

## GENERAL INFORMATION

Various adaptors and bellows are used for glass pipelines to form joints with other pipelines or with tubes. Especially for forming joints with fixed pipelines or in certain cases between glass pipes bellows are used to ensure a low-tension connection to the glass structural component.



The following standard adaptors and bellows are available:

- Bellows with glass-glass connection
- Bellows with glass--EN 1092-1 connection, PN10
- Bellows with glass-ANSI 150 connection
- Bellows with EN 1092-1 connections, PN40, for media connections
  
- Adaptors for Hose adaptors
- Adaptors for Tri-Clamp couplings
- Adaptors for KAMLOK couplings
- Adaptors for milk pipe connections
- Adaptors for threaded media connections

In addition to the adaptors and bellows described in the following there are also numerous possible customer-specific adaptors. For example special glass adaptor pieces can be delivered for nominal diameters of 32, 65 and 125 (example of possible order PR 050/032-... as a transition piece from nominal diameters of 50 to nominal diameters of 32, please contact one of our specialist departments if you are interested).

The operating conditions included in chapter 10 "technical information" only apply for the standard flanges in PF and KF systems. If the specific operating conditions are not entered for the following structural components then please contact our specialist departments if needed.

## BELLOWS

Bellows are used in systems with borosilicate glass 3.3 to

- balance out length differences and temperature-dependent length changes,
- to guarantee a tension-free connection to components mostly made of different materials and
- reduce vibrations in apparatus.

Standard product bellows are delivered for transitions from glass pipelines to counter flanges using a glass connector in accordance with EN 1092-1 and ANSI. The bellow flanges are manufactured from coated aluminium cast metal and from stainless steel.

The permitted operating conditions for bellows are included in chapter 10 and should be observed when fixing approved system operating conditions.

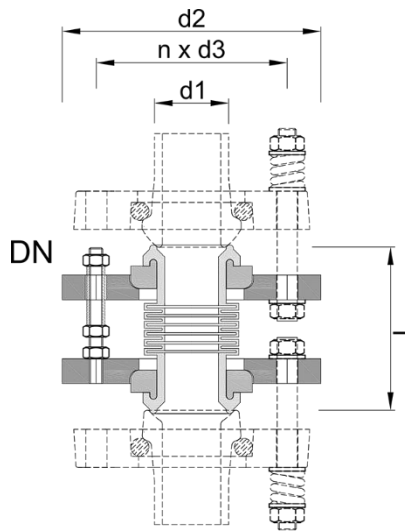
The mounting dimensions and approved flexibility  $\pm \Delta L$  of the bellows are set up using bolt stops and spacer bushes. Angular deflections up to a maximum of  $\pm 5^\circ$  are permitted. Adaptions to the bellows and the guiding and mounting of glass structural components during assembly should be carried out so that no unapproved forces are exerted on the pipeline system. You can receive more information from our specialists.

We can also deliver bellows for higher operating pressures as well as bellows made of conductive PTFE on request. Examples of orders are shown in the following.

<b>Product name:</b>	<b>Item no.</b>	<b>Example</b>
Bellows, glass-glass and glass-EN1092, KF system:	CBG....-K	CBG 025-K
Bellows, glass-ANSI, KF system:	CBA....-K	CBA 025-K
Bellows, glass-glass, KF system, conductive:	CBG....-K-M2	CBG 025-K-M2
Bellows, glass-glass, KF system, conductive, with FDA:	CBG....-K-M2-Z1	CBG 025-K-M2-Z1

**BELLOWS FOR FLANGE CONNECTIONS GLASS-GLASS**

Bellows for installing in glass pipelines as well as for connecting to flanges in accordance with EN 1092-1, PN10 in the KF system are delivered in line with the following representation and table. Type CAPG ...-K adaptor couplings are needed to connect bellows to glass flanges and must be ordered separately. The bellows are designed with a sealing lip so that no additional sealing gaskets are needed for the connection. The bellows can also optionally be delivered with stainless steel clamp rings. Examples of such orders are also shown in the following table.



