Vacuum Viewports

Standard Viewports

Viewports with
Defined Optical Quality

Viewports with
Electrical Conductive Layers

Special Viewports

Viewports with
Flanged Socket

Viewport Shutters

Contents

Introduction

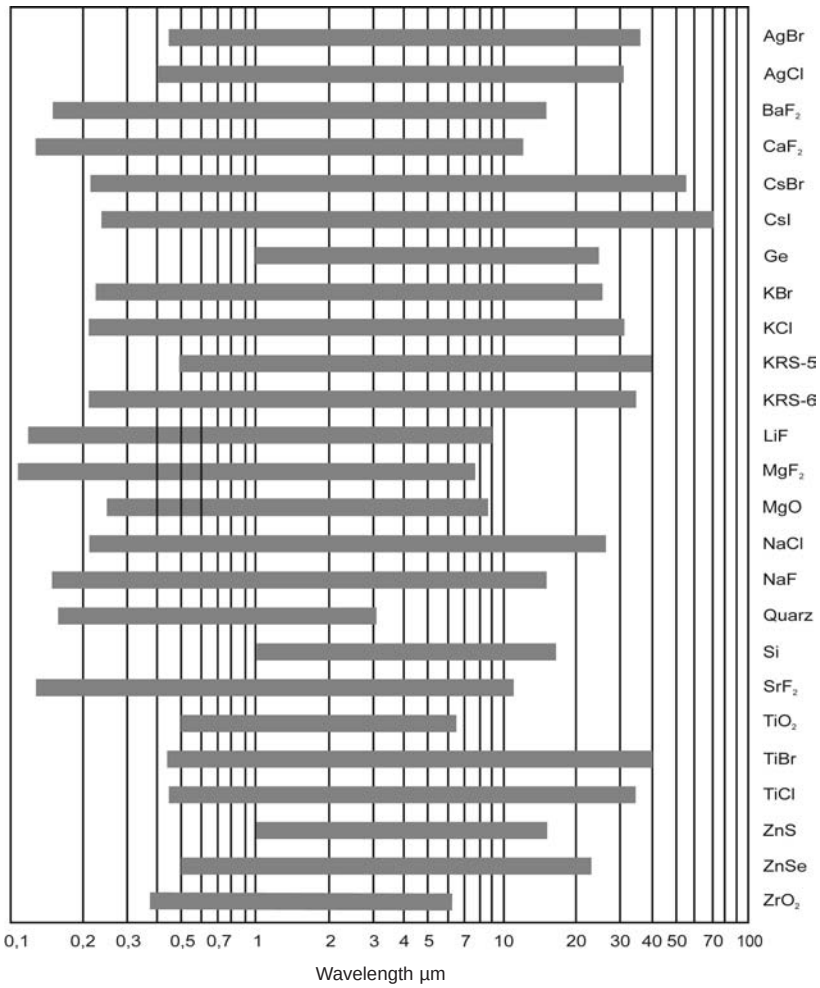
It is often necessary to observe the processes within the vacuum line visually. Different characteristics are required from a viewport depending on the individual processes ranging from simple visual inspection of positioning up to highly precise measurements by laser beams. The following aspects need to be considered in order to select the right viewport:

1. The correct material has to be selected for the viewport depending on the wavelengths it is exposed to.
2. The optical quality of the viewport needs to be specified in order to satisfy the optical requirements. This includes the surface quality itself, such as scratch and dig, flatness and parallelism of the optical planes towards each other, as well as the treatment of the surface with optical coatings (e. g. anti-reflection coatings with various transmission properties).
3. Your process defines the pressure range that has a great impact on the connection method between the optical material and the flange.
4. Furthermore it is important to consider other ambient conditions the viewport is exposed to, e. g. radiation level of the most different wave lengths, contact with aggressive gases or media, the temperature range of the application, or the interaction with magnetic fields. These parameters have a great impact on the lifetime and performance of the viewport. We would be pleased to give advice regarding these points.

The requirements are versatile and still increasing with further applications. There are time-tested solutions, others have been developed in our company - in some extent in cooperation with partners - and listed in this catalogue. And we will keep on searching for new solutions, if your needs go beyond. Our experienced team of optical specialists, material scientists and vacuum technologists always looks forward to facing new challenges.
Besides the optical applications of viewports, it may be also necessary to provide dielectric materials with a conducting transparent layer in order to avoid charging effects. Please find solutions (ITO layers) for this aspect on page 3-7.

If a viewport is going to be used in the high energetic range it may be necessary - due to protection of labour (x-ray absorption) - to provide viewports with an extra lead glass cover. Information about high-resolution RHEED windows which are used for instance in the MBE technology, are also shown on page 3-7.

Transmission Ranges*



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Viewport Material

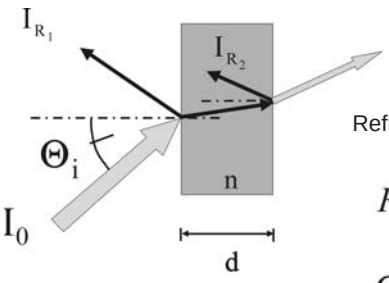
The following table shows the window materials offered by VACOM with transmission ranges, application areas as well as brand names if applicable:

Material (brand names)	Applications	Optical transmission range (µm) (current max. possible clearview)	Max. temperature* (°C)
Borosilicate (Borofloat®, BK7®)	Neutron poisons, substrates for dielectrical coatings, photovoltaics, water substrates	0.4 - 2	350
Quartz, crystalline SiO_2 / fused silica (Spectrosil® 2000)	VUV filters, polarisation optics, excimer laser as well as other critical applications in VUV, FIR screens	0.3 - 4	> 1200
Magnesium fluoride MgF_2	VUV optics, excimer laser, polarisation optics	0.12 - 7	200
Calcium fluoride CaF_2	Different qualities for IR, UV, VUV laser (best transmission in UV), IR analytics, astro optics	0.13 - 10	200
Barium fluoride BaF_2	Astro optics, correctors in lens systems, scintillator materials	0.15 - 12.5	200
Lithium fluoride LiF	X-ray monochromator crystals	0.12 - 6	200
Sapphire Al_2O_3	Spectroscopy, vacuum viewports, (birefringent : IR and UV transmission)	0.17 - 5.5	350
Zinc sulfide ZnS (Cleartran®)	IR spectroscopy	0.37 - 13.5	200
Zinc selenide ZnSe	CO_2 laser optics, cutting lenses	0.6 - 21	200
Silicon Si	Lenses, band-pass filters, thermography, ATR crystals	1.2 - 15	120
Germanium Ge	Windows, lenses, band-pass filters, thermography, FIR optics, ATR crystal	1.8 - 23	120
Beryllium Be	X-ray tubes (permeability of x-rays)	-	350

*Note temperature gradients!

Optical properties

The quality of a viewport is always determined by the fact how unaltered a beam of a certain wavelength passes the optical medium. Alterations can be caused by optical losses (absorption, reflection or scattering) and aberrations (refractive index inhomogeneities, cords, curvatures and corrugations of the surface, aberrations of the parallelism of the interfaces).
Optical losses are mostly determined by the refractive index and the absorption coefficient. The transmission - that also depends on the thickness of the material and the wavelength - can be specified with the help of these parameters for the first approximation (the following is valid only in case of perpendicular incident light):



$I_T \qquad I_{R1} = R_1 \cdot I_0$

Reflexion at two interfaces:

$$R_1 = R_2 = R = \left(\frac{n-1}{n+1}\right)^2$$

$$\Theta_i = 0^0$$

Absorption in the medium:

$$\propto \exp(-\alpha d)$$

$$T = \frac{I_t}{I_0} = (1-R)^2 \cdot e^{-\alpha d}$$

Viewport Material - Antireflection Coating

The following table shows the reflection and transmission rates of selected materials (absorption at perpendicular incident light neglected):

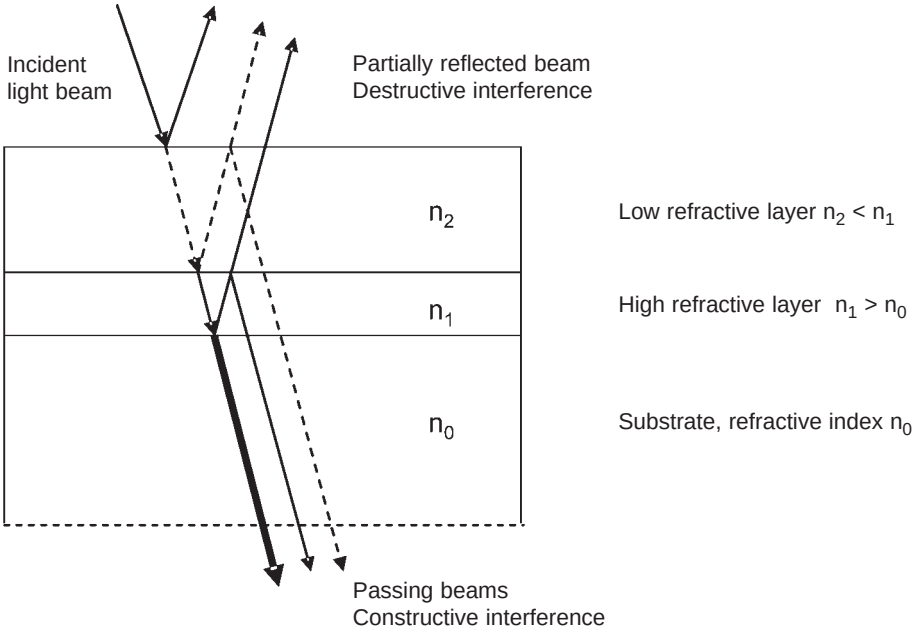
Material	Index of refraction n (at 500 nm, * at 3 µm)	Reflection loss R %	Transmission T %
Magnesium fluoride MgF_2	1.38	2.55	94.97
Lithium fluoride LiF	1.39	2.66	94.75
Calcium fluoride CaF_2	1.44	3.21	93.68
Quartz SiO_2 (synthetic)	1.46	3.50	93.13
Borofloat®	1.47	3.62	92.89
Barium fluoride BaF_2	1.48	3.75	92.65
Borosilicate BK7®	1.52	4.26	91.67
Zinc sulphide ZnS	2.42*	17.24	68.49
Zinc selenide ZnSe	2.43*	17.38	68.26
Silicon Si	3.43*	30.09	48.88

Another important source of optical loss is light scattering. Optical inhomogeneities within the material (air bubbles, grid dislocations) in the range of 1 …. 10 µm function as stray centres. In addition to that stray losses are caused by rough surfaces (polishing, scratches) and accumulations on surfaces (dust particles, water vapour, cleaning residues).

