



**QVF**

PROCESS PLANT COMPONENTS



## Introduction

QVF couplings are a strong and high-duty system providing maximum reliability with the minimum of maintenance. This is achieved throughout the whole range of nominal sizes by the use of the safety buttress end, which has been designed specifically to take into account the properties of the material, coupled with corrosion resistant, easy-to-install gaskets plus the carefully dimensioned individual parts of the actual coupling. The materials are selected to consider both the type of products being handled in the plant and equipment and also the possibility that they may be located in a corrosive atmosphere.

The particular properties of borosilicate glass 3.3 and the fact that it is an approved and proven material of construction for pressure vessels are of prime importance in this connection. This is one of the reasons that borosilicate glass 3.3 is so widely used in the chemical, pharmaceutical and allied industries together with other applications such as food and drink production, dye works and electroplating.

The complete range of standard components available is described on the following pages. Non-standard components can, however, also be supplied to special order.

A detailed listing of all couplings and individual components by »Description« and »Catalogue Reference« can be found in the »Index«.



Detailed information on couplings and a number of other topics referred to in the following pages can be found in Section 1 »Technical Information«.

The use of flexible gaskets (please see page 9.24) makes it possible to achieve a deviation of up to 3° and provides the same degree of movement as a ball and socket system.

The term »DN« always refers in this section to the nominal size of the glass components.

## GMP and clean room compliant installations

The design of plant and equipment complying with GMP regulations calls for special care in both the planning and selection of the components together with the materials of construction used for them. Borosilicate glass 3.3 has a number of special properties that are highly valued in the pharmaceutical industry, and these, in conjunction with PTFE materials (gaskets, bellows, lining) approved in accordance with the FDA catalogue ensure that any build-up of unwanted deposits is avoided in areas which come in contact with the product. A design without any dead space, which ensures that components drain fully and can be cleaned easily and effectively, is achieved in the case of many components by their shape and the way they are installed.

All these benefits can, however, only be taken advantage of if the gaskets used meet the same criteria. For that reason we use exclusively gaskets made from PTFE of the highest quality and can also supply a special GMP compliant gasket without any dead space (please see page 9.23) in addition to the other types of gasket available.

Where the external surfaces of the pipeline have to comply with clean room requirements, appropriate stainless steel coupling and support material can be supplied (please see also Section 10 »Structures and Supports«).

We would be happy to advise you on the basis of the regulatory requirements applicable to a particular case and the guidelines drawn up by us for the design of GMP compliant plant and for plant suitable for use under clean room conditions.

## Sealing In Accordance With TA Luft

The former German regulation "Technical Manual for Clean Air" (TA Luft) was amended, and the updated version came into force on 2004-07-24. It contains maximum permissible limiting values for dust, steam, or gas emissions during the processing, conveying, or re-filling of dust, fluid, or gas materials.

TA Luft requires that flange connections conform to a specific leaking rate of  $10^{-5}$  kPa/(sm). Compliance shall be proven by a design inspection in accordance with VDI 2440 (edition November 2000).

QVF flange connections have undergone design category inspections by TUEV Rhineland / Berlin-Brandenburg, and fulfill the specified requirements.

The relevant certificates may be supplied upon demand.

## Coated glass components

Damage to borosilicate glass 3.3 components resulting from accidental external causes cannot be entirely excluded, especially in the smaller nominal sizes. This is primarily due to the relatively rigorous conditions prevalent in production plants and applies especially where no additional protection is provided in the form of insulation.

Standard couplings and inserts are used to install Sectrans coated borosilicate glass 3.3 components.

In the case of components with a glass fibre reinforced polyester coating, which provides a higher level of protection, and can also be supplied on request, couplings complete with thinner inserts are required for nominal sizes DN 15 to DN 150.

## Permissible operating conditions

All couplings are suitable for operating temperatures of up to 200 °C on the product side and for the permissible operating pressure applicable to the particular nominal size. Plastic flanges may, however, only be used up to an operating temperature of 150 °C on the product side when lagged.

In the case of cover plate assemblies, quick release couplings and bellows, the operating conditions indicated in the respective product description apply.

## Connection to other materials

The requirement for connecting QVF borosilicate glass 3.3 plant and equipment to other materials of construction such as PTFE lined components, glass-lined branches and exotic materials, to mention but a few, is becoming more and more frequent

In addition to standard couplings for glass components, the following pages also contain solutions for these very different applications. They ensure that the normal bolting forces applicable to glass plant are applied but without being exceeded.

# COUPLINGS

## COUPLINGS

Various types of couplings are available to join borosilicate glass 3.3 components together to install operable pipelines and process plants. They are designed to comply not only with the requirements of GMP-compliant installations but also consider the fact that glass plant and pipeline often has to operate in relatively corrosive environments.

The table below provides a summary of the various couplings available:

Coupling	Nominal size												
	15	25	40	50	80	100	150	200	300	450	600	800	1000
<b>For uncoated and Sectrans coated components</b>													
Version 1	Plastic, »CP.« type									Cast iron/Steel, »CCS.« type			
Version 2	Stainless steel, »CSS.« type												
<b>For glass fibre reinforced polyester coated components</b>													
Version 1	Plastic, »CP.C« type							Plastic, »CP.« type		Cast iron/Steel, »CCS.« type			
Version 2	Stainless steel, »CSS.C« type							Stainless steel, »CCS.« type		Stainless steel, »CCS.« type			
<b>For uncoated and Sectrans coated components and flexible gasket</b>													
Version 1	Plastic, »CP.G« type												
Version 2	Stainless steel, »CSS.G« type												
<b>For glass fibre reinforced polyester coated components and flexible gasket</b>													
Version 1	Plastic, »CP.GC« type												
Version 2	Stainless steel, »CSS.GC« type												
<b>For fixed points</b>													
Version 1													Steel, »CCSF.« type
Version 2													Stainless steel, »CSSF.« type

## COUPLINGS

Complete couplings include two flanges and two inserts in the selected materials and the necessary quantity of stainless steel nuts, set screws, flat washers and springs. A detailed description of all the individual parts can be found on pages 9.12 to 9.20.

Compression springs are used to set and maintain the correct bolt load on the coupling. Further information on this can be found under the Compression Springs heading on page 9.20.

We recommend greasing stainless steel coupling set screws as protection against seizure.

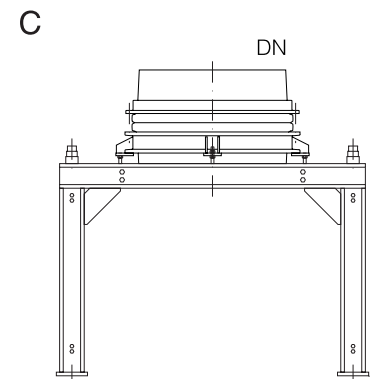
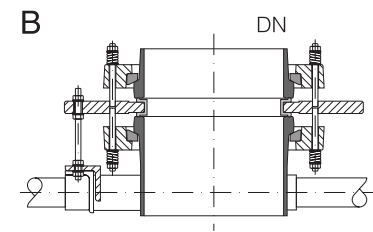
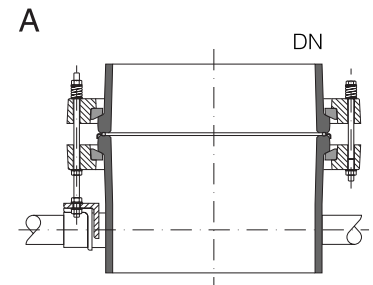


Couplings do not include gaskets which should be ordered separately and should be selected in accordance with the operating requirements of each particular case (please see page 9.22 to 9.24).

Standard inserts can be used with Sectrans coated glass components (suffix »L.«) but glass fibre reinforced polyester coated components (suffix »C.«) in the DN 15 to DN 150 nominal size range require the use of thinner inserts (please see section 1 »Technical information« and page 9.4).

In the DN 15 to DN 600 nominal size range fixed points are created by using a combination of standard couplings and support frames (type A) or support plates and support frames (type B) respectively in the structure. For nominal bore DN 450 use the special drilled flanges CCS450RRD or CSS450RRD. In the DN 800 and DN 1000 nominal size a special fixed point coupling (type C) is required. This includes a fixed point flange which is fixed directly to the heavy duty support stool.

»RRD.« tubular support frames and »UBD.« profile steel support frames can be found in section 10 »Structures & Supports«. Examples are illustrated alongside.



## COUPLINGS

### Couplings with Plastic Flanges

The standard version of these couplings incorporate glass fibre reinforced Duroplast flanges with inserts in plastic (up to DN 150 nominal size) or Duroplast with rubber/glass fibre layer in DN 200 and DN 300 respectively plus nuts, set screws, flat washers and springs.

These couplings do not require earthing, even if the products being handled are prone to set up an electrostatic charge as all the metal parts (set screws etc.) have a sufficiently low capacitance.

In addition, we supply couplings in the DN 15 to DN 150 nominal size range with thinner inserts as required for use with glass fibre reinforced polyester coated glass components (please see table on page 9.4) or, if applicable, longer set screws for use with flexible gaskets (please see page 9.24). These different versions are identified by adding the appropriate suffix to the catalogue reference.



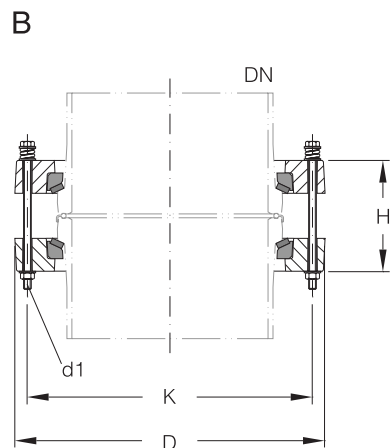
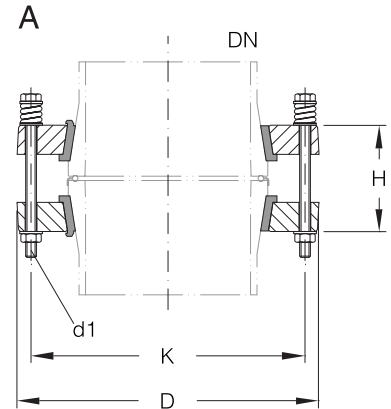
If thinner inserts are required for glass fibre reinforced polyester coated glass components of nominal sizes DN 15 to DN 150, the suffix »C« should be added to the catalogue reference which then becomes, for example, »CP.C«.

