GENERAL INFORMATION

Pipes made of borosilicate glass 3.3 in the ball and socket (KF) and flat safety flange systems (PF) have been tried and tested for decades and are particularly well established in the chemical and pharmaceutical industry. The main reasons for this are that

- Borosilicate glass 3.3 has special qualities, such as transparency, and, when combined with PTFE as a sealing material, it has almost universal chemical stability.
- Pipes made of borosilicate glass 3.3 on the basis of a modular system in accordance with EN 12585 (with basic measurement of 25 mm and many that deviate slightly from this measurement or have slight adaptions), which are standardised in metric units, ensuring structural components can be replaced easily. The result has been numerous improvements to subsequent structural components whilst still maintaining the same level of compatibility.
  In addition to the standard component system to be described in the following, client-specific structural components in special lengths and sizes are possible.
- Borosilicate glass 3.3 is an accepted material for the construction of pressure vessels and has been tried and tested over decades – both optimised pipe ends and flange couplings in the ball and socket (KF) and flat safety flange systems are evidence for this. Both flange systems are described in detail in chapter 10 “technical information” (see following figures). They form the basis of the structural components in this catalogue and are also available to purchase as parallel systems. This means clients can continue to use the flange system they have already established or, alternatively, choose the flange system which corresponds to their needs.

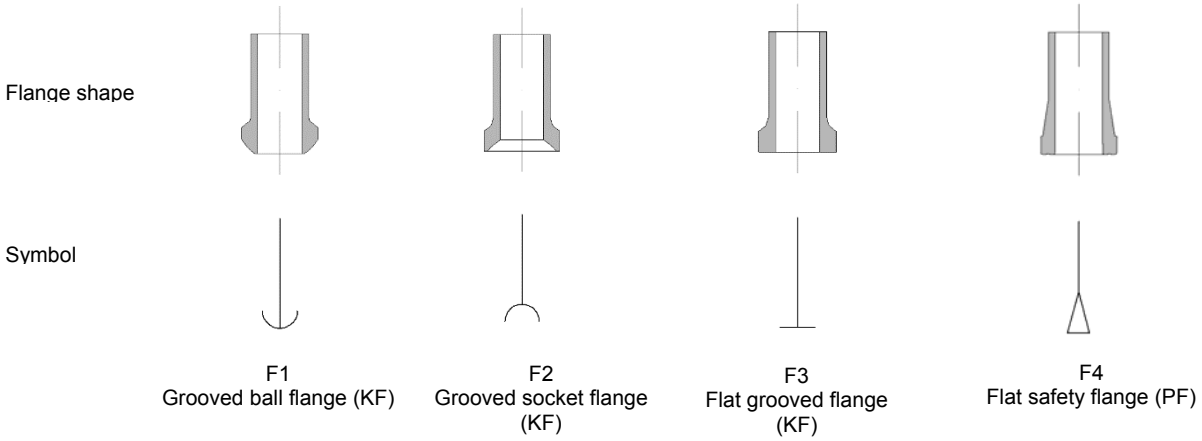
All the fundamental facts and information on the construction of pipes and apparatus using borosilicate glass 3.3 are included in chapter 10 “technical information”.

Here you will find details about:

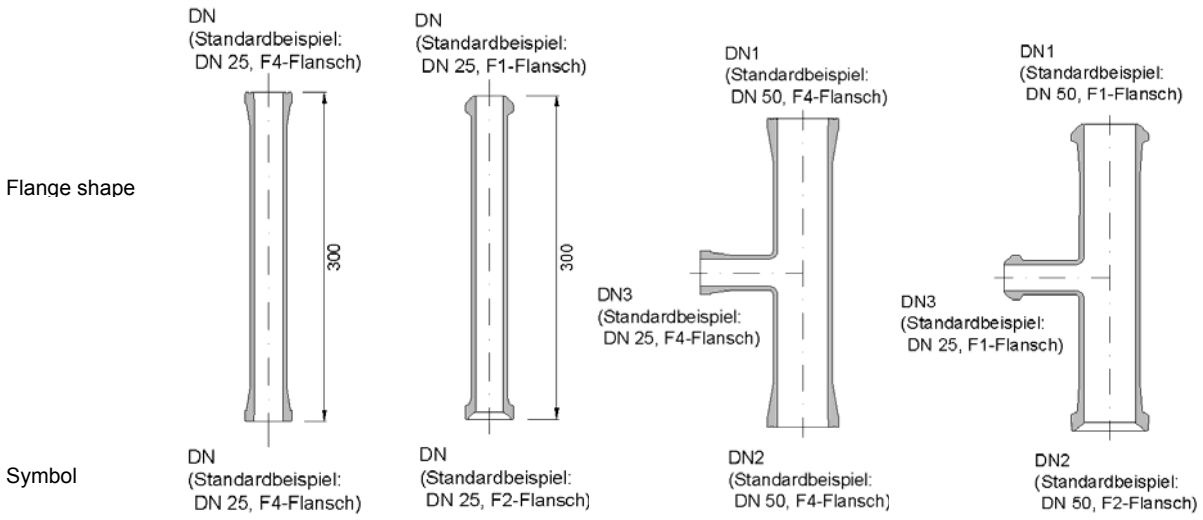
- Properties of borosilicate glass 3.3
- Flange systems and pipe ends in PF and KF systems as well as the corresponding certificates, such as approval by the Technical Guidelines on Air Quality Control (TA-Luft) for the coupling system.

