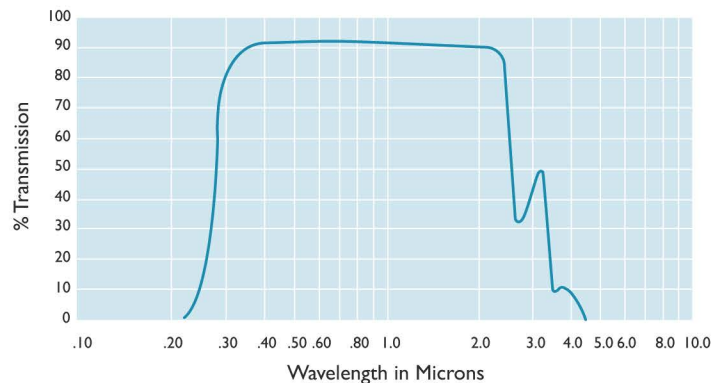




#### Optical transmission curve glass

1mm thick reflection losses included



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

### Features

- Versatile general purpose viewports for high vacuum and UHV
- Wide transmission range
- Bakeable to 400°C with good resistance to thermal shocks
- Wide variety of accessories available including lead glass shields and viewport shutters
- Non-magnetic option with 316LN flanges on request
- Magnesium fluoride option available

### Viewport selection table and specifications

Type of viewport	Maximum bakeout temperature of flange	Maximum bakeout temperature KF / LF flange	Window	Sleeve
304ss / 7056 glass	400°C	150°C	7056 Glass (kodial)	Kovar®
Non-magnetic 316LN	400°C	–	7056 Glass (kodial)	304ss
Magnesium fluoride	250°C	150°C	MgF <sub>2</sub>	304ss

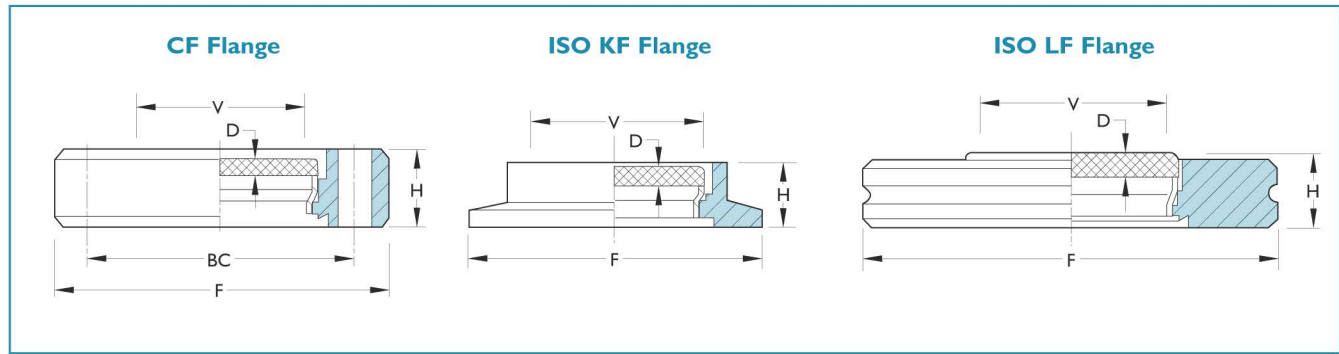
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## Viewports and glass components

Standard series



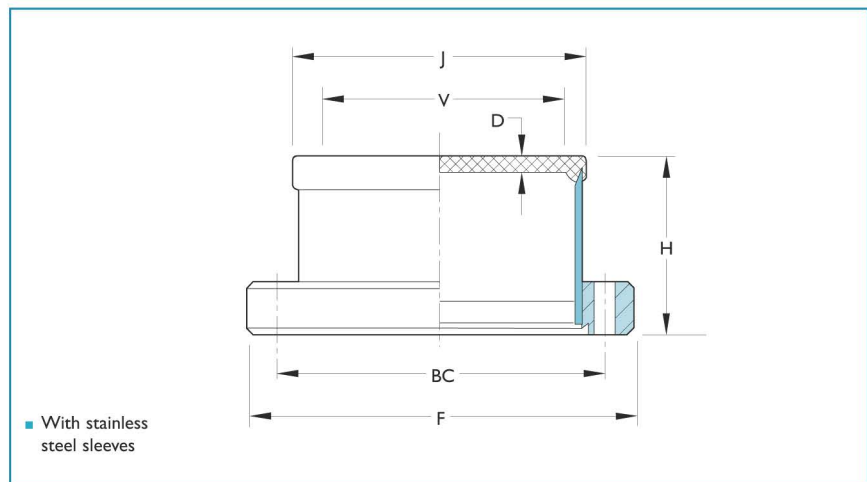
View diameter V	Flange	OD F	H	Glass thickness D	Wt kg	Reference	Part number
<b>304 Stainless steel / Kovar® sleeve</b>							
16	DN16CF	34	12.0	1.5	0.06	CVP-16	1210000
38	DN40CF	70	13.0	3.0	0.2	CVP-40	1210001
65	DN63CF	114	17.5	3.5	0.8	CVP-63	1210002
90	DN100CF	152	20.0	6.0	1.5	CVP-100	1210003
135	DN160CF	202	22.5	8.0	2.5	CVP-160	1210004
135	DN200CF	253	24.6	8.0	6.1	CVP-200	1210005
15	DN16KF	30	15	1.8	0.02	KVP-16	1210050
20	DN25KF	40	19	1.8	0.05	KVP-25	1210051
37	DN40KF	55	17.8	2.0	0.1	KVP-40	1210052
37	DN50KF	75	15	2.0	0.2	KVP-50	1210053
50	DN63LF	95	11.9	2.7	0.4	LVP-63	1210070
65	DN100LF	130	17.5	4.3	0.8	LVP-100	1210071
98	DN160LF	180	20.1	5.1	1.5	LVP-160	1210072

## Non-magnetic viewports



## Features

- Non-magnetic housekeeper seal
- Wide transmission 7056 glass (kodial)



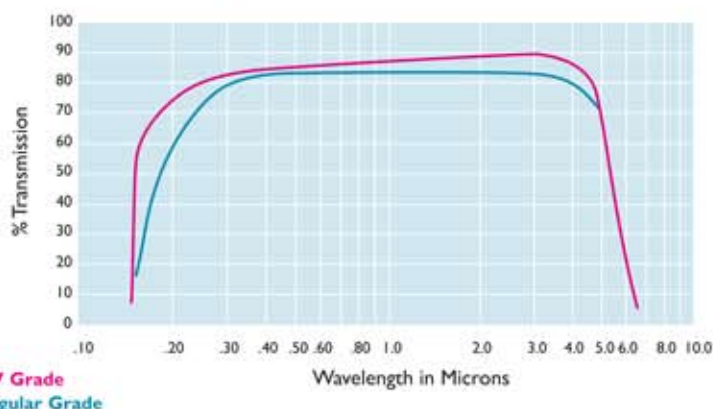
View diameter V	Flange	OD F	H	J	Glass thickness D	Wt kg	Reference	Part number
<b>316LN Stainless steel / 304 Stainless steel sleeve</b>								
12.7	DN16CF	34	28.4	—	1.8	0.3	CVP-16N	1210100
31.8	DN40CF	70	50.8	41.7	3.2	0.5	CVP-40N	1210101
50.8	DN63CF	114	53.8	—	4.3	1.1	CVP-63N	1210102
88.9	DN100CF	152	53.8	—	5.1	1.6	CVP-100N	1210103
136.7	DN160CF	202	69.9	—	9.5	3.0	CVP-160N	1210104