In nominal sizes DN 200 and DN 300 the standard couplings can also be used with Sectrans and glass fibre reinforced polyester coated glass components.

When flexible gaskets are used, longer set screws are necessary and a »G« should be added to the catalogue reference which then becomes, for example, »CP.G«.

Catalogue references with the suffix »GC«, e.g. »CP..GC«, refer to couplings for use with flexible gaskets in combination with coated glass components.

DN	D	K	n x d1	H	Type	Reference
15	70	50	3 x M6	39	A	CP15
25	90	70	3 x M8	61	A	CP25
40	109	86	3 x M8	66	A	CP40
50	122	98	3 x M8	73	A	CP50
80	160	133	6 x M8	87	A	CP80
100	204	178	6 x M8	98	A	CP100
150	280	254	6 x M10	100	A	CP150
200	321	295	8 x M8	112	B	CP200
300	428	400	12 x M8	113	B	CP300

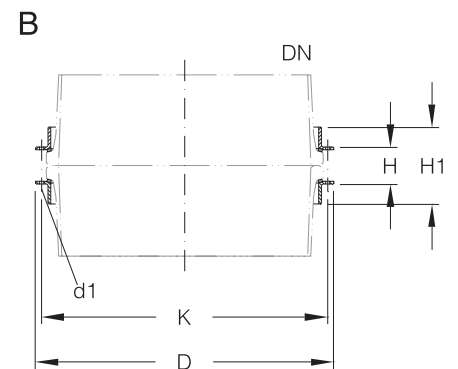
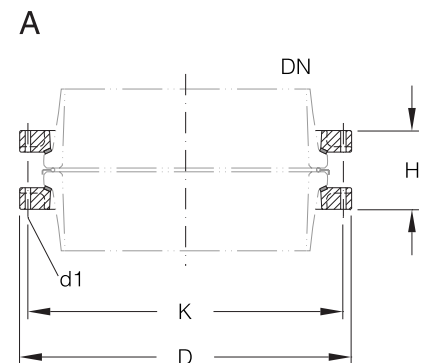


## COUPLINGS

### Couplings with Cast Iron and Steel Flanges

These couplings incorporate epoxy resin painted spheroidal graphite cast iron flanges (DN 450 and DN 600) or welded steel flanges (DN 800 and DN 1000) respectively, bonded rubber/glass fibre inserts plus stainless steel set screws, nuts, flat washers and springs. They can also be used with Sectrans and glass fibre reinforced polyester coated glass components.

DN	D	K	n x d1	H	H1	Type	Reference
450	615	585	16 x M8	146	-	A	CCS450
600	755	710	20 x M12	173	-	A	CCS600
800	996	950	24 x M12	121	253	B	CCS800
1000	1170	1120	28 x M12	123	255	B	CCS1000



## COUPLINGS

### Couplings with Stainless Steel Flanges

The standard version of these couplings incorporate stainless steel flanges, set screws, nuts, flat washers and springs. The inserts are plastic (up to DN 150 nominal size), Duroplast made of rubber/glass fiber support surfaces (in DN 200 and DN 300) or rubber/glass fibre in DN 450 and above respectively.

In addition, we supply couplings in the DN 15 to DN 150 nominal size range with thinner inserts as required for use with glass fibre reinforced polyester coated glass components (please see table on page 9.4) or longer set screws for use with flexible gaskets respectively (please see page 9.24). These different versions are identified by adding the appropriate suffix to the catalogue reference.

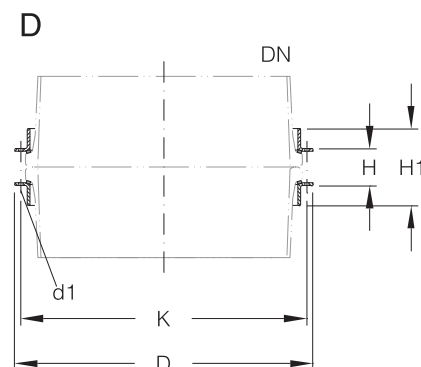
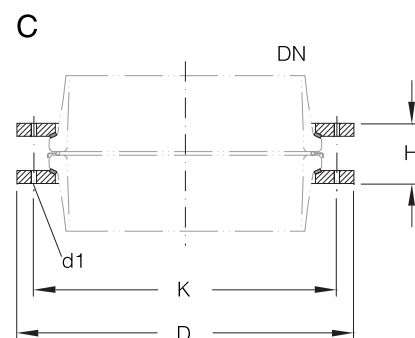
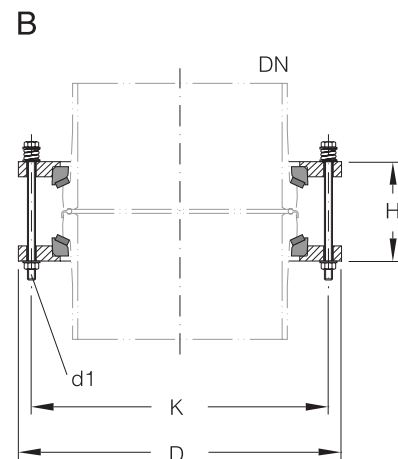
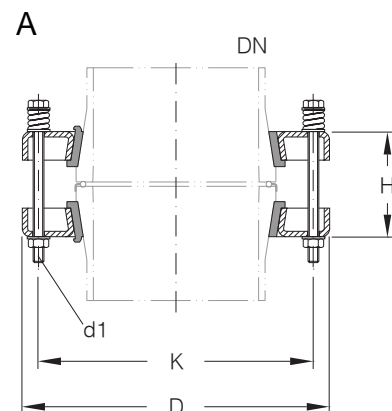
☞ If thinner inserts are required for glass fibre reinforced polyester coated glass components of nominal sizes DN 15 to DN 150, the suffix »C« should be added to the catalogue reference which then becomes, for example, »CSS..C«.

In nominal sizes DN 200 to DN1000 the standard couplings can also be used with Sectrans and glass fibre reinforced polyester coated glass components.

When flexible gaskets are used, longer set screws are necessary and a »G« should be added to the catalogue reference which then becomes, for example, »CSS..G«.

Catalogue references with the suffix »GC«, e.g. »CSS GC«, refer to couplings for use with flexible gaskets in combination with coated glass components.

DN	D	K	n x d1	H	H1	Type	Reference
15	64	50	3 x M6	38	-	A	CSS15
25	85	70	3 x M8	59	-	A	CSS25
40	106	86	3 x M8	66	-	A	CSS40
50	124	98	3 x M8	72	-	A	CSS50
80	155	133	6 x M8	83	-	A	CSS80
100	200	178	6 x M8	95	-	A	CSS100
150	284	254	6 x M10	97	-	A	CSS150
200	325	295	8 x M8	96	-	B	CSS200
300	428	400	12 x M8	97	-	B	CSS300
450	615	585	16 x M8	116	-	C	CSS450
600	755	710	20 x M12	125	-	C	CSS600
800	996	950	24 x M12	121	253	D	CSS800
1000	1170	1120	28 x M12	123	255	D	CSS1000



## COUPLINGS

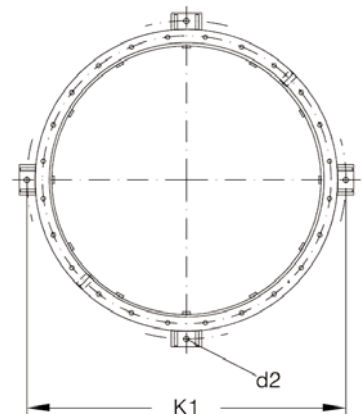
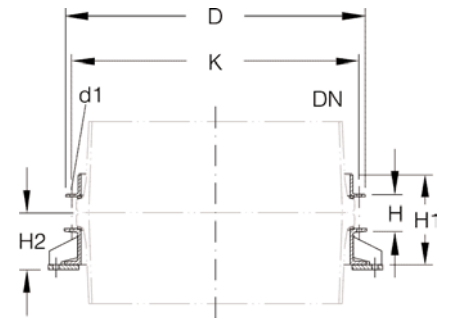
### Steel and Stainless Steel Fixed Point Couplings

In DN 800 and DN 1000, fixed points are created by using special couplings on a profile steel support frame. They incorporate one standard and one fixed point flange which is fixed directly to the U-profile frame by means of four support lugs set at 90°.



For the nominal diameter DN 450, fixed-point connections are implemented via special flanges CCS450RRD and CSS450RRD in connection with a support frame.

DN	D	K	K1	n x d1	n x d2	H	H1	H2	Reference Steel	Reference Stainless steel
800	996	950	1050	24 x M12	4 x 18	121	298	187	CCSF800	CSSF800
1000	1170	1120	1220	28 x M12	4 x 18	123	300	188	CCSF1000	CSSF1000



## COUPLINGS FOR DURAPACK® COLUMNS

As described in section 6 »Column Components«, structured packing and, also DURAPACK® high efficiency packing is supported on a support ring. These are designed to be clamped in a coupling and for this purpose longer set screws are required. The complete couplings described on the following page take this aspect into account.

As regards design and the materials used they are the same as the »CP.« and »CCS.« couplings or alternatively »CCSF.« (fixed point coupling) which are described in detail on pages 9.6, 9.7 and 9.10. For this reason only two (»CPDU.« and »CCSFDU.«) of the versions actually available are shown.