CBG...K bellows  
for glass-glass connection

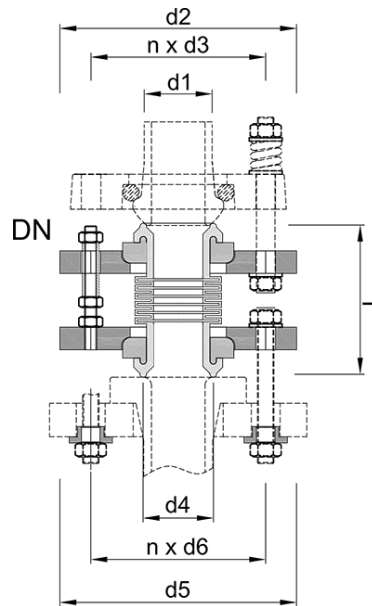
Product name:	Item no.	Example
Bellows, glass-glass:	CBG....-K	CBG 025-K
Bellows, glass-glass, stainless steel:	CBG....-K-O1	CBG 025-K-O1
Bellows, glass-glass, PTFE conductive:	CBG....-K-M2	CBG 025-K-M2
Bellows, glass-glass, stainless steel, PTFE conductive:	CBG....-K-M2-O1	CBG 025-K-M2-O1

DN	L [mm]	d1 [mm]	d2 [mm]	n x d3 [mm] [mm]	Item no. Bellows	Item no. Connection coupling
15	75±5	Ø23	Ø95	Ø50, 3 x Ø7	<b>CBG 015-K</b>	CAPB 015-K
25	75±5	Ø34	Ø115	Ø85, 4 x Ø9	<b>CBG 025-K</b>	CAPB 025-K
40	100±5	Ø51	Ø150	Ø110, 4 x Ø9	<b>CBG 040-K</b>	CAPB 040-K
50	100±6	Ø63	Ø165	Ø125, 4 x Ø9	<b>CBG 050-K</b>	CAPB 050-K
80	100±6	Ø96	Ø200	Ø160, 8 x Ø9	<b>CBG 080-K</b>	CAPB 080-K
100	100±6	Ø116	Ø220	Ø180, 8 x Ø9	<b>CBG 100-K</b>	CAPB 100-K
150	125±6	Ø169	Ø285	Ø240, 8 x Ø9	<b>CBG 150-K</b>	CAPB 150-K
200	100±6	Ø220	Ø340	Ø295, 8 x Ø9	<b>CBG 200</b>	CAPB 200
300	100±6	Ø321	Ø425	Ø400, 12 x Ø9	<b>CBG 300</b>	CAPB 300

**BELLOWS FOR FLANGE CONNECTIONS GLASS-EN1092-1**

Bellows for connecting to flanges in accordance with EN 1092-1, PN10 in the KF system are delivered in line with the following representation and table. Type CAPG ...-K adaptor couplings are needed to connect bellows to glass flanges and must be ordered separately. The bellows are designed with a sealing lip so that no additional sealing gaskets are needed for the connection.

The contact surface should be paid attention to when connecting to the EN flange and, if needed, a type CGS... steel core gasket should be used to balance out greater sealing surface radii. The bellows can also optionally be delivered with stainless steel clamp rings. Examples of such orders are also shown in the following table.



CBE...K bellows  
for glass-EN1092 connection

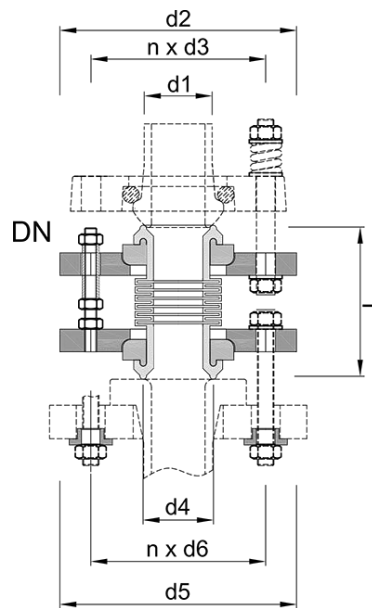
Product name:	Item no.	Example
Bellows, glass-EN1092:	CBE....-K	CBE 025-K
Bellows, glass-EN1092, stainless steel:	CBE....-K-O1	CBE 025-K-O1
Bellows, glass-EN1092, PTFE conductive:	CBE....-K-M2	CBE 025-K-M2
Bellows, glass-EN1092, stainless steel, PTFE conductive:	CBE....-K-M2-O1	CBE 025-K-M2-O1