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Transmission v wavelength



## General specifications

### Transmission range<sup>1</sup>

Regular grade	0.30 to 4.00µm
UV Grade	0.2 to 4.50µm

### Temperature rating<sup>2</sup>

CF Flange mount	to 450°C
ISO KF Flange mount	to 150°C

<sup>1</sup> Transmission curves are approximations, intended for reference only, they are based on a 1mm sample thickness as tested by sapphire manufacturers

<sup>2</sup> Thermal gradient should not exceed 25°C/minute

## Sapphire

This is a synthetic, hexagonal single crystal anisotropic material which displays substantially different physical, thermal, dielectric and optical characteristics when measured along different axes. Caburn-MDC standard sapphire viewports use material with 90° crystal orientation, i.e. crystal orientation parallel to window surface. Viewports with crystal orientation parallel to optical axis, or 0° orientation, are available on request at additional cost. Most material grades are available up to 49mm.

## Grades

All viewports up to 25mm in diameter are offered with UV grade sapphire; those exceeding 25mm diameters are offered with regular grade materials. UV grade material is available on request at additional cost.

**Note** Limitations in today's crystal growth technology make it difficult to guarantee constant transmission performance at wavelengths below 0.25 microns.

## Surface finish

Poor surface finish can contribute as much as 10% to overall transmission losses. All viewports are supplied with flat faces which have been finished to standards suitable for most applications. Caburn-MDC's standard finish is a 50-20 scratch-dig. Other finishes are available on request at additional cost. The optics industry typically recommends a 20-10 scratch-dig optical finish for service below 0.25µm.

## Crystal orientation

Crystal orientation of Caburn-MDC sapphire viewports is normal to optical axis or 90° orientation. Assemblies with crystal orientation parallel to optical axis or 0° orientation, are available on request at additional cost.

## Features

- Sapphire single crystal
- 90° crystal orientation
- 50-20 Scratch-dig

## Viewport coatings

Special order anti-reflection coatings can be applied to windows with view diameters greater than or equal to 25.4mm. Note that one window surface is recessed within the viewport's tubular metal mount which will produce shadowing on that side of the window. Caburn-MDC guarantees uniform AR coating over 80% of the window's clear aperture or view diameter. High temperature braze cycles (800°C) require that all coatings be applied after brazing.

## Single layer Narrow band Anti-reflection SLAR

SLAR coating is available for sapphire or quartz window substrates. This coating may be tailored and optimized for specific wavelengths between 200nm and 2200nm, with reflection losses less than or equal to 0.5% per surface for either substrate material.

## Multi-layer Broad band Anti-reflection MLAR

MLAR coating is available for sapphire or quartz window substrates. This coating is optimized for transmission over the entire range of wavelengths from 450nm to 800nm, with reflective losses at less than or equal to 1.0% per surface for either substrate material.



## CF Flanges

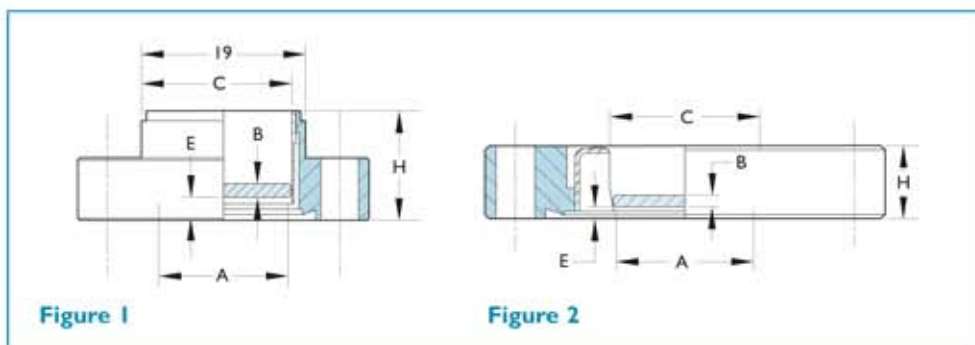
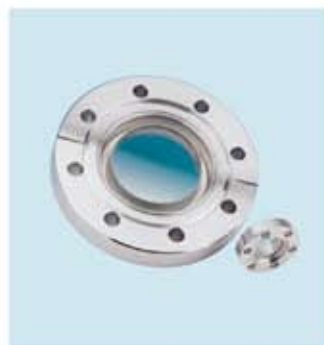


Figure 1

Figure 2

Grade	Flange	Nominal size	Figure	View diameter A	B	C	E	H	Wt kg	Reference	Part number
UV	DN16CF	9	2	8.9	2.0	9.6	1.6	7.2	0.04	VP-046S	9712007
UV	DN16CF	15	1	14.9	2.7	16.0	1.6	12.7	0.04	VP-075S	9712000
UV	DN40CF	18	2	17.5	2.03	19.6	2.0	12.7	0.3	VP-069S	9712001
UV	DN40CF	24	2	23.8	2.03	25.9	2.0	12.7	0.3	VP-100S	9712002
Reg	DN40CF	37	2	36.6	2.39	38.6	2.5	12.7	0.3	VP-144S	9712005
Reg	DN63CF	50	2	49.3	2.39	51.3	2.5	17.3	1.1	VP-200S	9712004

## KF Flanges

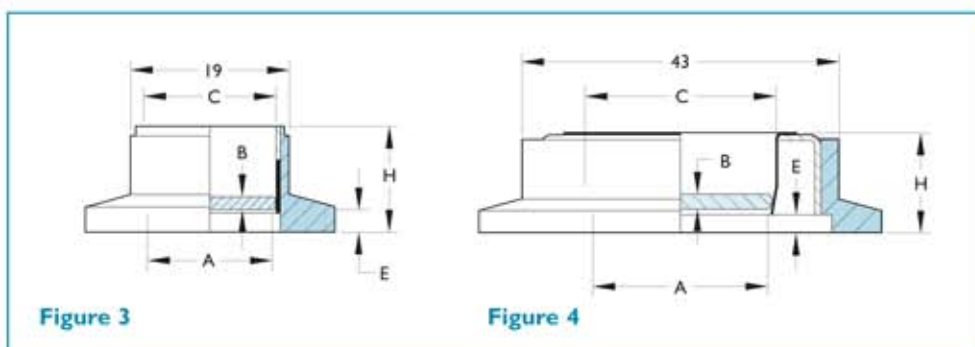
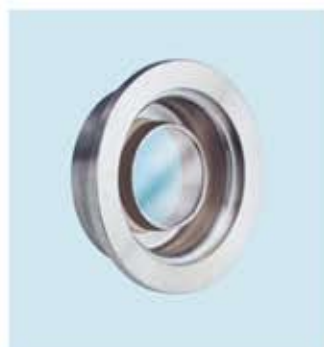