Even if an optical material is produced without causing aberrations, these can arise also when the material is fixed into the flange, because of thermal strains or mechanical tensions. If you have high requirements regarding the prevention of aberrations, please specify the necessary quality in your request for quotation.

Antireflection coating of viewports

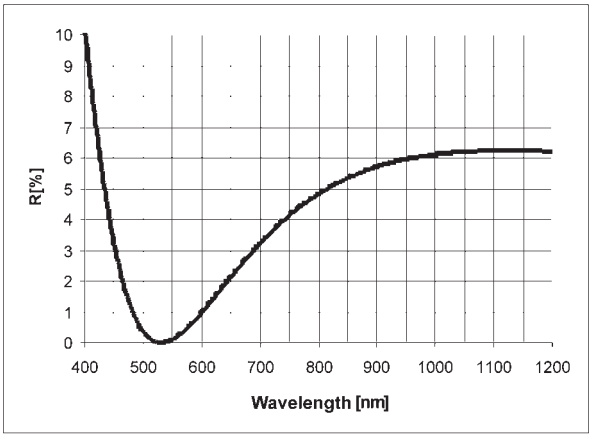
It is possible to avoid reflections at the surface to increase the transmission rate, using the effects of interference.
The basic principle is shown in the following illustration:



Viewport Material - Antireflection Coating

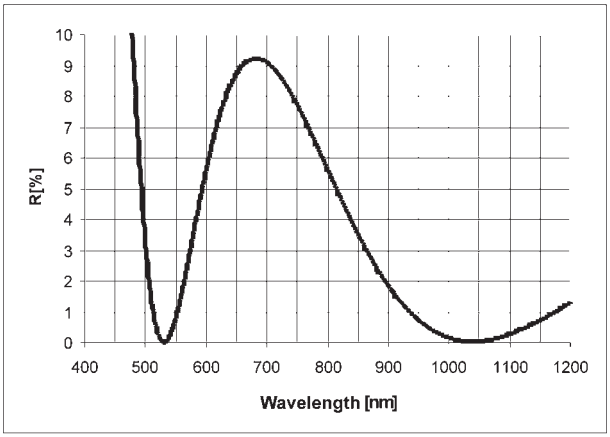
Antireflection coatings can be produced as narrow or broadband coatings for the most different applications. Coatings for standard applications are specified in this catalogue: 1QWOT (single layer), Multi Layer broad band and 'V' coatings. Furthermore we can elaborate and manufacture special solutions for you in cooperation with experienced coating companies.
Examples of different types of antireflection systems with which approximation to zero reflection (depending on technical complexity) can be achieved are shown below. Software is available to model antireflection coatings to customer requirements. We would be pleased to advise you in finding the optimum for your individual application.

Single wavelength antireflection coating



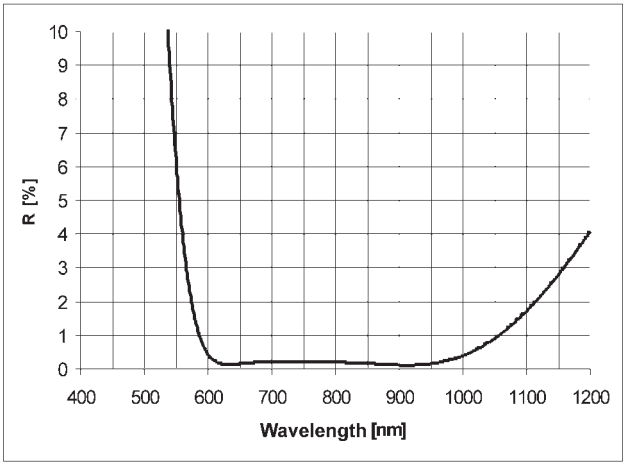
Residual reflection R < 0.5 % per side

Double wavelength antireflection coating



R < 1 % per side

Broad band antireflection coating



R < 1 % per side

Vacuum compatible combinations between optical and flange materials

The main problem in the manufacture of viewports is the fact that the thermal expansion coefficients of optical and flange materials are not only very different but the temperature dependence proceeds completely in an other way. As a consequence of that, even little temperature changes can cause mechanical tension that can lead to vacuum leaks and in extrem cases damage the optic. The use of various connecting or adjustment materials between the stainless steel flange and optic material, for the different coefficients of expansion enabled to find solutions for special applications. Costs and efforts for these different solutions are quite different as well. We are able to offer the right solution for your individual needs, starting with exchangeable viewports using o-rings through non-exchangeable viewports (glass solder, diffusion bonding, mechanical and brazed connections) up to differentially pumped viewports.

Viewports - Special Coatings

ITO coated glass

Indium tin oxide (ITO) is a transparent and semiconducting material. It is frequently used to apply a conducting and light-transmissive coating to glass or synthetic material. This coating is necessary e. g. to avoid electrostatic charging.

Our viewports, which are made of high quality borosilicate glass, are coated with a thin layer of ITO during a sputtering process. We offer ITO coatings with a surface resistance of 10 Ω/square which reach a transmission of ~ 80 % as standard.

RHEED screens

RHEED is the abbreviation for High Energy Electron Diffraction. This procedure uses electron diffraction for the analysis and inspection of surface structures at the atomic level e. g. in molecular beam epitaxy (MBE). The electrons reflected from the surface have a characteristic arrangement and show a typical diffraction pattern. It is possible to make this pattern visible by capturing the reflected electrons on a RHEED screen covered with a phosphor layer.

A standard viewport with a RHEED screen consists of an ITO covered CF viewport with a subsequently added phosphor layer. A version with an additional lead glass covering is available which is suitable for applications with damaging x-rays.

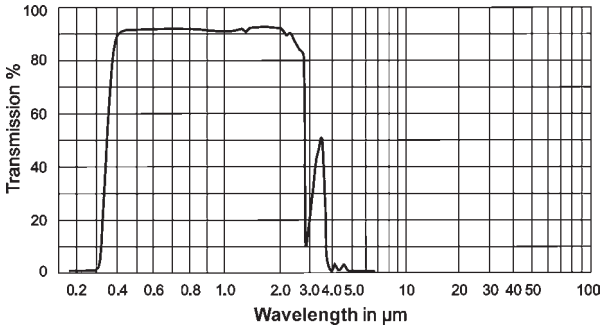
We offer RHEED screens suited for various applications. The thickness and type of the phosphor layer depends on the respective application. We offer four standard phosphor types: P20, P22, P11 and P43. Other phosphor types can be provided on request.

Instructions for the handling of viewports

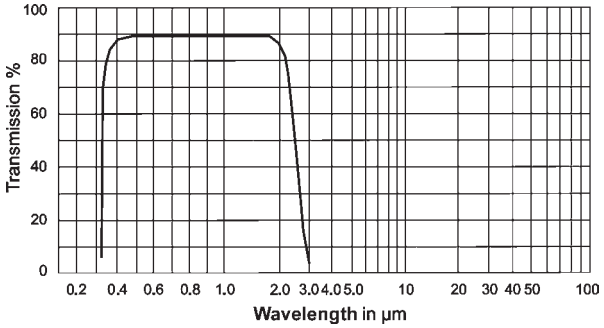
- Please note always the assembly instructions which are added to the viewports
- Use annealed copper gaskets for CF viewport assembly
- The temperature increase of 2 - 3 °C per minute must not be exceeded during the bakeout of welded viewports
- The pressure on the vacuum side of the viewport should always be lower than on the atmosphere side

Transmission curves (principle curves)