DN	L [mm]	d1 [mm]	d4 [mm]	n x d3	n x d6 [mm]	d2 [mm]	d5 [mm]	Item no.
15	75±5	Ø23	Ø23	Ø50, 3 x Ø7	Ø65, 4 x Ø7	Ø95	Ø95	<b>CBE 015-K</b>
25	75±5	Ø34	Ø34	Ø85, 4 x Ø9	Ø85, 4 x Ø9	Ø115	Ø115	<b>CBE 025-K</b>
40	100±5	Ø51	Ø51	Ø110, 4 x Ø9	Ø110, 4 x Ø9	Ø150	Ø150	<b>CBE 040-K</b>
50	100±6	Ø63	Ø63	Ø125, 4 x Ø9	Ø125, 4 x Ø9	Ø165	Ø165	<b>CBE 050-K</b>
80	100±6	Ø96	Ø96	Ø160, 4 x Ø9	Ø160, 4 x Ø9	Ø200	Ø200	<b>CBE 080-K</b>
100	100±6	Ø116	Ø116	Ø180, 8 x Ø9	Ø180, 8 x Ø9	Ø220	Ø220	<b>CBE 100-K</b>
150	125±6	Ø169	Ø169	Ø240, 8 x Ø9	Ø240, 8 x Ø9	Ø285	Ø285	<b>CBE 150-K</b>
200	100±6	Ø220	Ø220	Ø295, 8 x Ø9	Ø295, 8 x Ø9	Ø340	Ø340	<b>CBE 200</b>
300	100±6	Ø321	Ø321	Ø400, 12 x Ø9	Ø400, 12 x Ø9	Ø425	Ø425	<b>CBE 300</b>

**BELLOWS FOR FLANGE CONNECTIONS GLASS-ANSI 150 PSI**

Bellows for connecting glass flanges to flanges in accordance with ANSI 150 psi are available for the PF system in line with the following drawing and table. Reducing sleeves for the ANSI flange side are delivered for this variant in order to enable use of the normal bolts for glass apparatus and to balance out the bores which are normally larger.

The contact surface should be paid attention to when connecting to the ANSI flange and, if needed, a type CGS... steel core gasket should be used to balance out greater sealing surface radii.



Type CBA...-K bellows for glass-ANSI connection

Product name:	Item no.	Example
Bellows, glass-ANSI:	CBA....-K	CBA 025-K
Bellows, glass-ANSI, stainless steel:	CBA....-K-O1	CBA 025-K-O1
Bellows, glass-ANSI, PTFE conductive:	CBA....-K-M2	CBA 025-K-M2
Bellows, glass-ANSI, stainless steel, PTFE conductive:	CBA....-K-M2-O1	CBA 025-K-M2-O1

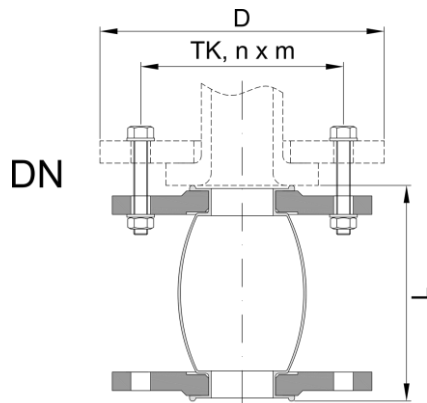
DN	L	d1	d4	n x d3	n x d6	d2	d5	Item no.
	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	
15	75±5	Ø23	Ø23	Ø50, 3 x Ø7	Ø60, 4 x Ø7	Ø95	Ø95	<b>CBA 015-K</b>
25	75±5	Ø34	Ø34	Ø85, 4 x Ø9	Ø79, 4 x Ø9	Ø115	Ø115	<b>CBA 025-K</b>
40	100±5	Ø51	Ø51	Ø110, 4 x Ø9	Ø98, 4 x Ø9	Ø150	Ø150	<b>CBA 040-K</b>
50	100±6	Ø63	Ø63	Ø125, 4 x Ø9	Ø121, 4 x Ø9	Ø165	Ø165	<b>CBA 050-K</b>
80	100±6	Ø96	Ø96	Ø160, 4 x Ø9	Ø152, 4 x Ø9	Ø190	Ø190	<b>CBA 080-K</b>
100	100±6	Ø116	Ø116	Ø180, 8 x Ø9	Ø190, 8 x Ø9	Ø220	Ø220	<b>CBA 100-K</b>
150	125±6	Ø169	Ø169	Ø240, 8 x Ø9	Ø241, 8 x Ø9	Ø285	Ø285	<b>CBA 150-K</b>
200	100±6	Ø220	Ø220	Ø295, 8 x Ø9	Ø298, 8 x Ø9	Ø340	Ø340	<b>CBA 200</b>
300	100±6	Ø321	Ø321	Ø400, 12 x Ø9	Ø432, 12 x Ø9	Ø452	Ø452	<b>CBA 300</b>

