerances, and splitting ratios on request.

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

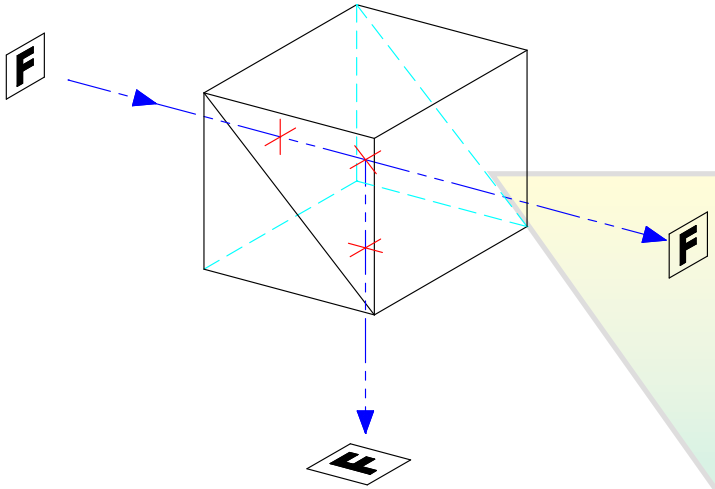
Beamsplitter
1400 – 1700nm; R:T=50:50+/-5%
Absorbtion <0.5%

All sides broadband antireflection coated
R <0.6% for 1400 – 1700nm

Beamsplitter cubes
STR-LT61
dielectric for IR

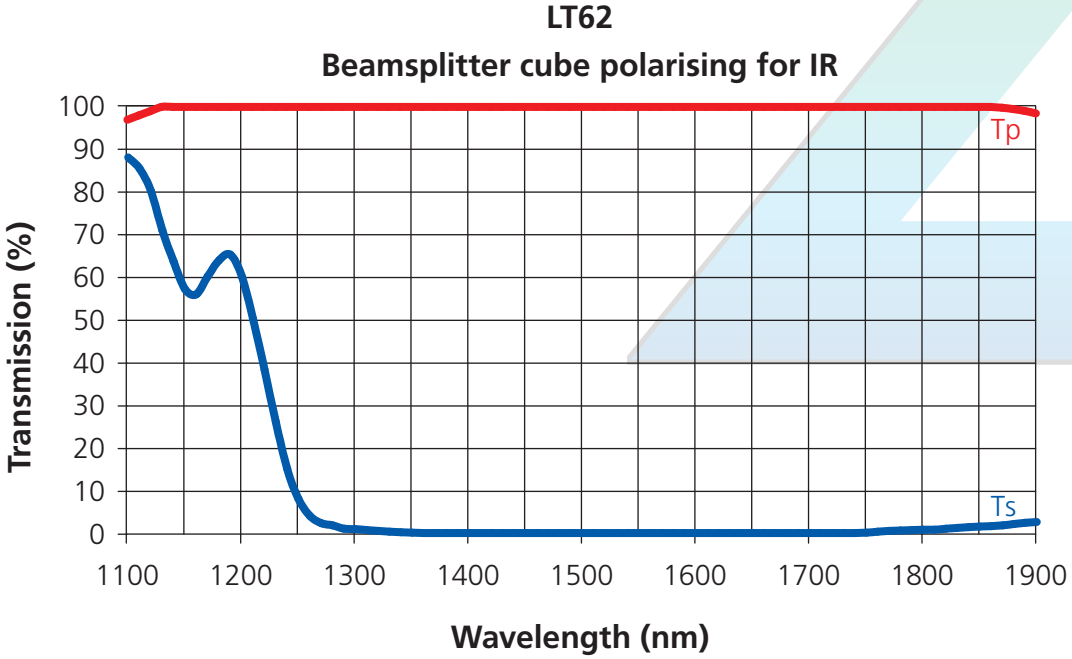
STR-LT62

broadband polarising for IR

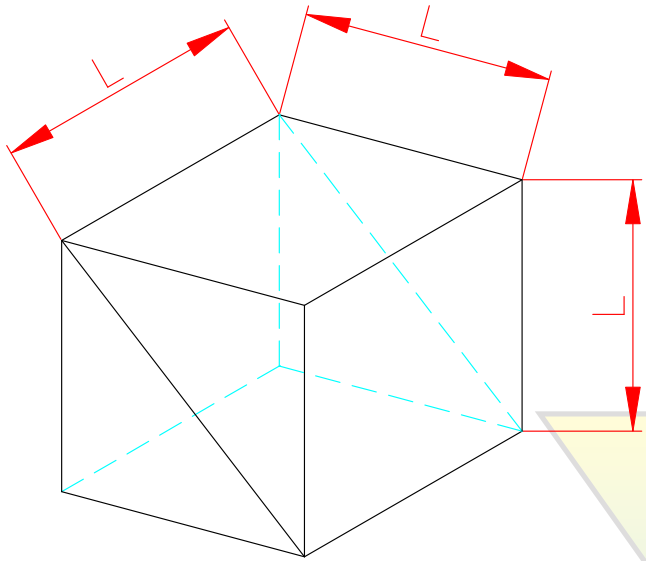


The user of our ultra broadband polarisiers is advised to align the cubes carefully in the optical path. The large bandwidth and the high extinction ratio have a strong angular dependence.

Definition extinction ratio:
The extinction ratio Ex is defined here as Ex=Tp/Ts. On request we can provide Ex according to other definitions.



STR-LT62: ultra broadband polariser for 1400 – 1700nm with an extinction ratio up to 1000:1.



Part no.	L Length (mm)
STR5-LT62	5
STR10-LT62	10
STR12.7-LT62	12.7
STR20-LT62	20

Other sizes and tolerances ratios on request.

Technical data

Material:	optical glass, fine annealed
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
1400 – 1700nm; extinction ratio >1000:1
1300 – 1800nm; extinction ratio >100:1

All sides broadband antireflection coated
R <1% for 1400 – 1800nm

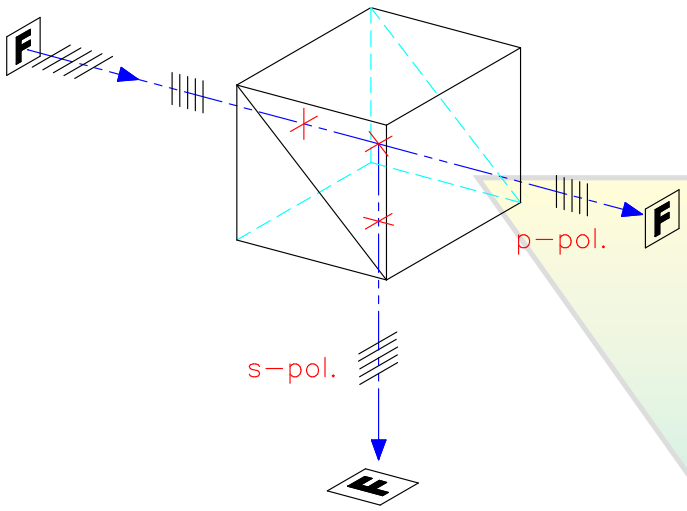
Beamsplitter cubes

STR-LT62

broadband polarising for IR

STR-LT110

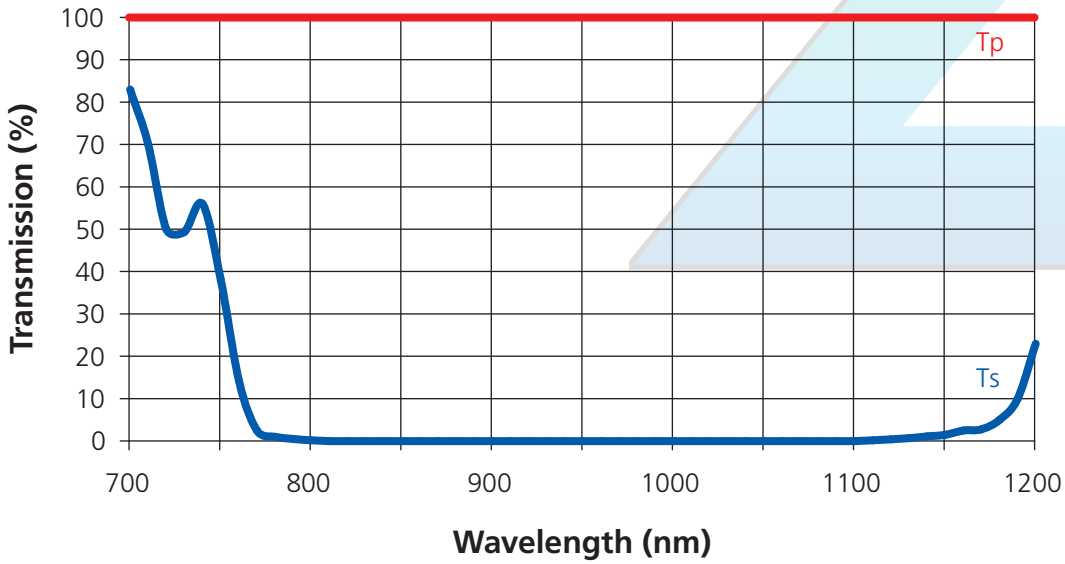
broadband polarising for NIR



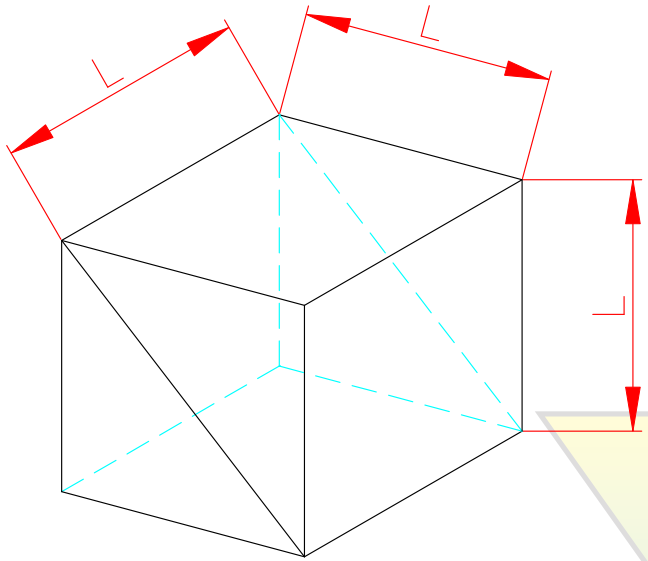
Definition extinction ratio:
The extinction ratio Ex is defined here as Ex=Tp/Ts. On request we can provide Ex according to other definitions.