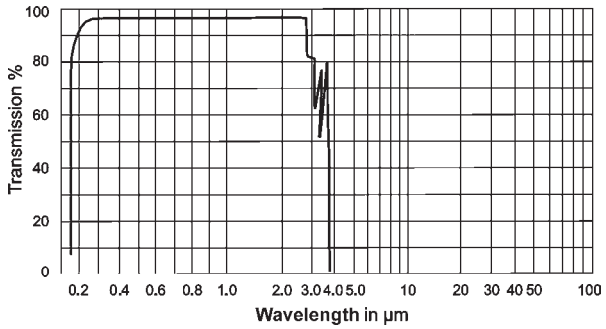
Borofloat®



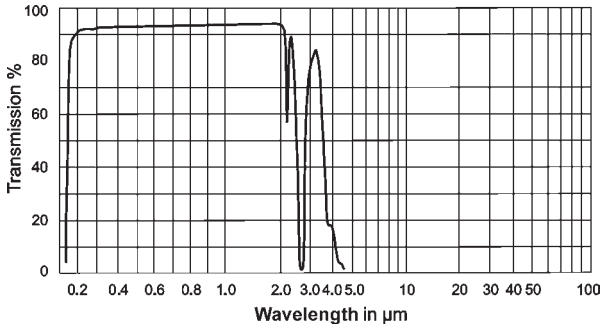
BK7®



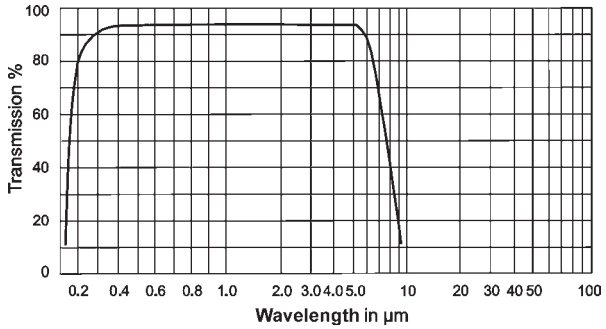
Quartz



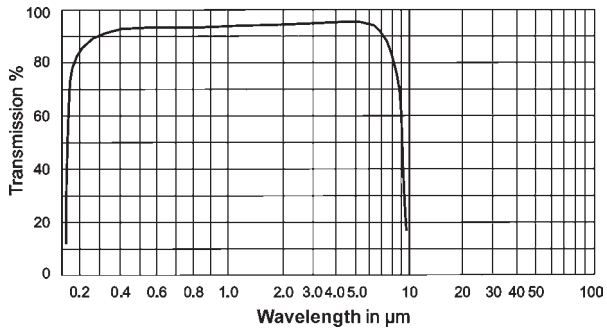
Spectrosil® 2000



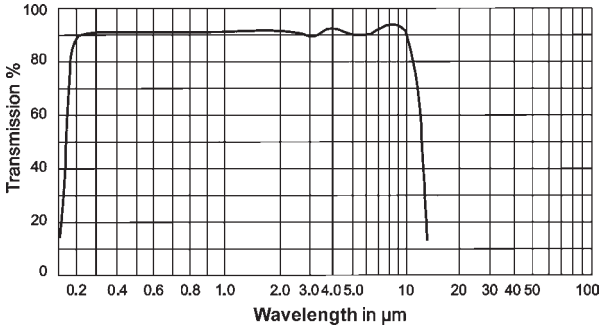
Magnesium fluoride



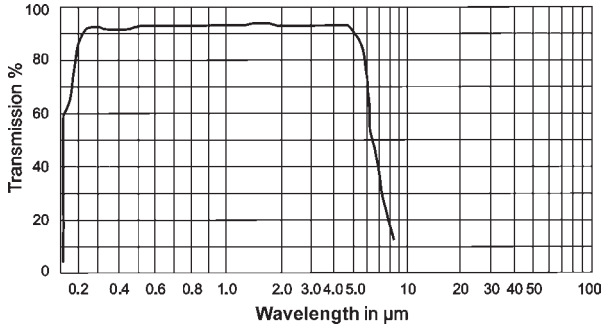
Calcium fluoride



Barium fluoride

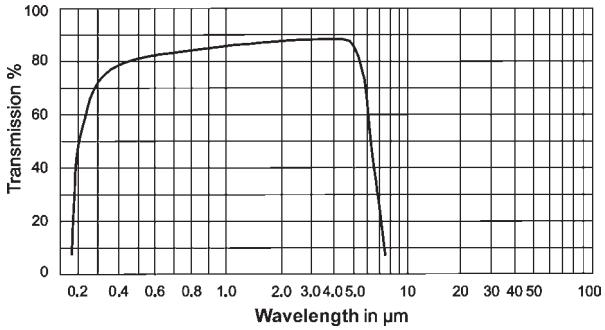


Lithium fluoride

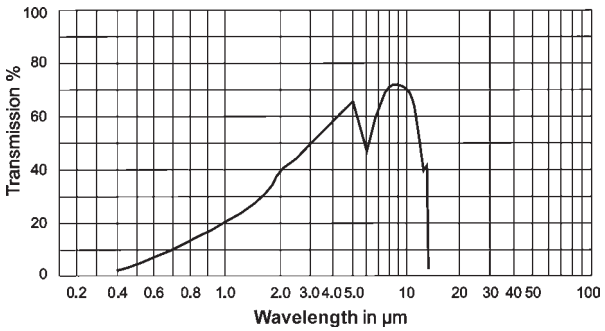


Transmission curves (principle curves)

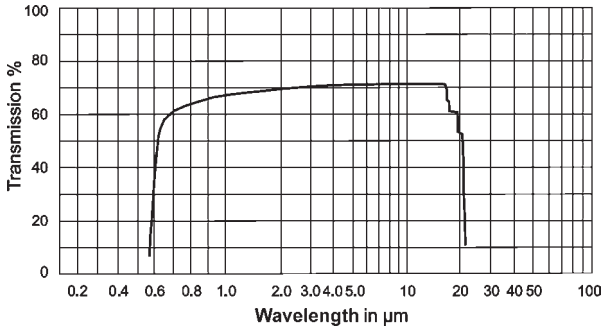
Sapphire



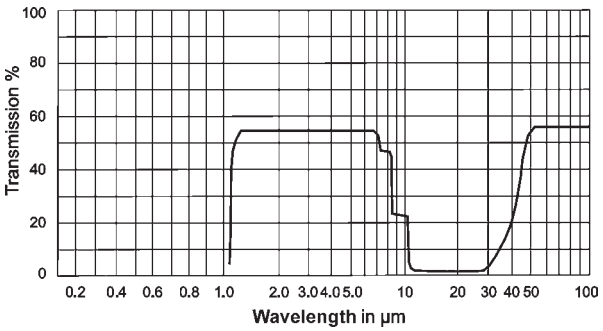
Zinc sulfide



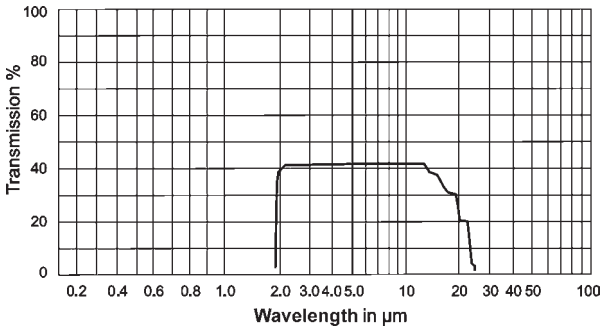
Zinc selenide



Silicon

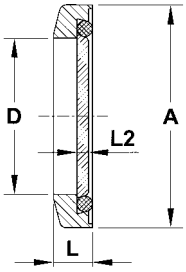


Germanium

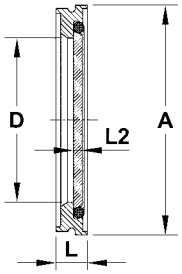


Borosilicate, Exchangeable Window

KF flange



ISO flange



Technical data

Specifications	KF and ISO-K viewport with exchangeable borosilicate window - flat construction - easy assembly and disassembly
Connection	KF and ISO-K flange
Leak rate	< 1.0E-8 mbar l/s
Window material	borosilicate (Borofloat®)
Flatness	< 4 λ
Flange material	stainless steel
Seal	FKM O-ring
Transmission range	0.4 - 2.0 µm
Temperature range	to 150 °C bakeable
Coatings	for detailed information see introduction
• narrow band	350 and 1064 nm
• broadband (ARVIS)	400 - 700 nm
• broadband (ARNIR)	700 - 1110 nm
Options	other wavelengths on request

Standard

Order code	Flange	A	D	L	L2
KVPZ40TCRSV	DN40KF	57	40	10.0	3.8
KVPZ50TCRSV	DN50KF	77	50	10.0	3.8
ISOVPZ63TCRSV	DN63ISO	98	70	13.5	3.8
ISOVPZ100TCRSV	DN100ISO	133	102	13.0	5
ISOVPZ160TCRSV	DN160ISO	183	153	17.0	9

With antireflection coating

Order code		Flange	A	D	L	L2
Narrow band	**Broadband**					
KVPZ40SV-AR350	**KVPZ40SV-ARVIS**	DN40KF	57	40	10.0	3.8
KVPZ40SV-AR1064	**KVPZ40SV-ARNIR**	DN40KF	57	40	10.0	3.8
KVPZ50SV-AR350	**KVPZ50SV-ARVIS**	DN50KF	77	50	10.0	3.8
KVPZ50SV-AR1064	**KVPZ50SV-ARNIR**	DN50KF	77	50	10.0	3.8
ISOVPZ63SV-AR350	**ISOVPZ63SV-ARVIS**	DN63ISO	98	70	13.5	3.8
ISOVPZ63SV-AR1064	**ISOVPZ63SV-ARNIR**	DN63ISO	98	70	13.5	3.8
ISOVPZ100SV-AR350	**ISOVPZ100SV-ARVIS**	DN100ISO	133	102	13.0	5
ISOVPZ100SV-AR1064	**ISOVPZ100SV-ARNIR**	DN100ISO	133	102	13.0	5
ISOVPZ160SV-AR350	**ISOVPZ160SV-ARVIS**	DN160ISO	183	153	17.0	9
ISOVPZ160SV-AR1064	**ISOVPZ160SV-ARNIR**	DN160ISO	183	153	17.0	9

Borosilicate, Exchangeable Window

Accessories, replacement windows

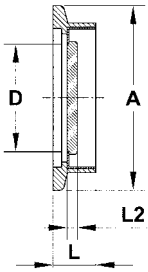
Order code	Flange	Accessories for
KF40VPBORO	DN40KF	KVPZ40TCRSV
KF40VPBORO-AR-350	DN40KF	KVPZ40SV-AR350
KF40VPBORO-AR-1064	DN40KF	KVPZ40SV-AR1064
KF40VPBORO-AR-VIS	DN40KF	KVPZ40SV-ARVIS
KF40VPBORO-AR-NIR	DN40KF	KVPZ40SV-ARNIR
KF50VPBORO	DN50KF	KVPZ50TCRSV
KF50VPBORO-AR-350	DN50KF	KVPZ50SV-AR350
KF50VPBORO-AR-1064	DN50KF	KVPZ50SV-AR1064
KF50VPBORO-AR-VIS	DN50KF	KVPZ50SV-ARVIS
KF50VPBORO-AR-NIR	DN50KF	KVPZ50SV-ARNIR
ISO63VPBORO	DN63ISO	ISOVPZ63TCRSV
ISO63VPBORO-AR-350	DN63ISO	ISOVPZ63SV-AR350
ISO63VPBORO-AR-1064	DN63ISO	ISOVPZ63SV-AR1064
ISO63VPBORO-AR-VIS	DN63ISO	ISOVPZ63SV-ARVIS
ISO63VPBORO-AR-NIR	DN63ISO	ISOVPZ63SV-ARVIS
ISO100VPBORO	DN100ISO	ISOVPZ100TCRSV
ISO100VPBORO-AR-350	DN100ISO	ISOVPZ100SV-AR350
ISO100VPBORO-AR-1064	DN100ISO	ISOVPZ100SV-AR1064
ISO100VPBORO-AR-VIS	DN100ISO	ISOVPZ100SV-ARVIS
ISO100VPBORO-AR-NIR	DN100ISO	ISOVPZ100SV-ARNIR
ISO160VPBORO	DN160ISO	ISOVPZ160TCRSV
ISO160VPBORO-AR-350	DN160ISO	ISOVPZ160SV-AR350
ISO160VPBORO-AR-1064	DN160ISO	ISOVPZ160SV-AR1064
ISO160VPBORO-AR-VIS	DN160ISO	ISOVPZ160SV-ARVIS
ISO160VPBORO-AR-NIR	DN160ISO	ISOVPZ160SV-ARNIR

