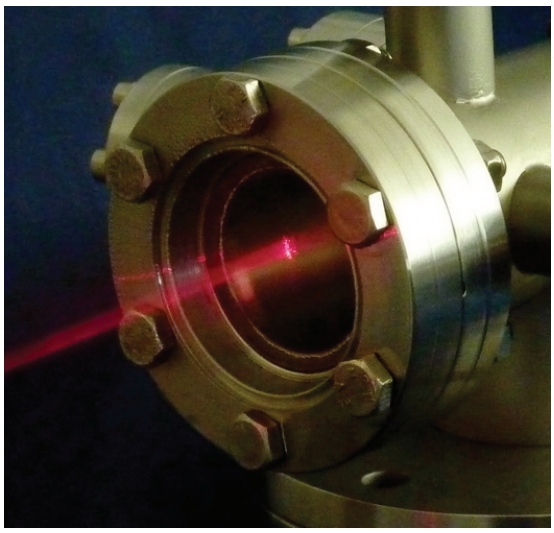
Fused Silica UHV Laser Viewports with 'VAR' Anti-Reflective Coatings

Fused Silica UHV Laser Viewports with 'VAR' Anti-Reflective Coatings

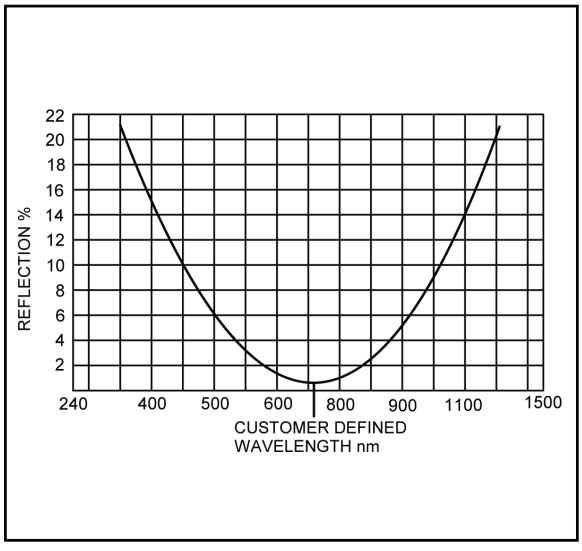


* (note, varies with wavelength, pulse width, laser type and cleanliness of optic)

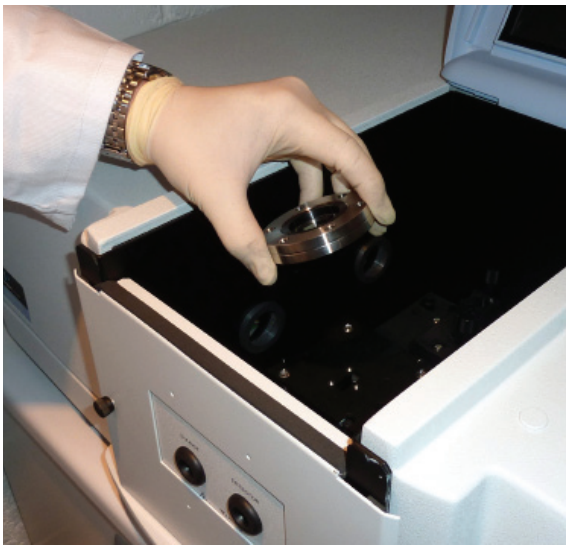
Specification	
Seal Type	Braze
Maximum Temperature	200°C
Minimum Temperature	minus 20°C
Maximum Rate of Temperature Change	3°C per minute
Leak Rate	$<1x10^{-10}$ atm-cc/sec (He)
Pressure Range	1 bar to $1x10^{-11}$ mbar
Surface Quality	20 /10 scratch/dig
Flatness	< 8λ
Laser Damage Threshold *	CW Continuous Wave - 500W/cm^2 at 530nm Pulsed 2 J/cm^2 at 530nm and 10ns pulse width
Coating	2-layer 'VAR' coating optimised to customer specified wavelength between 240nm and 1550nm
Reflectance	< 0.5% per face 1% total at the specified wavelength