LT110

Beamsplitter cube polarising for broad range of IR



STR-LT110: broadband polariser for 800-1100nm with an extinction ratio up to 1000:1.



Part no.	L Length (mm)
STR5-LT110	5
STR10-LT110	10
STR12.7-LT110	12.7
STR20-LT110	20

Other sizes and tolerances on request.

Technical data

Material:	optical glass, fine annealed
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter
Tp >97% for 800 – 1100nm
Rs >99% for 800 – 1100nm

Extinction ratio:
Ex=1:1000 for 800 – 1100nm

All sides broadband antireflection coated
R <0.7% for 800 – 1100nm

Beamsplitter cubes

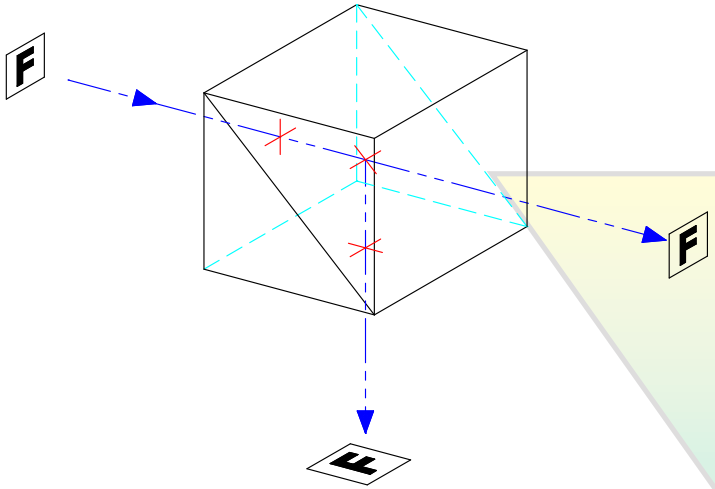
STR-LT110

broadband polarising for NIR

Beamsplitter cubes

STR-LT129

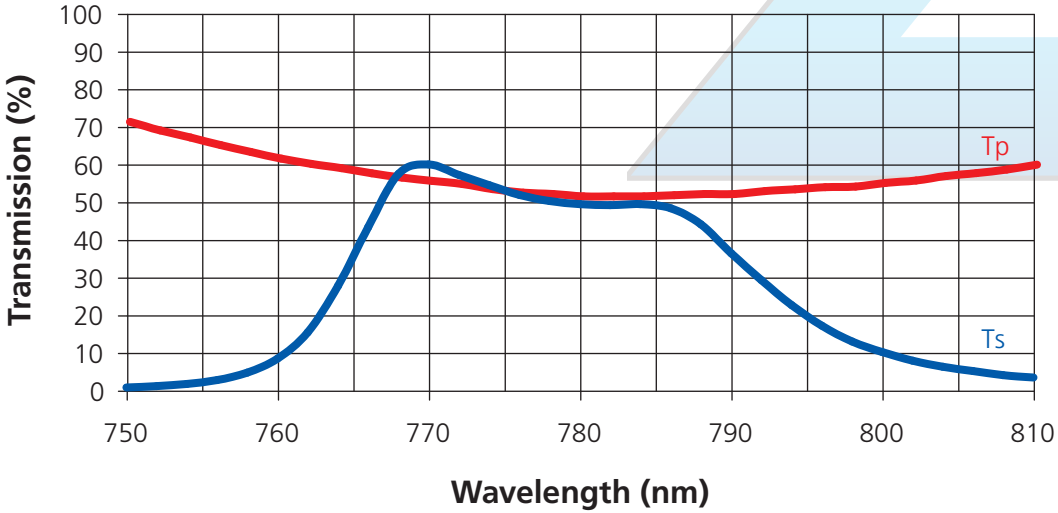
dielectric non-polarising
for 780nm



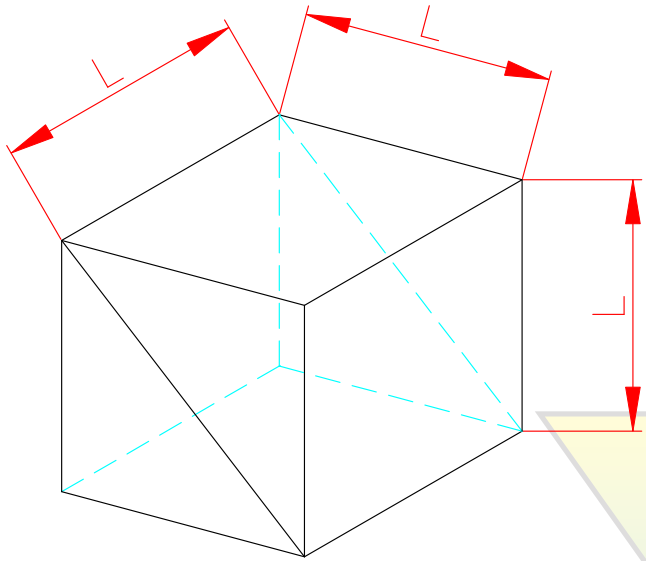
Dielectric non-polarising cubes exhibit a strong angular dependence of the splitting ratio. In order to meet the specifications the user is advised to align the cubes perpendicularly to the incoming beam.

LT129

Beamsplitter cube dielectric non-polarising for 780nm



STR-LT129: 50% polarisation neutral splitting optimised for 780nm.



Part no.	L Length (mm)
STR5-LT129	5
STR10-LT129	10
STR12.7-LT129	12.7
STR20-LT129	20

Other sizes, tolerances, and splitting ratios on request.

prices online wzw.ch

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Transmission
50%+/-5% for s- and p-polarisation at 780nm
R:T=50:50+/-5% with I Ts-Tp I <5%
Absorbtion <0.5%

All sides broadband antireflection coated
R <0.5% at 780nm

Beamsplitter cubes

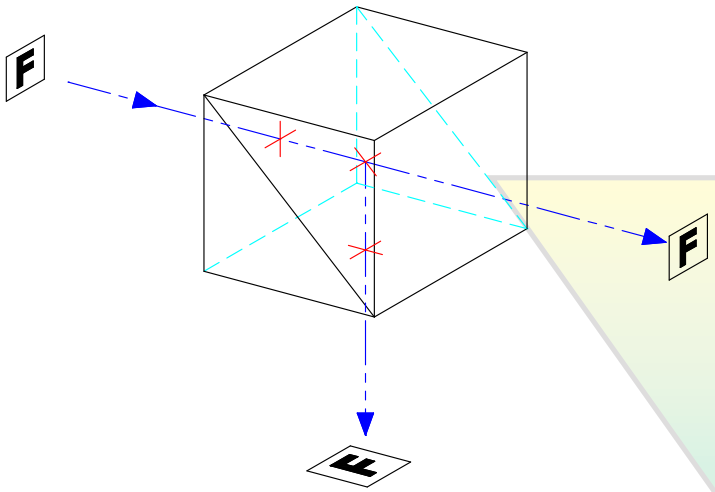
STR-LT129

dielectric non-polarising
for 780nm

Beamsplitter cubes

STR-LT130

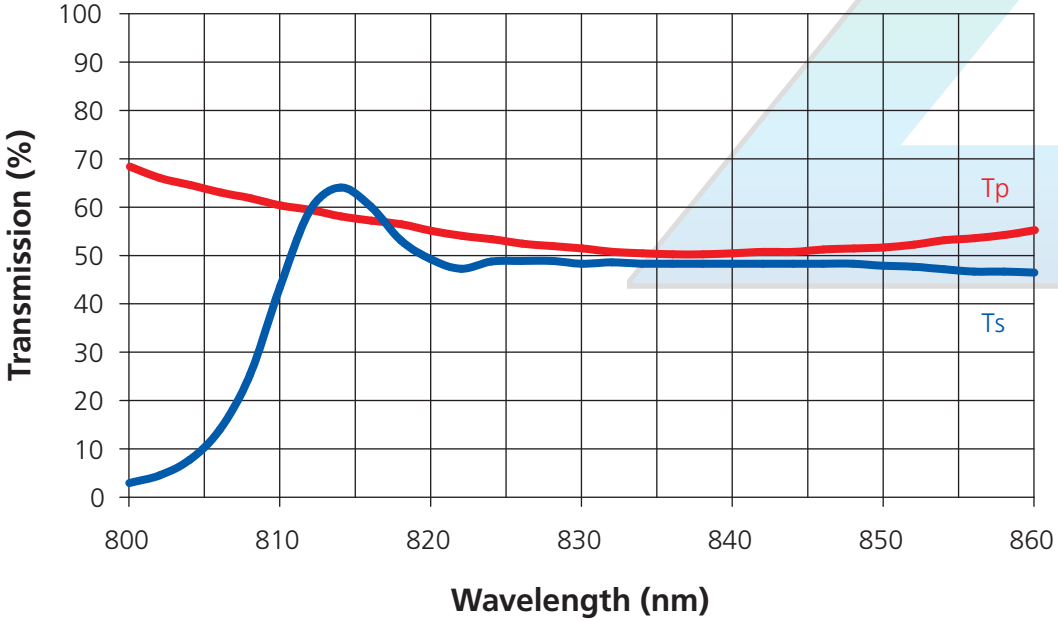
dielectric non-polarising
for 830nm



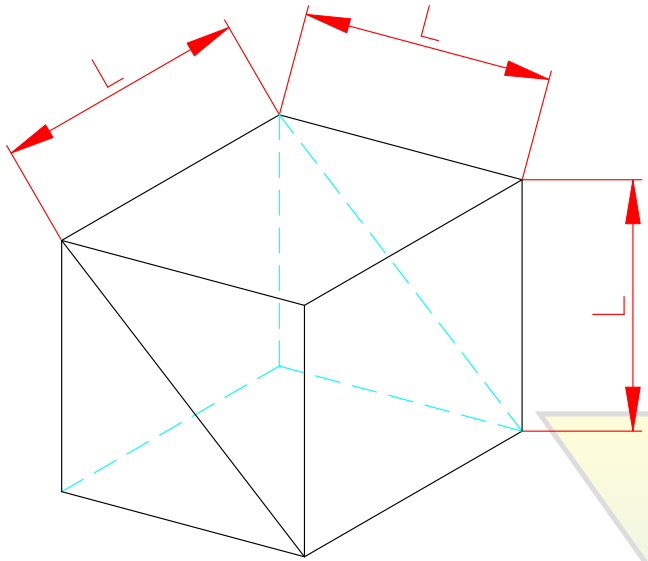
Dielectric non-polarising cubes exhibit a strong angular dependence of the splitting ratio. In order to meet the specifications the user is advised to align the cubes perpendicularly to the incoming beam.

