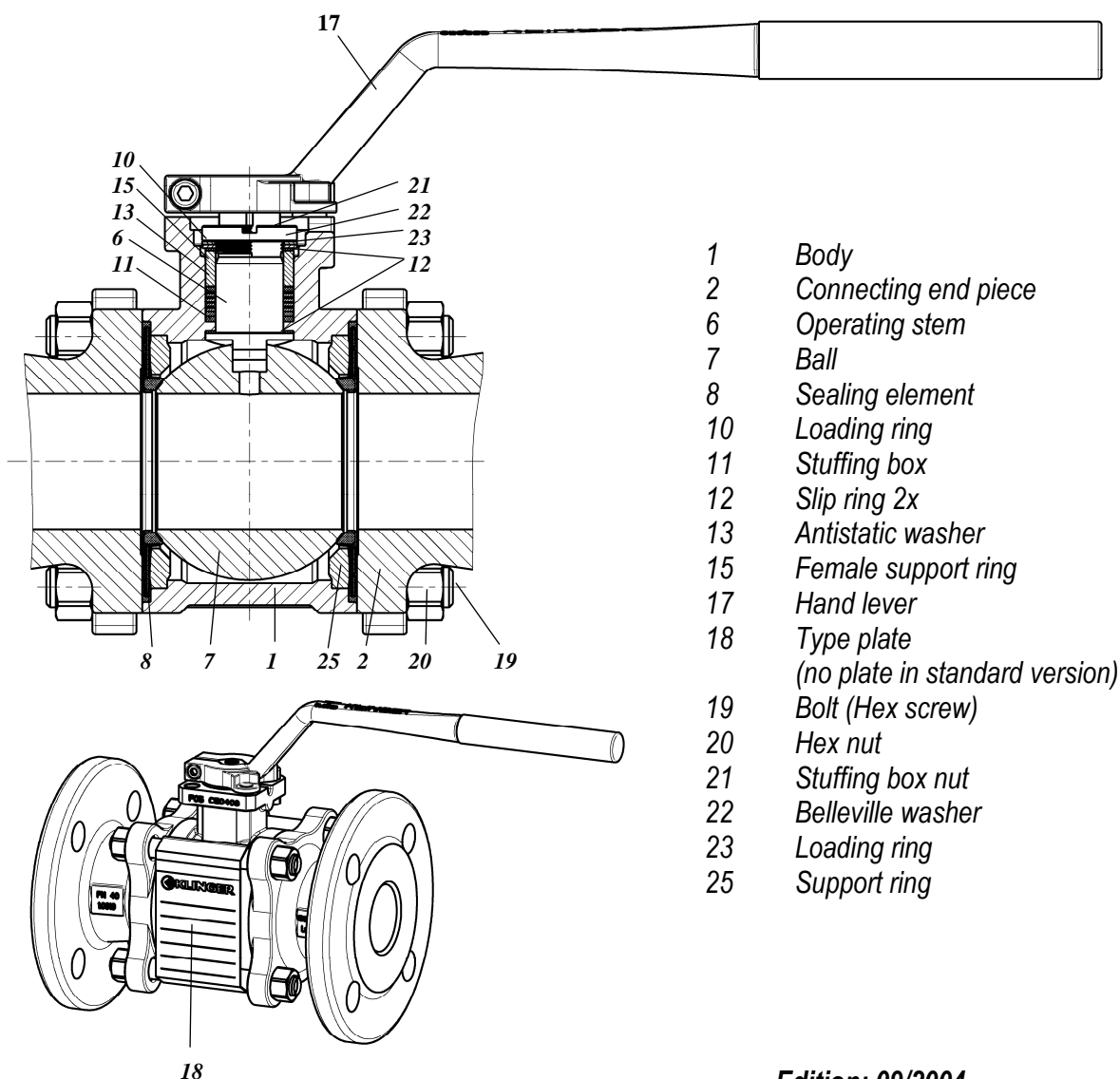


Installation Instructions, Handling and Care of

KLINGER

**Ballostar – A Ball Valves
3-Element Design Type DN 10 - 125**



- 1 Body
- 2 Connecting end piece
- 6 Operating stem
- 7 Ball
- 8 Sealing element
- 10 Loading ring
- 11 Stuffing box
- 12 Slip ring 2x
- 13 Antistatic washer
- 15 Female support ring
- 17 Hand lever
- 18 Type plate
(no plate in standard version)
- 19 Bolt (Hex screw)
- 20 Hex nut
- 21 Stuffing box nut
- 22 Belleville washer
- 23 Loading ring
- 25 Support ring