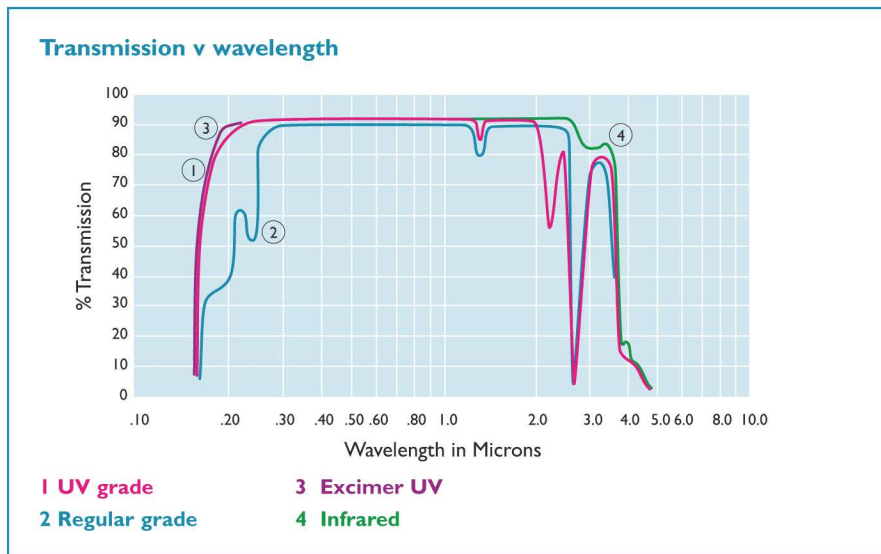
Figure 3

Figure 4

Grade	Flange	Nominal size	Figure	View diameter A	B	C	E	H	Wt kg	Reference	Part number
UV	DN16KF	15	3	15.0	1.57	16.0	3.3	12.7	0.1	KVP-075S	9713000
UV	DN40KF	18	4	17.5	2.03	19.6	3.3	12.7	0.2	KVP-150S	9713001
UV	DN40KF	24	4	23.9	2.03	25.9	3.3	12.7	0.2	KVP-150-IS	9713002

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### Features

- Synthetic fused silica
- Standard and zero length
- 40-20 scratch-dig
- Non-coated optics
- Six sizes available

The base UV grade material is suitable for all but the most demanding optical applications and certified to meet  $\geq 80\%/cm$  @ 185nm external transmittance. DUV-200 fused silica is equivalent to Suprasil-I® and similar to the base grade with the exception of inclusion specifications. EUV-185 is an excimer grade window material which offers excellent performance for excimer-UV laser applications. This material is certified to meet  $\geq 85\%/cm$  @ 185nm external transmittance.

Infrared fused silica windows with low 'OH' content can be quoted for applications requiring IR transmission to about 3600nm. This material has less than 1ppm OH content which eliminates the typical absorption band found in other materials.

Fused silica viewports are preferred over glass viewports because of their transparency to ultraviolet radiation. Other advantages include a higher abrasion resistance and a low coefficient of thermal expansion, making them very resistant to thermal shock. Poor surface finish can contribute as much as 10% overall transmission losses. All viewports are supplied with flat faces which have been finished to standards suitable for most applications. Caburn-MDC standard finish for fused silica viewports is 40-20 scratch-dig. Other finishes are available on request at additional cost. For Deep-UV grade materials, the optics industry typically recommends a 20-10 scratch-dig optical finish for service below 0.25 microns.

### General specifications

#### Transmission range<sup>1</sup>

Fused quartz	Discontinued	0.30 to 2.50µm
Base ultraviolet	UV	0.20 to 2.00µm
Deep ultraviolet	DUV-200	0.20 to 2.00µm
Excimer ultraviolet	EUV-185	0.185 to 2.20µm
Infra-red, low OH	On request	0.185 to 2.20µm

Material	Inclusion class number	Total inclusion cross-section	Maximum inclusion cross-section	Index homogeneity grade	ppm
UV	2	0.10-0.25mm <sup>2</sup>	0.50mm	F	≤5
DUV-200	0	0.00-0.03mm <sup>2</sup>	0.10mm	A	≤1
EUV-185	0	0.00-0.03mm <sup>2</sup>	0.10mm	C	≤2
Infrared	0	0.00-0.03mm <sup>2</sup>	0.20mm	A	≤5

#### Temperature rating<sup>2</sup>

CF Flange mount	200°C <sup>3</sup>
ISO KF Flange mount	150°C

<sup>1</sup> Transmission curves are approximations, intended for reference only, they are based on a 10mm sample thickness as tested by quartz manufacturers

<sup>2</sup> Thermal gradient should not exceed 25°C/minute

<sup>3</sup> Lead-silver braze alloy melts at 305°C

### Description

Caburn-MDC fused silica viewports are designed and rated for high and ultra-high vacuum applications. They are constructed using vacuum grade materials including high purity silicon dioxide, 304 stainless steel and vacuum tube-grade braze alloys.

Fused silica is a polycrystalline, isotropic material with no crystal orientation. Its physical, thermal, dielectric and optical properties are uniform in all directions of measurement.

Conventional fused quartz is suitable for basic non-demanding optical applications. Impurities in fused quartz cause a blue-violet fluorescence when exposed to ultraviolet radiation at 253.7µm. This fluorescence is not evident in synthetic fused silica, which is manufactured by flame hydrolysis of silicon tetrachloride.

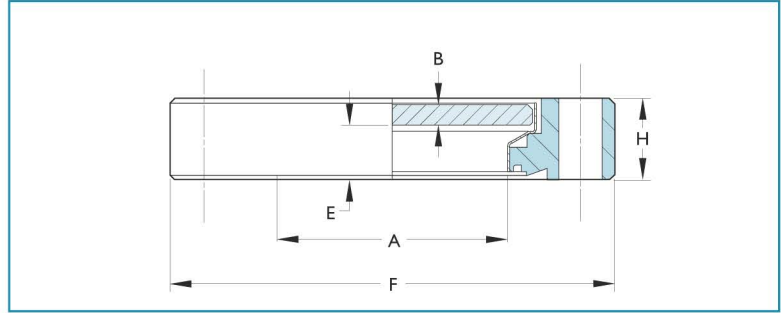
Caburn-MDC offers three ultraviolet grades of fused silica. A base ultraviolet and two deep ultraviolet grades, DUV-200 and EUV-185.