LT130

Beamsplitter cube dielectric non-polarising for 830nm



STR-LT130: 50% polarisation neutral splitting optimised for 830nm.



Part no.	L Length (mm)
STR5-LT130	5
STR10-LT130	10
STR12.7-LT130	12.7
STR20-LT130	20

Other sizes, tolerances, and splitting ratios on request.

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating
non-polarising for 830nm

Transmission
50%+/-5% for s- and p-polarisation at 830nm
R:T=50:50+/-5% with I Ts-Tp I <5%
Absorbtion <0.5%

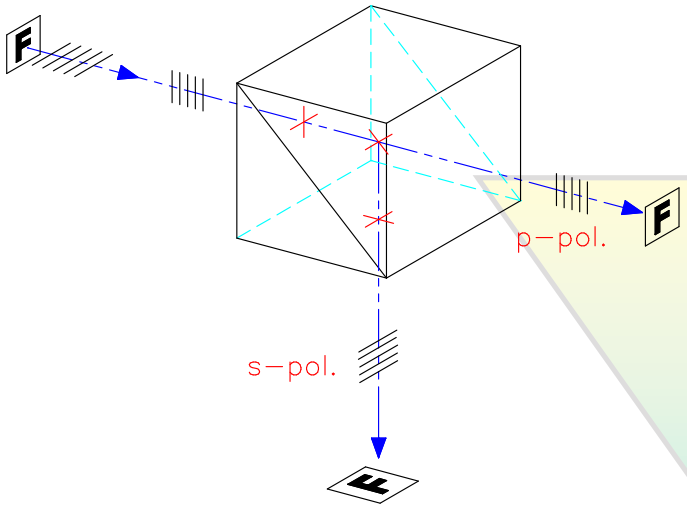
All sides broadband antireflection coated
R <0.5% at 830nm

Beamsplitter cubes
STR-LT130
dielectric non-polarising for 830nm

Beamsplitter cubes

STRQ-LT81

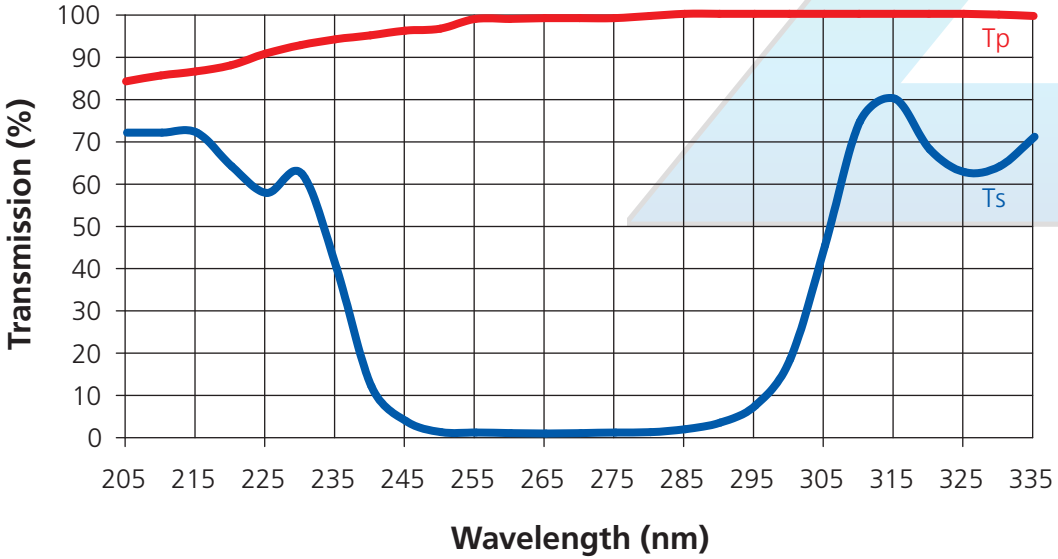
polarising for 266nm



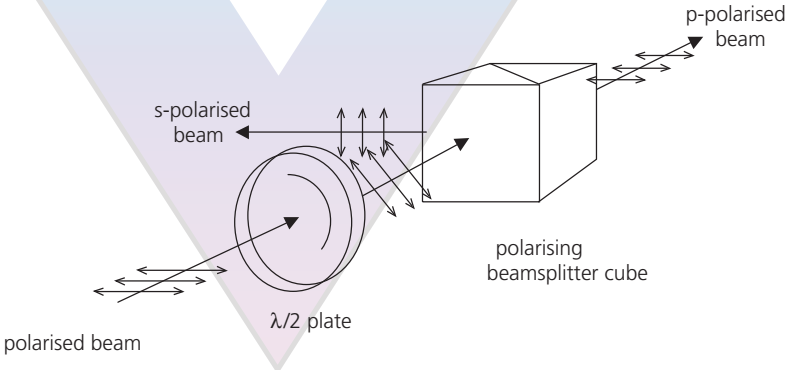
A simple way of setting up a variable power attenuator: the setup shown below works if the incoming light is linearly polarised and monochromatic. The λ/2 plate rotates the polarisation plane. This changes the ratio between s- and p-polarised power and thus the amount of light transmitted through the polariser.

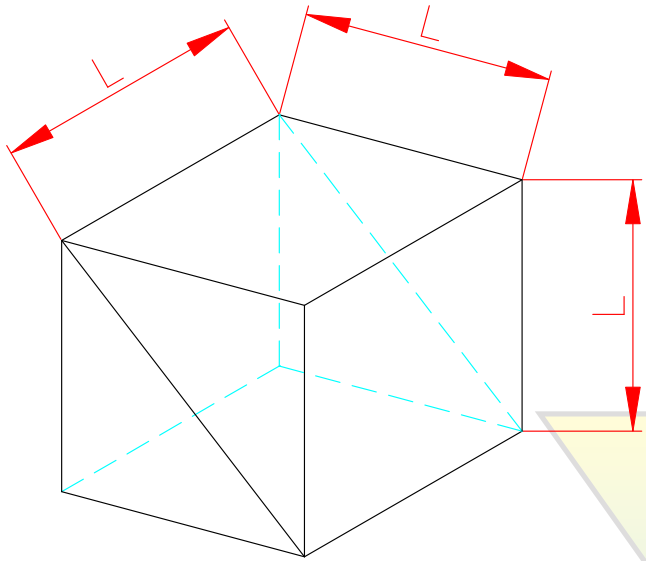
LT81

Beamsplitter cube polarising for 266nm



STRQ-LT81: Polariser optimised for 266nm.





Part no.	L Length (mm)
STR5Q-LT81	5
STR10Q-LT81	10
STR12.7Q-LT81	12.7
STR15Q-LT81	15
STR20Q-LT81	20

Other sizes, tolerances, and wavelengths on request.

prices online wzw.ch

Technical data

Material:	Fused silica, UV grade
Wavefront deformation:	λ/4
Beam deviation:	<10'
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Polariser
Tp >90% at 266nm
Rs >98.5% at 266nm

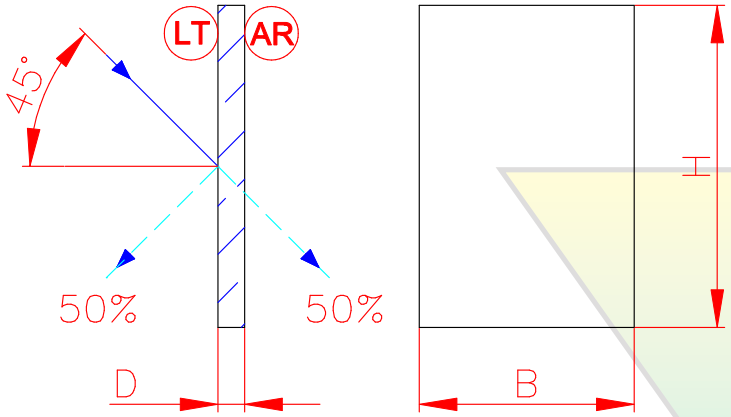
All sides broadband antireflection coated
R <0.5% at 266nm

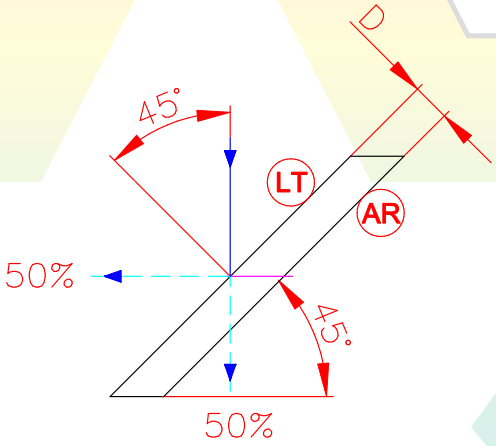
Beamsplitter cubes
STRQ-LT81
polarising for 266nm