Torr Scientific laser viewports are offered with a two-layer 'VAR' anti-reflective coating on both sides of the window optimised to a customer specified laser wavelength. The coating reduces reflection to below 0.5% per face or 1% total at the wavelength specified. Please advise the laser wavelength with your enquiry or order. Wavelengths between 240nm and 1550nm can be accepted as standard, although coatings for other wavelengths can be quoted on request. Viewports with coatings for a wavelength range can also be offered. The viewports comprise a high purity laser quality fused silica optic with precise flatness, parallelism, scratch and dig specifications. The ultra high vacuum (UHV) CF versions are offered using high grade 304L or 316LN stainless steel flanges. Non-magnetic viewports are offered for low energy applications or surface science applications needing low magnetic fields. The non-magnetic viewports use a tantalum weld ring instead of the regular kovar weld ring. TSL viewports are manufactured in clean room conditions and helium leak tested, cleaned and packed to UHV standards. The rugged construction of the fused silica viewports allows repeated bake-out with UHV performance, whilst the window offers broadband optical transmission through deep UV, visible to near infra-red. Non-standard viewports can be manufactured on request, including re-entrant style microscope/camera viewports. Annealed copper gaskets and other component accessories are also supplied by TSL.

Reflectance Curve



The TSL UV-Vis Spectrophotometer



Please note that the optical reflectance curves are approximations and should be used for reference only

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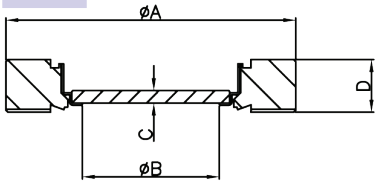
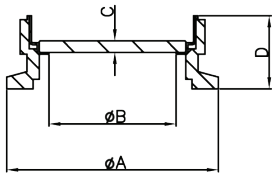
Fused Silica UHV Laser Viewports with 'VAR' Anti-Reflective Coatings