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## CF Flanges



## Zero length fused silica viewports Ultraviolet

Window material	CF flange	Nominal size	View dia. A	B	E	F	H	Wt kg	Reference	Part number
Fused silica	DN16CF	20	16.0	2.5	4.3	34	7.4	0.3	VP-UV-C16	9722013-I
Fused silica	DN40CF	38	35.6	3.3	8.9	70	12.7	0.4	VP-UV-C40	9722005-I
Fused silica	DN63CF	63	68.3	6.4	10.4	114	17.3	1.1	VP-UV-C63	9722007-I
Fused silica	DN100CF	102	98.6	6.4	13.0	152	19.8	1.4	VP-UV-C100	9722009-I
Fused silica	DN160CF	152	136.7	9.7	12.2	203	22.4	1.6	VP-UV-C160	9722011-I
Fused silica	DN200CF	203	197.6	9.7	13.5	254	24.6	2.7	VP-UV-C200	9722012-I

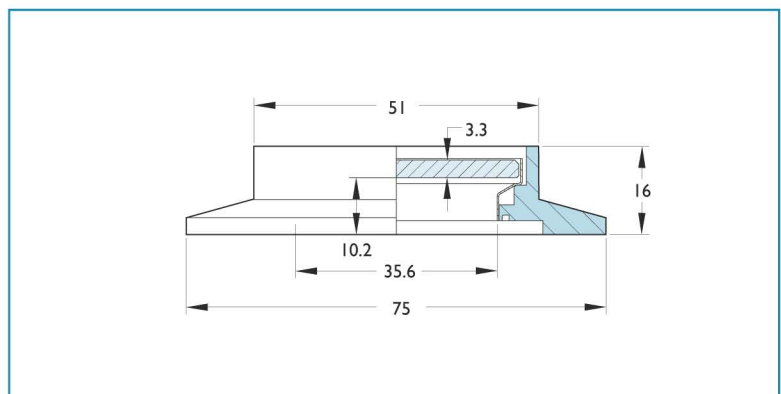
## Zero length fused silica viewports Deep ultraviolet

Window material	CF flange	Nominal size	View dia. A	B	E	F	H	Wt kg	Reference	Part number
Fused silica	DN16CF	16	16.0	2.5	4.3	34	7.4	0.3	VP-DUV-200-C16	9722213
Fused silica	DN40CF	38	35.6	3.3	8.9	70	12.7	0.4	VP-DUV-200-C40	9722205
Fused silica	DN63CF	63	68.3	6.4	10.4	114	17.3	1.1	VP-DUV-200-C63	9722207
Fused silica	DN100CF	102	98.6	6.4	13.0	152	19.8	1.4	VP-DUV-200-C100	9722209

## Zero length fused silica viewports Excimer ultraviolet

Window material	CF flange	Nominal size	View dia. A	B	E	F	H	Wt kg	Reference	Part number
Fused silica	DN16CF	16	16.0	2.5	4.3	34	7.4	0.3	UV-EUV-185-C16	9722300
Fused silica	DN40CF	38	35.6	3.3	8.9	70	12.7	0.4	UV-EUV-185-C40	9722301
Fused silica	DN63CF	63	68.3	6.4	10.4	114	17.3	1.1	UV-EUV-185-C63	9722302

## KF Flanges



## Zero length fused silica viewports Ultraviolet

Window material	Nominal size	View dia. A	Wt kg	Reference	Part number
DN50KF	38	35.6	0.2	KVP-150Q	9713002

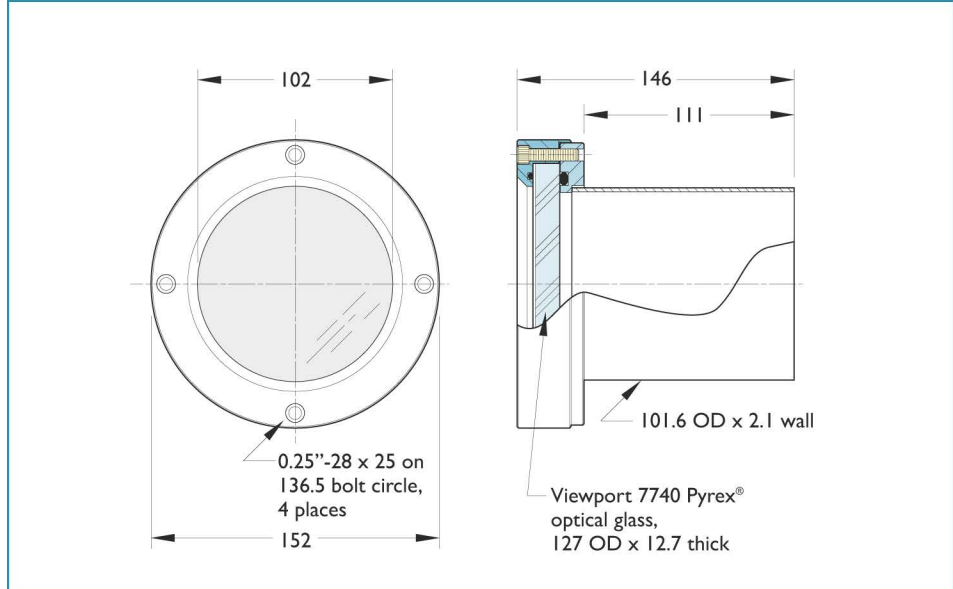
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### Features

- Weld neck, 101.6mm OD
- Pyrex® 7740 borosilicate optical glass
- 100mm diameter nominal viewing area
- Type 304 stainless steel mounting
- Viton® O-ring seal
- Replaceable glass



### Description

Economical visual quality viewport used on high vacuum chambers. Weldable configuration allows installation on a custom built stainless steel chamber. The replaceable viewport glass is captured between two elastomer O-rings. The viewport can be easily disassembled by removing four screws from the retainer ring.