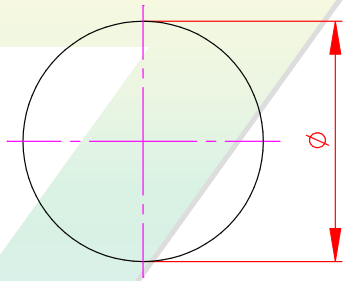
Beamsplitter plates

STRW-01LT01

rectangular, elliptical, round

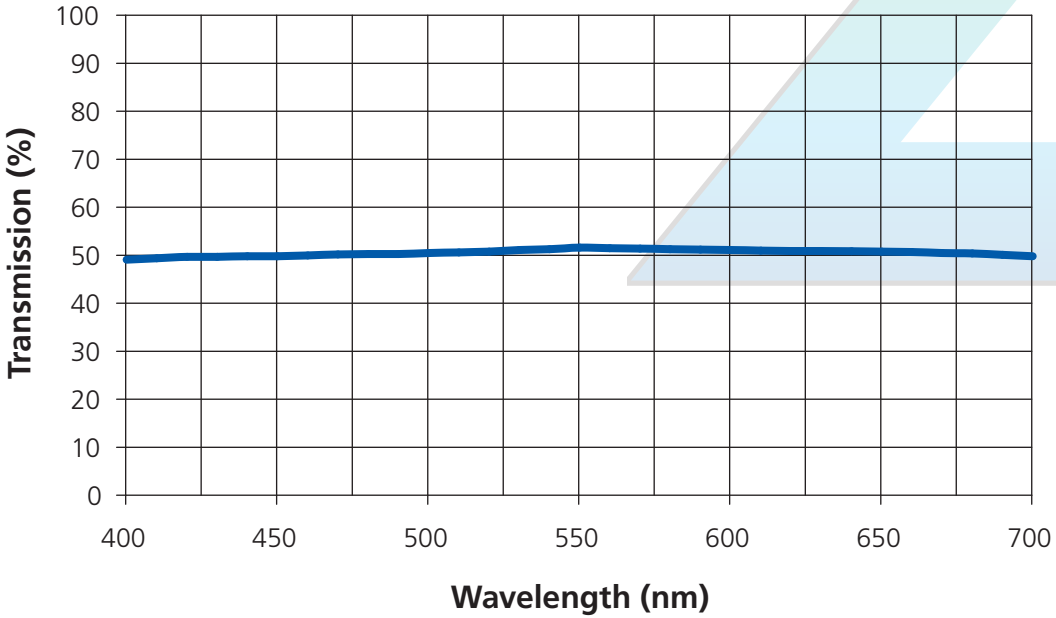


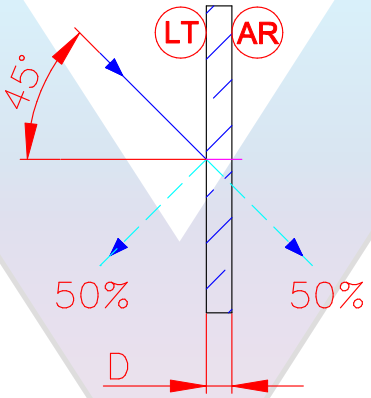


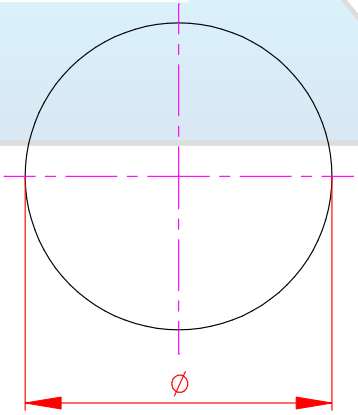


01LT01

Beamsplitter plate dielectric for VIS







STRW-01LT01: 50% splitting for the whole VIS range.

Rectangular

Part no.	H Height (mm)	B Width (mm)	D Thickness (mm)
STRW3x3x1	3	3	1
STRW7x5x1	7	5	1
STRW20x15x1	20	15	1
STRW30x20x2.5	30	20	2.5
STRW45x30x4	45	30	4

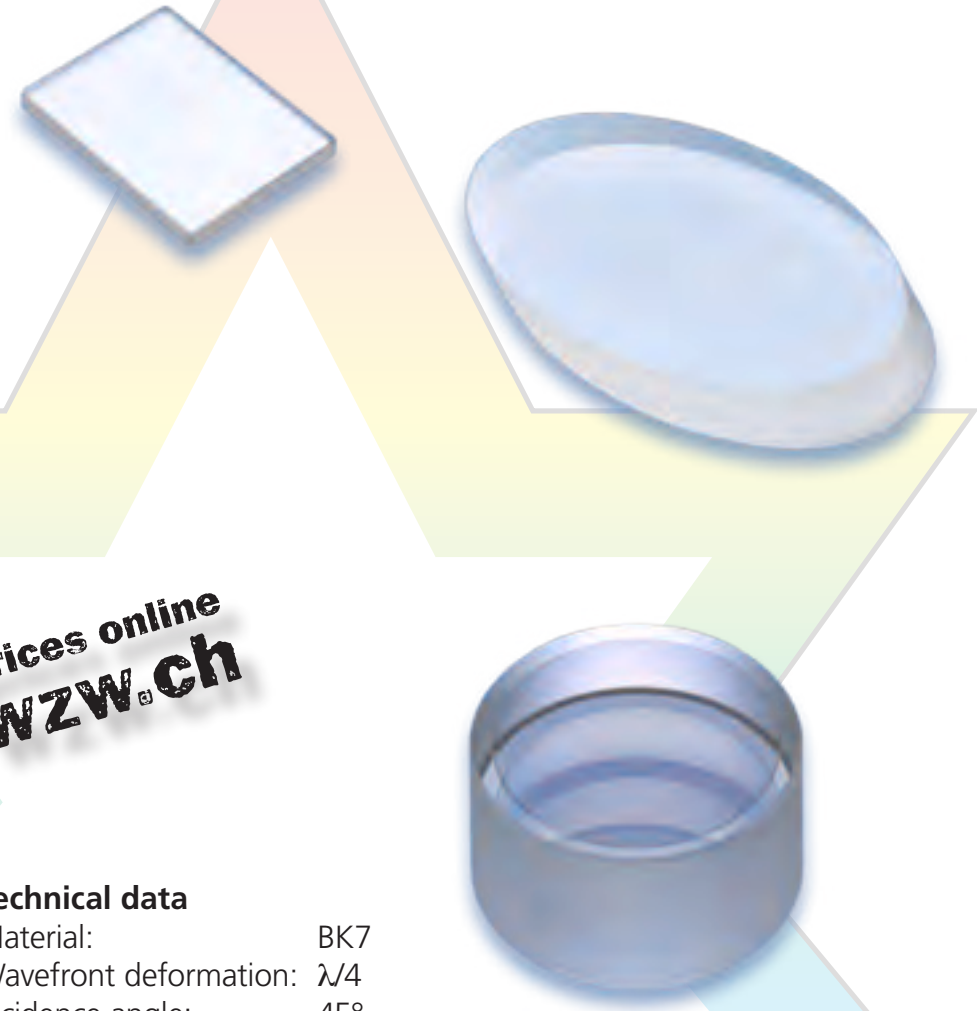
Elliptical

Part no.	Ø Diameter (mm)	D Thickness (mm)
LKLD14	14	0.6
LKLD19.5	19.5	0.6
LKLD29.5	29.5	0.6
LKLD39.5	39.5	0.6

Round

Part no.	Ø Diameter (mm)	D Thickness (mm)
STRRS12.7x1	12.7	1
STRRS25.4x1	25.4	1

Other sizes, tolerances, and splitting ratios on request.



prices online
wzw.ch

Technical data

Material:	BK7
Wavefront deformation:	λ/4
Incidence angle:	45°
Surface quality:	3x0.16
Clear aperture:	>90%

Coating

Beamsplitter: R:T=50%:50%+/-5%, 45°
Antireflection coating: 450 – 650nm,
Rabs <0.8%, 45°

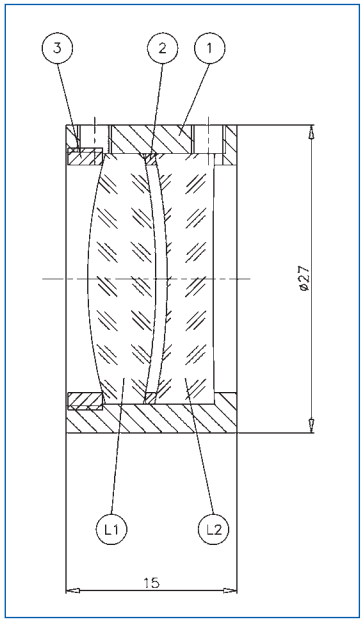
Beamsplitter plates
STRW-01LT01
rectangular, elliptical, round

Assemblies

wzw offers various, optomechanical assemblies which are usually custom built. We are able to design complete optical systems including the associated mechanical parts and also to manufacture the assemblies. Our design team can draw on their extensive practical experience in order to understand your needs.

Air-gap doublets

Air-gap doublets are used when the optical power density is so high that normal cemented doublets might be damaged. We offer various standard solutions:



These systems are optimised for wavelengths ranging from 800 nm to 1100 nm. The optical elements are coated with high performance antireflection coatings. The housings have two M3 threads for mounting. Of course, we can offer custom systems for all typical wavelengths.