- Approved operating conditions
- Labelling of structural components
- Coating of structural components
- Weight of structural components
- ATEX applications
- GMP applications
- Mounting and assembly of pipes and apparatus
- Safety regulations

In principle the following types of flange are used in PF and KF systems with article numbers ending in F1 to F4.



To help identify the ends of flanges the type of flange is entered at the end of each item number, for example "-F44" for pipe sections in the PF system. The order of the flange details is also important in clearly identifying many structural components. The numbering DN 1, DN 2, etc is used for these structural components on the relevant catalogue drawing. Flange types should be entered in the item number according to this order, for example "F121" for the T pipe joint in the example below.
To simplify things, standard items from the flat safety flange system (PF) mentioned in the catalogue are given a label ending in "...P" and from the KF system "...K".
This catalogue concentrates on structural components in the flat grooved flange system (KF).



Item numbers	PP025/0300-P (= PP025/0300-F44)	PP025/0300-K (= PP025/0300-F12)	PT050/025-P (= PT025/025-F444)	PT050/025-K (= PT025/025-F121)

PIPES

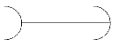
In the following table standard pipe parts in accordance with EN 12585 are listed for the nominal diameters of 15 – 600. The flat grooved flange system (KF) is manufactured all the way up to a nominal diameter of 600 according to the diagram below. The standard flange combination used up to DN 300 is the ball and socket flange, and in the implementation of plans for nominal diameters of 400 and over the grooved flange system is used.
The designs dependent on the nominal diameter are presented in the following figure and the rows of the table are labelled with the corresponding symbols.

Flange shape	DN … L	DN … L
Symbol		
	PP…-K pipe section for grooved flange (KF) up to DN 300	PP…-K pipe section for grooved flange at DN 400 and over

You can find more information on types of pipe end which are dependent on nominal diameter in chap. 10 “technical information” as well as on the corresponding flange couplings and sealing gaskets in chap 2 “couplings”.

We will be happy to deliver all further flange combinations with the KF system and with other flange systems, such as the PF system, or special lengths or options such as coatings. For this you need to add the optional extra digits to the item number as given at the end of the chapter. 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 numbering for optional extras.

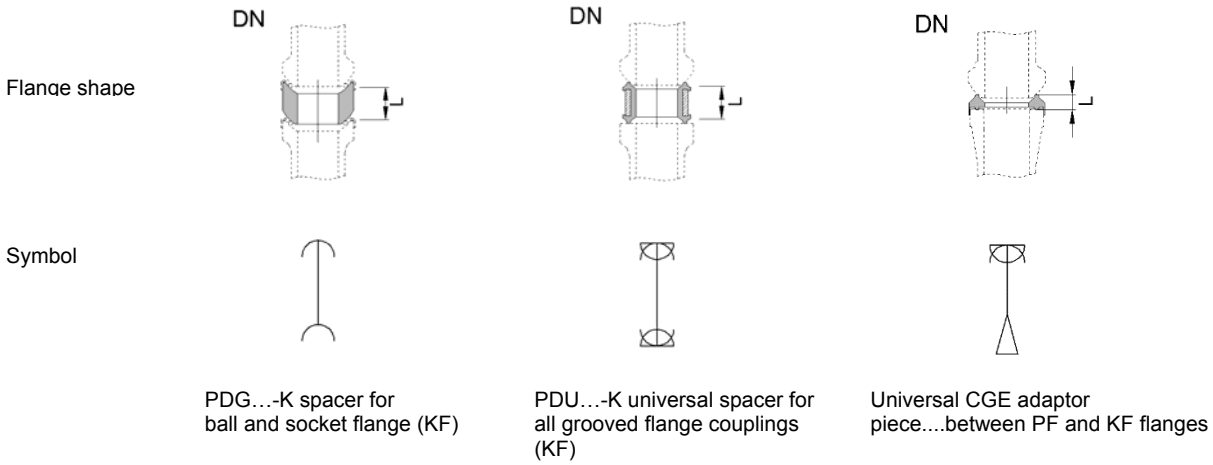
Product name:	**Item number**	**Examples**
KF pipe section with special length, for example 265 mm:	PP DN/length-K	PP 100/0265-K
KF pipe section with special flange combination:	PP DN/length-F…	PP 100/0500-F23
Pipe section with flange combination joining KF to PF:	PP DN/length-F14	PP 100/0150-F14
	PP DN/Length-F24	PP 100/0150-F24
Pipe section with coating:	PP DN/length-…-C…	PP 100/0500-K-C3
Pipe section with 2.2 material certificate:	PP DN/length-…-Z2	PP 100/0500-K-Z2
Pipe section with coating and 2.2 material certificate:	PP DN/length-…-C.-Z2	PP 100/0500-K-C3-Z2

Length [mm]	Item no. DN 15	Item no. DN 25	Item no. DN 40	Item no. DN 50	Item no. DN 80	Item no. DN100
						