**BELLOWS / COMPENSATORS FOR MEDIA CONNECTIONS IN ACCORDANCE WITH EN 1092, PN 10**

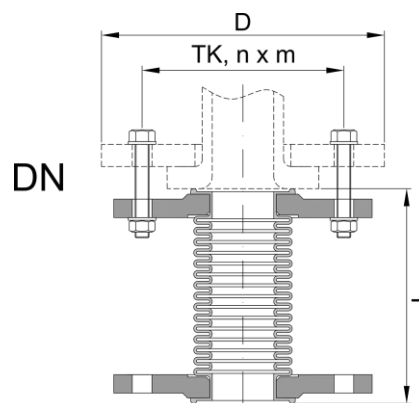
Bellows for connecting media pipelines (steam, condensation, heat transfer media, coolants) to stainless steel flanges are designed with two-sided connections to EN1092-1 flanges up to DN 150.

Standard bellows or compensators are available with galvanised steel clamp rings and EPDM bellows, which can be used in conditions of up to 10 bar and 80 °C. Alternatively, type CBM ...-O1 stainless steel bellows (1.4404) can be delivered, which can be used in conditions up to 16 barg and 200 °C.

The maximum angular displacement is a minimum of 5° in each case.



CBM... bellows  
for EN 1092 - EN 1092 connection,  
elastomeric bellows



CBM...-O1 bellows  
for EN 1092 - EN 1092 connection,  
stainless steel bellows

**Product name:**

Bellows, EN1092-EN1092:

Bellows, EN1092-EN1092, stainless steel:

**Item no.**

CBM....