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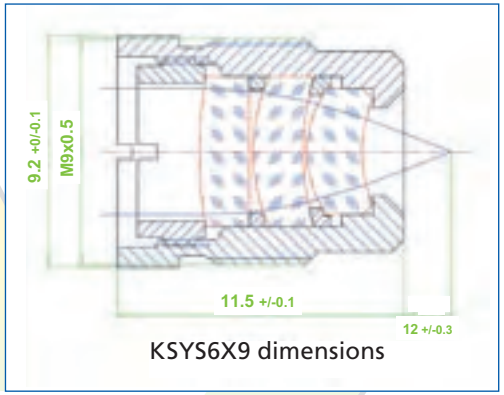
Part no.	Focal length (mm)	Clear aperture (mm)	Mech. dim. (mm)
KSYS-17F30-AIR	30	Ø15	Ø27 x 15
KSYS-22F40-AIR	40	Ø20	Ø27 x 15
KSYS-22F55-AIR	55	Ø20	Ø27 x 15
KSYS-22F75-AIR	75	Ø20	Ø27 x 15
KSYS-22F100-AIR	100	Ø20	Ø27 x 15

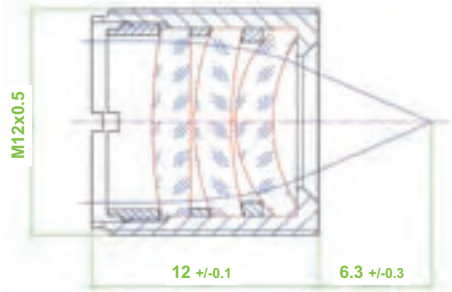
Collimators

Collimators are used to collimate laser diode beams. The high-end collimators manufactured by wzw generate a near diffraction limited beam. We offer two standard solutions for wavelengths between 630 nm and 700 nm.

Of course, we can provide custom solutions for other wavelengths or in other sizes. The client will receive excellent service because of our profound knowledge of lasers and their applications.



KSYS6X9 dimensions



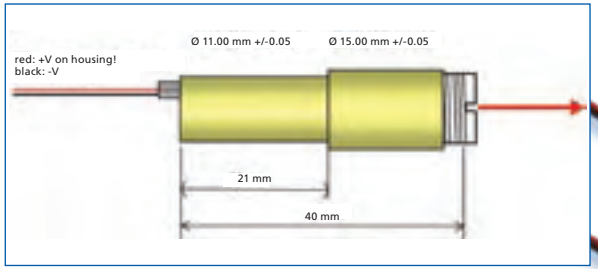
KSYS9X8 dimensions

Part no.	Focal length (mm)	NA	Mech. dim. (mm)
KSYS6X9	7.2	0.35	Ø9.2 x 11.5 (M9x0.5)
KSYS9X8	12	0.35	Ø12 x 12 (M12x0.5)

Laser modules

We provide high-end laser modules for various applications. These lasers are especially rugged, include polarity security, and have well collimated beams.

Technical data:
- Operating voltage 4-6 V DC (use stabilised 5V source)
- Current <80 mA
- Laser class 3B
- Size: Ø11 x 40 mm for "-7" types, "-12" types: see figure.



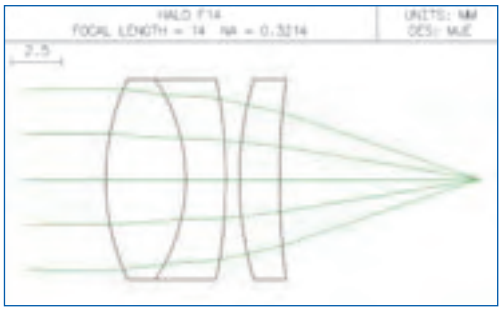
Part no.	Wavelength (nm)	Power (mW)	Exit beam (mm)	Beam after 20 m (mm)
LD-635-7	635	2	2x3	16x5.5
LD-650-7	650	2	2x3	16x5.5
LD-670-7	670	2	2x3	16x5.5
LD-635-12	635	2.5	8x4	6x3
LD-650-12	650	3.5	8x4	6x3
LD-670-12	670	3.5	8x4	6x3

Of course, we offer modules with other wavelengths, power levels, and optics (for example line generators) on request.

High aperture laser objectives

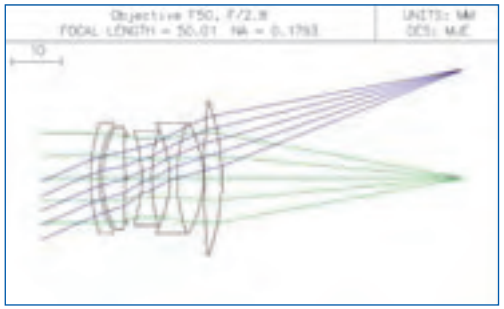
These objectives have near diffraction limited focal spots in spite of their relatively large entrance apertures. This performance is achieved with specially designed lens combinations.

In the example shown in the figure a power density of over 200 W/cm² is reached with a 5 mW laser diode! These objectives are supplied in housings that are adapted to the specific client application.



Objectives

We have developed objectives that are used in imaging and projecting systems.
During the design phase we work with the client to optimise the cost/ performance ratio.



Our knowledge of applications and optomechanical design provides our customers with truly optimal products.

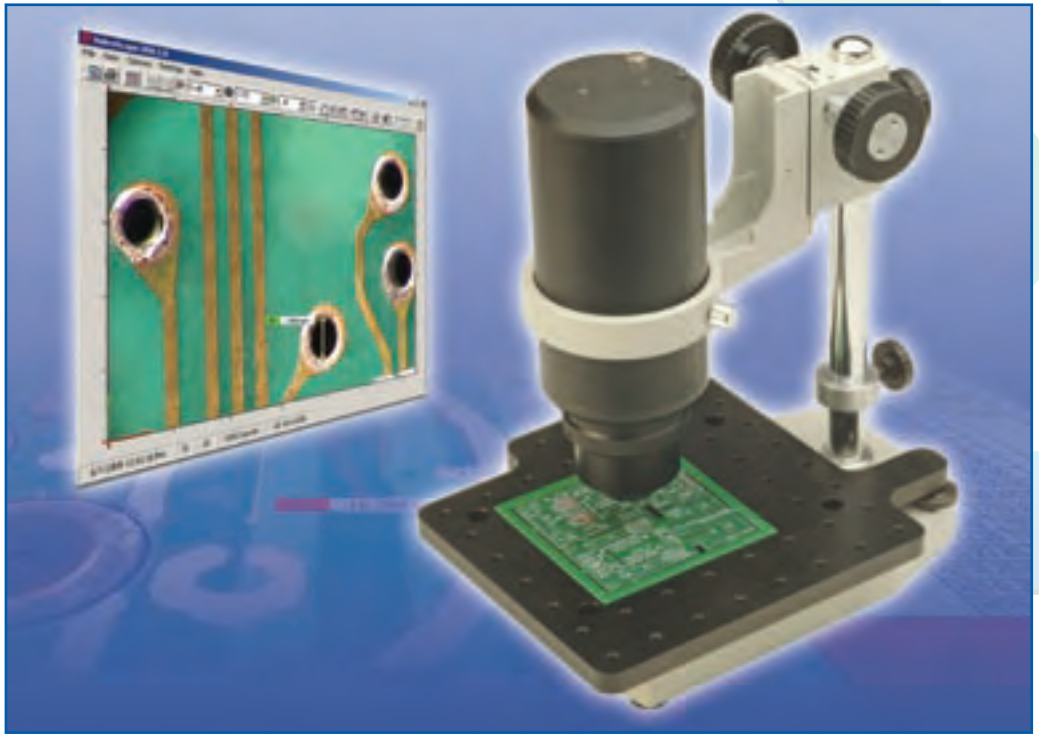
Special applications

We have the know-how to realise extremely specialised applications.
In the past we designed and manufactured, among others, a catadioptric projection system, a laser autocollimator, and a bispectral imager for a machine vision system.

The client profits from the close interaction with our designers and developers. Mechanical and optical designers work closely together to achieve high performance systems.

µVideoScope

Video Microscope Measurement on your PC

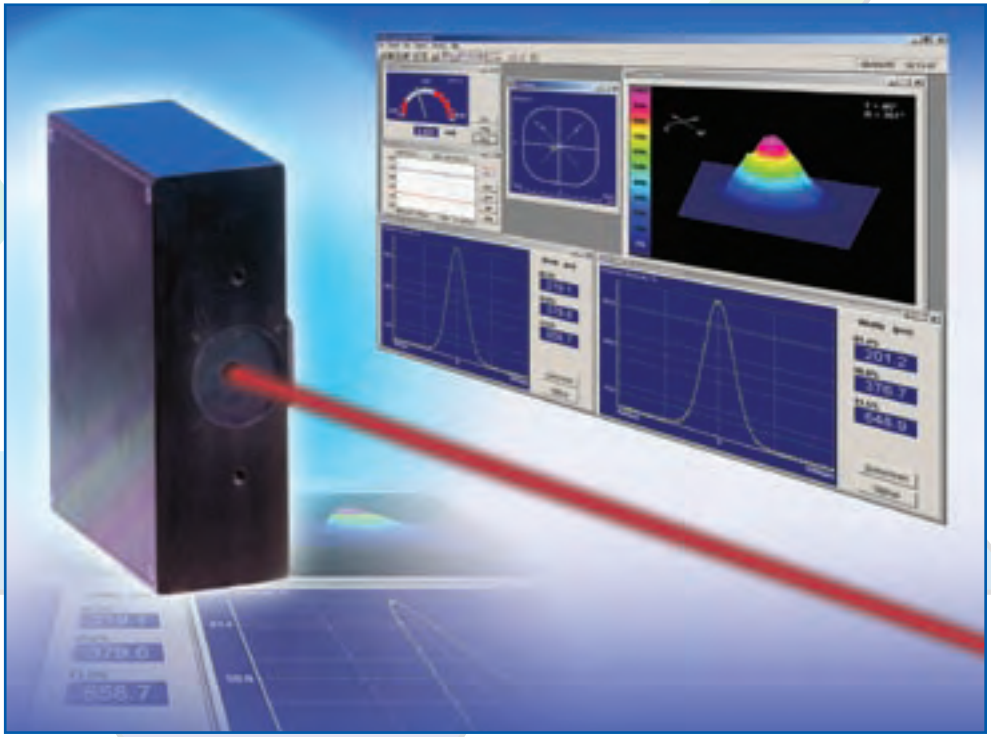


- Performs calibrated measurements of magnified images
- Resolution down to 0.3 µm
- Video zooming X25 Optical, or X10 Digital
- High-resolution CCD detector (Approx. 800,000 pixels)
- Exchangeable objectives
- Powerful measuring software