75	PP 015/0075-K	PP 025/0075-K	-	-	-	-
100	PP 015/0100-K	PP 025/0100-K	PP 040/0100-K	PP 050/0100-K	-	-
125	PP 015/0125-K	PP 025/0125-K	PP 040/0125-K	PP 050/0125-K	PP 080/0125-K	-
150	PP 015/0150-K	PP 025/0150-K	PP 040/0150-K	PP 050/0150-K	PP 080/0150-K	PP 100/0150-K
175	PP 015/0175-K	PP 025/0175-K	PP 040/0175-K	PP 050/0175-K	PP 080/0175-K	PP 100/0175-K
200	PP 015/0200-K	PP 025/0200-K	PP 040/0200-K	PP 050/0200-K	PP 080/0200-K	PP 100/0200-K
250	PP 015/0250-K	PP 025/0250-K	PP 040/0250-K	PP 050/0250-K	PP 080/0250-K	PP 100/0250-K
300	PP 015/0300-K	PP 025/0300-K	PP 040/0300-K	PP 050/0300-K	PP 080/0300-K	PP 100/0300-K
400	PP 015/0400-K	PP 025/0400-K	PP 040/0400-K	PP 050/0400-K	PP 080/0400-K	PP 100/0400-K
500	PP 015/0500-K	PP 025/0500-K	PP 040/0500-K	PP 050/0500-K	PP 080/0500-K	PP 100/0500-K
700	PP 015/0700-K	PP 025/0700-K	PP 040/0700-K	PP 050/0700-K	PP 080/0700-K	PP 100/0700-K
1000	PP 015/1000-K	PP 025/1000-K	PP 040/1000-K	PP 050/1000-K	PP 080/1000-K	PP 100/1000-K
1500	PP 015/1500-K	PP 025/1500-K	PP 040/1500-K	PP 050/1500-K	PP 080/1500-K	PP 100/1500-K
2000	PP 015/2000-K	PP 025/2000-K	PP 040/2000-K	PP 050/2000-K	PP 080/2000-K	PP 100/2000-K
3000	-	-	PP 040/3000-K	PP 050/3000-K	PP 080/3000-K	PP 100/3000-K

Length [mm]	Item no. DN 150	Item no. DN 200	Item no. DN 300	Item no. DN 400	Item no. DN 450	Item no. DN600
						
150	PP 150/0150-K	-	-	-	-	-
175	PP 150/0175-K	-	-	-	-	-
200	PP 150/0200-K	-	-	-	-	-
250	PP 150/0250-K	-	-	-	-	-
300	PP 150/0300-K	PP 200/0300-K	PP 300/0300-K	-	-	-
400	PP 150/0400-K	-	-	-	-	-
500	PP 150/0500-K	PP 200/0500-K	PP 300/0500-K	PP 400/0500-K	PP 450/0500-K	PP 600/0500-K
700	PP 150/0700-K	-	-	-	-	-
1000	PP 150/1000-K	PP 200/1000-K	PP 300/1000-K	PP 400/1000-K	PP 450/1000-K	PP 600/1000-K
1500	PP 150/1500-K	PP 200/1500-K	PP 300/1500-K	PP 400/1500-K	PP 450/1500-K	PP 600/1500-K
2000	PP 150/2000-K	PP 200/2000-K	PP 300/2000-K	PP 400/2000-K	PP 450/2000-K	PP 600/2000-K
3000	PP 150/3000-K	-	-	-	-	-

SPACERS AND ADAPTOR PIECES

Spacers are used to balance out small differences in length and to join different types of flange by clamping the corresponding flange couplings together.
Types of spacer, related symbols and the item numbers for KF couplings or PF to KF couplings are shown in the following diagrams and tables.



PDG…-K spacer for ball and socket flange (KF)

PDU…-K universal spacer for all grooved flange couplings (KF)

Universal CGE adaptor piece....between PF and KF flanges

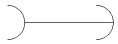
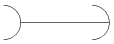
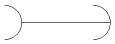
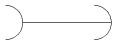
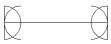
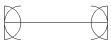
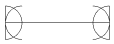
An additional sealing gasket and bolts of a size corresponding to the length of the spacer should be planned in for flange couplings for PDG type glass spacers, which are most frequently used. The additional length in mm is marked by entering option “L” after the item number. Examples of this are shown in the following table. More detailed information on the above-mentioned flange couplings and sealing gaskets can be found in chap. 2 “couplings”.
Alternatively “PDU …-K” universal spacers made of PTFE with a stainless steel core can be delivered. To make the order the item number “PDG …-K” should be replaced by “PDU…-K” as shown in the example below.

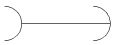
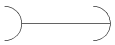
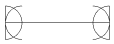
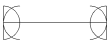
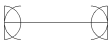
When using PDU …-K universal spacers it should be noted that no additional sealing gaskets are necessary and the approved operating conditions are reduced in line with chapter 10 “technical information”.

We will be happy to deliver all further flange combinations and optional extras such as coatings. For this you need to add the optional extra digits to the item number as given at the end of the chapter.