Accessories, replacement O-rings

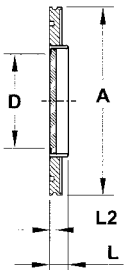
Order code	Flange
KF40VR	DN40KF
KF50VR	DN50KF
ISO63VR-VP	DN63ISO
ISO100VR-VP	DN100ISO
ISO160VR-VP	DN160ISO

Borosilicate, Unexchangeable Window on KF, ISO Flange

KF flange



ISO flange



Technical data

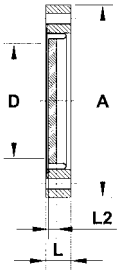
Specifications	KF and ISO-K viewport with firmly connected borosilicate window
Connection	KF and ISO-K flange
Leak rate	< 1.0E-10 mbar l/s
Window material	borosilicate
Flatness	< 8 λ
Flange material	stainless steel - 1.4307 (304L)
Seal material	glass-to-metal connection (Kovar®)
Transmission range	0.4 - 2.0 µm
Temperature range	to 200 °C bakeable

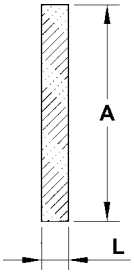
Standard, on KF and ISO flange

Order code	Flange	A	D	L	L2
KVPZ16-V16	DN16KF	30	16	12.7	1.6
KVPZ25-V16	DN25KF	40	16	12.7	1.6
KVPZ40-V32	DN40KF	55	32	12.7	3
KVPZ50-V32	DN50KF	75	32	12.7	3
ISO63VPZ	DN63ISO	95	49	14.0	3.5
ISO100VPZ	DN100ISO	130	65	15.5	3.5
ISO160VPZ	DN160ISO	180	90	18.0	6
ISO200VPZ	DN200ISO	240	135	18.0	8
ISO250VPZ	DN250ISO	290	135	18.0	8

Borosilicate, Unexchangeable Window on CF Flange

CF flange





accessories, lead glass screen

Technical data

Specifications	CF viewport with firmly connected borosilicate window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	borosilicate
Flatness	< 8 λ
Transmission range	0.4 - 2.0 µm
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
• temperature range	to 350 °C
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
• temperature range	
Coating	detailed information see introduction
• narrow band (1QWOT or "V" coating)	possible coating range 194 - 1200 nm
• broadband	

Please add the required wavelength or wavelength range to the order code

Standard, on CF flange

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16	**VPZ16-BO-NM**	DN16CF	34	16	12.7	1.5
-	**VPZ40-BO-NM**	DN40CF	70	32	12.7	3
VPZ40	**-**	DN40CF	70	38	12.7	3
VPZ64	**VPZ64-BO-NM**	DN63CF	114	63	17.4	3.5
VPZ100	**VPZ100-BO-NM**	DN100CF	152	90	19.9	6
VPZ160	**VPZ160-BO-NM**	DN160CF	203	136	22.3	8

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16-MB-AR	**VPZ16-BO-NM-AR**	DN16CF	34	16	12.7	1
VPZ40-MB-AR	**VPZ40-BO-NM-AR**	DN40CF	70	32	12.7	2.5
VPZ40LA-MB-AR	**-**	DN40CF	70	38	12.7	3
VPZ64-MB-AR	**VPZ64-BO-NM-AR**	DN63CF	114	63	17.4	3
VPZ100-MB-AR	**VPZ100-BO-NM-AR**	DN100CF	152	89	19.9	4
VPZ160-MB-AR	**VPZ160-BO-NM-AR**	DN160CF	203	136	22.3	6.5

Borosilicate, Unexchangeable Window on CF Flange

With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16-MB-VAR	VPZ16-BO-NM-VAR	DN16CF	34	16	12.7	1
VPZ40-MB-VAR	VPZ40-BO-NM-VAR	DN40CF	70	32	12.7	2.5
VPZ40LA-MB-VAR	-	DN40CF	70	38	12.7	3
VPZ64-MB-VAR	VPZ64-BO-NM-VAR	DN63CF	114	63	17.4	3
VPZ100-MB-VAR	VPZ100-BO-NM-VAR	DN100CF	152	89	19.9	4
VPZ160-MB-VAR	VPZ160-BO-NM-VAR	DN160CF	203	136	22.3	6.5

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16-MB-BBAR	VPZ16-BO-NM-BBAR	DN16CF	34	16	12.7	1
VPZ40-MB-BBAR	VPZ40-BO-NM-BBAR	DN40CF	70	32	12.7	2.5
VPZ40LA-MB-BBAR	-	DN40CF	70	38	12.7	3
VPZ64-MB-BBAR	VPZ64-BO-NM-BBAR	DN63CF	114	63	17.4	3
VPZ100-MB-BBAR	VPZ100-BO-NM-BBAR	DN100CF	152	89	19.9	4
VPZ160-MB-BBAR	VPZ160-BO-NM-BBAR	DN160CF	203	136	22.3	6.5

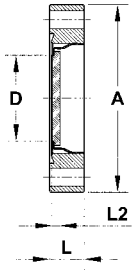
With lead glass screen

Order code	Flange	A	D	L	L2
VPZ16LG	DN16CF	34	16	12.7	1
VPZ40LG	DN40CF	70	32	12.7	2.5
VPZ64LG	DN63CF	114	63	17.4	3
VPZ100LG	DN100CF	152	89	19.9	4
VPZ160LG	DN160CF	203	136	22.3	6.5

Accessories, lead glass screen

Order code	Flange	D	L	Accessories for
LG16	DN16CF	17	5.0	VPZ16LG
LG40	DN40CF	40	5.0	VPZ40LG
LG64	DN63CF	70	5.0	VPZ64LG
LG100	DN100CF	93	5.0	VPZ100LG
LG160	DN160CF	143	5.0	VPZ160LG

Boron Crown Glass, BK7® Optically Polished, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected BK7® window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	boron crown glass, BK7® optically polished
Transmission range	0.4 - 2.0 µm
Temperature range	to 130 °C
Surface quality	20/10 (scratch/dig)
Flatness	< 4 λ (better surface quality and flatness on request)
Magnetic type • flange material	 stainless steel - 304L (1.4307)
Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
Coating • narrow band (1QWOT or "V" coating) • broadband	detailed information see introduction possible coating range 194 - 1200 nm

Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16BK7-GS	**VPZ16BK7-GS-NM**	DN16CF	34	16	12.7	3
VPZ40BK7-GS	**VPZ40BK7-GS-NM**	DN40CF	70	32	12.7	6
VPZ40LABK7-GS	**-**	DN40CF	70	38	12.7	6
VPZ64BK7-GS	**VPZ64BK7-GS-NM**	DN63CF	114	63	17.4	6
VPZ100BK7-GS	**VPZ100BK7-GS-NM**	DN100CF	152	89	19.9	8
VPZ160BK7-GS	**VPZ160BK7-GS-NM**	DN160CF	203	136	22.3	8

Boron Crown Glass, BK7® Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BK7-GS-AR	VPZ16BK7-GS-NM-AR	DN16CF	34	16	12.7	3
VPZ40BK7-GS-AR	VPZ40BK7-GS-NM-AR	DN40CF	70	32	12.7	3
VPZ40LABK7-GS-AR	-	DN40CF	70	38	12.7	3
VPZ64BK7-GS-AR	VPZ64BK7-GS-NM-AR	DN63CF	114	63	17.4	3
VPZ100BK7-GS-AR	VPZ100BK7-GS-NM-AR	DN100CF	152	89	19.9	4
VPZ160BK7-GS-AR	VPZ160BK7-GS-NM-AR	DN160CF	203	136	22.3	4

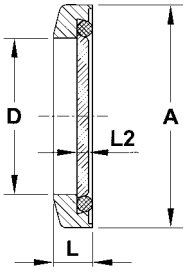
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BK7-GS-VAR	VPZ16BK7-GS-NM-VAR	DN16CF	34	16	12.7	3
VPZ40BK7-GS-VAR	VPZ40BK7-GS-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LABK7-GS-VAR	-	DN40CF	70	38	12.7	3
VPZ64BK7-GS-VAR	VPZ64BK7-GS-NM-VAR	DN63CF	114	63	17.4	3
VPZ100BK7-GS-VAR	VPZ100BK7-GS-NM-VAR	DN100CF	152	89	19.9	4
VPZ160BK7-GS-VAR	VPZ160BK7-GS-NM-VAR	DN160CF	203	136	22.3	4

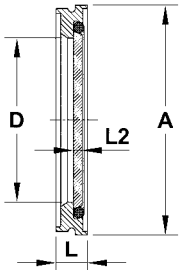
With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BK7-GS-BBAR	VPZ16BK7-GS-NM-BBAR	DN16CF	34	16	12.7	3
VPZ40BK7-GS-BBAR	VPZ40BK7-GS-NM-BBAR	DN40CF	70	32	12.7	3
VPZ4038LABK7-GS-BBAR	-	DN40CF	70	38	12.7	3
VPZ64BK7-GS-BBAR	VPZ64BK7-GS-NM-BBAR	DN63CF	114	63	17.4	3
VPZ100BK7-GS-BBAR	VPZ100BK7-GS-NM-BBAR	DN100CF	152	89	19.9	4
VPZ160BK7-GS-BBAR	VPZ160BK7-GS-NM-BBAR	DN160CF	203	136	22.3	4

Quartz, Exchangeable Window



KF flange



ISO flange

Technical data

Specifications	KF and ISO-K viewport with exchangeable quartz window - flat construction - easy assembly and disassembly
Connection	KF and ISO-K flange
Leak rate	< 1.0E-8 mbar l/s
Window material	quartz
Flatness	< 4 λ
Flange material (magnetic)	stainless steel - 304L (1.4307)
Seal	FKM O-ring
Transmission range	0.3 - 4.0 µm
Temperature range	to 150 °C bakeable

Standard

Order code	Flange	A	D	L	L2
KVPZ40QTCRSV	DN40KF	57	40	10.0	3.8
KVPZ50QTCRSV	DN50KF	77	50	10.0	3.8
ISOVPZ63QTCRSV	DN63ISO	98	70	13.5	3.8
ISOVPZ100QTCRSV	DN100ISO	133	102	13.0	5
ISOVPZ160QTCRSV	DN160ISO	183	153	17.0	6