CBM....-O1

**Example**

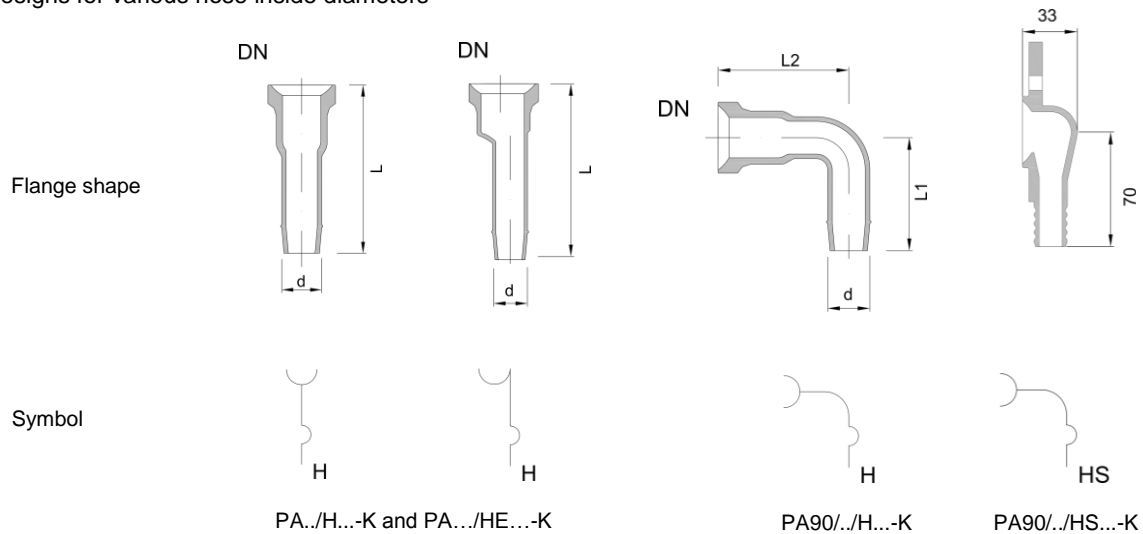
CBM 025

CBM 025-O1

DN	L [mm]	D [mm]	TK [mm]	n x M [mm]	Steel/galv./elastomer Item no.	L [mm]	Stainless steel Item no.
15		Ø95	Ø65	4 x Ø14		108±8,5	<b>CBM 015-O1</b>
25	100+20/-10	Ø115	Ø85	4 x Ø14	<b>CBM 025</b>	125±13	<b>CBM 025-O1</b>
40	125+35/-10	Ø150	Ø110	4 x Ø18	<b>CBM 040</b>	135±15	<b>CBM 040-O1</b>
50	125+35/-10	Ø165	Ø125	4 x Ø18	<b>CBM 050</b>	155±18	<b>CBM 050-O1</b>
80	150+40/-10	Ø200	Ø160	8 x Ø20	<b>CBM 080</b>	175±23	<b>CBM 080-O1</b>
100	150+40/-10	Ø220	Ø180	8 x Ø20	<b>CBM 100</b>	180±23	<b>CBM 100-O1</b>
150	150+40/-10	Ø285	Ø240	8 x Ø22	<b>CBM 150</b>	230±25	<b>CBM 150-O1</b>

**ADAPTORS WITH HOSE CONNECTION**

Hose adaptors are used to empty or connect plug-in tubes. Hose adaptors are available in straight and 90° designs for various hose inside diameters



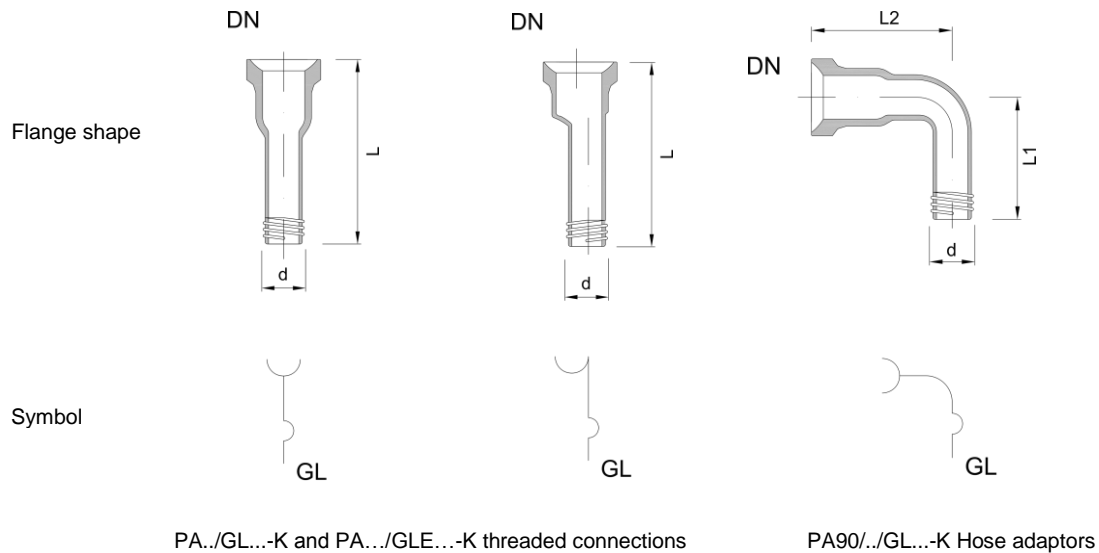
When using hose adaptors it should be ensured that no unapproved turning moment occurs due to the hose adaptor (i.e. due to the mounting of the hoses) and the hoses are fitted with a clamp to the glass adaptor.

Product name:	Item no.	Example
Hose adaptor, glass, straight, KF system:	PA DN/H...-K	PA 25/H16-K
Hose adaptor, glass, eccentric, KF system:	PA DN/HE...-K	PA 25/HE16-K
Hose adaptor, glass, 90°, KF system:	PA 90/DN/H...-K	PA 90/25/H16-K
Hose adaptor, glass, 90°, KF system, plane:	PA 90/DN/H...-F3	PA 90/25/H16-F3

DN	Ød	L	L1	L2	Hose adaptors straight	Hose adaptors eccentric	Hose adaptors 90° angled	Hose adaptors stainless steel
-	-	[mm]	[mm]	[mm]	Item no.	Item no.	Item no.	Item no.
15	16	110	60	60	PA 15/H16-K	PA 15/HE16-K	PA 90/15/H16-K	-
15	20	70	60	60	PA 15/H20-K	-	PA 90/15/H20-K	-
25	16	90	60	80	PA 25/H16-K	PA 25/HE16-K	-	-
25	20	90	60	80	PA 25/H20-K	PA 25/HE20-K	PA 90/25/H20-K	PA 90/25/HS20-K
25	26	110	70	80	PA 25/H26-K	-	PA 90/25/H26-K	-
40	26	100			PA 40/H26-K	PA 40/HE26-K	-	-
40	42	110			PA 40/H42-K	-	-	-

**ADAPTORS WITH GL THREAD**

GL threaded adaptors are mostly used to empty tubes or as a clamp coupling for tubes or components like thermometers. GL threaded adaptors are available in straight and 90° designs for various GL threads. The standard GL threads used are the GL threads 18 and 25.