Product name:	**Item no.**	**Examples**	**Example**
		Spacer	**Special coupling**
Spacer with special length, for example 30 mm	PDG DN/length-K	PDG 100/030-K	CP100-K-L0030
Spacer with special flange combination:	PDG DN/length-F…	PDG 100/050-F23	CP100-K-L0050
Glass spacer, joint KF to PF:	PDG DN/length-F14	PDG 100/050-F14	CP100-PK-L0050
	PDG DN/length-F24	PDG 100/050-F24	CP100-PK-L0050
Glass spacer with coating:	PDG DN/length-K-C.	PDG 100/050-K-C3	CP100-K-L0050
Universal KF spacer, PTFE:	PDU DN/length-K	PDU 100/050-K	CP100-K-L0050
Adaptor piece, PTFE, KF to PF:	CGE DN	CGE 050	CP050-PK-L0010
Adaptor piece, PTFE, KF to PF, conductive:	CGE DN-M2	CGE 050-M2	CP050-PK-L0010

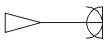
TYPE PDG SPACERS

Length [mm]	Item no. DN 15 KF system	DN 25	Item no. DN 40 KF system	Item no. DN 40 KF system	Item no. DN 50 KF system
					
25	PDG 015/025-K		PDG 025/025-K	PDG 040/025-K	PDG 050/025-K
50	PDG 015/050-K		PDG 025/050-K	PDG 040/050-K	PDG 050/050-K
					
25	PDU 015/025-K		PDU 025/025-K	PDU 040/025-K	PDU 050/025-K
50	PDU 015/050-K		PDU 025/050-K	PDU 040/050-K	PDU 050/050-K

Length [mm]	Item no. DN 80 KF system	Item no. DN 100 KF system	Item no. DN 150 KF system
			
25	-	-	-
50	PDG 80/050-K	PDG 100/050-K	PDG 150/050-K
			
25	-	-	-
50	PDU 80/050-K	PDU 100/050-K	PDU 150/050-K

TYPE CGE ADAPTOR PIECES

“CGE” adaptor pieces are not intended to balance out the length between the PF and KF flange coupling systems but to function as a joint which presents a universal alternative to type “PP …/…-F14” or “PP …/…-F24“ und „PP…/…-F34” pipe sections. During assembly the centering collar must be attached to the pipe end containing the flat safety flange. In order to join the structural components a special coupling is needed as shown in the table.

DN	Length [mm]	Item no.	Special transition coupling (For details see chap. 2 »couplings«)
			
15	6	CGE015	CP025-PK-L0005
25	7	CGE025	CP025-PK-L0010
40	8	CGE040	CP025-PK-L0010
50	8	CGE050	CP025-PK-L0010
80	10	CGE080	CP025-PK-L0010

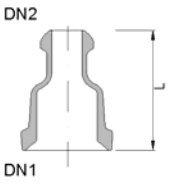
REDUCERS

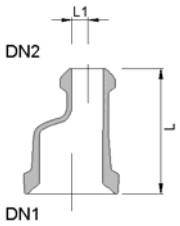
Reducers are available in symmetrical and eccentric designs.
Normally the symmetrical “PR...” shape is used. For specific applications, for example for minimising dead volume in horizontal piping with nominal diameter transition or for more compact designs in vertical piping, “PRE …” eccentric reducers are used. Eccentric reducers are available in standard up to DN 150. If larger nominal diameters are needed please contact one of our specialist departments.
The measurements for reducers can be seen in the following table.

We will be happy to deliver optional extras such as coatings and further flange combinations for the KF system, for example the “PR …-31”. grooved flange connection is often used for apparatus. For this you need to add the optional extra digits to the item number as given at the end of the chapter.

Product name:	**Item no.**	**Example**
Symmetrical reducers, KF system:	PR DN1/DN2-K	PR 100/050-K
	PR DN1/DN2-F31	PR 200/050-F31
Eccentric reducers, KF system:	PRE DN1/DN2-K	PRE 100/050-K

Flange shape



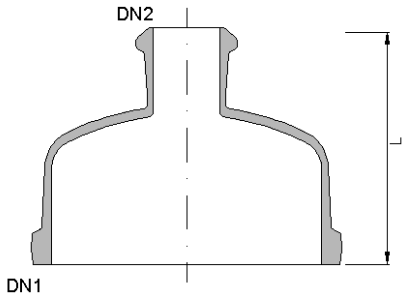


Symbol

PR…K reducer for
ball and socket flange (KF)
up to DN 150

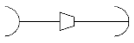
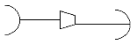
PRE…K reducer for
ball and socket flange (KF)
up to DN 150

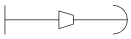
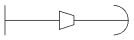
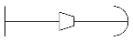
Flange shape



Symbol

PR…K reducer for
ball and socket flange (KF)
for DN 400 and over

				Symmetrical reducer	Eccentric reducer
DN1	DN2	L	L1	Item no.	Item no.
-	-	[mm]	[mm]	KF system	KF system
					
25	15	100	5	PR 025/015-K	PRE 025/015-K
40	15	100	11	PR 040/015-K	PRE 040/015-K
40	25	100	6	PR 040/025-K	PRE 040/025-K
50	15	100	17	PR 050/015-K	PRE 050/015-K
50	25	100	12	PR 050/025-K	PRE 050/025-K
50	40	100	6	PR 050/040-K	PRE 050/040-K
80	25	125	24	PR 080/025-K	PRE 080/025-K
80	40	125	18	PR 080/040-K	PRE 080/040-K
80	50	125	12	PR 080/050-K	PRE 080/050-K
100	25	150	39	PR 100/025-K	PRE 100/025-K
100	40	150	33	PR 100/040-K	PRE 100/040-K
100	50	150	27	PR 100/050-K	PRE 100/050-K
100	80	150	15	PR 100/080-K	PRE 100/080-K
150	25	200	63	PR 150/025-K	PRE 150/025-K
150	40	200	57	PR 150/040-K	PRE 150/040-K
150	50	200	52	PR 150/050-K	PRE 150/050-K
150	80	200	40	PR 150/080-K	PRE 150/080-K
150	100	200	25	PR 150/100-K	PRE 150/100-K
200	25	175		PR 200/025-K	
200	40	200*		PR 200/040-K	
200	50	200*		PR 200/050-K	
200	80	200		PR 200/080-K	
200	100	200		PR 200/100-K	
200	150	200		PR 200/150-K	
300	25	225		PR 300/025-K	
300	40	225		PR 300/040-K	
300	50	225		PR 300/050-K	
300	80	250		PR 300/080-K	
300	100	250		PR 300/100-K	
300	150	250		PR 300/150-K	
300	200	250		PR 300/200-K	