Description	Wt kg	Reference	Part number
Pyrex viewport with 102mm OD weld neck	1.5	PVP-4	<b>450010</b>

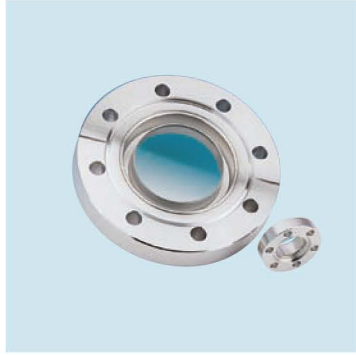
### Spare parts



Description	Wt kg	Reference	Part number
Replacement glass, 7740 pyrex optical 127mm OD	0.5	PRG-4	<b>045010</b>
Bolt, socket head, stainless steel, 0.25\"-28 x 1\" long (pack of 4)	0.1	BSPW	<b>190166</b>
O-ring, glass-to-flange	0.1	VO-2-346	<b>041346</b>
O-ring, glass-to-retainer	0.1	VO-2-243	<b>041243</b>

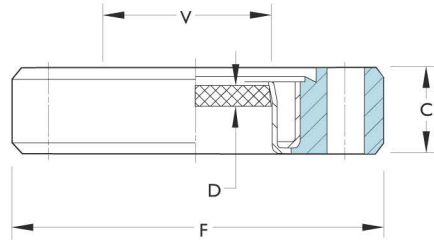
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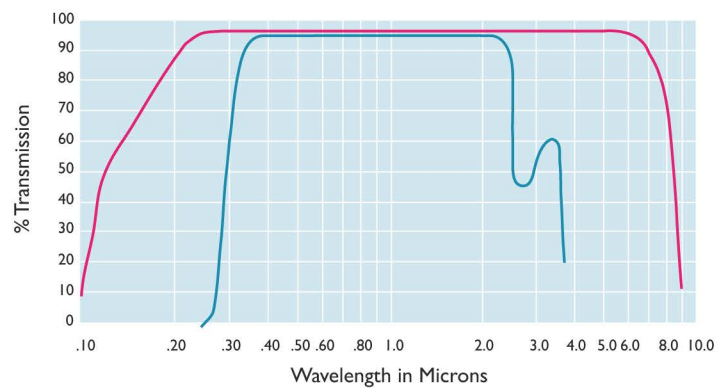


### Features

- UHV compatible
- Bakeable to 300°C
- Wider transmission range than the standard series



### Transmission v wavelength



Magnesium fluoride  
7056

View diameter V	Flange	OD F	Flange thickness C	Magnesium fluoride thickness D	Reference	Part number
20	DN40CF	70	12.7	2	CVPMG22	1210200
38	DN40CF	70	12.7	3	CVPMG40	1210201

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# Glass components

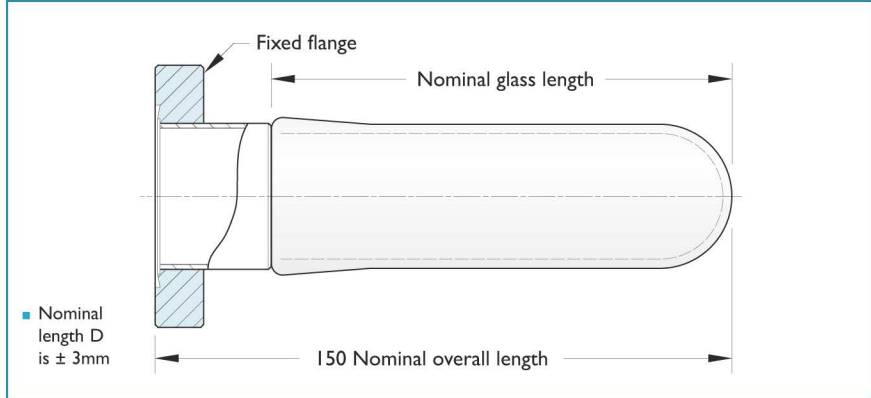
Sealed-off



## CF



300°C maximum bakeout



## Features

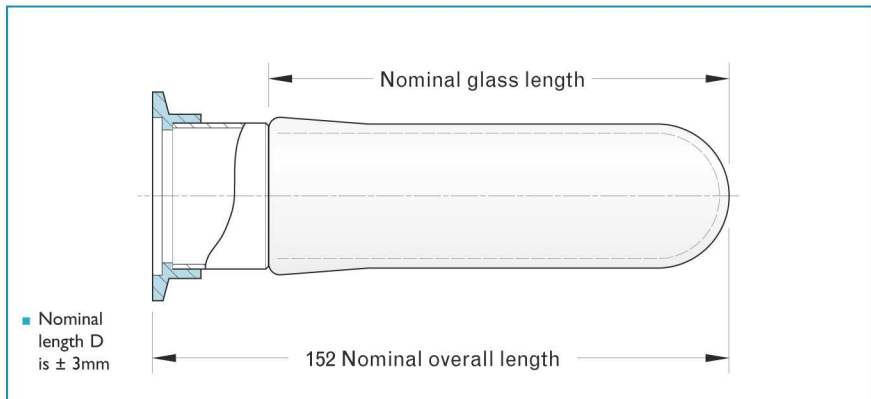
- 7052 Glass
- Kovar® sleeve material
- Optional Pyrex® to stainless steel
- 300°C maximum bakeout
- 304ss non-rotatable flange
- Custom lengths available on request
- Other configurations available on request

Nominal ID	Flange size	Flange OD	Nominal glass length	Wt kg	Reference	Part number
14	DN16CF	34	111	0.2	SEG-075	<b>463000</b>
33	DN40CF	70	121	0.5	SEG-150	<b>463002</b>
55	DN63CF	114	108	0.8	SEG-250	<b>463004</b>
93	DN100CF	152	98	1.4	SEG-400	<b>463006</b>
139	DN160CF	203	98	2.3	SEG-600	<b>463008</b>

## ISI KF



200°C maximum bakeout



## Features

- 7052 Glass
- Kovar® sleeve material
- Optional Pyrex® to stainless steel
- 200°C maximum bakeout
- 304ss flange
- Custom lengths available on request
- Other configurations available on request

Nominal ID	Flange size	Flange OD	Nominal glass length	Wt kg	Reference	Part number
14	DN16KF	30	111	0.2	KSEG-075	<b>463020</b>
21	DN25KF	40	111	0.3	KSEG-100	<b>463021</b>
33	DN40KF	55	121	0.5	KSEG-150	<b>463022</b>
46	DN50KF	75	108	0.5	KSEG-200	<b>463023</b>