Details on demand

BeamAnalyzer

Multiple Scanning Knife-Edge Beam Profiler



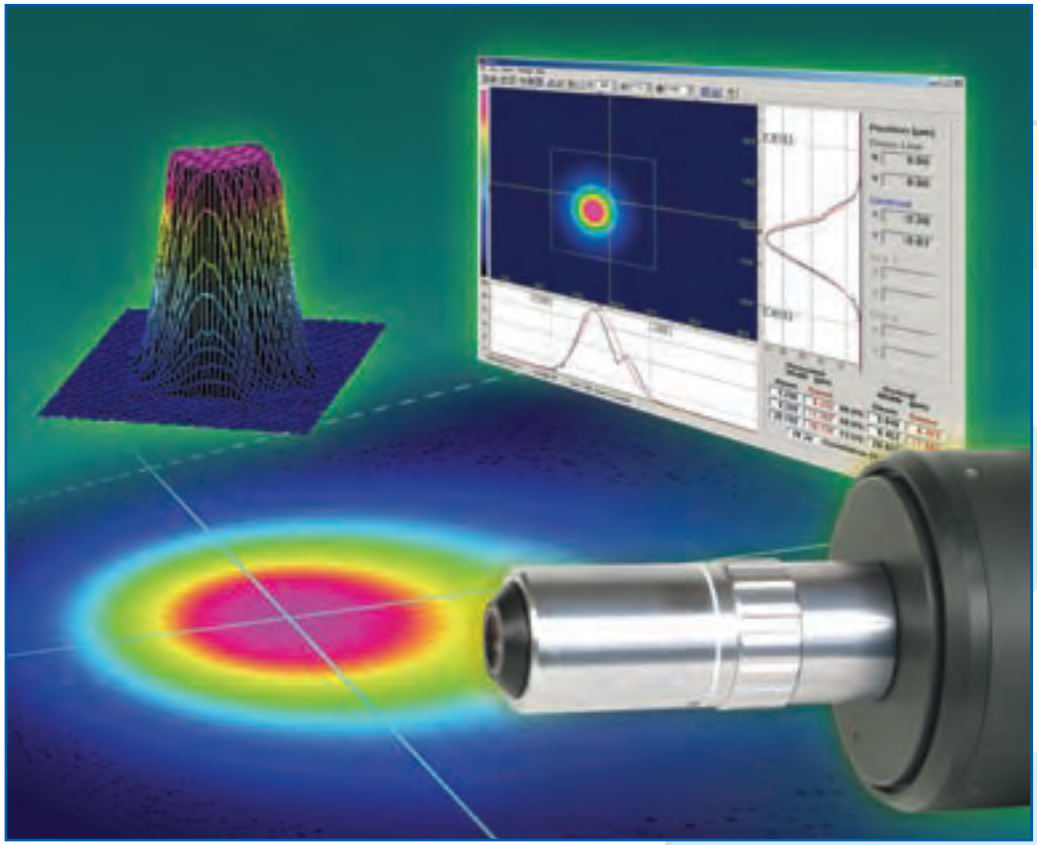
High precision beam diagnostics for CW lasers

- Versatile: Measures beam profile, beam size, beam shape, position and power
- Flexible: Wide spectral range, from 190 nm through 1800 nm
- Accurate: Beam sizes from 3 µm to 9 mm with 0.1 µm resolution
- Feature packed software

Full list of features available at davide@wzw.ch

µBeam

The Analyzer for Microscopic beams

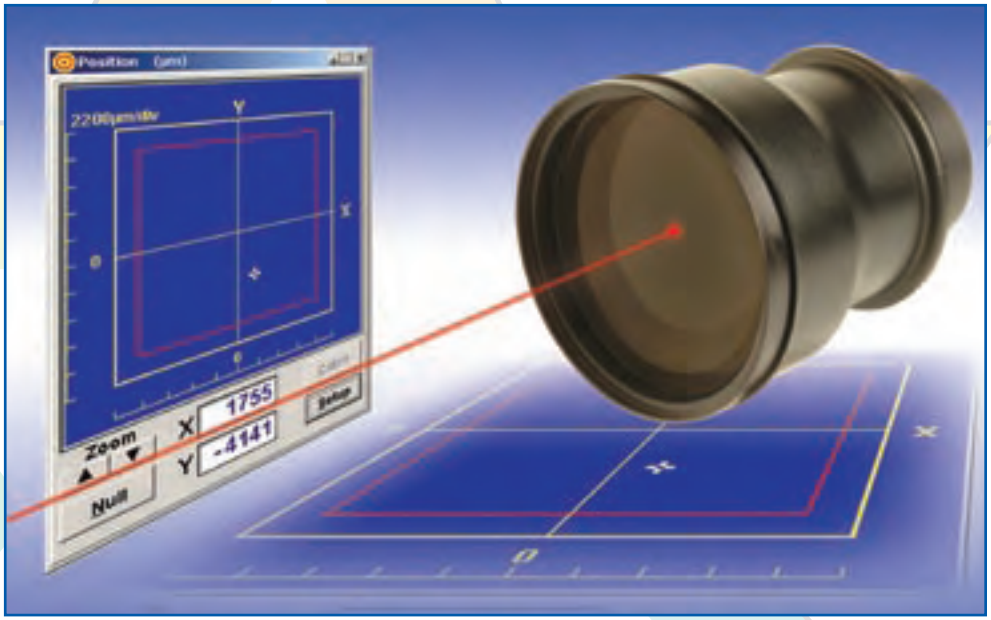


- Measures microscopic beams of less than 0.5 µm (FWHM)
- Handles CW or pulses at low or high repetition rates
- Wide spectral response range
- Optical zooming for fast beam finding

Details on demand

SpotOn

Optical Beam Position and Power Measurement System –
EXTENDED RANGE



Novel design for wide measurement range

Specifications
Max beam size: 22 mm diameter
Position resolution: +/- 3 µm typical
Position accuracy: Better than 1%

Full list of features available at davide@wzw.ch

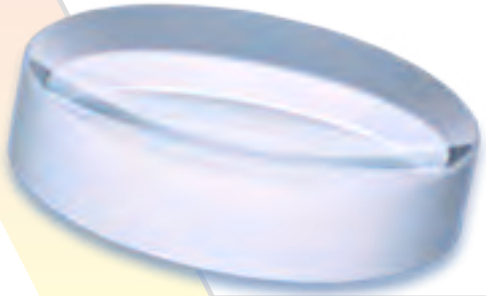
Beam - Diagnostics

Lenses

We offer top quality achromatic doublets for visible and near infrared wavelengths as well as various positive and negative single lenses. We can also design complete optical systems for you or use our know-how to help you solve your optical problems.
Apart from the standard products listed here, we can also manufacture virtually any custom lens. In order to save on tooling costs, we list our tools on our web site under “downloads”. Our designers can also help you optimise the costs and performance of your lenses.

Doublets

Doublets, also called achromatic lenses, are lenses that cause less imaging errors than single elements. This is achieved by combining two different types of optical glasses and by optimising the various curvatures. In this way, the errors of the two cemented elements are partially compensated.

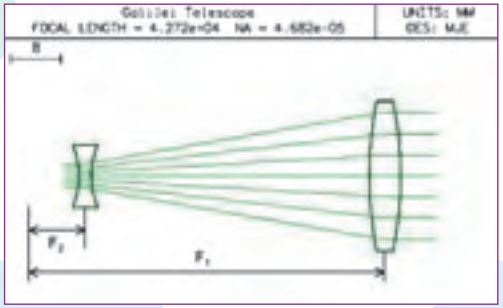


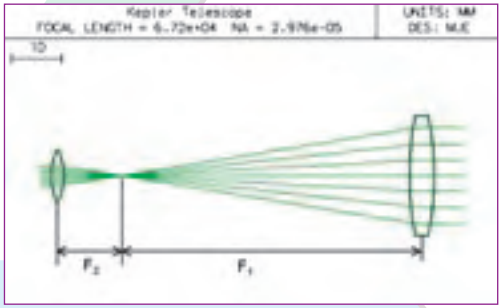
Estimating the focal length

Sometimes it is necessary to find the focal length of an unknown lens. One way is to project a distant source (sun or ceiling lamp) on to a flat surface. The lens is moved up or down until the image is sharp. The distance from from image to lens is then approximately the focal length.

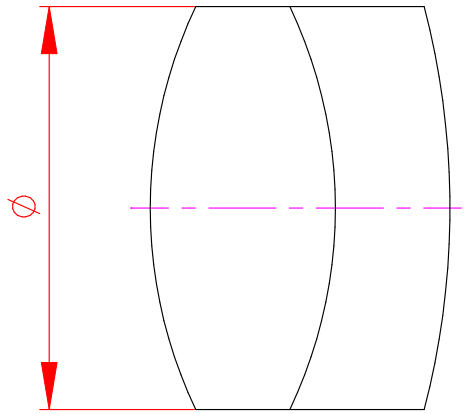
Telescope

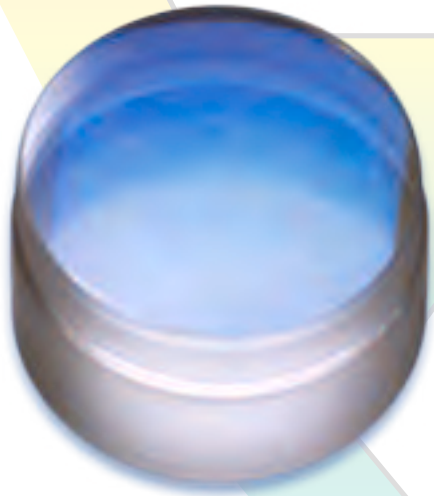
A simple telescope or beam expander (or compressor) can be realised in two ways:





The magnification is F1/F2. The Galileo telescope has the advantage that no internal focal point is generated. This can be a problem for high power laser applications. The Kepler telescope has an internal focal point where a target reticle can be inserted. The user of a Kepler telecope sees an inverted image.