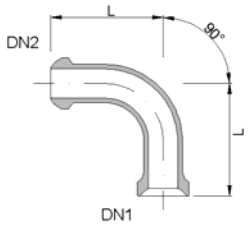
				Symmetrical reducer
DN1	DN2	L	L1	Item no.
-	-	[mm]	[mm]	KF system
				
400	25	300		PR 400/025-K
400	40	300		PR 400/040-K
400	50	300		PR 400/050-K
400	80	300		PR 400/080-K
400	100	300		PR 400/100-K
400	150	300		PR 400/150-K
400	200	300		PR 400/200-K
400	300	300		PR 400/300-K
				
450	25	325		PR 450/025-K
450	40	325		PR 450/040-K
450	50	325		PR 450/050-K
450	80	325		PR 450/080-K
450	100	325		PR 450/100-K
450	150	350		PR 450/150-K
450	200	325		PR 450/200-K
450	300	325		PR 450/300-K
				
600	50	375		PR 600/050-K
600	80	375		PR 600/080-K
600	100	400		PR 600/100-K
600	150	425		PR 600/150-K
600	200	400		PR 600/200-K
600	300	400		PR 600/300-K

* Lengths which deviate from the previous standard lengths

BENDS

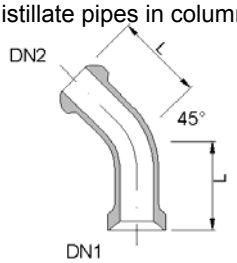
Standard bends are made with 45° and 90° angles and in smaller nominal diameters with a 180° angle (as a U bend). In addition to these standard angles, a range of special angles are offered, in particular 10°, 30° and 80°. For bends with these angles please enter the angle you would like in the item number as shown in the example below.
In addition to these standard bends, space-saving PBR type reducing bends and PBT type bends with temperature connectors are offered as standard variants of 90° bends.
U bends are available in the standard version with an outlet nozzle (PUO type) and without an outlet nozzle (PU type). They are typically used to ventilate pipes or to make liquid seals with a outlet in distillate pipes in columns.

Flange shape



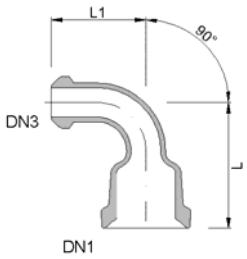
Symbol

PB…-K 90° bend for
ball and socket flange (KF)
up to DN 300



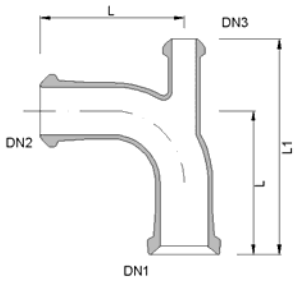
PB…-K 45° bend for
ball and socket flange (KF)
up to DN 300

Flange shape



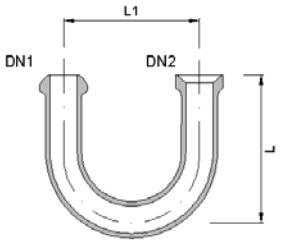
Symbol

PBR…-K 90° reducing bend for ball
and socket flange (KF) up to DN 300



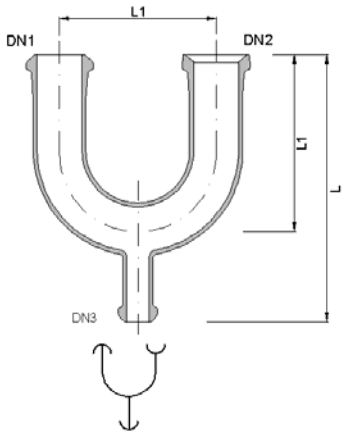
PBT…-K 90° bend with temperature connectors for
ball and socket flange (KF) up to DN 300

Flange shape



Symbol

PU…-K U bend for
ball and socket flange (KF)
up to DN 50



PUO…-K U bend with discharge valve for
ball and socket flange (KF)
up to DN 50

The measurements for bends can be seen in the following table. The item code is:

Product name:	**Item no.**	**Example**
90° bend, KF system:	PB 90/DN-K	PB 90/050-K
90° reducing bend, KF system:	PBR 90/DN1/DN2-K	PBR 90/100/050-K
90° bend with temperature connectors, KF system:	PBT 90/DN-K	PBT 90/100-K
Bend, KF system, elbow design 80°:	PB 80/DN-K	PB 80/050-K
90° bend, KF system, conductive coating:	PB 90/DN-K-C3	PB 90/050-K-C3
U bend, KF system:	PU DN-K	PU 050-K
U bend with outlet, KF system:	PUO DN1/DN3-K	PUO 050/025-K