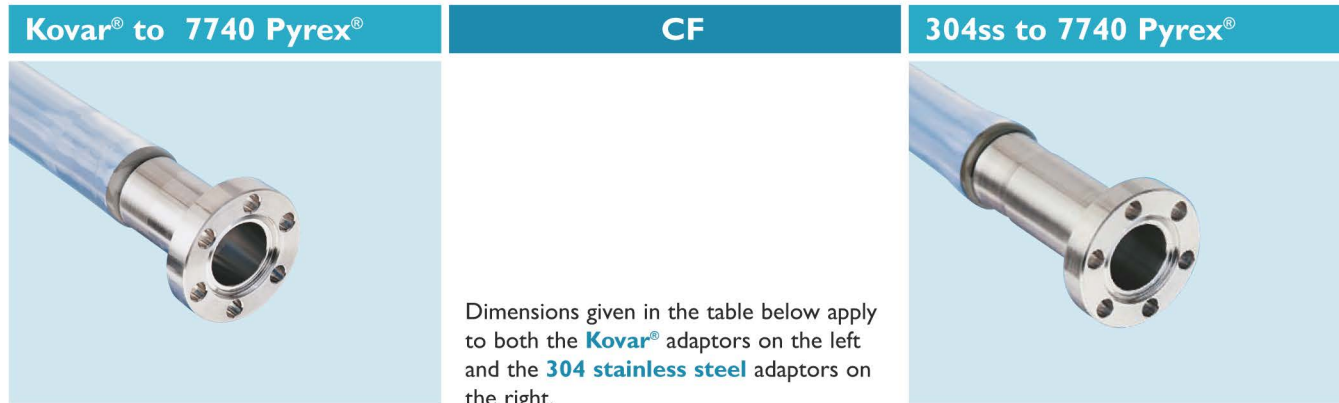
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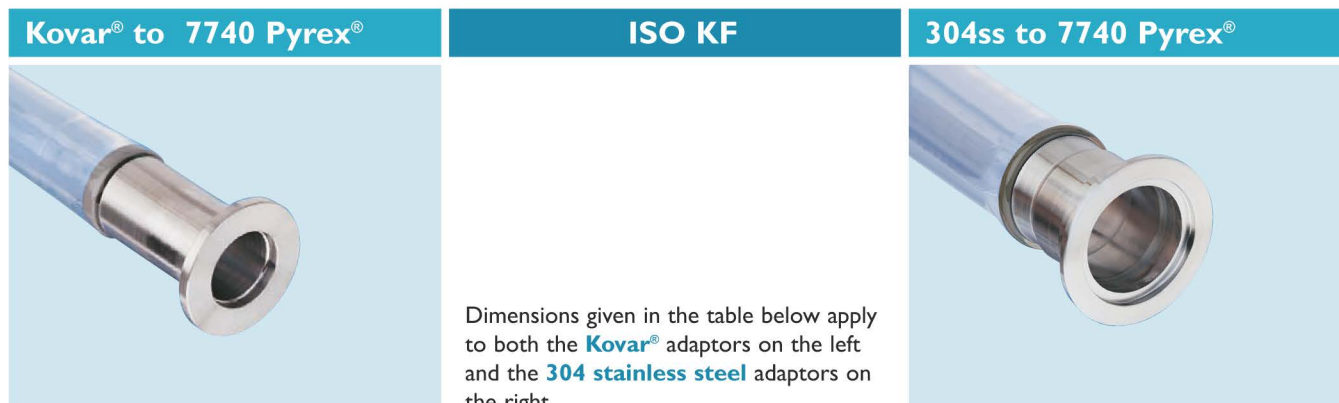
## Glass components

## Glass to metal adaptors



Dimensions given in the table below apply to both the **Kovar®** adaptors on the left and the **304 stainless steel** adaptors on the right.

Part number	Reference	Kovar®-to-Pyrex® overall length	Nominal glass OD	Wall thickness	Flange	304ss-to-Pyrex® overall length	Reference	Part number
<b>461000</b>	GA-012P	136	3.1	0.8	DN16CF	124	GA-012P-S	<b>460000</b>
<b>461001</b>	GA-018P	136	4.7	0.8	DN16CF	124	GA-018P-S	<b>460001</b>
<b>461002</b>	GA-025P	136	6.3	1.0	DN16CF	124	GA-025P-S	<b>460002</b>
<b>461003</b>	GA-031P	136	7.9	1.0	DN16CF	124	GA-031P-S	<b>460003</b>
<b>461004</b>	GA-037P	136	9.5	1.0	DN16CF	124	GA-037P-S	<b>460004</b>
<b>461005</b>	GA-050P	136	12.7	1.3	DN16CF	124	GA-050P-S	<b>460005</b>
<b>461006</b>	GA-062P	136	15.9	1.3	DN16CF	124	GA-062P-S	<b>460006</b>
<b>461007</b>	GA-075P	136	19.0	1.3	DN16CF	133	GA-075P-S	<b>460007</b>
<b>461010</b>	GA-112P	136	28.6	1.5	DN40CF	124	GA-112P-S	<b>460010</b>
<b>461011</b>	GA-125P	136	31.8	1.8	DN40CF	124	GA-125P-S	<b>460011</b>
<b>461023</b>	GA-137P	136	34.9	2.0	DN40CF	124	GA-137P-S	<b>460012</b>
<b>461012</b>	GA-150P	136	38.1	2.0	DN40CF	124	GA-150P-S	<b>460013</b>
<b>461014</b>	GA-225P	147	57.1	2.5	DN63CF	136	GA-225P-S	<b>460017</b>
<b>461015</b>	GA-250P	190	63.5	2.5	DN63CF	143	GA-250P-S	<b>460018</b>
-	-	-	82.6	2.5	DN100CF	162	GA-325P-S	<b>460021</b>
-	-	-	88.9	2.5	DN100CF	162	GA-350P-S	<b>460022</b>
-	-	-	95.3	2.5	DN100CF	162	GA-375P-S	<b>460023</b>
<b>461020</b>	GA-400P	257	101.6	2.5	DN100CF	162	GA-400P-S	<b>460024</b>
<b>461022</b>	GA-600P	270	152.4	3.5	DN200CF	210	GA-600P-S	<b>460026</b>



Dimensions given in the table below apply to both the **Kovar®** adaptors on the left and the **304 stainless steel** adaptors on the right.

Part number	Reference	Kovar®-to-Pyrex® overall length	Nominal glass OD	Wall thickness	Flange	304ss-to-Pyrex® overall length	Reference	Part number
<b>461040</b>	KGA-075P	146	19.0	1.3	DN16KF	133	KGA-075P-S	<b>460040</b>
<b>461041</b>	KGA-100P	140	25.4	1.5	DN25KF	124	KGA-100P-S	<b>460041</b>
<b>461042</b>	KGA-150P	140	38.1	2.0	DN40KF	127	KGA-150P-S	<b>460042</b>
<b>461043</b>	KGA-200P	152	50.8	2.0	DN50KF	139	KGA-200P-S	<b>460043</b>

All dimensions are nominal in millimetres unless specified - Weights given are approximate

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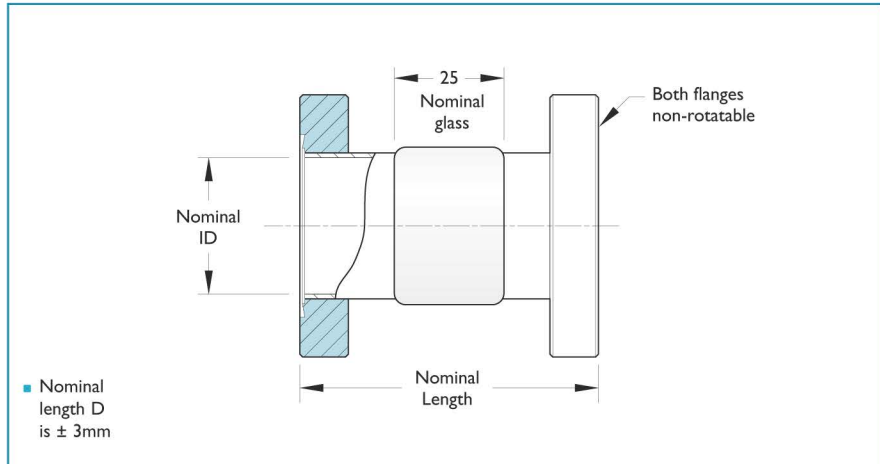
# Glass components