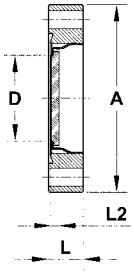
Accessories, replacement windows

Order code	Flange	Accessories for
KF40VPQUARZ	DN40KF	KVPZ40QTCRSV
KF50VPQUARZ	DN50KF	KVPZ50QTCRSV
ISO63VPQUARZ	DN63ISO	ISOVPZ63QTCRSV
ISO100VPQUARZ	DN100ISO	ISOVPZ100QTCRSV
ISO160VPQUARZ	DN160ISO	ISOVPZ160QTCRSV

Accessories, replacement O-rings

Order code	Flange
KF40VR	DN40KF
KF50VR	DN50KF
ISO63VR-VP	DN63ISO
ISO100VR-VP	DN100ISO
ISO160VR-VP	DN160ISO

Quartz, Fused Silica Spectrosil 2000®, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected quartz (fused silica Spectrosil 2000®) window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	fused silica Spectrosil 2000®
Transmission range	0.19 - 2.0 µm
Temperature range	to 200 °C
Surface quality	20/10 (scratch/dig)
Flatness	< 8 λ (better surface quality and flatness on request)
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
Coating	detailed information see introduction
• narrow band (1QWOT or "V" coating)	possible coating range 194 - 1200 nm
• broadband	Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16QS-MB	**VPZ16QS-MB-NM**	DN16CF	34	16	12.7	1.5
VPZ40QS-MB	**VPZ40QS-MB-NM**	DN40CF	70	32	12.7	3
VPZ40LAQS-MB	**-**	DN40CF	70	38	12.7	3,5
VPZ64QS-MB	**VPZ64QS-MB-NM**	DN63CF	114	63	17.4	4.5
VPZ100QS-MB	**VPZ100QS-MB-NM**	DN100CF	152	89	19.9	6
VPZ160QS-MB	**VPZ160QS-MB-NM**	DN160CF	203	136	22.3	9.5

Quartz, Fused Silica Spectrosil 2000®, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QS-MB-AR	VPZ16QS-MB-NM-AR	DN16CF	34	16	12.7	1.5
VPZ40QS-MB-AR	VPZ40QS-MB-NM-AR	DN40CF	70	32	12.7	3
VPZ40LAQS-MB-AR	-	DN40CF	70	38	12.7	3.5
VPZ64QS-MB-AR	VPZ64QS-MB-NM-AR	DN63CF	114	63	17.4	4.5
VPZ100QS-MB-AR	VPZ100QS-MB-NM-AR	DN100CF	152	89	19.9	6
VPZ160QS-MB-AR	VPZ160QS-MB-NM-AR	DN160CF	203	136	22.3	9.5

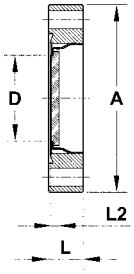
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QS-MB-VAR	VPZ16QS-MB-NM-VAR	DN16CF	34	16	12.7	1.5
VPZ40QS-MB-VAR	VPZ40QS-MB-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LAQS-MB-VAR	-	DN40CF	70	38	12.7	3.5
VPZ64QS-MB-VAR	VPZ64QS-MB-NM-VAR	DN63CF	114	63	17.4	4.5
VPZ100QS-MB-VAR	VPZ100QS-MB-NM-VAR	DN100CF	152	89	19.9	6
VPZ160QS-MB-VAR	VPZ160QS-MB-NM-VAR	DN160CF	203	136	22.3	9.5

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QS-MB-BBAR	VPZ16QS-MB-NM-BBAR	DN16CF	34	16	12.7	1.5
VPZ40QS-MB-BBAR	VPZ40QS-MB-NM-BBAR	DN40CF	70	32	12.7	3
VPZ40LAQS-MB-BBAR	-	DN40CF	70	38	12.7	3.5
VPZ64QS-MB-BBAR	VPZ64QS-MB-NM-BBAR	DN63CF	114	63	17.4	4.5
VPZ100QS-MB-BBAR	VPZ100QS-MB-NM-BBAR	DN100CF	152	89	19.9	6
VPZ160QS-MB-BBAR	VPZ160QS-MB-NM-BBAR	DN160CF	203	136	22.3	9.5

Quartz, Z-cut, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected quartz (Z-cut) window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	quartz (Z-cut)
Transmission range	0.3 - 4.0 µm
Temperature range	to 200 °C
Surface quality	20/10 (scratch/dig)
Flatness	< 8 λ (better surface quality and flatness on request)
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
Coating	detailed information see introduction
• narrow band (1QWOT or "V" coating)	possible coating range 194 - 1200 nm
• broadband	Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16QZCUT-MB	**VPZ16QZCUT-MB-NM**	DN16CF	34	16	12.7	1.5
VPZ40QZCUT-MB	**VPZ40QZCUT-MB-NM**	DN40CF	70	32	12.7	3
VPZ40LAQZCUT-MB	**-**	DN40CF	70	38	12.7	3.5
VPZ64QZCUT-MB	**VPZ64QZCUT-MB-NM**	DN63CF	114	63	17.4	4.5
VPZ100QZCUT-MB	**VPZ100QZCUT-MB-NM**	DN100CF	152	89	19.9	6
VPZ160QZCUT-MB	**VPZ160QZCUT-MB-NM**	DN160CF	203	136	22.3	9.5

Quartz, Z-cut, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QZCUT-MB-AR	VPZ16QZCUT-MB-NM-AR	DN16CF	34	16	12.7	1.5
VPZ40QZCUT-MB-AR	VPZ40QZCUT-MB-NM-AR	DN40CF	70	32	12.7	3
VPZ40LAQZCUT-MB-AR	-	DN40CF	70	38	12.7	3.5
VPZ64QZCUT-MB-AR	VPZ64QZCUT-MB-NM-AR	DN63CF	114	63	17.4	4.5
VPZ100QZCUT-MB-AR	VPZ100QZCUT-MB-NM-AR	DN100CF	152	89	19.9	6
VPZ160QZCUT-MB-AR	VPZ160QZCUT-MB-NM-AR	DN160CF	203	136	22.3	9.5

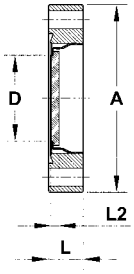
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QZCUT-MB-VAR	VPZ16QZCUT-MB-NM-VAR	DN16CF	34	16	12.7	1.5
VPZ40QZCUT-MB-VAR	VPZ40QZCUT-MB-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LAQZCUT-MB-VAR	-	DN40CF	70	38	12.7	3.5
VPZ64QZCUT-MB-VAR	VPZ64QZCUT-MB-NM-VAR	DN63CF	114	63	17.4	4.5
VPZ100QZCUT-MB-VAR	VPZ100QZCUT-MB-NM-VAR	DN100CF	152	89	19.9	6
VPZ160QZCUT-MB-VAR	VPZ160QZCUT-MB-NM-VAR	DN160CF	203	136	22.3	9.5

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16QZCUT-MB-BBAR	VPZ16QZCUT-MB-NM-BBAR	DN16CF	34	16	12.7	1.5
VPZ40QZCUT-MB-BBAR	VPZ40QZCUT-MB-NM-BBAR	DN40CF	70	32	12.7	3
VPZ40LAQZCUT-MB-BBAR	-	DN40CF	70	38	12.7	3.5
VPZ64QZCUT-MB-BBAR	VPZ64QZCUT-MB-NM-BBAR	DN63CF	114	63	17.4	4.5
VPZ100QZCUT-MB-BBAR	VPZ100QZCUT-MB-NM-BBAR	DN100CF	152	89	19.9	6
VPZ160QZCUT-MB-BBAR	VPZ160QZCUT-MB-NM-BBAR	DN160CF	203	136	22.3	9.5

Magnesium Fluoride Optically Polished, Unexchangeable Window



Technical data

■ Specifications	CF viewport with firmly connected magnesium fluoride window
■ Connection	CF flange
■ Leak rate	< 1.0E-10 mbar l/s
■ Window material	magnesium fluoride
■ Transmission range	0.12 - 7.0 µm
■ Temperature range	to 120 °C
■ Surface quality	60/40 (scratch/dig)
■ Flatness	< 4 λ (better surface quality and flatness on request)
■ Magnetic type • flange material	 stainless steel - 304L (1.4307)
■ Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
■ Coating • narrow band (1QWOT or "V" coating) • broadband	detailed information see introduction possible coating range 194 - 1200 nm Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16MGF2-BO	**VPZ16MGF2-BO-NM**	DN16CF	34	16	12.7	1.5
VPZ40MGF2-BO	**VPZ40MGF2-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LAMGF2-BO	**-**	DN40CF	70	38	12.7	4
VPZ64MGF2-BO	**VPZ64MGF2-BO-NM**	DN63CF	114	63	17.4	5
VPZ100MGF2-BO	**VPZ100MGF2-BO-NM**	DN100CF	152	89	19.9	6.5
VPZ160MGF2-BO	**VPZ160MGF2-BO-NM**	DN160CF	203	136	22.3	9.5

Magnesium Fluoride Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16MGF2-BO-AR	VPZ16MGF2-BO-NM-AR	DN16CF	34	16	12.7	1.5
VPZ40MGF2-BO-AR	VPZ40MGF2-BO-NM-AR	DN35CF	70	32	12.7	3
VPZ40LAMGF2-BO-AR	-	DN35CF	70	38	12.7	4
VPZ64MGF2-BO-AR	VPZ64MGF2-BO-NM-AR	DN63CF	114	63	17.5	5
VPZ100MGF2-BO-AR	VPZ100MGF2-BO-NM-AR	DN100CF	152	89	19.9	6.5
VPZ160MGF2-BO-AR	VPZ160MGF2-BO-NM-AR	DN150CF	203	136	22.3	9.5

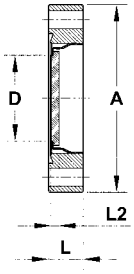
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16MGF2-BO-VAR	VPZ16MGF2-BO-NM-VAR	DN16CF	34	16	12.7	1.5
VPZ40MGF2-BO-VAR	VPZ40MGF2-BO-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LAMGF2-BO-VAR	-	DN40CF	70	38	12.7	4
VPZ64MGF2-BO-VAR	VPZ64MGF2-BO-NM-VAR	DN63CF	114	63	17.4	5
VPZ100MGF2-BO-VAR	VPZ100MGF2-BO-NM-VAR	DN100CF	152	89	19.9	6.5
VPZ160MGF2-BO-VAR	VPZ160MGF2-BO-NM-VAR	DN160CF	203	136	22.3	9.5