When connecting to GL threaded adaptors it should be ensured that no unapproved bending moment occurs.

Product name:	Item no.	Example
GL adaptor, straight, KF system:	PA DN/GL...-K	PA 25/GL18-K
GL adaptor, straight, KF system, eccentric:	PA DN/GLE...-K	PA 25/GLE18-K
GL adaptor, 90°, KF system:	PA 90/DN/GL...-K	PA 90/25/GL18-K

DN	ØGL	L [mm]	L1 [mm]	L2 [mm]	GL adaptors	GL adaptors	GL adaptors
					straight Item no.	eccentric Item no.	90° angled Item no.
15	GL18	70	60	60	PA 15/GL18-K	PA 15/GLE18-K	PA 90/15/GL18-K
15	GL25	110	60	80	PA 15/GL25-K	-	PA 90/15/GL25-K
25	GL18	90	60	80	PA 25/GL18-K	PA 25/GLE18-K	PA 90/25/GL18-K
25	GL25	110	70	80	PA 25/GL25-K	-	PA 90/25/GL25-K
40	GL18	90	60	80	PA 40/GL18-K	PA 40/GLE18-K	PA 90/40/GL18-K
40	GL25	110	70	80	PA 40/GL25-K	PA 40/GLE25-K	PA 90/40/GL25-K



**ADAPTORS WITH TRICLAMP PTFE CONNECTION**

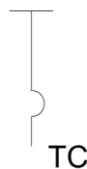
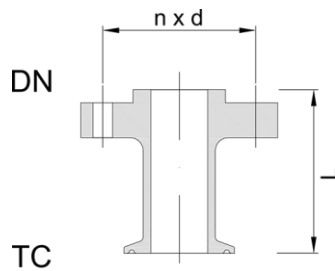
Adaptors with TriClamp connections according DIN 32676 are manufactured from PTFE.

For connection to the glass flange, the adaptor has the pitch circle diameter of the standard flange connection.

A standard sealing gasket type CGR... is necessary to form a joint with the KF glass flange.

In order to form joints with the TriClamp flange stainless steel clamp rings and the relevant TriClamp sealing gasket – made out of FEP with a viton core – can also be delivered.

For more information you can contact our specialist department.



PA../TC..-K TriClamp connection

**Product name:**

TC adaptor, straight:

TC adaptor, straight, conductive:

**Item no.**

PA DN/TC..-K

PA DN/TC..-K-M1

**Example**

PA 25/TC25-K

PA 25/TC25-K-M1

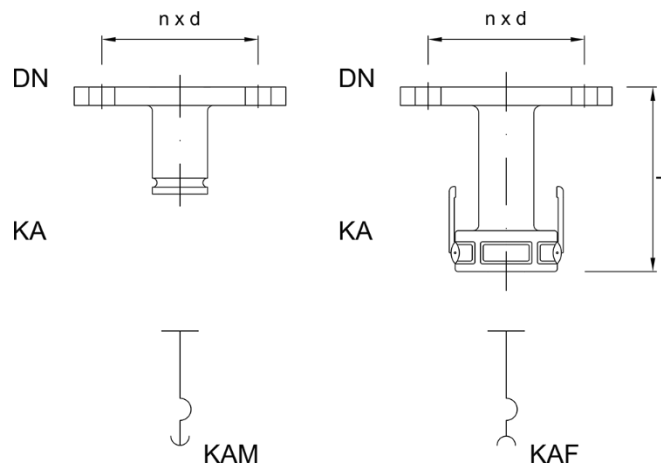
DN	TC	L [mm]	n x d [mm]	TC-adaptor, straight <sup>1)</sup> Item no.
15	TC15	75	Ø50, 3 x Ø7	PA 15/TC15
25	TC25	75	Ø85, 4 x Ø9	PA 25/TC25-K
40	TC40	75	Ø110, 4 x Ø9	PA 40/TC40-K
50	TC50	75	Ø125, 4 x Ø9	PA 50/TC50-K

**ADAPTORS WITH KAMLOK CONNECTION, LINED WITH ETFE**

Standard adaptors with KAMLOK connection are designed with an ETFE lining.