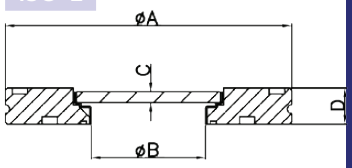
CF-1



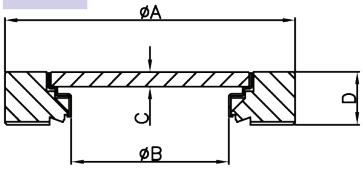
KF-1



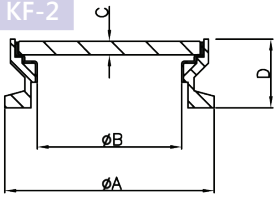
ISO-1



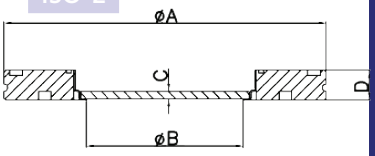
CF-2



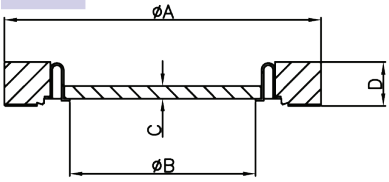
KF-2



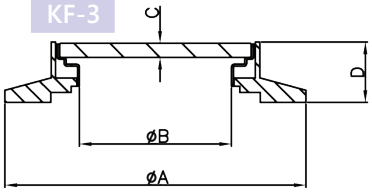
ISO-2



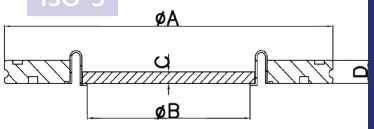
CF-3



KF-3



ISO-3

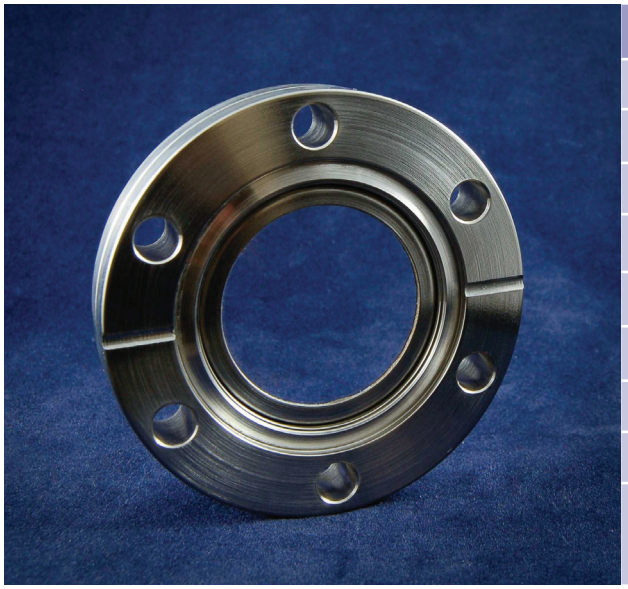


Part Number	Flange Type	A	B	C	D	Diagram	Flange Material	Weld Ring Material	Non-Magnetic
VPZ16QVAR	NW16CF	34	15	1.5	12.7	CF-1	304L	Kovar	
VPZ16QVAR-LN	NW16CF	34	15	1.5	12.7	CF-1	316LN	Kovar	
VPZ16QVAR-NM	NW16CF	34	15	1.5	12.7	CF-1	316LN	Tantalum	Yes
KVPZ16QVAR	KF16	25	15	1.5	15	KF-1	304L	Kovar	
KVPZ25QVAR	KF25	40	20	2	18.5	KF-1	304L	Kovar	
VPZ38QVAR	NW35CF	70	32	3	12.7	CF-1	304L	Kovar	
VPZ38LAQVAR	NW35CF	70	38	3.5	12.7	CF-2	304L	Kovar	
VPZ38QVAR-LN	NW35CF	70	32	3	12.7	CF-1	316LN	Kovar	
VPZ38QLAVAR-LN	NW35CF	70	38	3.5	12.7	CF-2	316LN	Kovar	
VPZ38QVAR-NM	NW35CF	70	32	3	12.7	CF-1	316LN	Tantalum	Yes
KVPZ40/32QVAR	KF40	55	32	3	12.7	KF-1	304L	Kovar	
KVPZ40QVAR	KF40	55	38	3.5	18.5	KF-2	304L	Kovar	
KVPZ50QVAR	KF50	75	38	3.5	15	KF-3	304L	Kovar	
ISO63QVPZVAR	ISO63	95	38	3.5	12	ISO-1	304L	Kovar	
VPZ64QVAR	NW63CF	114	63	4.5	17.4	CF-1	304L	Kovar	
VPZ64QVAR-LN	NW63CF	114	63	4.5	17.4	CF-1	316LN	Kovar	
VPZ64QVAR-NM	NW63CF	114	63	4.5	17.4	CF-1	316LN	Tantalum	Yes
VPZ100QVAR	NW100CF	152	89	6	19.9	CF-3	304L	Kovar	
VPZ100QVAR-LN	NW100CF	152	89	6	19.9	CF-3	316LN	Kovar	
VPZ100QVAR-NM	NW100CF	152	89	6	19.9	CF-3	316LN	Tantalum	Yes
ISO100QVPZVAR	ISO100	130	63	4.5	12	ISO-2	304L	Kovar	
VPZ150QVAR	NW150CF	203	136	9.5	22.3	CF-3	304L	Kovar	
VPZ150QVAR-LN	NW150CF	203	136	9.5	22.3	CF-3	316LN	Kovar	
VPZ150QVAR-NM	NW150CF	203	136	9.5	22.3	CF-3	316LN	Tantalum	Yes
ISO160QVPZVAR	ISO160	180	89	6	12	ISO-3	304L	Kovar	
VPZ200QVAR	NW200CF	254	136	9.5	24.5	CF-3	304L	Kovar	

* Note that the position of the optic in the VPZ38LAQ design results in the coating being effective over the central >30mm only.