Edition: 09/2004

Rev.: 03/2010



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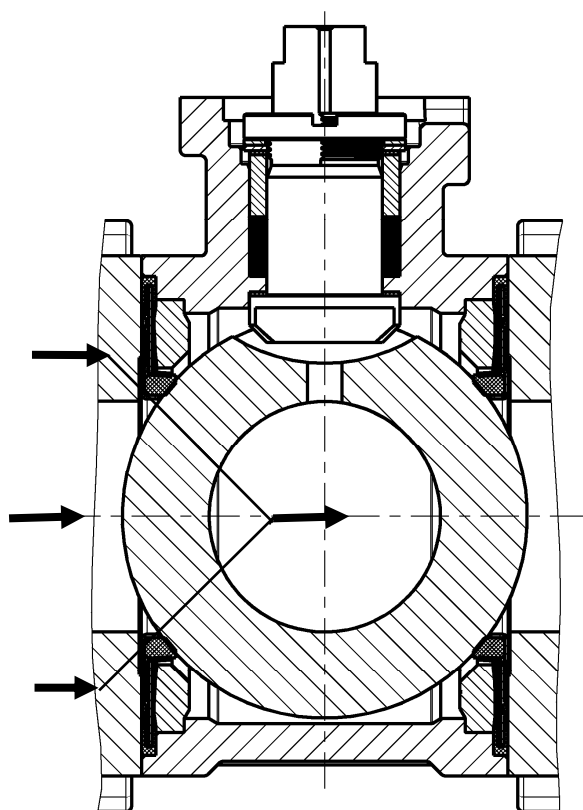
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FUNCTIONAL PRINCIPLE

Because of the **ELASTIC SEALING SYSTEM**, the KLINGER Ballostar® KHA ball valve is absolutely leak tight at high, but also at extremely low pressures. The required contact forces between sealing ring and ball are created by the differential pressure in the ball valve. For the **FLOATING BALL** sealing principle it is important that the shut-off device is freely moveable. The sealing rings perform two functions at the same time: They guide the ball and absorb bearing forces.

FLOW OF FORCE



The forces which are absorbed by the sealing rings increase with larger nominal diameters (DN, NPS). Therefore the floating ball design is only used for small sized ball valves. To achieve a high service life and to reduce the operating torques for pivot movements, the floating ball design is only used for sizes up to DN 125. For larger sizes lower costs in production face the significant higher costs for increasing the moment of force to surmount the high operating torques. The increased amount of friction caused by high loading pressures additionally leads to a low service life and a poor number of shifting cycles.

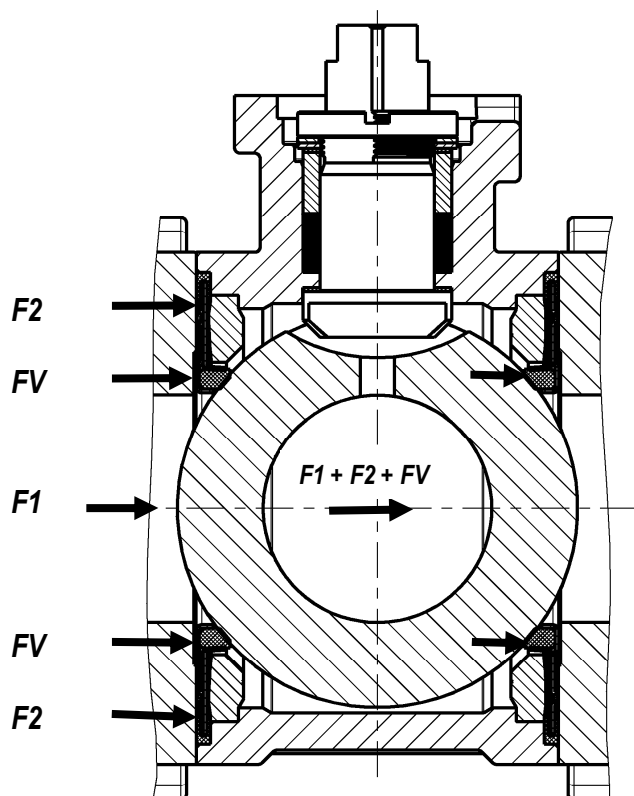
MODE OF OPERATION

The sealing system consists of the two pre-stressed, elastic sealing elements of stainless and acid resistant steel with KFC-sealing rings and a U-sleeve made of K-Flon at the pitch of the body together with the ball itself.

The fluid pressure presses the ball against the downstream located sealing element. At the same time, the upstream located sealing element is pressed against the ball. Because of the elasticity of the KLINGER sealing system **two sealing areas** are **permanently** available in the bore.

KLINGER Ballostar® KHA ball valves are basically maintenance free and can be pressurized in both flow directions.

The U-sleeve which is drawn onto the supporting ring is completely chambered (only one-piece-sealing-element) and seals the pitch flange against the outside.