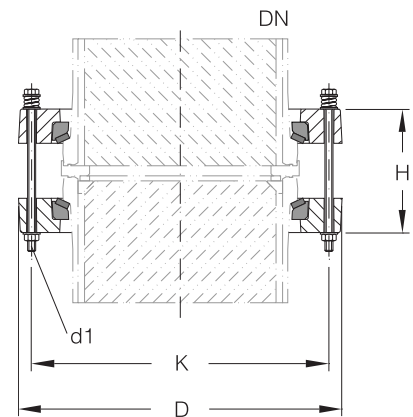
These couplings can also be supplied on request with stainless steel flanges.

# COUPLINGS

## COUPLINGS FOR DURAPACK® COLUMNS

### Couplings for Column Sections

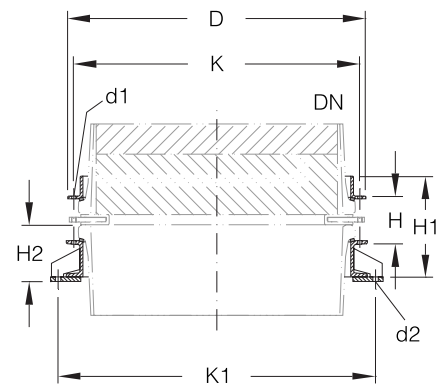
DN	D	n x d1	K	H	Reference
100	204	6 x M8	178	105	CPDU100
150	280	6 x M10	254	109	CPDU150
200	321	8 x M8	295	122	CPDU200
300	428	12x M8	400	128	CPDU300
450	615	16 x M8	585	164	CCSDU450
600	755	20 x M12	710	191	CCSDU600
800	986	24 x M12	950	139	CCSDU800
1000	1160	28 x M12	1120	141	CCSDU1000



## COUPLINGS FOR DURAPACK® COLUMNS

### Fixed Point Couplings


DN	D	n x d1	n x d2	K	K1	H	H1	H2	Reference
800	996	24 x M12	4 x M18	950	1050	139	313	183	CCSFDU800
1000	1170	28 x M12	4 x M18	1120	1220	141	315	184	CCSFDU1000



## QUICK RELEASE COUPLINGS

There is a frequent requirement in process plant applications to open or close couplings as quickly as possible without using tools. Charging materials to reaction or extraction vessels or replacing measurement indicators are typical examples of this. The ideal solution in such instances is our quick release couplings.

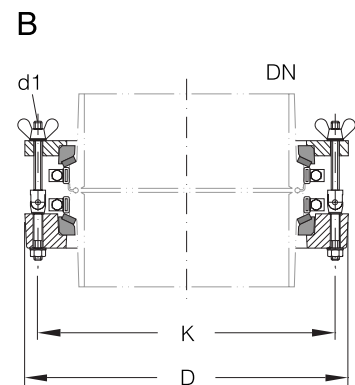
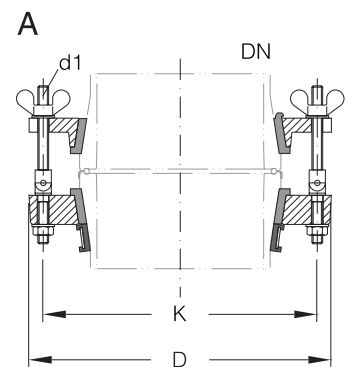
These comprise a stainless steel upper flange with slotted bolt holes, hinged quick release bolts and a lower plastic backing flange which is fixed to prevent it falling down. The support ring and the fastenings are stainless steel. As with all couplings, the gasket is not included and should be ordered separately.

 The permissible operating pressure for quick release couplings ranges from -1 to +0.5 bar g as the bolts can only be tightened by hand.

If thinner inserts are required for glass fibre reinforced polyester coated glass components of nominal sizes DN 25 to DN 150 (please see page 9.4), the suffix »C« should be added to the catalogue reference which then becomes »CVS..C«.

In nominal sizes DN 200 and DN 300 the standard couplings can also be used with Sectrans and glass fibre reinforced polyester coated glass components.


DN	D	K	n x d1	Type	Reference
25	90	70	3 x M8	A	CVS25
40	109	86	3 x M8	A	CVS40
50	122	98	3 x M8	A	CVS50
80	160	133	6 x M8	A	CVS80
100	204	178	6 x M8	A	CVS100
150	280	254	6 x M10	A	CVS150
200	321	295	8 x M8	B	CVS200
300	428	400	12 x M8	B	CVS300



## SHACKLE CLOSURES

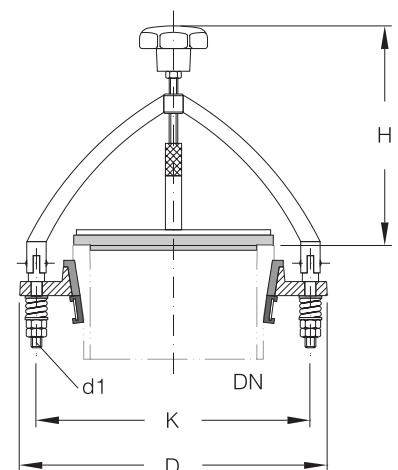
These shackle closures provide a more convenient solution for special applications compared to the quick release couplings described previously. They have a swivelling bracket and are closed or released by means of a spindle attached to it via a centrally located hand-wheel.

The flange, cover, bracket and hinged bolts are stainless steel. The cover is faced with a PTFE disc on the product side and the O-ring which is also corrosion resistant, is located in a recessed groove so that it cannot fall out when the closure is opened.

 The permissible operating overpressure of the shackle closure is -1 to +0.1 bar. The version KMC...A may be deployed at an operating overpressure of +0.6 bar, if the unit is equipped with a local pressure gange.

If thinner inserts are required for glass fibre reinforced polyester coated glass components, the suffix »C« should be added to the catalogue reference which then becomes »KMC..C«.

DN	D	d1	K	H	Reference -1/+0,1 bar	Reference -1/+0,6 bar
50	132	M8	110	138	KMC50	KMC50A
80	155	M8	133	148	KMC80	KMC80A
100	200	M8	178	178	KMC100	KMC100A
150	280	M10	254	180	KMC150	KMC150A



## BACKING FLANGES

Flanges can be supplied in a variety of materials to complement the complete couplings described on pages 9.4 to 9.9. These are one-piece units up to and including DN 300 nominal size and two-piece in the larger sizes. The materials used have been selected on the basis of the bolting forces required whilst also taking into account the practical requirements of plant and pipeline in borosilicate glass 3.3.

The diameter and number of bolt holes as well as the PCD (QVF PCD) are identical for all types of the same nominal size. They can, therefore, be easily interchanged. However, the different set screw lengths required for DN 200 and DN 300 should be taken into account.


 Inserts for size DN 15 to DN 300 flanges should be ordered separately (please see pages 9.18 and 9.19).

Adaptor flanges connecting borosilicate glass 3.3 components to equipment in other materials can be found on pages 9.16 and 9.17.

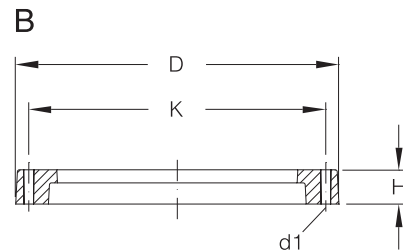
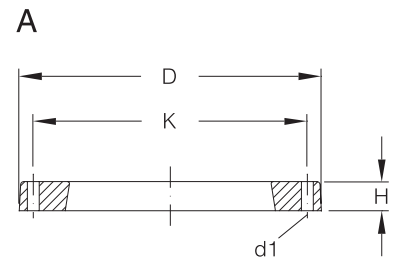
## BACKING FLANGES

### Plastic Backing Flanges

Because of their low weight and relatively good corrosion resistance, glass fibre reinforced Duroplast backing flanges are used in the vast majority of installations. They provide the additional benefit that they do not need earthing even if the products being handled are prone to setting up an electrostatic charge.

 Plastic backing flanges can be used up to a maximum operating temperature on the product side of 200°C. If the coupling is insulated, this temperature should not exceed 150°C.

DN	D	K	n x d1	H	Type	Reference
15	70	50	3 x 7	11	A	CRP15
25	90	70	3 x 9	16	A	CRP25
40	109	86	3 x 9	19	A	CRP40
50	122	98	3 x 9	22	A	CRP50
80	160	133	6 x 9	27	A	CRP80
100	204	178	6 x 9	28	A	CRP100
150	280	254	6 x 11	28	A	CRP150
200	321	295	8 x 9	34	B	CRP200
300	428	400	12 x 9	36	B	CRP300



## BACKING FLANGES

### Cast Iron and Steel Backing Flanges

Because of the bolting forces required, only metal backing flanges are used for the larger nominal sizes. The standard versions are made of spheroidal graphite cast iron (DN 450 and DN 600) or profile steel (DN 800 and DN 1000).

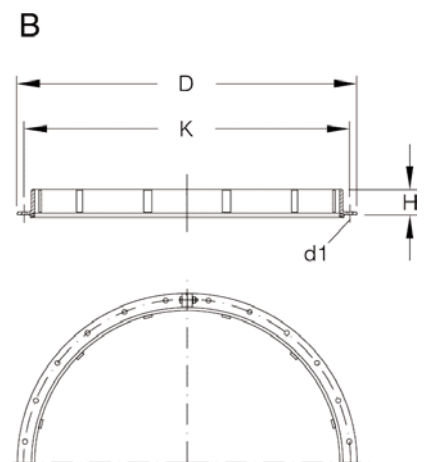
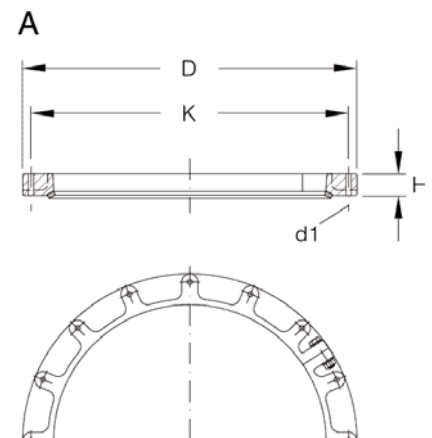
These backing flanges consist of two halves joined together by means of location sleeves and set screws. They are primed and then painted with epoxy resin to provide them with relatively good resistance to corrosion.