				45 ° BENDS	**90° BENDS**
DN1.2	**DN3**	**L**	**L1**	**Item no.**	**Item no.**
-	**-**	**[mm]**	**[mm]**	**KF system**	**KF system**
					
15		50		PB45/015-K	PB90/015-K
25		100		PB45/025-K	PB90/025-K
25	15	100	50		PBR025/015-K
40		150		PB45/040-K	PB90/040-K
40	25	125	100		PBR040/025-K
50		150		PB45/050-K	PB90/050-K
50	25	150	100		PBR050/025-K
50	40	150	150		PBR050/040-K
50	25	150	225		PBT050/025-K
80		200		PB45/080-K	PB90/080-K
80	25	150	100		PBR080/025-K
80	50	150	150		PBR080/050-K
80	25	200	280		PBT080/025-K
100		250		PB45/100-K	PB90/100-K
100	25	200	100		PBR100/025-K
100	50	200	150		PBR100/050-K
100	25	250	330		PBT100/025-K
150		250		PB45/150-K	PB90/150-K
150	50	200	150		PBR150/050-K
150	80	250	175		PBR150/080-K
150	25	250	340		PBT150/025-K
200		300		PB45/200-K	PB90/200-K

200	50	250	150		PBR200/050-K
200	80	250	175		PBR200/080-K
200	25	300	450		PBT200/025-K
300		400		PB45/300-K	PB90/300-K
300	80	300	175		PBR300/080-K
300	150	350	250		PBR300/150-K
300	25	400	525		PBT300/025-K

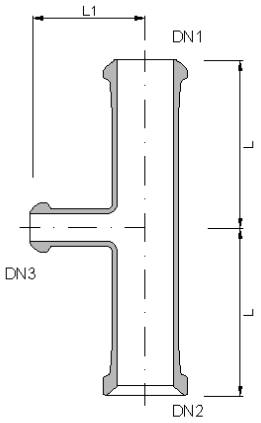
180° BENDS/ U BENDS

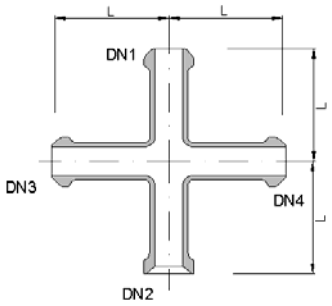
				U bends	U bends with outlet
DN1.2	**DN3**	**L**	**L1**	**Item no.**	**Item no.**
-	**-**	**[mm]**	**[mm]**	**KF system**	**KF system**
					
15	15	100	200	PU 015-K	PUO 015/015-K
25	25	150	250	PU 025-K	PUO 025/025-K
40	25	150	250	PU 040-K	PUO 040/025-K
50	25	150	250	PU 050-K	PUO 050/025-K

T AND X PIPE PIECES

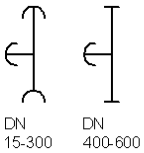
T and X pipe pieces are used to merge and to separate product pipelines.
In order to make them compatible and easy to replace isosceles T and X pipe pieces have the same side length as 90º bends, and angle valves too.

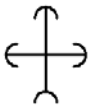
Flange shape





Symbol





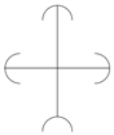
PT…-K T pipe joint for ball and socket flange (KF)

PX../..-K X pipe joint for ball and socket flange (KF) up to DN 150

The measurements for standardised T and X pipe pieces can be seen in the following table.

We will be happy to deliver optional extras such as coatings and further flange combinations. For this you need to add the optional extra digits to the item number as given at the end of the chapter. To request specific flange combinations enter the flanges you require in order, DN1, DN2, ..., according to the outline of structural components above.

Product name:	**Item no.**	**Example**
T pipe joint, KF system:	PT DN1/DN3-K	PT 050/050-K
T pipe joint with reducing side branch, KF system:		PT DN1/DN3-K PT 050/025-K
T pipe joint with reducing side branch, special:	PT DN1/DN3-F…	PT 050/025-F231
X pipe joint, KF system:	PX DN1-K	PX 050-K
X pipe joint, special:	PX DN1/DN2/DN3/DN4-F…	PX 050/050/025/025-F2312

DN1.2	DN3.4	L	L1	T pipe joint Item no.	X pipe joint Item no
-	-	[mm]	[mm]	KF system	KF system
					
15	15	50		PT015/015-K	PX015-K
25	15	75	75	PT025/015-K	
25	25	100		PT025/025-K	PX025-K
40	15	100	75	PT040/015-K	
40	25	100	75	PT040/025-K	
40	40	150		PT040/040-K	PX040-K
50	15	100	75	PT050/015-K	
50	25	100	80	PT050/025-K	
50	40	100	100	PT050/040-K	
50	50	150		PT050/050-K	PX050-K
80	25	125	100	PT080/025-K	
80	40	125	100	PT080/040-K	
80	50	125	115	PT080/050-K	
80	80	200		PT080/080-K	PX080-K
100	25	125	110	PT100/025-K	
100	40	125	125	PT100/040-K	
100	50	125	125	PT100/050-K	
100	80	150	150	PT100/080-K	
100	100	250		PT100/100-K	PX100-K
150	25	125	150	PT150/025-K	
150	40	125	150	PT150/040-K	
150	50	125	150	PT150/050-K	
150	80	150	150	PT150/080-K	
150	100	125	200	PT150/100-K	
150	150	250		PT150/150-K	PX150-K