Please advise the laser wavelength with your enquiry or order. Wavelengths between 240nm and 1550nm can be accepted as standard, although coatings for other wavelengths can be quoted on request.

Fused Silica UHV Viewports with Anti-Reflective Coatings

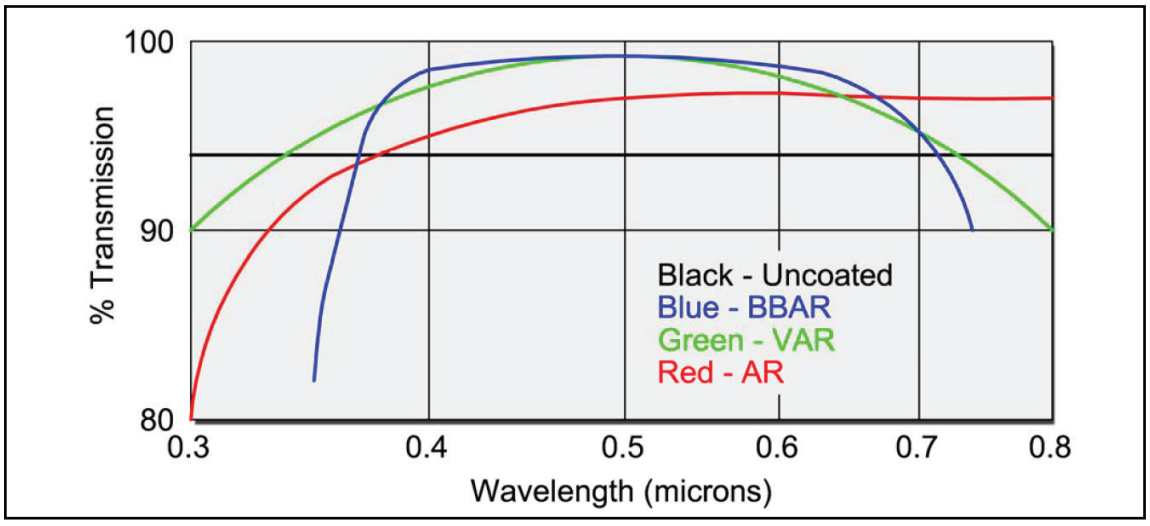


Specification	
Seal Type	Braze
Maximum Temperature	200°C
Minimum Temperature	minus 20°C
Maximum Rate of Temperature Change	3°C per minute
Leak Rate	$<1x10^{-10}$ atm-cc/sec (He)
Pressure Range	1 bar to $1x10^{-11}$ mbar
Surface Quality	20 /10 scratch/dig
Flatness	< 8λ
Coating	Single layer 1 x QWOT 'AR' coating optimised to customer specified wavelength range between 190nm and 1550nm

Torr Scientific fused silica viewports are offered with a single 1 x QWOT MgF2 layer anti-reflective (AR) coating on both sides of the window optimised to a customer specified wavelength range. Please advise the important wavelengths or wavelength range with your enquiry or order. Wavelength ranges between 190nm and 1550nm can be accepted as standard, although coatings for other wavelength ranges can be quoted on request. Viewports with 'V' coatings for a single wavelength for laser applications and four-layer broadband low reflectance 'BBAR' coatings are also offered. The viewports comprise a high purity laser quality fused silica optic with precise flatness, parallelism, scratch and dig specifications. The ultra high vacuum (UHV) CF versions are offered using high grade 304L or 316LN stainless steel flanges. Non-magnetic viewports are offered for low energy applications or surface science applications needing low magnetic fields. The non-magnetic viewports use a tantalum weld ring instead of the regular kovar weld ring. TSL viewports are manufactured in cleanroom conditions and helium leak tested, cleaned and packed to UHV standards. The rugged construction of the fused silica viewports allows repeated bake-out with UHV performance, whilst the window offers broadband optical transmission through deep UV, visible to near infra-red. Non-standard viewports can be manufactured on request, including re-entrant style microscope/camera viewports. Annealed copper gaskets and other component accessories are also supplied by TSL.