They are supplied complete with a bonded segmented rubber/glass fibre insert.



These backing flanges are made up of matching halves which carry appropriate identification. Non-matching halves should not be substituted during installation.

DN	D	K	n x d1	H	Type	Reference
450	615	585	16 x 9	40	A	CRCS450
600	755	710	20 x 14	50	A	CRCS600
800	986	950	24 x 14	75	B	CRCS800
1000	1160	1120	28 x 14	75	B	CRCS1000




## BACKING FLANGES

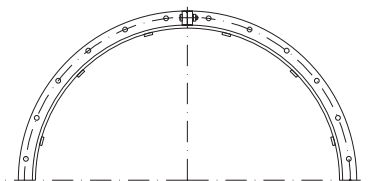
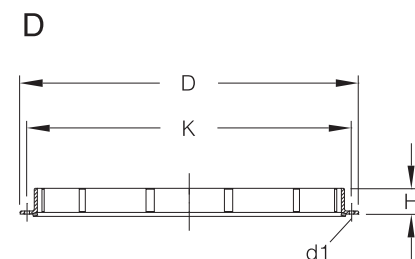
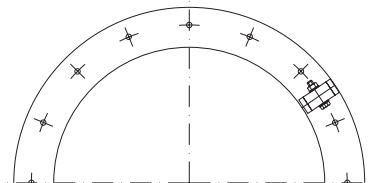
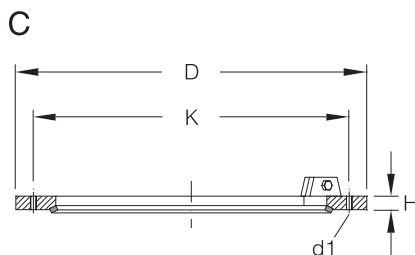
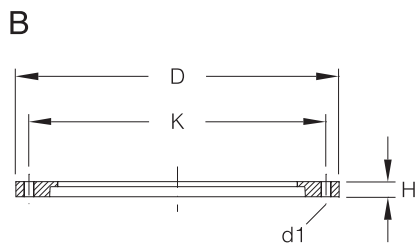
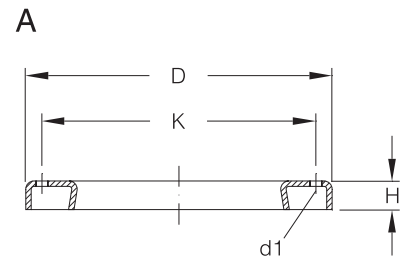
### Stainless Steel Backing Flanges

One-piece backing flanges are used in the DN 15 to DN 300 nominal sizes range. These are deep-drawn (up to and including DN 150) or machined stainless steel. Inserts (please see pages 9.18 and 9.19) for these backing flanges should be ordered separately.

For the DN 450 to DN 1000 nominal sizes a welded design has been chosen. These flanges consist of two halves joined together by means of location sleeves and set screws. They are supplied complete with a bonded segmented rubber/glass fibre insert.

 Backing flanges of DN 450 to DN 1000 nominal sizes are made up of matching halves which carry appropriate identification. Non-matching halves should not be substituted during installation.

DN	D	K	n x d1	H	Type	Reference
15	64	50	3 x 7	10	A	CRSS15
25	85	70	3 x 9	16	A	CRSS25
40	106	86	3 x 9	19	A	CRSS40
50	124	98	3 x 9	22	A	CRSS50
80	155	133	6 x 9	25	A	CRSS80
100	200	178	6 x 9	27	A	CRSS100
150	284	254	6 x 11	27	A	CRSS150
200	325	295	8 x 9	15	B	CRSS200
300	428	400	12 x 9	15	B	CRSS300
450	615	585	16 x 9	25	C	CRSS450
600	755	710	20 x 14	25	C	CRSS600
800	986	950	24 x 14	75	D	CRSS800
1000	1160	1120	28 x 14	75	D	CRSS1000




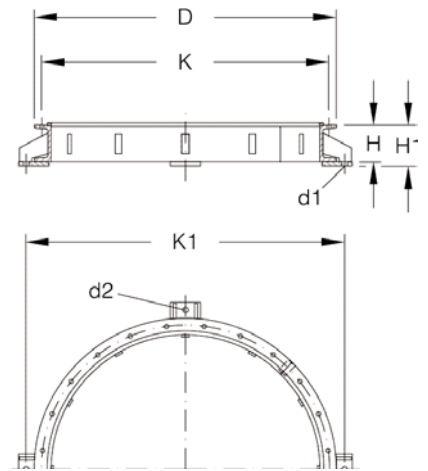
## FIXED POINT FLANGES

### Steel and Stainless Steel Fixed Point Flanges

In the DN 15 to DN 600 nominal size range, fixed points are created by using a combination of standard couplings with support flanges and vessel holders and support rings with tubular support frames in the structure (please see section 10 »Structures & Supports«). In the DN 800 and DN 1000 nominal sizes, special couplings are used to mount fixed points directly onto a profile steel support frame. For this purpose a special fixed point flange should be used as the lower flange. This is fixed directly to the U-profile frame by means of four support lugs set at 90°.

All fixed point flanges are supplied in epoxy resin painted steel or stainless steel. They consist of two halves joined together by means of location sleeves and set screws.

 These backing flanges are made up of matching halves which carry appropriate identification. Non-matching halves should not be substituted during installation.




DN	D	K	K1	n x d1	n x d2	H	H1	Reference Steel	Reference Stainless steel
800	996	950	1050	24 x 14	4 x 18	120	135	CRCSF800	CRSSF800
1000	1170	1120	1220	28 x 14	4 x 18	120	135	CRCSF1000	CRSSF1000

## ADAPTOR FLANGES

Where borosilicate glass 3.3 components have to be connected to flanges on equipment in other materials of construction, different PCDs, bolt hole diameters and bolt configurations are generally involved. These adaptor flanges provide a solution to such problems. They have a larger than normal outside diameter and can be supplied either undrilled or drilled to a particular specification.

As the bolting force applicable to couplings for glass components is lower than for metal equipment, we supply adaptor flanges predrilled to your specifications but with bolt hole diameters identical to those in our standard backing flanges. Where the mating flange is drilled to take larger bolts, reducing washers (please see page 9.21) should be used.

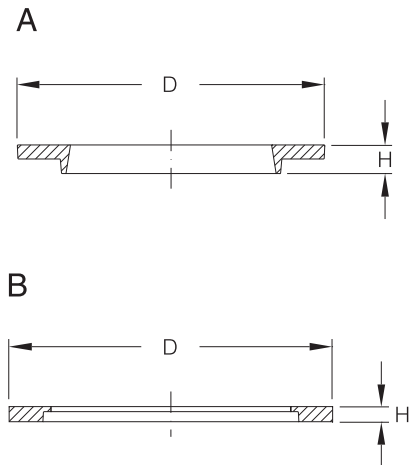
Adaptor flanges can be supplied in cast iron (in the DN15 to DN150 nominal sizes) or machined steel (in the DN200 and DN 300 nominal sizes) with an epoxy resin painting or alternatively stainless steel.

 If the flanges are required with a hole configuration differing from those indicated below, please provide details when ordering.

## ADAPTOR FLANGES

### Undrilled Adaptor Flanges

DN	D	H	Type	Reference Cast iron/Steel	Reference Stainless steel
15	95	10	A	CRCSU15	CRSSU15
25	115	16	A	CRCSU25	CRSSU25
40	150	19	A	CRCSU40	CRSSU40
50	165	22	A	CRCSU50	CRSSU50
80	200	25	A	CRCSU80	CRSSU80
100	220	27	A	CRCSU100	CRSSU100
150	285	27	A	CRCSU150	CRSSU150
200	325	15	B	CRCSU200	CRSSU200
300	460	15	B	CRCSU300	CRSSU300



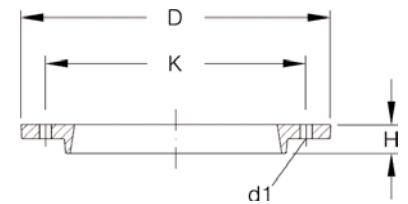
## ADAPTOR FLANGES

### Adaptor Flanges drilled to EN 1092, PN 10



In nominal sizes DN 200 and DN 300 plastic flanges (type »CRP..«) and stainless steel flanges (type »CRSS..«) are drilled to EN 1092, PN 10 (PCD only) and can also be used as adaptor flanges.

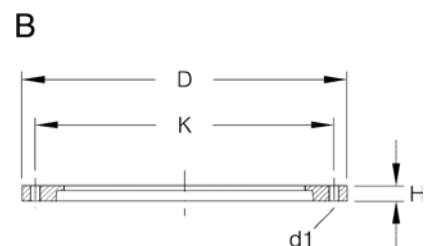
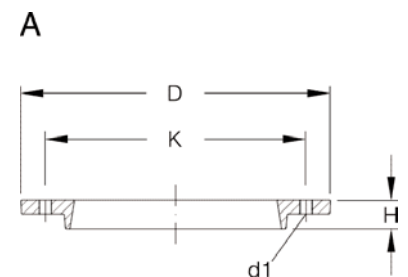
DN	D	K	n x d1	H	Reference Cast iron	Reference Stainless steel
15	95	65	4 x 7	10	CRCSE15	CRSSE15
25	115	85	4 x 9	16	CRCSE25	CRSSE25
40	150	110	4 x 9	19	CRCSE40	CRSSE40
50	165	125	4 x 9	22	CRCSE50	CRSSE50
80	200	160	8 x 9	25	CRCSE80	CRSSE80
100	220	180	8 x 9	27	CRCSE100	CRSSE100
150	285	240	8 x 11	27	CRCSE150	CRSSE150



## ADAPTOR FLANGES

### Adaptor Flanges drilled to ANSI, Class 150

DN	D	K	n x d1	H	Type	Reference Cast iron/Steel	Reference Stainless steel
15	95	60	4 x 7	10	A	CRCSA15	CRSSA15
25	115	79	4 x 9	16	A	CRCSA25	CRSSA25
40	150	98	4 x 9	19	A	CRCSA40	CRSSA40
50	165	121	4 x 9	22	A	CRCSA50	CRSSA50
80	200	152	4 x 9	25	A	CRCSA80	CRSSA80
100	220	190	8 x 9	27	A	CRCSA100	CRSSA100
150	285	241	8 x 11	27	A	CRCSA150	CRSSA150
200	325	298	8 x 9	15	B	CRCSA200	CRSSA200
300	460	432	12 x 9	15	B	CRCSA300	CRSSA300



# COUPLINGS

## INSERTS

Inserts are fitted to avoid direct contact between the flange and glass buttress end and to compensate for any unevenness resulting from manufacturing tolerances. They should always be renewed if a joint is dismantled.