The adaptor has a flange connection in accordance with EN 1092-1, PN10 so that a standard sealing gasket CGR and connection coupling CAPG are all that are needed to form a joint with the glass flange.

The KAMLOK adaptor connection is available as an adaptor connection (M) and as a fitting (F). The KAMLOK connection can also optionally be ordered with a blind cap and chain (option -O2).



PA../KAM.. and PA../KAF.. KAMLOK connections

Product name:	Item no.	Example
KAMLOK adaptor, straight, adaptor:	PA DN/KAM..	PA 25/KAM25
KAMLOK adaptor, straight, fitting:	PA DN/KAF..	PA 25/KAF25
KAMLOK adaptor, fitting, conductive:	PA DN/KAF..-M2	PA 25/KAF25-M2
KAMLOK adaptor, fitting, conductive, with FDA certificate:	PA DN/KAF..-M2-Z1	PA 25/KAF25-M2-Z1

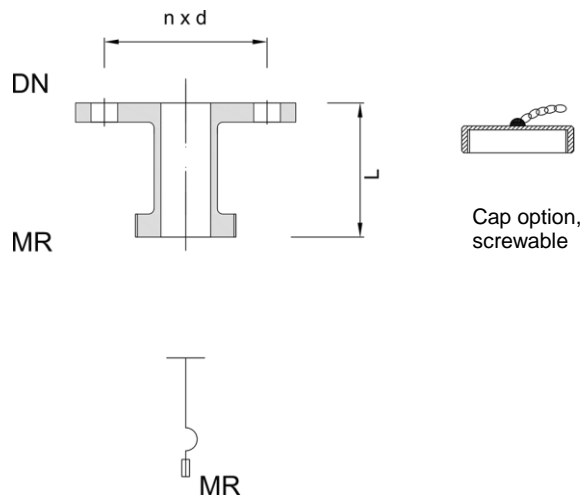
DN	KA	L [mm]	n x d [mm]	KAMLOK adaptor, adaptor <sup>1)</sup> Item no.	KAMLOK adaptor, fitting <sup>1)</sup> Item no.
25	1"	75	Ø85, 4 x Ø9	<b>PA 25/KAM25</b>	<b>PA 25/KAF25</b>
40	1 ½"	75	Ø110, 4 x Ø9	<b>PA 40/KAM40</b>	<b>PA 40/KAF40</b>
50	2"	75	Ø125, 4 x Ø9	<b>PA 50/KAM50</b>	<b>PA 50/KAF50</b>

1) A CAPG...-K type transition coupling is needed to connect the adaptor to the KF system on the glass side.

**ADAPTORS WITH THREADED MILK PIPE, LINED WITH ETFE**

Standard adaptors with threaded milk pipe are available in designs lined with ETFE. The adaptor has a flange connection in accordance with EN 1092-1, PN10 so that a standard sealing gasket and transition coupling are all that are needed to form a joint with the glass flange. The adaptor with threaded milk pipe can also optionally be ordered with a blind cap and chain (option -O2).

When connecting the adaptor to glass structural components it must be ensured that forces are decoupled, particularly those produced when pulling with a milk pipe wrench.



PA../MR.. milk pipe connection

**Product name:**

- Milk pipe adaptor, straight:
- Milk pipe adaptor, straight, with screw cap:
- Milk pipe adaptor, straight, conductive:
- Milk pipe adaptor, straight, conductive, with FDA cert.:

**Item no.**

- PA DN/MR..
- PA DN/MR..-O2
- PA DN/MR..-M2
- PA DN/MR..-M2-Z1

**Example**

- PA 25/MR25
- PA 25/MR25-O2
- PA 25/MR25-M2
- PA 25/MR25-M2-Z1

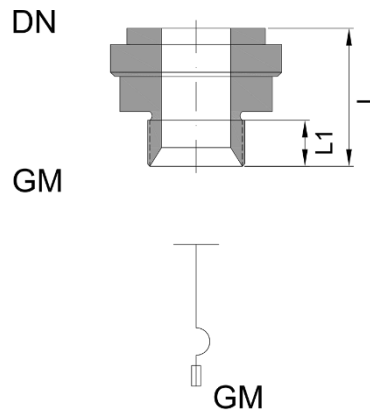
DN	MR	L [mm]	n x d [mm]	Milk pipe adaptor <sup>1)</sup> Item no.
25	1"	100	Ø85, 4 x Ø14	<b>PA 25/MR25</b>
40	1 ½"	100	Ø110, 4 x Ø18	<b>PA 40/MR40</b>
50	2"	100	Ø125, 4 x Ø18	<b>PA 50/MR50</b>



1) A CAPG...-K type transition coupling is needed to connect the adaptor to the KF system on the glass side.