Transmission Curve - Fused Silica

The graph below shows typical before and after transmission effect of 'AR', 'VAR', and BBAR' anti-reflective coatings on Fused Silica Viewports. Customers should specify wavelength range of application with their enquiry.



Please note that the optical reflectance curves are approximations and should be used for reference only

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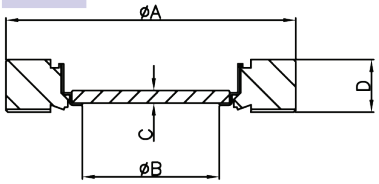
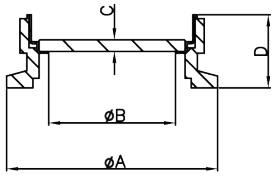
Fused Silica UHV Viewports with Anti-Reflective Coatings

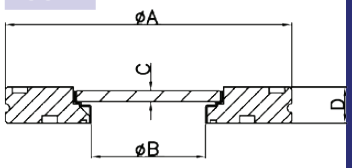
CF-1



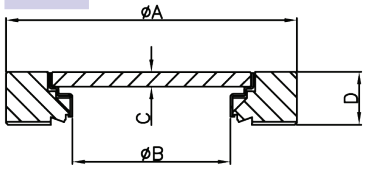
KF-1



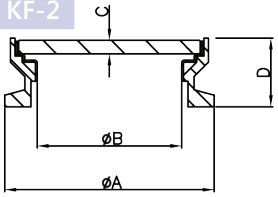
ISO-1



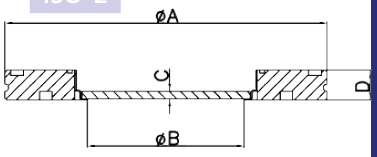
CF-2



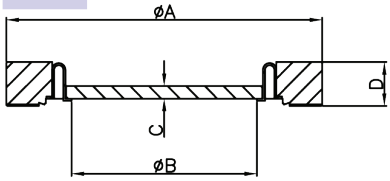
KF-2



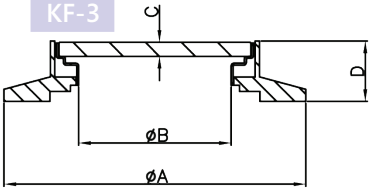
ISO-2



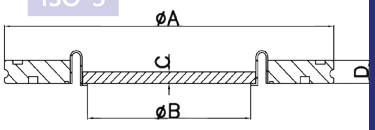
CF-3



KF-3



ISO-3

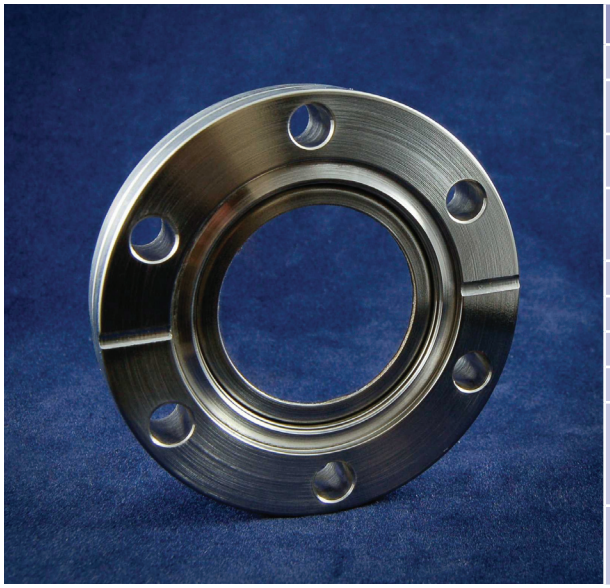


Part Number	Flange Type	A	B	C	D	Diagram	Flange Material	Weld Ring Material	Non-Magnetic
VPZ16QAR	NW16CF	34	15	1.5	12.7	CF-1	304L	Kovar	
VPZ16QAR-LN	NW16CF	34	15	1.5	12.7	CF-1	316LN	Kovar	
VPZ16QAR-NM	NW16CF	34	15	1.5	12.7	CF-1	316LN	Tantalum	Yes
KVPZ16QAR	KF16	25	15	1.5	15	KF-1	304L	Kovar	
KVPZ25QAR	KF25	40	20	2	18.5	KF-1	304L	Kovar	
VPZ38QAR	NW35CF	70	32	3	12.7	CF-1	304L	Kovar	
VPZ38LAQAR	NW35CF	70	38	3.5	12.7	CF-2	304L	Kovar	