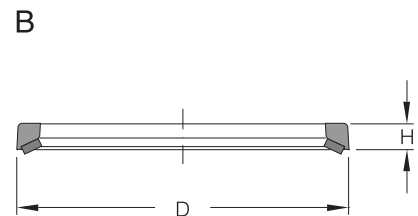
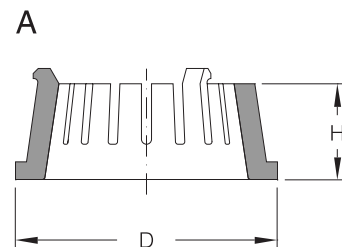
 The »DN« figure in the table below refers to the nominal size of the coupling.

## INSERTS

### Plastic Inserts

Where small nominal sizes are involved, for example in interconnecting pipework in and between units, the number of joints that has to be made is relatively large and inserts that are especially easy to install can reduce the time and effort involved quite considerably. This requirement can be best catered for by using these one-piece inserts made of specific polyamide in the DN 15 to DN 150 nominal size range and the hinged Duroplast with rubber/glass fibre layer version in the DN 200 and DN 300 nominal sizes.

DN	D	H	Type	Reference
15	37	12	A	CIP15
25	52	19	A	CIP25
40	68	22	A	CIP40
50	82	25	A	CIP50
80	113	29	A	CIP80
100	150	33	A	CIP100
150	202	33	A	CIP150
200	254	18	B	CIP200A
300	359	18	B	CIP300A



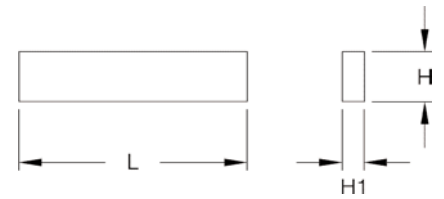
## INSERTS

### Rubber/Glass Fibre Inserts

This segmented version is for the DN 450 to DN 1000 nominal size range. The inserts are bonded to the flange, i.e. they are included in the supply. They only need to be ordered separately when required as spares.



The black side of the insert should be bonded to the flange.



DN	n x L	H	H1	Reference
450	2 x 795	13	6	<b>CIR450</b>
600	2 x 1047	13	6	<b>CIR600</b>
800	4 x 700	13	6	<b>CIR800</b>
1000	4 x 837	13	6	<b>CIR1000</b>

## INSERTS

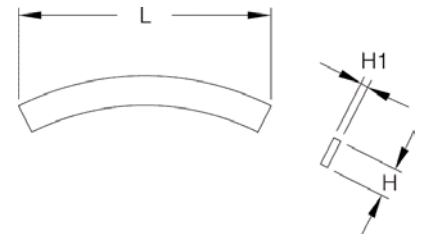
### Rubber/Aramide Fibre Inserts

In applications involving glass fibre reinforced polyester coated borosilicate glass 3.3 components, identified by the suffix »C« (please see section 1 »Technical Information«), these thinner rubber/aramide fibre inserts should be used in the DN 15 to DN 150 nominal size range. All the other coupling components are the same as the standard version.



These inserts should never be used with uncoated or Sctrans coated glass components.

The side of the insert which is marked in blue should be fitted towards the glass flange.



DN	L	H	H1	Reference
15	89	10	2,5	<b>CIC15</b>
25	133	16	3,5	<b>CIC25</b>
40	180	19	4	<b>CIC40</b>
50	220	22	5	<b>CIC50</b>
80	308	25	5,5	<b>CIC80</b>
100	411	27	6	<b>CIC100</b>
150	570	27	6,5	<b>CIC150</b>

## COMPRESSION SPRINGS

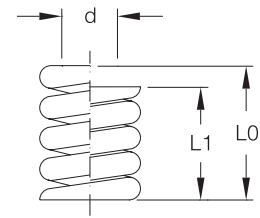
Compression springs are used to set the correct bolt load and to maintain it after the gasket has settled, thus ensuring that the coupling remains leak-free. These springs are supplied exclusively in stainless steel.



To achieve the required sealing load and to ensure that the coupling bolts are tightened evenly, first make the nuts finger-tight and then finish off with a spanner (from DN 80 upwards alternating between bolts on opposite sides of the coupling). The free length  $L_0$  and compressed length  $L_1$  are shown in the table below.

In addition, with couplings in the DN 450 to DN 1000 range the compressed length  $L_1$  should be checked after the plant is heated for the first time and if necessary the set screws retightened.

In the table below »DN« refers to the nominal size of the coupling.

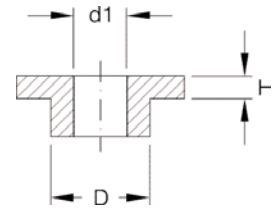


Suitable for coupling DN	d	L0	L1	Reference
15	6,5	13,5	11	DFSS6.5
25	8,5	20	14,5	DFSS8.5
40	8,5	20	14,5	DFSS8.5
50	8,5	20	14,5	DFSS8.5
80	8,5	20	14,5	DFSS8.5
100	8,5	20	14,5	DFSS8.5
150	10,5	30	24,5	DFSS10.5
200	10,5	30	24,5	DFSS10.5
300	10,5	30	24,5	DFSS10.5
450	10,5	30	24,5	DFSS10.5
600	13	39	31	DFSS13
800	13	39	31	DFSS13
1000	13	39	31	DFSS13

## REDUCING WASHERS

Whenever borosilicate glass 3.3 components have to be connected to those of other materials of construction, we recommend the use of predrilled adaptor flanges (please see page 9.17). The diameter of the bolt holes in these flanges is identical to the equivalent type of standard flange described on pages 9.12 and 9.14 in order to limit the bolting force to the figure applicable to glass components.

As the mating flange is usually drilled to take larger bolts, reducing washers should be used to locate the smaller bolts centrally in the mating flange hole. These are supplied in stainless steel as standard.



The »DN« figure in the table below refers to the nominal size of the coupling.

Reducing washers can be supplied in other sizes on request.

### Reducing Washers for Flanges to EN 1092, PN 10

Suitable for coupling DN	D	d1	H	Reference
15	13	7	3	RWSS13/7
25	13	9	3	RWSS13/9
40-100	17	9	3	RWSS17/9
150	21	11	3	RWSS21/11
200-300	21	9	3	RWSS21/9

### Reducing Washers for Flanges to ANSI, Class 150

Suitable for coupling DN	D	d1	H	Reference
15	15	7	3	RWSS15/7
25-40	15	9	3	RWSS15/9
50-100	18	9	3	RWSS18/9
150	21	11	3	RWSS21/11
200	21	9	3	RWSS21/9
300	24	9	3	RWSS24/9

# COUPLINGS

## GASKETS

The choice of the correct gasket is of crucial importance for the proper functioning of borosilicate glass 3.3 plant and pipeline as well as for connections to components in other materials of construction. Depending on the particular application, a suitable gasket can be selected from the four basic versions described below.

Special gaskets and gaskets in other materials can also be supplied to special order.

## GASKETS

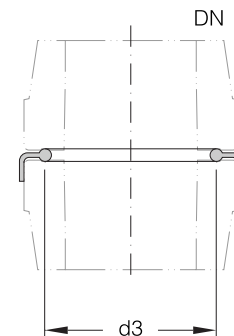
### PTFE 'O' Ring Gaskets

This simple type is the most widely used gasket. It is self-centring on the periphery of the pipe end and up to and including DN 300 the sealing 'O' ring sits in a groove on the buttress end face.

'O' ring gaskets are made to the highest standards from pure, high quality PTFE.



'O' ring gaskets are also suitable in many cases for connections to components in other materials of construction provided the surface does not exhibit any great unevenness. We would be happy to advise you in cases of doubt.



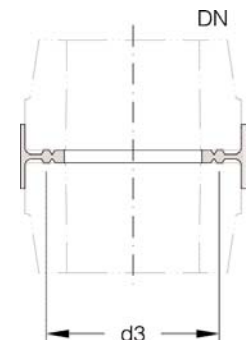
DN	d3	Reference
15	23	TR15
25	34	TR25
40	48	TR40
50	61	TR50
80	88	TR80
100	121	TR100
150	172	TR150
200	220	TR200
300	321	TR300
450	492	TRN450
600	646	TRN600
800	871	TR800
1000	1050	TR1000

## GASKETS

### GMP-Compliant Gaskets

The essential difference between this special type and the version described on page 9.22 is that the seal between the glass components is made on the internal bore. To do this it was necessary to replace the 'O' ring with a flat, slender sealing bead. The same quality material is used as for the »TR.« type.

In addition, these gaskets have a double collar that prevents the product escaping radially in the event of leakage.