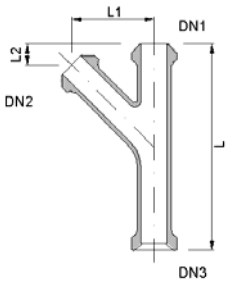
DN1.2	DN3.4	L	L1	T pipe joint Item no.
-	-	[mm]	[mm]	KF system
				
200	25	100	175	PT200/025-K
200	40	125	175	PT200/040-K
200	50	125	175	PT200/050-K
200	80	150	175	PT200/080-K
200	100	150	175	PT200/100-K
200	150	200	225	PT200/150-K
200	200	300		PT200/200-K
300	25	150	225	PT300/025-K
300	40	200	225	PT300/040-K
300	50	200	225	PT300/050-K
300	80	200	225	PT300/080-K
300	100	200	225	PT300/100-K
300	150	250	275	PT300/150-K
300	200	300	275	PT300/200-K
300	300	400		PT300/300-K
				
400	80	200	325	PT400/080-K
400	150	250	350	PT400/150-K
450	80	200	325	PT450/080-K
450	150	250	375	PT450/150-K
600	80	200	400	PT600/080-K
600	150	300	450	PT600/150-K
600	300	400	500	PT600/300-K

Y PIPE PIECES

Y pipe pieces are suitable for merging currents in pipeline construction as well as for assembling parts in vertical pipelines.

The measurements for standardised Y pipe pieces can be seen in the following table.

Flange shape



Symbol

PY…-K Y pipe joint for grooved flange system (KF) up to DN 150

We will be happy to deliver optional extras such as coatings and further flange combinations for the KF system. For this you need to add the optional extra digits to the item number as given at the end of the chapter. To request specific flange combinations enter the flanges you require in order, DN1, DN2, ... , according to the outline of structural components above.

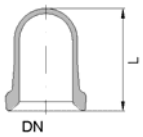
Product name:	**Item no.**	**Example**
Y pipe joint, KF system:	PY DN1/DN3-K	PY 050/025-K
Y pipe joint, special:	PY DN1/DN3-F…	PY 050/025-F231

DN 1,2	**DN3**	**Item no**	**Length [mm]**		
			L	**L1**	**L2**
					
25	25	PY 025/025-K	200	106	19
40	25	PY 040/025-K	225	92	83
50	25	PY 050/025-K	250	97	103
80	25	PY 080/025-K	275	121	79
100	25	PY 100/025-K	325	147	103
150	25	PY 150/025-K	325	197	101

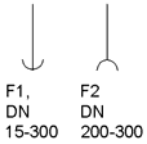
BLIND FLANGES

Blind flanges are normally used to block off pipelines.
The measurements of the blind flanges can be seen in the following table.

Flange shape



Symbol



PC…-F1...F3 blind flanges for
flat grooved flange system (KF)

We will be happy to deliver optional extras such as coatings. For this you need to add the optional extra digits to the item number as given at the end of the chapter.

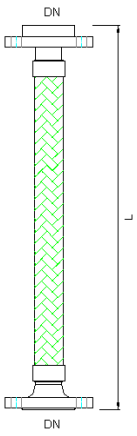
Product name:	**Item no.**	**Example**
Blind flange, KF system, ball:	PC DN-F1	PC 050-F1
Blind flange, KF system, socket:	PC DN-F2	PC 050-F2
Blind flange, KF system, flat:	PC DN-F3	PC 050-F3
Blind flange, KF system, ball, conductive coating:	PC DN-F1-C…	PC 050-F1-C3

DN	**Item no**			**Length [mm]**
	KF system			**L**
				
15	PC 015-F1	PC 015-F2	PC 015-F3	40
25	PC 025-F1	PC 025-F2	PC 025-F3	75
40	PC 040-F1	PC 040-F2	PC 040-F3	75
50	PC 050-F1	PC 050-F2	PC 050-F3	100
80	PC 080-F1	PC 080-F2	PC 080-F3	110
100	PC 100-F1	PC 100-F2	PC 100-F3	145
150	PC 150-F1	PC 150-F2	PC 150-F3	125
200	PC 200-F1	PC 200-F2	PC 200-F3	120
300	PC 300-F1	PC 300-F2	PC 300-F3	170

PRODUCT TUBES

Corrosion-proof product tubes are usually used as an alternative to glass piping when product piping needs to be changed regularly or there are very limited amounts of space.
Spiral tubes made of PTFE material with flange adaptors made of borosilicate glass 3.3 (type PHP) are suitable for glass systems. The minimum bending radius for PHP tubes is 35 mm (DN15) or 50 mm (DN25 and DN40). Standard couplings can be used to form pieces with glass piping in accordance with chapter 3.
For applications with higher approved operating pressures and temperatures PTFE-lined tubes with stainless steel braid sleeving (PHE …) are used as an alternative. They are smooth on the inside. When connecting to glass branches of piping it should be ensured that there is no tension. The recommended connector flange coupling for EN flanges is a CAPE adaptor coupling with a CGS steel core sealing gasket and ring sealing gasket in accordance with chapter 3.
In addition to the standard lengths provided, special lengths can be ordered by entering the option “–L _ _ _ _”.