VPZ38QAR-LN	NW35CF	70	32	3	12.7	CF-1	316LN	Kovar	
VPZ38QLAAR-LN	NW35CF	70	38	3.5	12.7	CF-2	316LN	Kovar	
VPZ38QAR-NM	NW35CF	70	32	3	12.7	CF-1	316LN	Tantalum	Yes
KVPZ40/32QAR	KF40	55	32	3	12.7	KF-1	304L	Kovar	
KVPZ40QAR	KF40	55	38	3.5	18.5	KF-2	304L	Kovar	
KVPZ50QAR	KF50	75	38	3.5	15	KF-3	304L	Kovar	
ISO63QVPZAR	ISO63	95	38	3.5	12	ISO-1	304L	Kovar	
VPZ64QAR	NW63CF	114	63	4.5	17.4	CF-1	304L	Kovar	
VPZ64QAR-LN	NW63CF	114	63	4.5	17.4	CF-1	316LN	Kovar	
VPZ64QAR-NM	NW63CF	114	63	4.5	17.4	CF-1	316LN	Tantalum	Yes
VPZ100QAR	NW100CF	152	89	6	19.9	CF-3	304L	Kovar	
VPZ100QAR-LN	NW100CF	152	89	6	19.9	CF-3	316LN	Kovar	
VPZ100QAR-NM	NW100CF	152	89	6	19.9	CF-3	316LN	Tantalum	Yes
ISO100QVPZAR	ISO100	130	63	4.5	12	ISO-2	304L	Kovar	
VPZ150QAR	NW150CF	203	136	9.5	22.3	CF-3	304L	Kovar	
VPZ150QAR-LN	NW150CF	203	136	9.5	22.3	CF-3	316LN	Kovar	
VPZ150QAR-NM	NW150CF	203	136	9.5	22.3	CF-3	316LN	Tantalum	Yes
ISO160QVPZAR	ISO160	180	89	6	12	ISO-3	304L	Kovar	
VPZ200QAR	NW200CF	254	136	9.5	24.5	CF-3	304L	Kovar	

* Note that the position of the optic in the VPZ38LAQ design results in the coating being effective over the central >30mm only.

Please advise the laser wavelength with your enquiry or order. Wavelengths between 240nm and 1550nm can be accepted as standard, although coatings for other wavelengths can be quoted on request.

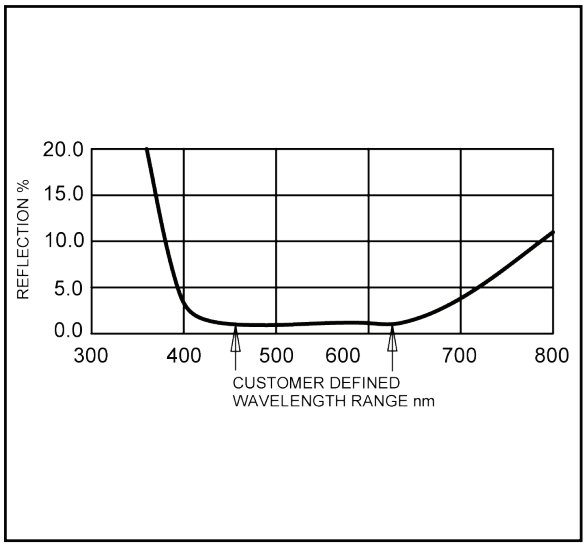
Fused Silica UHV Viewports with Broadband Anti-Reflective Coatings