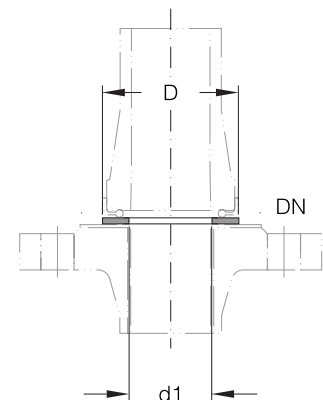


DN	d3	Reference
15	23	TRGMP15
25	34	TRGMP25
40	48	TRGMP40
50	61	TRGMP50
80	88	TRGMP80
100	121	TRGMP100
150	172	TRGMP150
200	220	TRGMP200
300	321	TRGMP300
450	509	TRNGMP450
600	662	TRNGMP600

## GASKETS

### Flat Gaskets

If borosilicate glass 3.3 components have to be connected to PTFE-lined components, we recommend the use of a flat gasket in addition to the 'O' ring gasket. The standard bolting forces applicable to the connection of glass components are then adequate for these applications and the 'O' ring cannot press into the PTFE sealing surface. These flat gaskets are also made from a PTFE material of selected quality.



DN	D	d1	Reference
15	29	17	TP15
25	42	27	TP25
40	57	40	TP40
50	70	51	TP50
80	99	77	TP80
100	133	106	TP100
150	185	156	TP150
200	233	205	TP200
300	338	302	TP300

## GASKETS

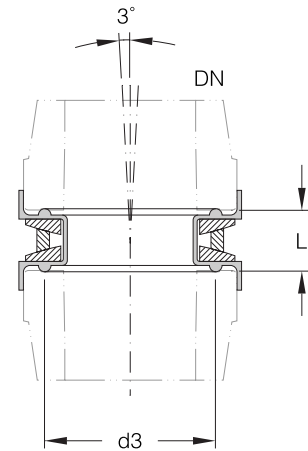
### Flexible Gaskets

These flexible gaskets are ideal for applications in which angular deviations resulting from manufacturing tolerances have to be corrected or where a 'fall' has to be created deliberately. The outside of the gasket is made from pure PTFE of selected quality and the ring and washers from stainless steel.

Deflections of up to 3° (equivalent to 52mm/m) are possible. Up to a temperature of 180 °C, the permissible operating pressure is the same as for glass components of the same nominal size.

If earthing straps are required for flexible gaskets to discharge electrostatic charges, they should be ordered separately. They are also suitable for retrofitting.

DN	d3	L	Reference
15	23	11	KSG15
25	34	12	KSG25
40	48	14	KSG40
50	61	16	KSG50
80	88	20	KSG80
100	121	22	KSG100
150	172	28	KSG150



## BELLOWS

Bellows are important elements in the construction of borosilicate glass 3.3 plant and pipeline. They can be used not only to compensate for expansion and contraction due to changes in temperature but also to avoid stress within plant or to ensure stress-free connection to other components, usually in other materials, which could induce vibration (e.g. service lines, pumps, stirred vessels, etc.). The versions described below take into account these various applications.

Bellow flanges are supplied in either epoxy resin coated, spheroidal graphite, cast iron or stainless steel. Screws, nuts and compression springs are stainless steel in both versions.



The relationship between permissible operating pressure and temperature for the various types of bellows is indicated in the tables below. If used at the maximum permissible operating temperature of 200 °C, they are only suitable for use without any internal pressure. Intermediate figures can be interpolated.

### Permissible operating conditions for »FB.« bellows

DN	Permissible operating pressures (bar g)				
	20 °C	100 °C	160 °C	200 °C	
15	-1 / +4	-1 / +3	-1 / +1,5		
25	-1 / +4	-1 / +3	-1 / +1,5		
40	-1 / +4	-1 / +3	-1 / +1,5		
50	-1 / +4	-1 / +2	-1 / +1		unpressurised
80	-1 / +3	-1 / +2	0 / +1		
100	-1 / +2	-1 / +2	0 / +1		
150	-1 / +2	-1 / +1,5	0 / +0,7		
200	-1 / +1	-1 / +1	0 / +0,5		
300	-1 / +1	-1 / +0,7	0 / +0,3		

As this table indicates, »FB.« type bellows of DN 80 and above cannot be used under vacuum at temperatures in excess of 100 °C. In such cases type »VB.« vacuum bellows, which have an internal stiffening tube, should be used.

### Permissible operating conditions for »VB.« bellows

DN	Permissible operating pressures (bar g)				
	20 °C	100 °C	160 °C	200 °C	
80	-1 / +3	-1 / +2	-1 / +1		unpressurised
100	-1 / +2	-1 / +2	-1 / +1		
150	-1 / +2	-1 / +1,5	-1 / +0,7		
200	-1 / +1	-1 / +1	-1 / +0,5		
300	-1 / +1	-1 / +0,7	-1 / +0,3		

The bellows are set to the correct length with the permitted amount of movement  $\pm DL$  (please see table) using locknuts before leaving the factory. The adjustment of the locknuts at the time of installation and the support and restraint of equipment should be such that the forces resulting from pressure or vacuum in bellows does not result in undue stresses in the pipework. For further information please consult our sales engineers.

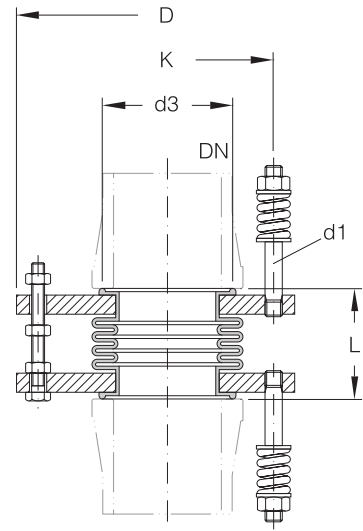
We can also supply bellows for higher operating pressures as well as dissipative PTFE bellows.

## BELLOWS

### Bellows for Connecting Glass to Glass

The complete assembly includes the high grade PTFE bellows which is in contact with the product together with two flanges, limiting screws which ensure that the maximum permissible movement is not exceeded and the ancillary items such as studs etc. for the couplings.

DN	L $\pm^3L$	D	K	n x d1	d3	Reference Cast iron	Reference Stainless steel
15	35 $\pm$ 5	80	50	3 x M6	23	FBCS15	FBSS15
25	43 $\pm$ 5	105	70	3 x M8	34	FBCS25	FBSS25
40	52 $\pm$ 5	125	86	3 x M8	48	FBCS40	FBSS40
50	50 $\pm$ 6	140	98	3 x M8	61	FBCS50	FBSS50
80	68 $\pm$ 6	190	133	6 x M8	88	FBCS80	FBSS80
100	70 $\pm$ 6	200	178	6 x M8	121	FBCS100	FBSS100
150	73 $\pm$ 6	280	254	6 x M10	172	FBCS150	FBSS150
200	73 $\pm$ 6	345	295	8 x M8	220	FBCS200	FBSS200
300	73 $\pm$ 6	460	400	12 x M8	321	FBCS300	FBSS300

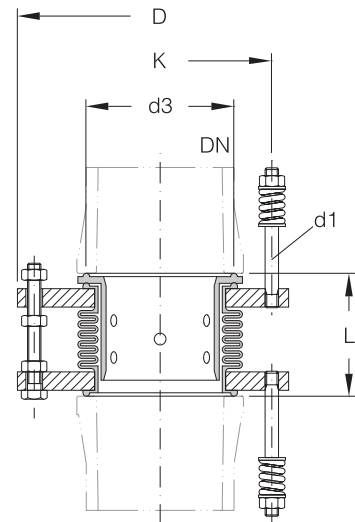


## BELLOWS

### Vacuum Bellows for Connecting Glass to Glass

The complete assembly includes the high grade PTFE bellows (including stiffening tube) which is in contact with the product together with two flanges, limiting screws, which ensure that the maximum permissible movement is not exceeded, and the ancillary items such as studs etc. for the couplings.

DN	L $\pm^3L$	D	K	n x d1	d3	Reference Cast iron	Reference Stainless steel
80	73 $\pm$ 6	190	133	6 x M8	88	VBCS80	VBSS80
100	76 $\pm$ 6	200	178	6 x M8	121	VBCS100	VBSS100
150	79 $\pm$ 6	280	254	6 x M10	172	VBCS150	VBSS150
200	79 $\pm$ 6	345	295	8 x M8	220	VBCS200	VBSS200
300	79 $\pm$ 6	460	400	12 x M8	321	VBCS300	VBSS300



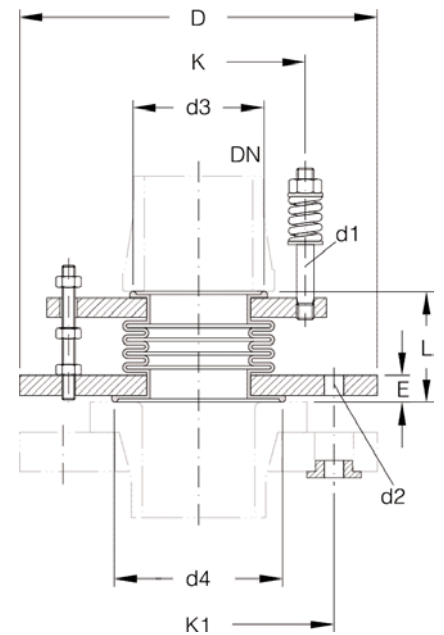
## BELLOWS

### Bellows for Connecting Glass to other materials

This version comprises the high grade PTFE bellows which is in contact with the product together with two different types of flange, limiting screws, which ensure that the maximum permissible movement is not exceeded, and the ancillary items such as studs etc. for the coupling on the glass side and reducing washers for the other side.

Both flanges supplied with these bellows are sized for the bolting forces and bolt sizes (for hole diameter please see page 9.12) appropriate to glass plant. When connecting to flanges in other materials that usually have larger holes, the reducing washers referred to above (please see also page 9.21) should be used.

We can also supply bellows for coupling to flanges with different hole configurations and sealing faces.