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Part no.	Ø Diameter (mm)	F Focal length (mm)
LEK10F20-01	10	20
LEK11F25.2-01	11	25.2
LEK12F125-01	12	125
LEK13F43.1-01	13	43.1
LEK18F125-01	18	125
LEK31.5F140-01	31.5	140
LEK40F120-01	40	120
LEK40F300-01	40	300

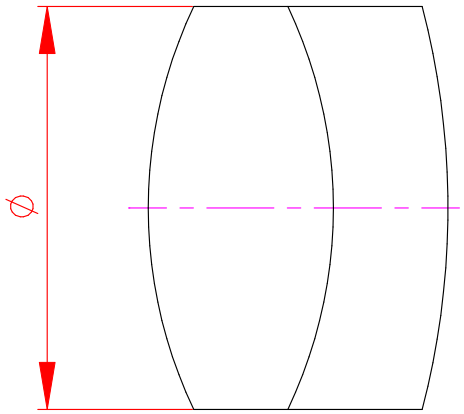
Other dimensions, tolerances, and coatings on request.

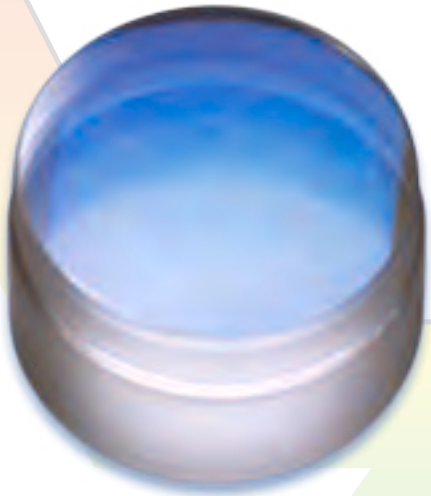
Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

Coating

-01: Broadband antireflection coating for visible wavelengths





Part no.	Ø Diameter (mm)	F Focal length (mm)
LEK5F10-04	5	10
LEK6F17-04	6	17
LEK9F12.6-04	9	12.6
LEK11F25.2-04	11	25.2
LEK12.5F25-04	12.5	25
LEK12.7F25-04	12.7	25
LEK12.7F30-04	12.7	30
LEK12.7F50-04	12.7	50
LEK12.7F75-04	12.7	75
LEK13F43-04	13	43
LEK40F300-04	40	300

Other dimensions, tolerances, and coatings on request.

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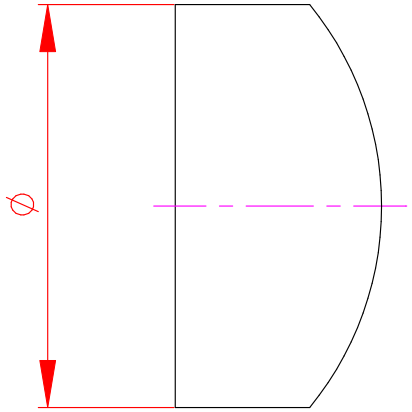
wzw.ch

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

Coating

-04: Braodband antireflection coating for near infrared wavelengths



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Part no.	Ø Diameter (mm)	F Focal length (mm)
LE4F8-01	4	8
LE5.5F6-01	5.5	6
LE6F5-01	6	5
LE6F10-01	6	10
LE10.5F28.8-01	10.5	28.8
LE12.7F25-01	12.7	25
LE12.7F50-01	12.7	50
LE15F48.44-01	15	48.44

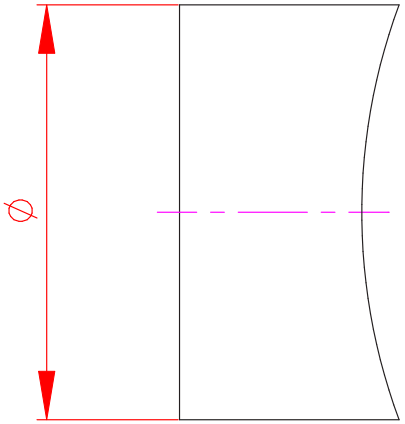
Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

Coating

-01: Broadband antireflection coating for visible wavelengths



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Part no.	Ø Diameter (mm)	F Focal length (mm)
LE6F-6-01	6	-6
LE6F-12-01	6	-12
LE6F-18-01	6	-18
LE12.7F-25-01	12.7	-25
LE12.7F-50-01	12.7	-50
LE12.7F-75-01	12.7	-75
LE12.7F-100-01	12.7	-100

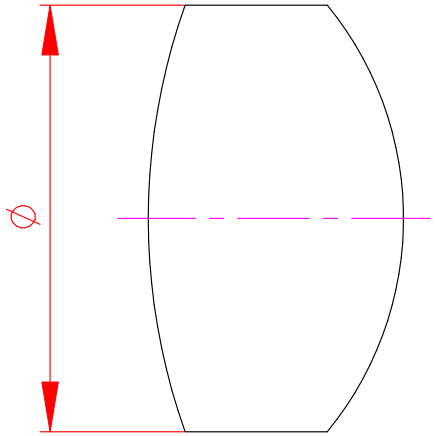
Other dimensions, tolerances, and coatings on request.

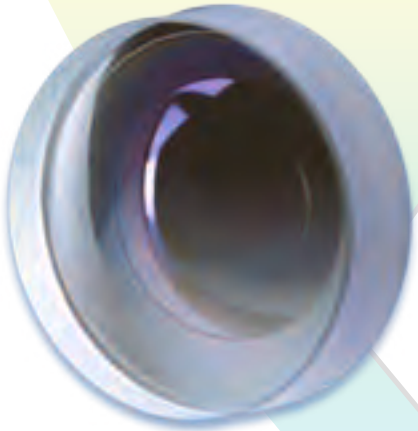
Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

Coating

-01: Broadband antireflection coating for visible wavelengths





Part no.	Ø Diameter (mm)	F Focal length (mm)
LE6F5-01	6	5
LE10F10-01	10	10
LE12F41.9-01	12	41.9
LE22.4F147-01	22.4	147
LE22.4F196-01	22.4	196
LE22.4F372-01	22.4	372
LE22.4F491-01	22.4	491
LE22.4F496-01	22.4	496
LE22.4F980-01	22.4	980
LE22.4F2177-01	22.4	2177

Other dimensions, tolerances, and coatings on request.

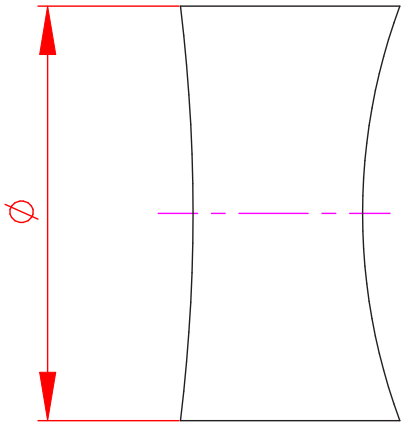
prices online wzw.ch

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

Coating

-01: Broadband antireflection coating for visible wavelengths



Part no.	Ø Diameter (mm)	F Focal length (mm)
LE10F-16-01	10	-16
LE22.4F-587-01	22.4	-587

Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3'
Clear aperture:	>90%

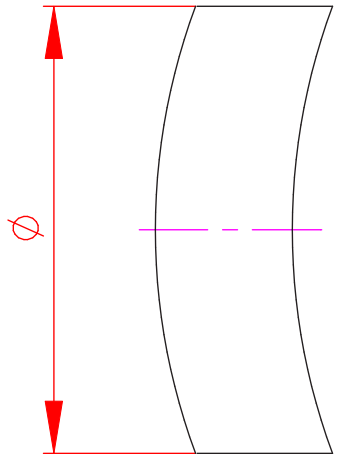
Coating

-01: Broadband antireflection coating for visible wavelengths

BIKV Lenses

LE

Biconcave lenses



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Part no.	Ø Diameter (mm)	F Focal length (mm)
LE22.4F198-01	22.4	198
LE22.4F293-01	22.4	293
LE22.4F342-01	22.4	342

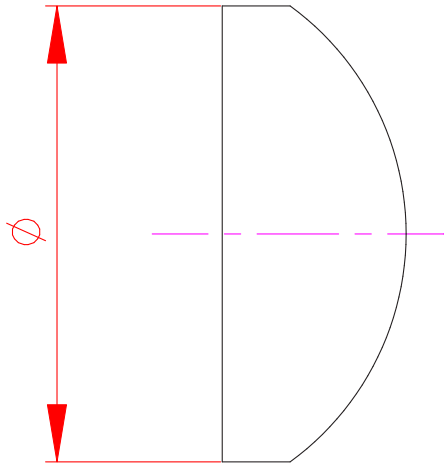
Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3′
Clear aperture:	>90%

Coating

-01: Broadband antireflection coating for visible wavelengths



Part no.	Ø Diameter (mm)	F Focal length (mm)
ALE2F6	2	6
ALE12F7.5	12	7.5
ALE12F9.5	12	9.5
ALE12F11	12	11
ALE22.4F18	22.4	18
ALE32F35	32	35

Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3′
Clear aperture:	>90%

Aspheres

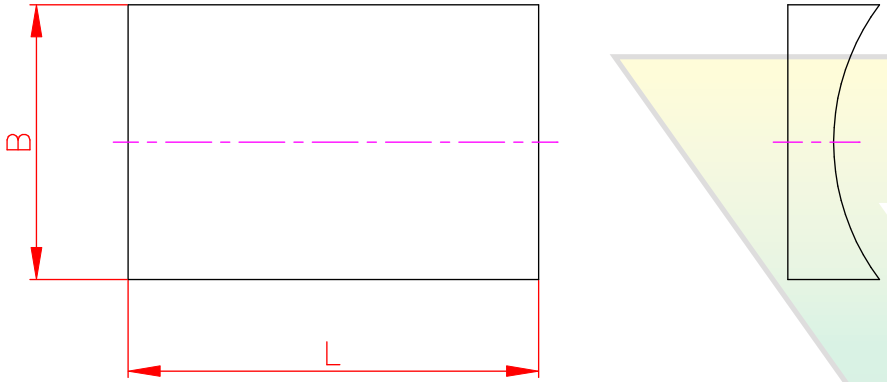
ALE

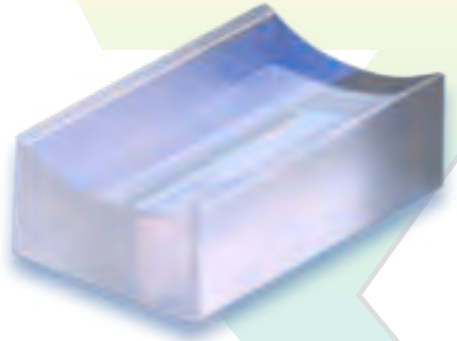
Aspheric PLEX lenses

PLKV cylinder lenses

ZLE

Plano-concave cylinder lenses





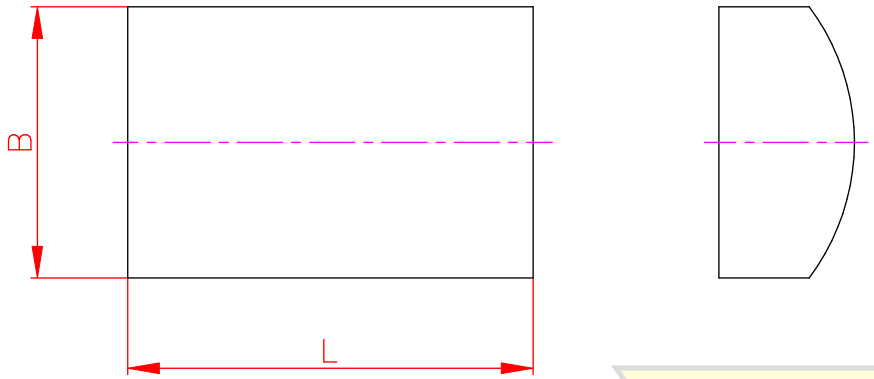
prices online wzw.ch

Part no.	L Length (mm)	B Width (mm)	F Focal length (mm)
ZLE25x11F-11	25	11	-11
ZLE60x22F-25.4	60	22	-25.4
ZLE60x26F-50	60	26	-50
ZLE60x50F-100	60	50	-100
ZLE60x50F-150	60	50	-150

Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3′
Clear aperture:	>90%



Part no.	L Length (mm)	B Width (mm)	F Focal length (mm)
ZLE25x11F11	25	11	11
ZLE60x22F25.4	60	22	25.4
ZLE60x26F50	60	26	50
ZLE60x50F100	60	50	100
ZLE60x50F150	60	50	150

Other dimensions, tolerances, and coatings on request.

Technical data

Surface figure:	λ
Surface quality:	3x0.16
Centration:	<3′
Clear aperture:	>90%

PLEX cylinder lenses

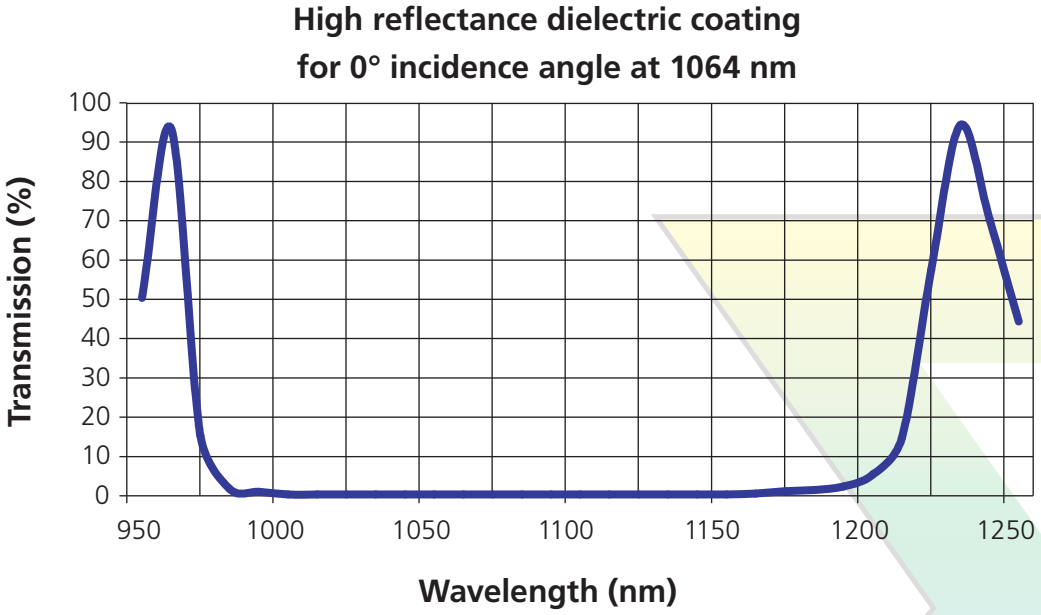
ZLE

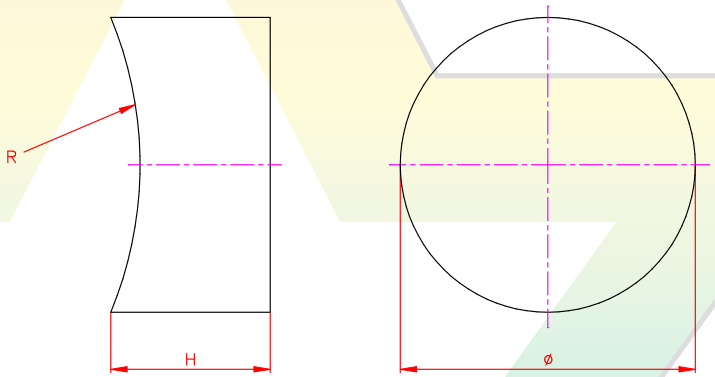
Plano-convex cylinder lenses

HR concave mirrors

HSD

for 1064nm





Part no.	Ø Diameter (mm)	H Thickness (mm)	R Radius (mm)
HSD12.7R30	12.7	6.35	-30
HSD12.7R100	12.7	6.35	-100
HSD12.7R150	12.7	6.35	-150
HSD12.7R200	12.7	6.35	-200
HSD12.7R300	12.7	6.35	-300
HSD12.7R400	12.7	6.35	-400
HSD12.7R500	12.7	6.35	-500
HSD12.7R600	12.7	6.35	-600
HSD12.7R750	12.7	6.35	-750
HSD12.7R1000	12.7	6.35	-1000

Other dimensions, tolerances, coatings, and materials on request.

prices online wzw.ch

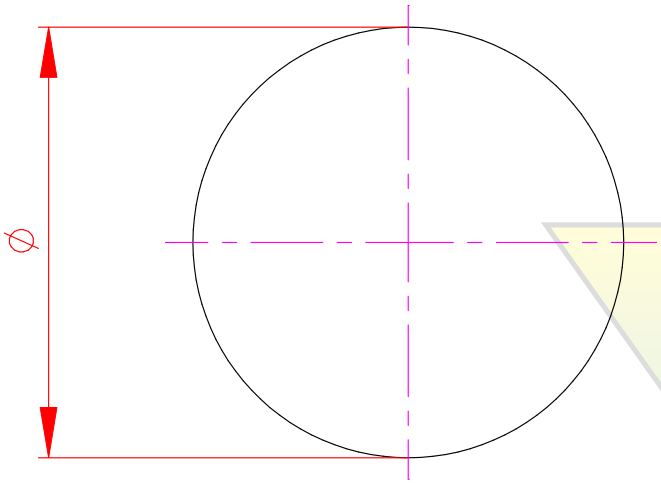
Technical data

Material:	Fused Silica
Surface figure:	λ/10
Surface quality:	laser polish
Clear aperture:	90%
Chamfers:	protective chamfers

Coating

R>99.9% for 1064nm, 0°

Ball lenses have the largest possible ratio of diameter to focal length that can be achieved with a single element. Such lenses are used mainly for fibre coupling applications.



Part no.	Ø Diameter (mm)	Material
KU0.35Q	0.35	Quarz
KU2	2	BK7
KU5	5	BK7
KU2LASF9	2	LASF9

Other dimensions, coatings, and materials will be offered on request.

Technical data

Material:	see table
Surface quality:	3x0.16

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❒ Anfrage / *Request for quote*

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Firma:
Company: _____

Strasse:
Street address: _____

Ort:
City: _____

PLZ:
ZIP: _____

Land:
Country: _____

E-mail: _____

Telefon / *Phone*: _____

Telefax / *Fax*: _____

	Artikel Nr. *Part No.*	Anzahl *Quantity*	Beschreibung *Description*	Preis/Stück *Unit price*	Summe *Total*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
				Summe / *Total*	

Gewünscher Liefertermin:
Requested delivery date: _____

Unterschrift:
Signature: _____

❒ Bestellung / *Purchase order*

❒ Anfrage / *Request for quote*

Datum / *Date*: _____

Firma:
Company: _____

Strasse:
Street address: _____

Ort:
City: _____

PLZ:
ZIP: _____

Land:
Country: _____

E-mail: _____

Telefon / *Phone*: _____

Telefax / *Fax*: _____

	Artikel Nr. *Part No.*	Anzahl *Quantity*	Beschreibung *Description*	Preis/Stück *Unit price*	Summe *Total*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
				Summe / *Total*	

Gewünscher Liefertermin:
Requested delivery date: _____

Unterschrift:
Signature: _____