Double ended

CF



400°C maximum bakeout



## Features

- 7052 Glass
- Kovar sleeve material
- Optional Pyrex® to stainless steel
- 400°C maximum bakeout
- 304ss non-rotatable flange
- Custom lengths available on request
- Other configurations available on request

Nominal ID	Flange size	Flange OD	Nominal length	Wt kg	Reference	Part number
14	DN16CF	34	76	0.2	DEG-075	<b>462000</b>
33	DN40CF	70	76	0.3	DEG-150	<b>462002</b>
55	DN63CF	114	130	1.0	DEG-250	<b>462004</b>
94	DN100CF	152	133	2.0	DEG-400	<b>462006</b>
140	DN160CF	203	136	3.2	DEG-600	<b>462008</b>

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## Glass components

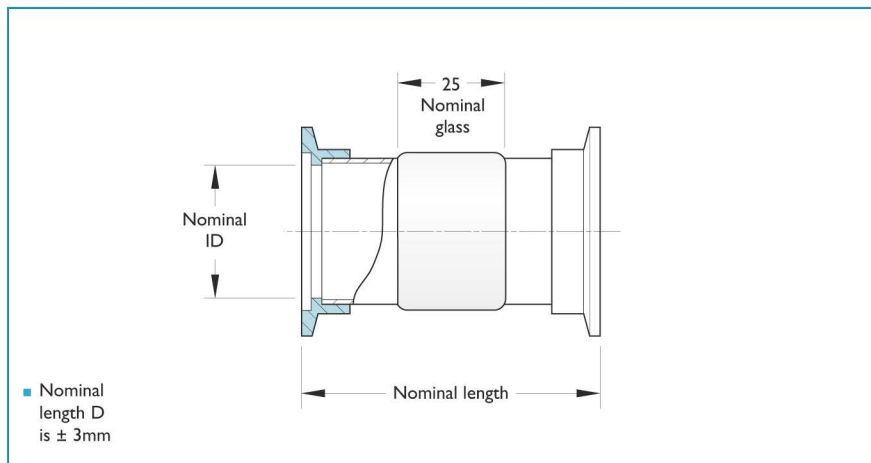
Double ended



## ISO KF



200°C maximum bakeout



## Features

- 7052 Glass
- Kovar sleeve material
- Optional Pyrex® to stainless steel
- 200°C maximum bakeout
- 304ss flange
- Custom lengths available on request
- Other configurations available on request

Nominal ID	Flange size	Flange OD	Nominal length	Wt kg	Reference	Part number
14	DNI6KF	30	76	0.2	KDEG-075	<b>462020</b>
21	DN25KF	40	81	0.3	KDEG-100	<b>462021</b>
33	DN40KF	55	84	0.4	KDEG-150	<b>462022</b>
46	DN50KF	75	96	0.7	KDEG-200	<b>462023</b>

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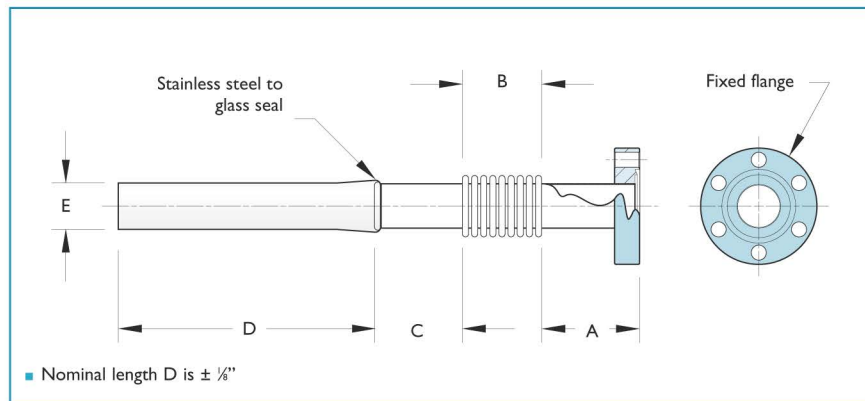
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## Glass components

## Bellows adaptors



## CF to glass





## Features

- Excellent vibrational absorption
- Ideal for high temperature and cryogenics
- 7740 Pyrex®
- 321ss bellows material
- 304ss flange material
- 300°C maximum bakeout

Flange size	A	Bellows B <sup>1</sup>	C	D	E	Maximum bend	Wt kg	Reference	Part number
DN16CF	22.0	50	19	76	6.4	180°	0.2	FGA-025-2	466000
DN16CF	22.0	25	19	76	9.5	90°	0.2	FGA-037-1	466007
DN16CF	22.0	76	19	76	9.5	180°	0.2	FGA-037-3	466008
DN16CF	28.4	25	25	76	12.7	45°	0.2	FGA-050-1	466001
DN16CF	28.4	76	25	76	12.7	180°	0.2	FGA-050-3	466002
DN40CF	28.4	25	25	76	19.1	30°	0.7	FGA-075-1	466003
DN40CF	28.4	76	25	76	19.1	90°	0.7	FGA-075-3	466004
DN40CF	28.4	25	25	76	38.1	15°	1.0	FGA-150-1	466005
DN40CF	28.4	76	25	76	38.1	60°	1.0	FGA-150-3	466006