Specification	
Seal Type	Braze
Maximum Temperature	200°C
Minimum Temperature	minus 20°C
Maximum Rate of Temperature Change	3°C per minute
Leak Rate	$<1x10^{-10}$ atm-cc/sec (He)
Pressure Range	1 bar to $1x10^{-11}$ mbar
Surface Quality	20 /10 scratch/dig
Flatness	<8λ
Laser Damage Threshold	CW Continuous Wave - 500W/cm^2 at 530nm Pulsed 2 J/cm^2 at 530nm and 10ns pulse width (note, varies with wavelength, pulse width, laser type and cleanliness of optic)
Coating	4-layer BBAR coating optimised to customer specified wavelength range between 240nm and 1550nm

Torr Scientific fused silica viewports are offered with a four-layer broadband anti-reflective (BBAR) coating on both sides of the window optimised to a customer specified laser wavelength range. In many cases, the coating reduces reflection to below 0.5% per face or 1% total at the key wavelengths specified. Please advise the important wavelengths or wavelength range with your enquiry or order. Wavelength ranges between 240nm and 1550nm can be accepted as standard, although coatings for other wavelength ranges can be quoted on request. Viewports with 'V' coatings for a single wavelength for laser applications are also offered. The viewports comprise a high purity laser quality fused silica optic with precise flatness, parallelism, scratch and dig specifications. The ultra high vacuum (UHV) CF versions are offered using high grade 304L or 316LN stainless steel flanges. Non-magnetic viewports are offered for low energy applications or surface science applications needing low magnetic fields. The non-magnetic viewports use a tantalum weld ring instead of the regular kovar weld ring. TSL viewports are manufactured in cleanroom conditions and helium leak tested, cleaned and packed to UHV standards. The rugged construction of the fused silica viewports allows repeated bake-out with UHV performance, whilst the window offers broadband optical transmission through deep UV, visible to near infra-red. Non-standard viewports can be manufactured on request, including re-entrant style microscope/camera viewports. Annealed copper gaskets and other component accessories are also supplied by TSL.

Reflectance Curve



The TSL UV-Vis Spectrophotometer

Please note that the optical reflectance curves are approximations and should be used for reference only

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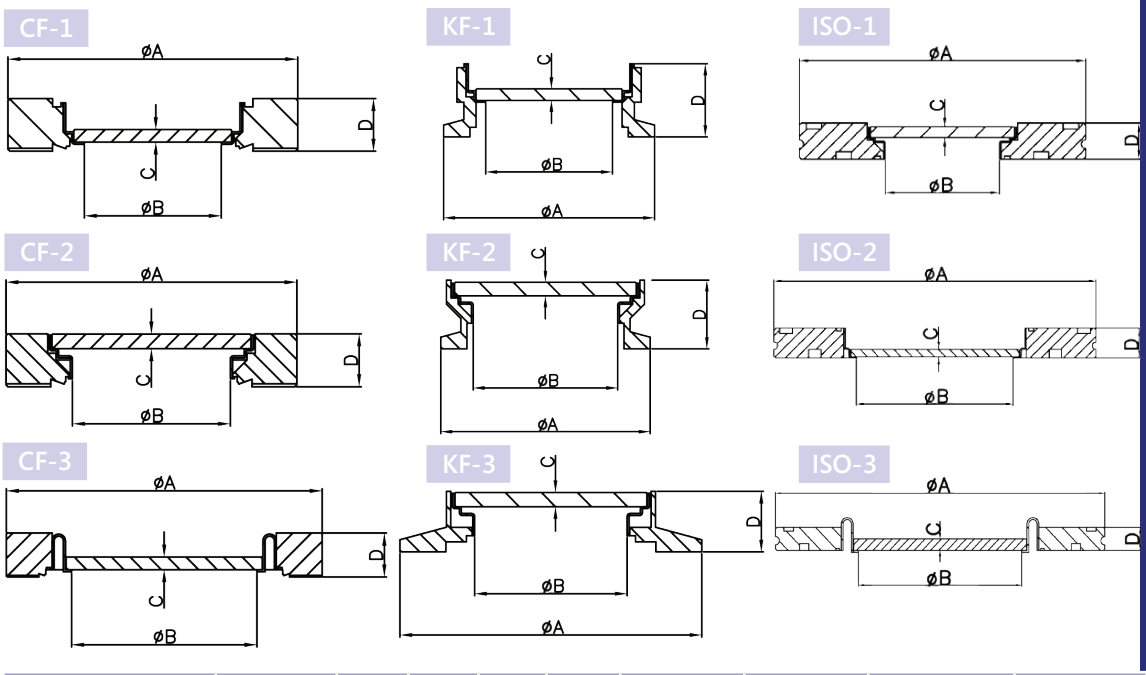
Fused Silica UHV Viewports with Broadband Anti-Reflective Coatings