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16MGF2-BO-BBAR	VPZ16MGF2-BO-NM-BBAR	DN16CF	34	16	12.7	1.5
VPZ40MGF2-BO-BBAR	VPZ40MGF2-BO-NM-BBAR	DN40CF	70	32	12.7	3
VPZ40LAMGF2-BO-BBAR	-	DN40CF	70	38	12.7	4
VPZ64MGF2-BO-BBAR	VPZ64MGF2-BO-NM-BBAR	DN63CF	114	63	17.4	5
VPZ100MGF2-BO-BBAR	VPZ100MGF2-BO-NM-BBAR	DN100CF	152	89	19.9	6.5
VPZ160MGF2-BO-BBAR	VPZ160MGF2-BO-NM-BBAR	DN160CF	203	136	22.3	9.5

Calcium Fluoride Optically Polished, Unexchangeable Window



Technical data

■ Specifications	CF viewport with firmly connected calcium fluoride window
■ Connection	CF flange
■ Leak rate	< 1.0E-10 mbar l/s
■ Window material	calcium fluoride
■ Transmission range	0.13 - 10.0 µm
■ Temperature range	to 120 °C
■ Surface quality	80/50 (scratch/dig)
■ Flatness	< 4 λ (better surface quality and flatness on request)
■ Magnetic type • flange material	 stainless steel - 304L (1.4307)
■ Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
■ Coating • narrow band (1QWOT or "V" coating) • broadband	detailed information see introduction possible coating range 194 - 1200 nm Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16CAF2-BO	**VPZ16CAF2-BO-NM**	DN16CF	34	16	12.7	1.5
VPZ40CAF2-BO	**VPZ40CAF2-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LACAF2-BO	**-**	DN40CF	70	38	12.7	4
VPZ64CAF2-BO	**VPZ64CAF2-BO-NM**	DN63CF	114	63	17.4	5
VPZ100CAF2-BO	**VPZ100CAF2-BO-NM**	DN100CF	152	89	19.9	7
VPZ160CAF2-BO	**VPZ160CAF2-BO-NM**	DN160CF	203	136	22.3	11

Calcium Fluoride Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16CAF2-BO-AR	VPZ16CAF2-BO-NM-AR	DN16CF	34	16	12.7	1.5
VPZ40CAF2-BO-AR	VPZ40CAF2-BO-NM-AR	DN40CF	70	32	12.7	3
VPZ40LACAF2-BO-AR	-	DN40CF	70	38	12.7	4
VPZ64CAF2-BO-AR	VPZ64CAF2-BO-NM-AR	DN63CF	114	63	17.4	5
VPZ100CAF2-BO-AR	VPZ100CAF2-BO-NM-AR	DN100CF	152	89	19.9	7
VPZ160CAF2-BO-AR	VPZ160CAF2-BO-NM-AR	DN160CF	203	136	22.3	11

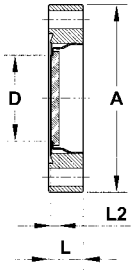
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16CAF2-BO-VAR	VPZ16CAF2-BO-NM-VAR	DN16CF	34	16	12.7	1.5
VPZ40CAF2-BO-VAR	VPZ40CAF2-BO-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LACAF2-BO-VAR	-	DN40CF	70	38	12.7	4
VPZ64CAF2-BO-VAR	VPZ64CAF2-BO-NM-VAR	DN63CF	114	63	17.4	5
VPZ100CAF2-BO-VAR	VPZ100CAF2-BO-NM-VAR	DN100CF	152	89	19.9	7
VPZ160CAF2-BO-VAR	VPZ160CAF2-BO-NM-VAR	DN160CF	203	136	22.3	11

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16CAF2-BO-BBAR	VPZ16CAF2-BO-NM-BBAR	DN16CF	34	16	12.7	1.5
VPZ40CAF2-BO-BBAR	VPZ40CAF2-BO-NM-BBAR	DN40CF	70	32	12.7	3
VPZ40LACAF2-BO-BBAR	-	DN40CF	70	38	12.7	4
VPZ64CAF2-BO-BBAR	VPZ64CAF2-BO-NM-BBAR	DN63CF	114	63	17.4	5
VPZ100CAF2-BO-BBAR	VPZ100CAF2-BO-NM-BBAR	DN100CF	152	89	19.9	7
VPZ160CAF2-BO-BBAR	VPZ160CAF2-BO-NM-BBAR	DN160CF	203	136	22.3	11

Barium Fluoride Optically Polished, Unexchangeable Window



Technical data

■ Specifications	CF viewport with firmly connected barium fluoride window
■ Connection	CF flange
■ Leak rate	< 1.0E-10 mbar l/s
■ Window material	barium fluoride
■ Transmission range	0.15 - 12.5 µm
■ Temperature range	to 120 °C
■ Surface quality	60/40 (scratch/dig)
■ Flatness	< 4 λ (better surface quality and flatness on request)
■ Magnetic type • flange material	 stainless steel - 304L (1.4307)
■ Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
■ Coating • narrow band (1QWOT or "V" coating) • broadband	detailed information see introduction possible coating range 194 - 1200 nm

Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16BAF2-BO	**VPZ16BAF2-BO-NM**	DN16CF	34	16	12.7	2
VPZ40BAF2-BO	**VPZ40BAF2-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LABAF2-BO	**-**	DN40CF	70	38	12.7	5
VPZ64BAF2-BO	**VPZ64BAF2-BO-NM**	DN63CF	114	63	17.4	7
VPZ100BAF2-BO	**VPZ100BAF2-BO-NM**	DN100CF	152	89	19.9	9
VPZ160BAF2-BO	**VPZ160BAF2-BO-NM**	DN160CF	203	136	22.3	14

Barium Fluoride Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BAF2-BO-AR	VPZ16BAF2-BO-NM-AR	DN16CF	34	16	12.7	2
VPZ40BAF2-BO-AR	VPZ40BAF2-BO-NM-AR	DN40CF	70	32	12.7	3
VPZ40LABAF2-BO-AR	-	DN40CF	70	38	12.7	5
VPZ64BAF2-BO-AR	VPZ64BAF2-BO-NM-AR	DN63CF	114	63	17.4	7
VPZ100BAF2-BO-AR	VPZ100BAF2-BO-NM-AR	DN100CF	152	89	19.9	9
VPZ160BAF2-BOX-AR	VPZ160BAF2-BO-NM-AR	DN160CF	203	136	22.3	14

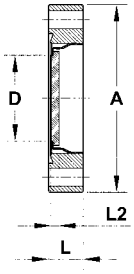
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BAF2-BO-VAR	VPZ16BAF2-BO-NM-VAR	DN16CF	34	16	12.7	2
VPZ40BAF2-BO-VAR	VPZ40BAF2-BO-NM-VAR	DN40CF	70	32	12.7	3
VPZ40LABAF2-BO-VAR	-	DN40CF	70	38	12.7	5
VPZ64BAF2-BO-VAR	VPZ64BAF2-BO-NM-VAR	DN63CF	114	63	17.4	7
VPZ100BAF2-BO-VAR	VPZ100BAF2-BO-NM-VAR	DN100CF	152	89	19.9	9
VPZ160BAF2-BO-VAR	VPZ160BAF2-BO-NM-VAR	DN160CF	203	136	22.3	14

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16BAF2-BO-BBAR	VPZ16BAF2-BO-NM-BBAR	DN16CF	34	16	12.7	2
VPZ40BAF2-BO-BBAR	VPZ40BAF2-BO-NM-BBAR	DN40CF	70	32	12.7	3
VPZ40LABAF2-BO-BBAR	-	DN40CF	70	38	12.7	5
VPZ64BAF2-BO-BBAR	VPZ64BAF2-BO-NM-BBAR	DN63CF	114	63	17.4	7
VPZ100BAF2-BO-BBAR	VPZ100BAF2-BO-NM-BBAR	DN100CF	152	89	19.9	9
VPZ160BAF2-BO-BBAR	VPZ160BAF2-BO-NM-BBAR	DN160CF	203	136	22.3	14

Lithium Fluoride Optically Polished, Unexchangeable Window



Technical data

■ Specifications	CF viewport with firmly connected lithium fluoride window
■ Connection	CF flange
■ Leak rate	< 1.0E-10 mbar l/s
■ Window material	lithium fluoride
■ Transmission range	0.12 - 6.0 µm
■ Temperature range	to 120 °C
■ Surface quality	60/40 (scratch/dig)
■ Flatness	< 4 λ (better surface quality and flatness on request)
■ Magnetic type • flange material	 stainless steel - 304L (1.4307)
■ Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
■ Coating • narrow band (1QWOT or "V" coating) • broadband	detailed information see introduction possible coating range 194 - 1200 nm Please add the required wavelength or wavelength range to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16LIF2-BO	**VPZ16LIF2-BO-NM**	DN16CF	34	16	12.7	2
VPZ40LIF2-BO	**VPZ40LIF2-BO-NM**	DN40CF	70	32	12.7	5
VPZ40LALIF2-BO	**-**	DN40CF	70	38	12.7	7
VPZ64LIF2-BO	**VPZ64LIF2-BO-NM**	DN63CF	114	63	17.4	10
VPZ100LIF2-BO	**VPZ100LIF2-BO-NM**	DN100CF	152	89	19.9	14
VPZ160LIF2-BO	**VPZ160LIF2-BO-NM**	DN160CF	203	136	22.3	20

Lithium Fluoride Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16LIF2-BO-AR	VPZ16LIF2-BO-NM-AR	DN16CF	34	16	12.7	2
VPZ40LIF2-BO-AR	VPZ40LIF2-BO-NM-AR	DN40CF	70	32	12.7	5
VPZ40LALIF2-BO-AR	-	DN40CF	70	38	12.7	7
VPZ64LIF2-BO-AR	VPZ64LIF2-BO-NM-AR	DN63CF	114	63	17.4	10
VPZ100LIF2-BO-AR	VPZ100LIF2-BO-NM-AR	DN100CF	152	89	19.9	14
VPZ160LIF2-BO-AR	VPZ160LIF2-BO-NM-AR	DN160CF	203	136	22.3	20