<sup>1</sup> Allows up to 50% expansion and 20% compression of bellows length

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## UHV Series

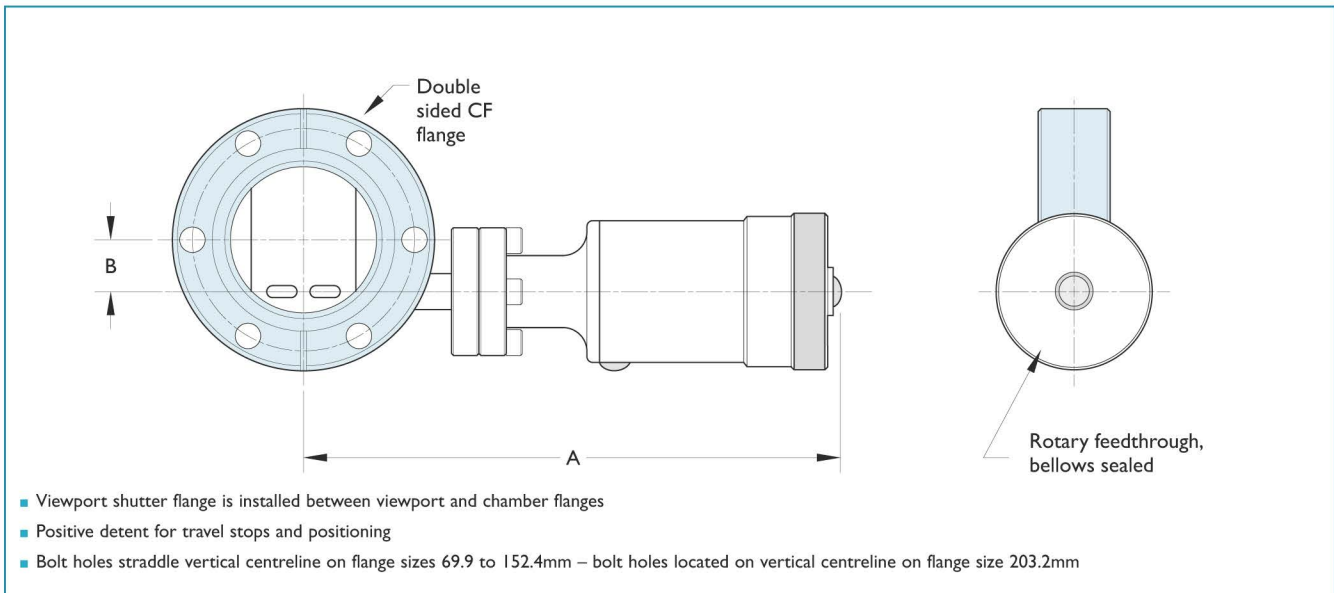
### Description

VPS Series rotary viewport shutters provide quick and efficient shielding for standard viewports. These shutters are ideally suited for service in high and ultrahigh vacuum coating applications. They are swing-type, pivoting shutters that are mounted between viewports and chamber port flanges. The shape of each shutter has been designed to maximize its aperture into a standard tubed port. The actual amount of shutter swing will be dependent on the mating chamber port's tube diameter.

The table below gives the maximum swing angle for shutters mounted on Caburn-MDC half-nipples fitted with standard CF metal seal flanges with corresponding tube diameters. To provide maximum shielding of viewports, each shutter body has a step machined to match the shape and contour of the shutter's flap. Actuation of the shutter is provided through an MDC bellows sealed rotary drive. Improved design features include all stainless steel body allowing for bakeout up to 230°C. A positive click-stop action has also been added to the rotary driver that allows for partial opening of the shutter's flapper plate between the fully opened and fully closed positions. Shutter path must be unobstructed during actuation as shutter mechanism can be damaged when shutter is forced beyond a clear and unobstructed travel path, such as smaller tube diameters.

### Features

- 100% viewport shielding
- Double-sided flange mount
- CF metal seal interface
- Actuated with bellows sealed rotary feedthrough
- All stainless steel construction
- Four flange sizes
- Bakeable to 200°C



Nominal flange	Flange OD	Flange thickness	A	B	Shutter angle	Wt kg	Reference	Part number
DN40CF	70	19	142	13.7	85°	0.7	VPS-275	454000
DN63CF	114	17	180	27.2	72°	1.4	VPS-450	454001
DN100CF	152	20	188	45.2	75°	2.0	VPS-600	454002
DN160CF	203	22	207	63.2	78°	4.3	VPS-800	454003

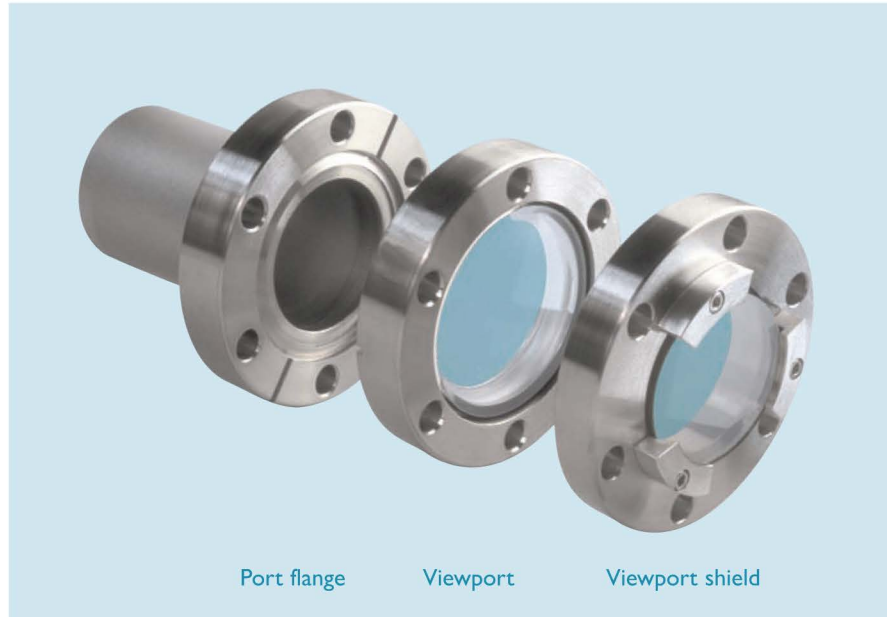
Refer to individual double-sided flange size for mounting hardware

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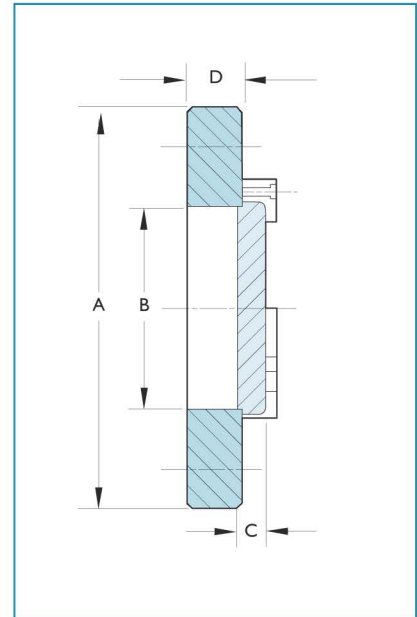
## Viewport shield accessories



Port flange

Viewport

Viewport shield



## Features

- Lead equivalent see below
- For radiation protection
- RWB 46 glass contains 48% Pb and 15% Ba
- Easily mountable to viewports fitted with CF flanges
- Bakeable to 250°C
- Lead glass screens are not leak tight and must be used in conjunction with vacuum viewports
- Use bolt sets for double sided flanges [see corresponding flange size accessories](#)

## Lead equivalent

## 6mm thickness

100-110KV	1.86mm
150KV	1.80mm
200KV	1.50mm

Port flange	OD A	View B	Glass thickness C	Shield thickness D	Wt kg	Reference	Part number
DN40CF	70	39	6	10	0.5	LG-40	1210300
DN63CF	114	66	6	10	1.4	LG-63	1210301
DN100CF	152	89	6	10	2.5	LG-100	1210302
DN160CF	203	139	6	10	5.5	LG-160	1210303

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