### EN 1092, PN 10

DN	L ±³L	D	E	K	K1	n x d1	n x d2	d3	d4	Reference Cast iron	Reference Stainless steel
15	35 ± 5	95	8	50	65	3 x M6	4 x 7	23	28	FBCSE15	FBSSE15
25	43 ± 5	115	12	70	85	3 x M8	4 x 9	34	44	FBCSE25	FBSSE25
40	52 ± 5	150	13	86	110	3 x M8	4 x 9	48	58	FBCSE40	FBSSE40
50	50 ± 6	165	14	98	125	3 x M8	4 x 9	61	71	FBCSE50	FBSSE50
80	68 ± 6	200	17	133	160	6 x M8	8 x 9	88	100	FBCSE80	FBSSE80
100	70 ± 6	220	17	178	180	6 x M8	8 x 9	121	128	FBCSE100	FBSSE100
150	73 ± 6	285	19	254	240	6 x M10	8 x 11	172	178	FBCSE150	FBSSE150
200	73 ± 6	345	19	295	295	8 x M8	8 x M8	220	231	FBCSE200	FBSSE200
300	73 ± 6	460	19	400	400	12 x M8	12 x M8	321	335	FBCSE300	FBSSE300

### ANSI, Class 150

DN	L ±³L	D	E	K	K1	n x d1	n x d2	d3	d4	Reference Cast iron	Reference Stainless steel
15	35 ± 5	95	8	50	60	3 x M6	4 x 7	23	28	FBCSA15	FBSSA15
25	43 ± 5	115	12	70	79	3 x M8	4 x 9	34	44	FBCSA25	FBSSA25
40	52 ± 5	150	13	86	98	3 x M8	4 x 9	48	58	FBCSA40	FBSSA40
50	50 ± 6	165	14	98	121	3 x M8	4 x 9	61	71	FBCSA50	FBSSA50
80	68 ± 6	200	17	133	152	6 x M8	4 x 9	88	100	FBCSA80	FBSSA80
100	70 ± 6	220	17	178	190	6 x M8	8 x 9	121	128	FBCSA100	FBSSA100
150	73 ± 6	285	19	254	241	6 x M10	8 x 11	172	178	FBCSA150	FBSSA150
200	73 ± 6	345	19	295	298	8 x M8	8 x 9	220	231	FBCSA200	FBSSA200
300	73 ± 6	460	19	400	432	12 x M8	12 x 9	321	335	FBCSA300	FBSSA300

## BELLOWS

### Vacuum Bellows for Connecting Glass to other materials

This version comprises the high grade PTFE bellows (including stiffening tube) which is in contact with the product together with two different types of flange, limiting screws, which ensure that the maximum permissible movement is not exceeded and the ancillary items such as studs etc. for the coupling on the glass side and reducing washers for the other side.

Both flanges supplied with these bellows are sized for the bolting forces and bolt sizes (for hole diameter please see page 9.12) appropriate to glass plant. When connecting to flanges in other materials that usually have larger holes, the reducing washers referred to above (please see also page 9.21) should be used.

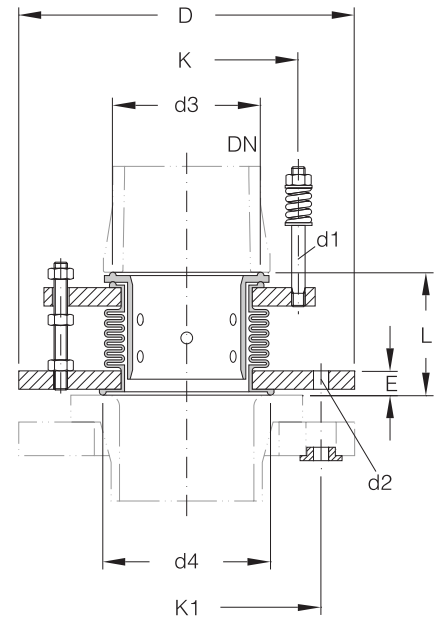
We can also supply bellows for coupling to flanges with different hole configurations and sealing faces.

### EN 1092, PN 10

DN	L $\pm^3L$	D	E	K	K1	n x d1	n x d2	d3	d4	Reference Cast iron	Reference Stainless steel
80	73 ± 6	200	17	133	160	6 x M8	8 x 9	88	100	VBCSE80	VBSSE80
100	76 ± 6	220	17	178	180	6 x M8	8 x 9	121	128	VBCSE100	VBSSE100
150	79 ± 6	285	19	254	240	6 x M10	8 x 11	172	178	VBCSE150	VBSSE150
200	79 ± 6	345	19	295	295	8 x M8	8 x M8	220	231	VBCSE200	VBSSE200
300	79 ± 6	460	19	400	400	12 x M8	12 x M8	321	335	VBCSE300	VBSSE300

### ANSI, Class 150

DN	L $\pm^3L$	D	E	K	K1	n x d1	n x d2	d3	d4	Reference Cast iron	Reference Stainless steel
80	73 ± 6	200	17	133	152	6 x M8	4 x 9	88	100	VBCSA80	VBSSA80
100	76 ± 6	220	17	178	190	6 x M8	8 x 9	121	128	VBCSA100	VBSSA100
150	79 ± 6	285	19	254	241	6 x M10	8 x 11	172	178	VBCSA150	VBSSA150
200	79 ± 6	345	19	295	298	8 x M8	8 x M8	220	231	VBCSA200	VBSSA200
300	79 ± 6	460	19	400	432	12 x M8	12 x M8	321	335	VBCSA300	VBSSA300



## METAL/PTFE SPACERS

These components must always be used as interface spacers when connecting borosilicate glass 3.3 to other materials where a direct connection is not possible because either the inside diameters are different or the mating surface has a highly radiused edge, e.g. on a glass lined branch.

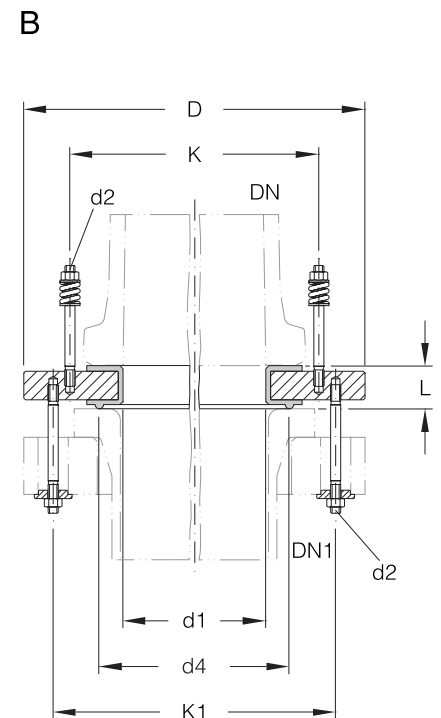
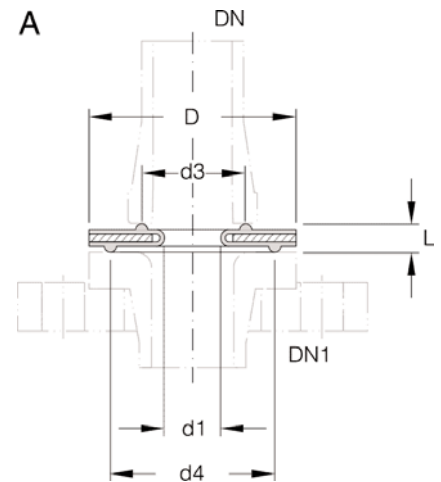
The spacers are in the form of a stainless steel disk, with two soft insert rings and a "U" section high grade PTFE sheath.



In nominal sizes DN 40 to DN 1000 the metal/PTFE spacers are suitable for use with flanges drilled to EN 1092, PN 10 and ANSI, Class 150. In nominal size DN25 the "EMPA25/25" type has to be used with ANSI Class 150 flanges.

The spacers can be clamped in the coupling in the case of components up to and including DN 600.

In the larger nominal sizes (DN 800 and DN 1000), both components are bolted separately to the spacer, its stainless steel ring being drilled to the appropriate PCDs and hole sizes. The stainless steel coupling screws, nuts and compression springs are included in the supply.



DN	DN1	D	K	K1	d1	n x d2	d3	d4	L	Type	Reference
25	25	68	-	-	18	-	34	54	9	A	EMPA25/25
25	25	50	-	-	18	-	34	40	9	A	EMPA25/25
40	32	78	-	-	30	-	48	66	9	A	EMP40/32
40	40	88	-	-	30	-	48	70	9	A	EMP40/40
50	50	102	-	-	42	-	60.5	82	11	A	EMP50/50
50	65	122	-	-	42	-	60.5	110	11	A	EMP50/65
80	65	122	-	-	68	-	88	110	12	A	EMP80/65
80	80	138	-	-	68	-	88	120	12	A	EMP80/80
100	80	138	-	-	100	-	120.5	120	15	A	EMP100/80
100	100	158	-	-	100	-	120.5	142	15	A	EMP100/100
150	150	212	-	-	150	-	172	194	15	A	EMP150/150
150	200	268	-	-	150	-	172	242	16	A	EMP150/200
200	200	268	-	-	200	-	220	242	16	A	EMP200/200
200	250	320	-	-	200	-	220	298	16	A	EMP200/250
300	300	370	-	-	300	-	321	344	16	A	EMP300/300
450	450	544	-	-	450	-	492	500	21	A	EMP450/450
600	600	700	-	-	600	-	646	640	22	A	EMP600/600
800	800	1015	950	950	779	24 x M12	-	840	46	B	EMP800/800
1000	1000	1230	1120	1160	1000	28 x M12	-	1050	46	B	EMP1000/1000

# COUPLINGS

## PRODUCT HOSES

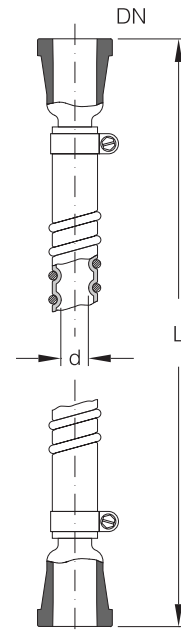
These flexible hoses are ideal as product lines in applications calling for frequent modifications, e.g. in pilot plant. They have also proven ideal for complicated piping arrangements where space is limited. Another application for which they provide an ideal solution is to provide a variable height overflow.