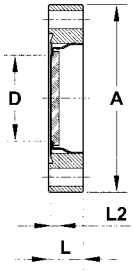
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16LIF2-BO-VAR	VPZ16LIF2-BO-NM-VAR	DN16CF	34	16	12.7	2
VPZ40LIF2-BO-VAR	VPZ40LIF2-BO-NM-VAR	DN40CF	70	32	12.7	5
VPZ40LALIF2-BO-VAR	-	DN40CF	70	38	12.7	7
VPZ64LIF2-BO-VAR	VPZ64LIF2-BO-NM-VAR	DN63CF	114	63	17.4	10
VPZ100LIF2-BO-VAR	VPZ100LIF2-BO-NM-VAR	DN100CF	152	89	19.9	14
VPZ160LIF2-BO-VAR	VPZ160LIF2-BO-NM-VAR	DN160CF	203	136	22.3	20

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16LIF2-BO-BBAR	VPZ16LIF2-BO-NM-BBAR	DN16CF	34	16	12.7	2
VPZ40LIF2-BO-BBAR	VPZ40LIF2-BO-NM-BBAR	DN40CF	70	32	12.7	5
VPZ40LALIF2-BO-BBAR	-	DN40CF	70	38	12.7	7
VPZ64LIF2-BO-BBAR	VPZ64LIF2-BO-NM-BBAR	DN63CF	114	63	17.4	10
VPZ100LIF2-BO-BBAR	VPZ100LIF2-BO-NM-BBAR	DN100CF	152	89	19.9	14
VPZ160LIF2-BO-BBAR	VPZ160LIF2-BO-NM-BBAR	DN160CF	203	136	22.3	20

IR Optics, Sapphire Optically Polished, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected sapphire window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	sapphire
Transmission range	0.25 - 4.0 µm
Temperature range	to 4500 °C
Surface quality	60/40 (scratch/dig)
Flatness	< 8 λ (better surface quality and flatness on request)
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
Coating	detailed information see introduction
• narrow band (1QWOT or "V" coating)	possible coating range 194 - 1200 nm
• broadband	

Please add the required wavelength
or wavelength range
to the order code

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16S-MB	**VPZ16S-MB-NM**	DN16CF	34	16	12.7	1.5
VPZ40S-MB	**VPZ40S-MB-NM**	DN40CF	70	32	12.7	1.5
VPZ40LAS-MB	**-**	DN40CF	70	38	12.7	1.5
VPZ64S-MB	**VPZ64S-MB-NM**	DN63CF	114	63	17.4	2
VPZ100S-MB	**VPZ100S-MB-NM**	DN100CF	152	89	19.9	3
VPZ160S-MB	**VPZ160S-MB-NM**	DN160CF	203	136	22.3	4

IR Optics, Sapphire Optically Polished, Unexchangeable Window

With antireflection coating, 1QWOT

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16S-MB-AR	VPZ16S-MB-NM-AR	DN16CF	34	16	12.7	1.5
VPZ40S-MB-AR	VPZ40S-MB-NM-AR	DN40CF	70	32	12.7	1.5
VPZ40LAS-MB-AR	-	DN40CF	70	38	12.7	1.5
VPZ64S-MB-AR	VPZ64S-MB-NM-AR	DN63CF	114	63	17.4	2
VPZ100S-MB-AR	VPZ100S-MB-NM-AR	DN100CF	152	89	19.9	3
VPZ160S-MB-AR	VPZ160S-MB-NM-AR	DN160CF	203	136	22.3	4

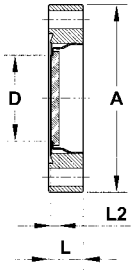
With antireflection coating, "V" coating

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16S-MB-VAR	VPZ16S-MB-NM-VAR	DN16CF	34	16	12.7	1.5
VPZ40S-MB-VAR	VPZ40S-MB-NM-VAR	DN40CF	70	32	12.7	1.5
VPZ40LAS-MB-VAR	-	DN40CF	70	38	12.7	1.5
VPZ64S-MB-VAR	VPZ64S-MB-NM-VAR	DN63CF	114	63	17.4	2
VPZ100S-MB-VAR	VPZ100S-MB-NM-VAR	DN100CF	152	89	19.9	3
VPZ160S-MB-VAR	VPZ160S-MB-NM-VAR	DN160CF	203	136	22.3	4

With antireflection coating, broadband

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16S-MB-BBAR	VPZ16S-MB-NM-BBAR	DN16CF	34	16	12.7	1.5
VPZ40S-MB-BBAR	VPZ40S-MB-NM-BBAR	DN40CF	70	32	12.7	1.5
VPZ40LAS-MB-BBAR	-	DN40CF	70	38	12.7	1.5
VPZ64S-MB-BBAR	VPZ64S-MB-NM-BBAR	DN63CF	114	63	17.4	2
VPZ100S-MB-BBAR	VPZ100S-MB-NM-BBAR	DN100CF	152	89	19.9	3
VPZ160S-MB-BBAR	VPZ160S-MB-NM-BBAR	DN160CF	203	136	22.3	4

IR Optics, Zinc Selenide Optically Polished, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected zinc selenide window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	zinc selenide (optically polished)
Transmission range	0.6 - 21.0 µm
Temperature range	to 120 °C
Surface quality	60/40 (scratch/dig)
Flatness	< 2 λ (better surface quality and flatness on request)
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
Coating	for detailed information see introduction
• AR 10.6	antireflection coating at 10.6 µm

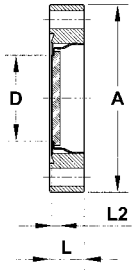
Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ZNSE-BO	**VPZ16ZNSE-BO-NM**	DN16CF	34	16	12.7	1.5
VPZ40ZNSE-BO	**VPZ40ZNSE-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LAZNSE-BO	**-**	DN40CF	70	38	12.7	3.75
VPZ64ZNSE-BO	**VPZ64ZNSE-BO-NM**	DN63CF	114	63	17.4	5
VPZ100ZNSE-BO	**VPZ100ZNSE-BO-NM**	DN100CF	152	89	19.9	6.5
VPZ160ZNSE-BO	**VPZ160ZNSE-BO-NM**	DN160CF	203	136	22.3	9.5

With antireflection coating, AR 10.6

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ZNSE-BO-AR-10600	**VPZ16ZNSE-BO-NM-AR-10600**	DN16CF	34	16	12.7	1.5
VPZ40ZNSE-BO-AR-10600	**VPZ40ZNSE-BO-NM-AR-10600**	DN40CF	70	32	12.7	3
VPZ40LAZNSE-BO-AR-10600	**-**	DN40CF	70	38	12.7	3.75
VPZ64ZNSE-BO-AR-10600	**VPZ64ZNSE-BO-NM-AR-10600**	DN63CF	114	63	17.4	5
VPZ100ZNSE-BO-AR-10600	**VPZ100ZNSE-BO-NM-AR-10600**	DN100CF	152	89	19.9	6.5
VPZ160ZNSE-BO-AR-10600	**VPZ160ZNSE-BO-NM-AR-10600**	DN160CF	203	136	22.3	9.5

IR Optics, Zinc Sulfide Optically Polished, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected zinc sulfide window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	zinc sulfide
Transmission range	0.37 - 13.5 µm
Temperature range	to 120 °C
Surface quality	60/40 (scratch/dig)
Flatness	< 2 λ (better surface quality and flatness on request)
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
Non-magnetic type	
• flange material	stainless steel - 316LN (1.4429)
• glass-to-metal connection	tantalum
Coating	for detailed information see introduction
• AR 10.6	antireflection coating at 10.6 µm

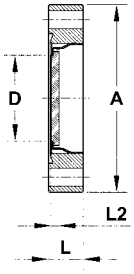
Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ZNS-BO	**VPZ16ZNS-BO-NM**	DN16CF	34	16	12.7	1.5
VPZ40ZNS-BO	**VPZ40ZNS-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LAZNS-BO	**-**	DN40CF	70	38	12.7	3.5
VPZ64ZNS-BO	**VPZ64ZNS-BO-NM**	DN63CF	114	63	17.4	5
VPZ100ZNS-BO	**VPZ100ZNS-BO-NM**	DN100CF	152	89	19.9	6
VPZ160ZNS-BO	**VPZ160ZNS-BO-NM**	DN160CF	203	136	22.3	9.5

With antireflection coating, AR 10.6

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ZNS-BO-AR-10600	**VPZ16ZNS-BO-NM-AR-10600**	DN16CF	34	16	12.7	1.5
VPZ40ZNS-BO-AR-10600	**VPZ40ZNS-BO-NM-AR-10600**	DN40CF	70	32	12.7	3
VPZ40LAZNS-BO-AR-10600	**-**	DN40CF	70	38	12.7	3.5
VPZ64ZNS-BO-AR-10600	**VPZ64ZNS-BO-NM-AR-10600**	DN63CF	114	63	17.4	5
VPZ100ZNS-BO-AR-10600	**VPZ100ZNS-BO-NM-AR-10600**	DN100CF	152	89	19.9	6
VPZ160ZNS-BO-AR-10600	**VPZ160ZNS-BO-NM-AR-10600**	DN160CF	203	136	22.3	9.5

IR Optics, Silicon Optically Polished, Unexchangeable Window



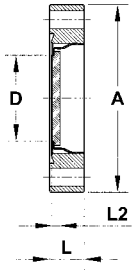
Technical data

Specifications	CF viewport with firmly connected silicon window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	silicon optically polished
Transmission range	1.2 - 15.0 µm
Temperature range	to 120 °C
Surface quality	20/10 (scratch/dig)
Flatness	< 4 λ (better surface quality and flatness on request)
Magnetic type • flange material	 stainless steel - 304L (1.4307)
Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16SI-BO	**VPZ16SI-BO-NM**	DN16CF	34	16	12.7	2
VPZ40SI-BO	**VPZ40SI-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LASI-BO	**-**	DN40CF	70	38	12.7	3
VPZ64SI-BO	**VPZ64SI-BO-NM**	DN63CF	114	63	17.4	4
VPZ100SI-BO	**VPZ100SI-BO-NM**	DN100CF	152	89	19.9	4.5
VPZ160SI-BO	**VPZ160SI-BO-NM**	DN160CF	203	136	22.3	7.5