Part Number	Flange Type	A	B	C	D	Diagram	Flange Material	Weld Ring Material	Non-Magnetic
VPZ16QBBAR	NW16CF	34	15	1.5	12.7	CF-1	304L	Kovar	
VPZ16QBBAR-LN	NW16CF	34	15	1.5	12.7	CF-1	316LN	Kovar	
VPZ16QBBAR-NM	NW16CF	34	15	1.5	12.7	CF-1	316LN	Tantalum	Yes
KVPZ16QBBAR	KF16	25	15	1.5	15	KF-1	304L	Kovar	
KVPZ25QBBAR	KF25	40	20	2	18.5	KF-1	304L	Kovar	
VPZ38QBBAR	NW35CF	70	32	3	12.7	CF-1	304L	Kovar	
VPZ38LAQBBAR	NW35CF	70	38	3.5	12.7	CF-2	304L	Kovar	
VPZ38QBBAR-LN	NW35CF	70	32	3	12.7	CF-1	316LN	Kovar	
VPZ38QLABBAR-LN	NW35CF	70	38	3.5	12.7	CF-2	316LN	Kovar	
VPZ38QBBAR-NM	NW35CF	70	32	3	12.7	CF-1	316LN	Tantalum	Yes
KVPZ40/32QBBAR	KF40	55	32	3	12.7	KF-1	304L	Kovar	
KVPZ40QBBAR	KF40	55	38	3.5	18.5	KF-2	304L	Kovar	
KVPZ50QBBAR	KF50	75	38	3.5	15	KF-3	304L	Kovar	
ISO63QVPZBBAR	ISO63	95	38	3.5	12	ISO-1	304L	Kovar	
VPZ64QBBAR	NW63CF	114	63	4.5	17.4	CF-1	304L	Kovar	
VPZ64QBBAR-LN	NW63CF	114	63	4.5	17.4	CF-1	316LN	Kovar	
VPZ64QBBAR-NM	NW63CF	114	63	4.5	17.4	CF-1	316LN	Tantalum	Yes
VPZ100QBBAR	NW100CF	152	89	6	19.9	CF-3	304L	Kovar	
VPZ100QBBAR-LN	NW100CF	152	89	6	19.9	CF-3	316LN	Kovar	
VPZ100QBBAR-NM	NW100CF	152	89	6	19.9	CF-3	316LN	Tantalum	Yes
ISO100QVPZBBAR	ISO100	130	63	4.5	12	ISO-2	304L	Kovar	
VPZ150QBBAR	NW150CF	203	136	9.5	22.3	CF-3	304L	Kovar	
VPZ150QBBAR-LN	NW150CF	203	136	9.5	22.3	CF-3	316LN	Kovar	
VPZ150QBBAR-NM	NW150CF	203	136	9.5	22.3	CF-3	316LN	Tantalum	Yes
ISO160QVPZBBAR	ISO160	180	89	6	12	ISO-3	304L	Kovar	
VPZ200QBBAR	NW200CF	254	136	9.5	24.5	CF-3	304L	Kovar	

* Note that the position of the optic in the VPZ38LAQ design results in the coating being effective over the central >30mm only.

Please advise the laser wavelength with your enquiry or order. Wavelengths between 240nm and 1550nm can be accepted as standard, although coatings for other wavelengths can be quoted on request.