The hoses are made of high grade PTFE shrunk onto a borosilicate glass 3.3 hose connector at each end and fixed with a special stainless steel clamp. Longer hoses up to a maximum length of 10 metres can be supplied on request.



All spiral hoses can be used under vacuum to an absolute pressure of 1 mbar at a temperature of 180° C. The permissible operating pressure as a function of temperature is indicated in the table below.

DN	d	L	Minimum bend radius	Permissible operating pressures (bar g)			Reference
				20 °C	100 °C	120 °C	
15	10	500	50	4	0,5		SP15/500
15	10	1000	50	4	0,5		SP15/1000
15	10	2000	50	4	0,5		SP15/2000
25	20	500	85	4	0,5	unpressurised	SP25/500
25	20	1000	85	4	0,5		SP25/1000
25	20	2000	85	4	0,5		SP25/2000
40	36	500	120	2,5	0,5		SP40/500
40	36	1000	120	2,5	0,5		SP40/1000
40	36	2000	120	2,5	0,5		SP40/2000



## HOSES FOR SERVICE CONNECTIONS

These hoses provide a flexible connection for service lines (steam, condensate, heating fluids and coolants) to heat exchangers, boilers and borosilicate glass 3.3 jacketed components or jacketed metal reaction vessels. The corrugated hose, woven sleeve and coupling flange are stainless steel.

Hoses are also available in other lengths on request.



The permissible maximum operating pressure for these hoses is 16 bar g and the permissible operating temperature is -30/+300 °C.

The permissible operating conditions for the components to which they are connected should also be taken into account.

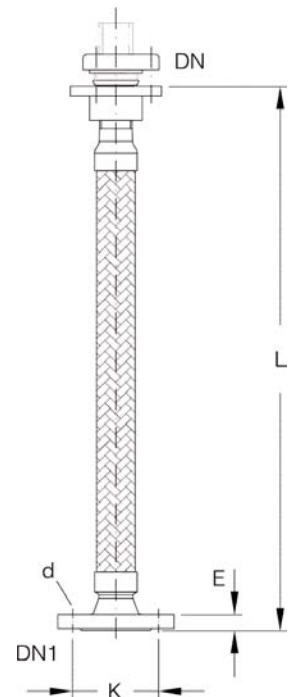
All hoses can also be supplied with woven glass fibre fabric insulation. In such cases the suffix »IN« should be added to the catalogue reference, e.g. »MSCIN25«.

## HOSES FOR SERVICE CONNECTIONS

with QVF/EN 1092, PN 16 connections

These are used with heat exchangers and jacketed components with borosilicate glass 3.3 jacket. A complete stainless steel coupling including gasket for connection to the glass side branch is included in the supply.

DN	DN1	L	K	n x d	E	Reference
15	15	1000	65	4 x 14	14	<b>MSC15</b>
25	25	1000	85	4 x 14	16	<b>MSC25</b>
50	50	1000	125	4 x 18	18	<b>MSC50</b>

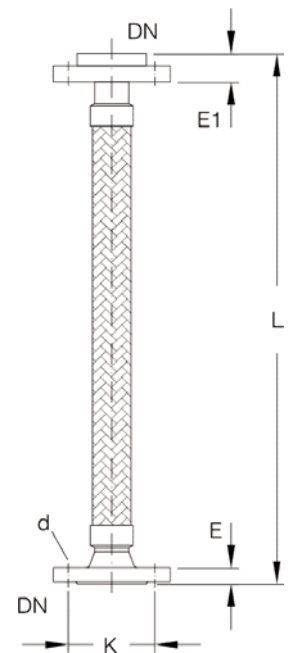


## HOSES FOR SERVICE CONNECTIONS

with connections to EN 1092, PN 16

These hoses are used with metal immersion heat exchangers, heating baths and shell and tube heat exchangers with metal headers. One end is fitted with a loose flange for ease of assembly.

DN	L	K	n x d	E	E1	Reference
15	1000	65	4 x 14	14	28	<b>MSCE15</b>
25	1000	85	4 x 14	16	32	<b>MSCE25</b>
50	1000	125	4 x 18	18	36	<b>MSCE50</b>



# COUPLINGS

## COMPLETE COUPLINGS FOR BUTTERFLY VALVES

These complete couplings are designed for the installation of butterfly valves (please see section 3 »Valves & Filters«) between borosilicate glass 3.3 buttress ends or between glass and metal flanges.



If the valves are installed between glass fibre reinforced polyester coated glass components (with the suffix »C« in the catalogue reference), thinner inserts are required for nominal sizes DN 50 to DN 150. In such cases the suffix »C« should also be added to the catalogue reference for the coupling e.g. »FVT../1C«.

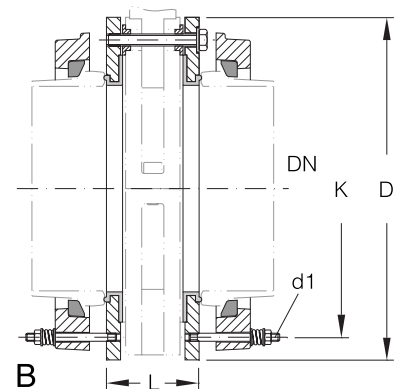
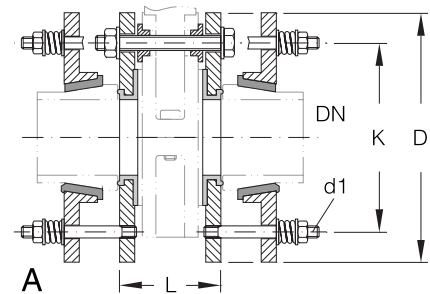
## COMPLETE COUPLINGS FOR BUTTERFLY VALVES

for fitting between glass buttress ends

In this case, the couplings comprise two stainless steel rings with a "U" section high grade PTFE sheath, two spheroidal graphite cast iron flanges (up to DN 150 nominal size) or plastic flanges (DN 200 and 300 nominal size) with inserts and the appropriate quantity of stainless steel reducing washers, set screws, compression springs and nuts.

Stainless steel flanges can also be supplied on request.

DN	L	D	K	n x d1	Type	Reference
50	70	165	125	4 x M8	A	FVT50/1
80	74	200	160	8 x M8	A	FVT80/1
100	80	220	180	8 x M8	A	FVT100/1
150	88	285	240	8 x M10	A	FVT150/1
200	96	340	295	8 x M8	B	FVT200/1



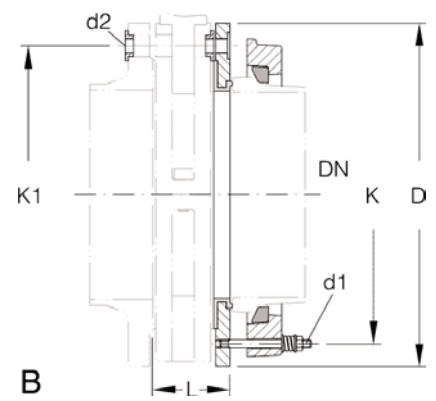
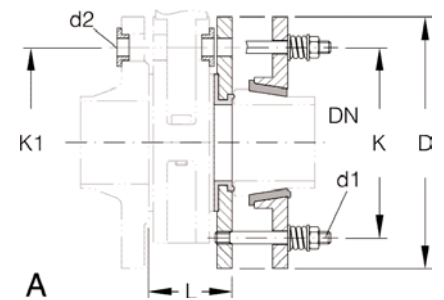
## COMPLETE COUPLINGS FOR BUTTERFLY VALVES

for fitting between glass and metal flanges  
to EN 1092, PN 10

Couplings for this application comprise one stainless steel ring with a "U" section high grade PTFE sheath, one spheroidal graphite cast iron flange (up to DN 150 nominal size) or plastic flange (DN 200 and 300 nominal size) with insert and the appropriate quantity of stainless steel reducing washers, set screws, compression springs and nuts.

Stainless steel flanges can also be supplied on request.

DN	L	D	K	K1	n x d1	n x d2	Type	Reference
50	57	165	125	125	4 x M8	4 x 11	A	FVT50/2
80	60	200	160	160	8 x M8	8 x 11	A	FVT80/2
100	66	220	180	180	8 x M8	8 x 11	A	FVT100/2
150	72	285	240	240	8 x M10	8 x 13	A	FVT150/2
200	78	340	295	295	8 x M8	8 x 13	B	FVT200/2



## ADAPTORS KF TO WPR

To connect to safety flat buttress ends a special coupling was developed, with the reference no. CPKFA.... and can be used for ball and socket glass-ends. Following parts are in the scope of supply:

2 x SCHD.../K (KF-backing flanges)

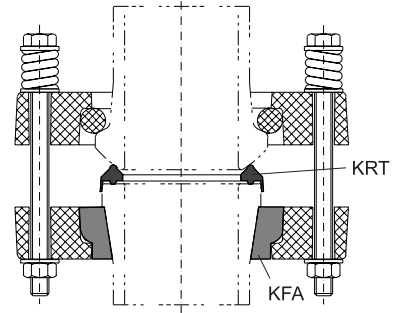
1 x BEIL.../K (KF-insert)

1 x KFA...(adaptor)

1 x KRT..., or KRTN... (adaptor PTFE/gasket,  $T_{\max} = 130^{\circ}\text{C}$ )

screws and springs

For the assembling of DN 80 take care the adaptor gasket KRT is exactly positioned.



DN	Reference
15	CPKFA15
25	CPKFA25
40	CPKFA40
50	CPKFA50
80	CPKFA80
100	CPKFA100
150	CPKFA150