IR Optics, Germanium Optically Polished, Unexchangeable Window



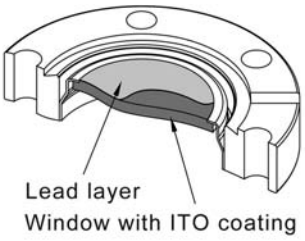
Technical data

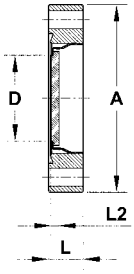
■ Specifications	CF viewport with firmly connected germanium window
■ Connection	CF flange
■ Leak rate	< 1.0E-10 mbar l/s
■ Window material	germanium optically polished
■ Transmission range	1.8 - 23.0 µm
■ Temperature range	to 120 °C
■ Surface quality	20/10 (scratch/dig)
■ Flatness	< 4 λ (better surface quality and flatness on request)
■ Magnetic type • flange material	 stainless steel - 304L (1.4307)
■ Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16GE-BO	**VPZ16GE-BO-NM**	DN16CF	34	16	12.7	2
VPZ40GE-BO	**VPZ40GE-BO-NM**	DN40CF	70	32	12.7	3
VPZ40LAGE-BO	**-**	DN40CF	70	38	12.7	3
VPZ64GE-BO	**VPZ64GE-BO-NM**	DN63CF	114	63	17.4	4
VPZ100GE-BO	**VPZ100GE-BO-NM**	DN100CF	152	89	19.9	4.5
VPZ160GE-BO	**VPZ160GE-BO-NM**	DN160CF	203	136	22.3	7.5

Borosilicate, Unexchangeable Window





Technical data

Specifications	CF viewport with firmly connected borosilicate window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	borosilicate
Transmission range	0.4 - 2.0 µm
Temperature range	to 350 °C
Surface quality	80/50 (scratch/dig)
Flatness	< 4 λ
Magnetic type • flange material	 stainless steel - 304L (1.4307)
Non-magnetic type • flange material	 stainless steel - 316LN (1.4429)
Coating • ITO • RHEED screen	for detailed information see introduction ITO + phosphor (standard phosphor types are P11, P20, P22 and P43, further types on request)

With ITO coating

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ITO-MB	**VPZ16ITO-MB-NM**	DN16CF	34	16	12.7	1
VPZ40ITO-MB	**VPZ40ITO-MB-NM**	DN40CF	70	32	12.7	2.5
VPZ40LAITO-MB	**-**	DN40CF	70	38	12.7	3
VPZ64ITO-MB	**VPZ64ITO-MB-NM**	DN63CF	114	63	17.4	3
VPZ100ITO-MB	**VPZ100ITO-MB-NM**	DN100CF	152	89	19.9	4
VPZ160ITO-MB	**VPZ160ITO-MB-NM**	DN160CF	203	136	22.3	6.5

With ITO coating and lead glass screen

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16ITOLG-MB	**VPZ16ITOLG-MB-NM**	DN16CF	34	16	12.7	1
VPZ40ITOLG-MB	**VPZ40ITOLG-MB-NM**	DN40CF	70	32	12.7	2.5
VPZ64ITOLG-MB	**VPZ64ITOLG-MB-NM**	DN63CF	114	63	17.4	3
VPZ100ITOLG-MB	**VPZ100ITOLG-MB-NM**	DN100CF	152	89	19.9	4
VPZ160ITOLG-MB	**VPZ160ITOLG-MB-NM**	DN160CF	203	136	22.3	6.5

Borosilicate, Unexchangeable Window

With ITO coating and RHEED screen (P11)

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITO-MB-11	VPZ16ITO-MB-NM-11	DN16CF	34	16	12.7	1
VPZ40ITO-MB-11	VPZ40ITO-MB-NM-11	DN40CF	70	32	12.7	2.5
VPZ40LAITO-MB-11	-	DN40CF	70	38	12.7	3
VPZ64ITO-MB-11	VPZ40ITO-MB-NM-11	DN63CF	114	63	17.4	3
VPZ100ITO-MB-11	VPZ64ITO-MB-NM-11	DN100CF	152	89	19.9	4
VPZ160ITO-MB-11	VPZ160ITO-MB-NM-11	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P20)

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITO-MB-20	VPZ16ITO-MB-NM-20	DN16CF	34	16	12.7	1
VPZ40ITO-MB-20	VPZ40ITO-MB-NM-20	DN40CF	70	32	12.7	2.5
VPZ40LAITO-MB-20	-	DN40CF	70	38	12.7	3
VPZ64ITO-MB-20	VPZ64ITO-MB-NM-20	DN63CF	114	63	17.4	3
VPZ100ITO-MB-20	VPZ100ITO-MB-NM-20	DN100CF	152	89	19.9	4
VPZ160ITO-MB-20	VPZ160ITO-MB-NM-20	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P22)

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITO-MB-22	VPZ16ITO-MB-NM-22	DN16CF	34	16	12.7	1
VPZ40ITO-MB-22	VPZ40ITO-MB-NM-22	DN40CF	70	32	12.7	2.5
VPZ40LAITO-MB-22	-	DN40CF	70	38	12.7	3
VPZ64ITO-MB-22	VPZ64ITO-MB-NM-22	DN63CF	114	63	17.4	3
VPZ100ITO-MB-22	VPZ100ITO-MB-NM-22	DN100CF	152	89	19.9	4
VPZ160ITO-MB-22	VPZ160ITO-MB-NM-22	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P43)

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITO-MB-43	VPZ16ITO-MB-NM-43	DN16CF	34	16	12.7	1
VPZ40ITO-MB-43	VPZ40ITO-MB-NM-43	DN40CF	70	32	12.7	2.5
VPZ40LAITO-MB-43	-	DN35CF	70	38	12.7	3
VPZ64ITO-MB-43	VPZ64ITO-MB-NM-43	DN63CF	114	63	17.4	3
VPZ100ITO-MB-43	VPZ100ITO-MB-NM-43	DN100CF	152	89	19.9	4
VPZ160ITO-MB-43	VPZ160ITO-MB-NM-43	DN160CF	203	136	22.3	6.5

Borosilicate, Unexchangeable Window

With ITO coating and RHEED screen (P11) and lead screen

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITOLG-MB-11	VPZ16ITOLG-MB-NM-11	DN16CF	34	16	12.7	1
VPZ40ITOLG-MB-11	VPZ40ITOLG-MB-NM-11	DN40CF	70	32	12.7	2.5
VPZ40LAITOLG-MB-11	-	DN40CF	70	38	12.7	3
VPZ64ITOLG-MB-11	VPZ64ITOLG-MB-NM-11	DN63CF	114	63	17.4	3
VPZ100ITOLG-MB-11	VPZ100ITOLG-MB-NM-11	DN100CF	152	89	19.9	4
VPZ160ITOLG-MB-11	VPZ160ITOLG-MB-NM-11	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P20) and lead screen

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITOLG-MB-20	VPZ16ITOLG-MB-NM-20	DN16CF	34	16	12.7	1
VPZ40ITOLG-MB-20	VPZ40ITOLG-MB-NM-20	DN40CF	70	32	12.7	2.5
VPZ40LAITOLG-MB-20	-	DN40CF	70	38	12.7	3
VPZ64ITOLG-MB-20	VPZ64ITOLG-MB-NM-20	DN63CF	114	63	17.4	3
VPZ100ITOLG-MB-20	VPZ100ITOLG-MB-NM-20	DN100CF	152	89	19.9	4
VPZ160ITOLG-MB-20	VPZ160ITOLG-MB-NM-20	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P22) and lead screen

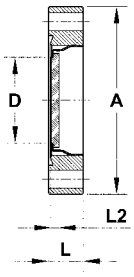
Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITOLG-MB-22	VPZ16ITOLG-MB-NM-22	DN16CF	34	16	12.7	1
VPZ40ITOLG-MB-22	VPZ40ITOLG-MB-NM-22	DN40CF	70	32	12.7	2.5
VPZ40LAITOLG-MB-22	-	DN40CF	70	38	12.7	3
VPZ64ITOLG-MB-22	VPZ64ITOLG-MB-NM-22	DN63CF	114	63	17.4	3
VPZ100ITOLG-MB-22	VPZ100ITOLG-MB-NM-22	DN100CF	152	89	19.9	4
VPZ160ITOLG-MB-22	VPZ160ITOLG-MB-NM-22	DN160CF	203	136	22.3	6.5

With ITO coating and RHEED screen (P43) and lead screen

Order code		Flange	A	D	L	L2
Magnetic	Non-magnetic					
VPZ16ITOLG-MB-43	VPZ16ITOLG-MB-NM-43	DN16CF	34	16	12.7	1
VPZ40ITOLG-MB-43	VPZ40ITOLG-MB-NM-43	DN40CF	70	32	12.7	2.5
VPZ40LAITOLG-MB-43	-	DN40CF	70	38	12.7	3
VPZ64ITOLG-MB-43	VPZ64ITOLG-MB-NM-43	DN63CF	114	63	17.4	3
VPZ100ITOLG-MB-43	VPZ100ITOLG-MB-NM-43	DN100CF	152	89	19.9	4
VPZ160ITOLG-MB-43	VPZ160ITOLG-MB-NM-43	DN160CF	203	136	22.3	6.5

Special Viewports

Beryllium, Unexchangeable Window



Technical data

Specifications	CF viewport with firmly connected beryllium window
Connection	CF flange
Leak rate	< 1.0E-10 mbar l/s
Window material	beryllium
Flatness	< 8 λ
Magnetic type	
• flange material	stainless steel - 304L (1.4307)
• glass-to-metal connection	Kovar®
• temperature range	to 350 °C

Standard

Order code		Flange	A	D	L	L2
Magnetic	**Non-magnetic**					
VPZ16BE-MB	**VPZ16BE-MS-NM**	DN16CF	34	16	12.7	0.25
VPZ40BE-MB	**VPZ40BE-MS-NM**	DN40CF	70	32	12.7	0.5
VPZ40LABE-MB	**-**	DN40CF	70	38	12.7	0.5

Viewports with Flanged Socket

KF, ISO And CF Viewports with Flanged Socket

KF, ISO and CF viewports with flanged socket made of different glass materials are available on request. Please contact your customer advisor or send a request for quotation to: info@vacom-vacuum.com.