Flange shape



Symbol

PHP…-K product tubes for flat grooved flange (KF)

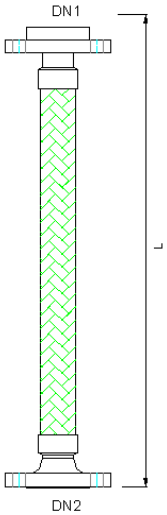
PHE… product tubes for increased operating pressure / temperature with flanges in accordance with EN 1092-1, PN 40

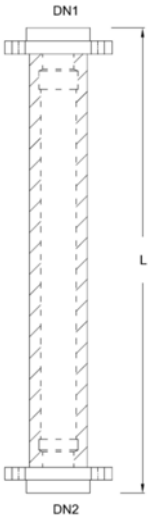
DN	d(PHP)	Length	Approved conditions	Product tube Item no.	Approved conditions	Product tube Item no.
-	-	[mm]	[at 20 °C]	KF system	[at 20 °C]	
						
15	10	500	-1/+4	PHP15/0500-K		
15	10	1000	-1/+4	PHP15/1000-K		
15	10	2000	-1/+4	PHP15/2000-K		
25	17	500	-1/+4	PHP25/0500-K	-1/+10	PHE25/0500
25	17	1000	-1/+4	PHP25/1000-K	-1/+10	PHE25/1000
25	17	2000	-1/+4	PHP25/2000-K	-1/+10	PHE25/2000
40	26	500	-1/+4	PHP 40/0500-K	-1/+10	PHE 40/0500
40	26	1000	-1/+4	PHP 40/1000-K	-1/+10	PHE 40/1000
40	26	2000	-1/+4	PHP 40/2000-K	-1/+10	PHE 40/2000

MEDIA TUBES

Media tubes are connected as flexible piping or connectors for non-corrosive media and most importantly for energy (steam, condensation, heat-transfer media and coolants). The corrugated tubes are lined with a sleeving and connector flanges made of stainless steel. Threaded connectors (e.g. connection to a thermostat) and insulated tube designs can also be delivered optionally. Operational conditions which differ from the standard operating conditions should be included in the order.
The tubes can be delivered in different lengths on request.
A complete coupling made of stainless steel including a sealing gasket for connection to branches of glass piping is included in the delivery. To help with assembly one side contains a loose flange. The bending radius is 50 mm (without insulation) or 80 mm (with insulation).

Flange shape





Symbol

PHM…media tubes
with flanges in accordance with EN 1092-1, PN40

PHM…-O1 product tubes
with insulation and flanges in accordance with EN 1092-1,PN 40

DN	L	n x d	Approved conditions	Media tube Item no.	
-	[mm]	[mm]	[barg // °C]		
					
15	500	□65, 4 x □14	-1/+16 // -50/+200	PHM15/0500	PHM15/0500-O1
15	1000	□65, 4 x □14	-1/+16 // -50/+200	PHM15/1000	PHM15/1000-O1
15	2000	□65, 4 x □14	-1/+16 // -50/+200	PHM15/2000	PHM15/2000-O1
25	500	□85, 4 x □14	-1/+16 // -50/+200	PHM25/0500	PHM25/0500-O1
25	1000	□85, 4 x □14	-1/+16 // -50/+200	PHM25/1000	PHM25/1000-O1
25	2000	□85, 4 x □14	-1/+16 // -50/+200	PHM25/2000	PHM25/2000-O1

PIPING AND TUBING OPTIONS

For piping items the following options can be chosen in addition to the standard structural components. The option chosen must be entered at the end of the item number. 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 numbering for additional options.

Product name:	**Item number**	**Examples**
Pipe section with special length, for example 265 mm:	PP DN/length-P	PP 100/0265-P
Pipe section with coating:	PP DN/length-P-C1	PP 100/0150-P-C1
Pipe section with material certificate:	PP DN/length-P-Z2	PP 100/0150-P-Z2
Pipe section with coating and material certificate:	PP DN/length-P-C1-Z2	PP 100/0150-P-C1-Z2

You can choose from the following options:

OPTION C – COATING / GLASS TYPE

The standard components are those made of borosilicate glass 3.3 without coating. Various transparent coatings can be chosen as optional extras. Please refer to the specification on coatings in chapter 10»technical information«.

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[1)]

1) Deliverable up to DN 300 with a limited product programme

OPTION F – FLANGE TYPE

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

The standard flanges (see page 1.2) are
F1 = KF flanges, KF../1 type
F2 = KF flanges, type KF../2
F3 = KF flanges, type KF../3
F4 = PF flanges, PF type

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

OPTION L – SPECIAL LENGTHS

Special lengths of piping can be delivered. Please enter the length you would like directly in the item number of the piping.

Special lengths of tubing can also be delivered. Please enter your preferred length according to the list of options and we will check if this is possible.

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

OPTION M – MATERIAL / PTFE-DESIGN

White virginal non-conductive PTFE material is used for components made of PTFE or for constructions containing PTFE which come into contact with products.
The following alternatives can also be delivered:

M1 = PTFE conductive
M2 = PTFE conductive with earthing

OPTION O – SPECIAL OPTIONS

The following special options are offered for certain structural components.

O1 = insulation (only for temperature tubes)

OPTION Z – CERTIFICATES

Standard deliveries do not come with certificates.
The following certificates can optionally be delivered with your order.

Z1 = FDA material certificate[1)]
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.