**ADAPTORS FOR THREADED MEDIA CONNECTIONS, STAINLESS STEEL**

Threaded tubes are often used to connect pipelines or tubes with temperature valves in glass structural components. In order to connect the tubes, threaded media adaptors made of stainless steel are available.



PA../GM.. adaptor for media connections

<b>Product name:</b>	<b>Item no.</b>	<b>Example</b>
Media adaptor, straight:	PA DN/GM..	PA 25/GM30x1.5
Media adaptor, straight, conductive, material certificate:	PA DN/GM..-Z2	PA 25/GM30x1.5-Z2

DN	GM	L	L1	Media adaptor <sup>1)</sup>
-	-	[mm]	[mm]	Item no.
25	M30x1,5	45	15	<a href="#">PA 25/GM30x1,5</a>
40	M30x1,5	45	15	<a href="#">PA 40/GM30x1,5</a>
50	M30x1,5	45	15	<a href="#">PA 50/GM30x1,5</a>



1) A CAPG...-K type transition coupling is needed to connect the adaptor to the KF system on the glass side for nominal diameters of 25 and over. In addition, a CFP ...-K clamp ring is needed as a loose flange for the adaptor.

## OPTIONS ADAPTORS AND BELLOWS

For adaptors and bellows the following options can be chosen in addition to the standard structural components. Each option chosen must be entered at the end of the Item no. Several options can be chosen and they are presented as far as possible in alphabetical order. In the following table you will find examples of Item noing for additional options.

Product name:	Item no	Examples
Hose adaptor, straight, 16 mm diameter:	PA DN/H(D)-K	PA 25/H16-K
Hose adaptor, straight, with coating:	PA DN/H(D)-K-C1	PA 25/H16-K-C1
Hose adaptor, straight, with material certificate:	PA DN/H(D)-K-Z2	PA 25/H16-K-Z2
Hose adaptor, straight, coated, material certificate:	PA DN/H(D)-K-C1-Z2	PA 25/H16-K-C1-Z2

You can choose from the following options:

### OPTION C – COATING / GLASS TYPE

The standard component is made of borosilicate glass 3.3 without coating

C1 = coating, non-conductive

C2 = coating, non-conductive, for high temperatures and chemical resistance

C3 = coating, conductive

C4 = amber glass based on borosilicate glass 3.3

C5 = quartz glass

### OPTION F – FLANGE TYPE

The standard component is made of borosilicate glass 3.3 with the flange type according to the article code

The following flange connectors can generally be selected for glass structural components

F1 = KF flanges, type KF../1

F2 = KF flanges, type KF../2

F3 = KF flanges, type KF../3

F4 = PF flanges, type PF

F5 = Hose connection 16 mm

F6 = Hose connection 26 mm

F7 = GL-thread GL 18

F7 = GL-thread GL 25

F9 = NS 29/32

F9 = NS 45/40

All other combinations of the flange types F1 to F4 can be added as optional extras.

**OPTION L – SPECIAL LENGTHS**

The fittings can also be manufactured in special lengths in many cases. Please enter your preferred length according to the list of options and our specialist department will then check if this is possible.

L □□□□ = special length L of fitting in mm, e.g. L0235 for 235 mm length

**OPTION M – MATERIAL / PTFE-DESIGN**

The standard design is in white PTFE, non-conductive and with no material certificate.

M1 = PTFE conductive

M2 = PTFE conductive with earthing

**OPTION O – SPECIAL OPTIONS**

The following options are offered for certain structural components.

O1 = stainless steel rings (can only be selected for bellows)

O2 = with blind cap and chain (only for KAMLOK adaptor and threaded milk pipe)

**OPTION Z – CERTIFICATES**

Standard deliveries do not come with certificates.

The following certificates can optionally be delivered with your order.

Z1 = FDA material certificate<sup>1)</sup>

Z2 = material certificate 2.2

Z3 = Certificate for Technical Guidelines on Air Quality Control (TA-Luft)

1) FDA material certificates can be delivered for product-side structural components containing PTFE.