Occurring forces:

F_1 ...Fluid force acting on ball

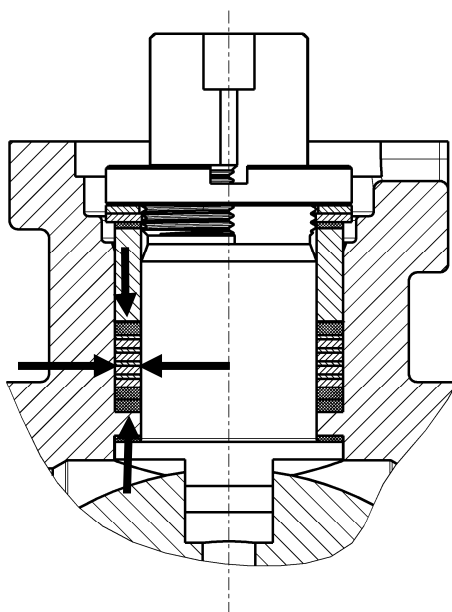
F_2 ...Fluid force acting on sealing element

F_v ...Spring force of sealing element

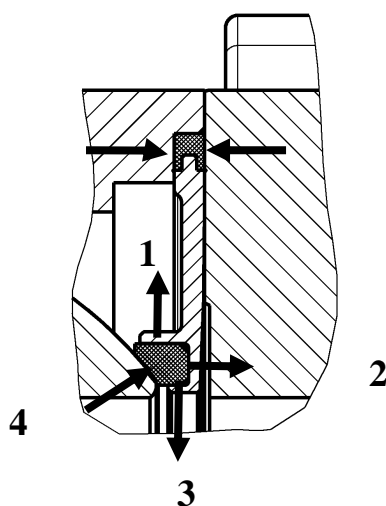
$F_1 + F_2 + F_v$...Total force, which acts onto the sealing ring

THE EXTERNAL SEALING SYSTEM

The sealing of the operating stem is carried out by a belleville washer supported stuffing box. This type of sealing is almost maintenance free and has just little set-off behaviour. Only small tightening forces are required for leak tightness. The arrangement of the belleville washer ensures that a constant contact pressure acts against the stuffing box to compensate alternating temperature- and pressure changes.



The groove in the one-part-sealing-element prevents floating of the sealing ring in radial direction (1) against the back side (2) and the bore (3). The ball presses against the sealing ring (4). Therefore the sealing ring can not set down or flow, because it is surrounded on each side (only one-piece-sealing-element).



INSTRUCTIONS FOR TREATMENT

*KLINGER Ballostar[®] ball valves are delivered in **OPEN** position. To protect them against dirt contamination and damage the flange ends are covered with plastic caps. We recommend removing the caps not until you want to install the valve. KLINGER valves should be stored in closed rooms with non-aggressive ambient atmosphere and where they are protected from moisture and dirt. Furthermore the maximum temperatures and pressures, specified in the P/T-diagrams, should not be exceeded during operation. Just under these specified conditions mentioned before our warranty for the determined duration is valid. Please notice, this warranty does not include valve components that are subjected to corrosion, erosion and wear during operation*

If cover- or shrink foils are used, you have to have to make sure, that the atmosphere within the foil is free of condensation. For storage in dusty rooms appropriate protective measures are recommended. To avoid confusion we suggest to name and store parts according to their shipping documents.

The temperature in the storage areas should range between -20° C and +50° C. Fast changes of temperature should be avoided (creation of condensation- and perspiration water).

Instructions for treatment and application are part of the shipment and should therefore be stored next to the goods. This makes sure that all necessary information and documentation are passed on.

Changes in documentation which belong to the storage of KLINGER products are timely forwarded by circular letters.

Damages which can result from inappropriate storage absolve KLINGER from obligations deriving from guarantee, warranty and product liability.

Please bear in mind the general hazard notes of Klinger valves (see document wT2792.11....)

KLINGER ball valves are basically MAINTENANCE FREE!

During long periods of non-operating, the valves have to be drained. In case of leakage the screws of the body have to be retightened. Please check table No.1 for the required torque values!

KLINGER recommends operating the valve **minimum six times** a year to increase the service life!

Table 1: Tightening Torque and width of hexagonal nut

Centre piece DN	15	20	25	32	40	50	65	80	100	125
Torque of Stuffing box nut	5	15	15	25	25	20	20	40	40	40
Torque of body bolt VIII, Xc	9	20	20	30	40	60	60	80	110	120
Torque of body bolt III	9	20	20	30	40	60	60	70	110	120
SW Hex nut screw Stop	8	10	10	13	13	13	13	19	19	19
SW Body bolts KHA-FL, SL, SK, G	10	13	13	17	19	22	19	24	24	24
SW Body bolts KHA-FK-VIII, Xc						22	22	24		
SW Body bolts KHA-FK-III						19	22	22		

Tolerance for Tightening Torque Stuffing box nut + 10 %

Tolerance for Tightening Torque Body screw ± 10 %

Threads are lubricated with hot screw grease (MOLYKOTE 1000)

Material codes of KLINGER Ballostar® KHA ball valves

The material codes (m.c.) characterise the materials of body and flange end piece.

Used Materials:

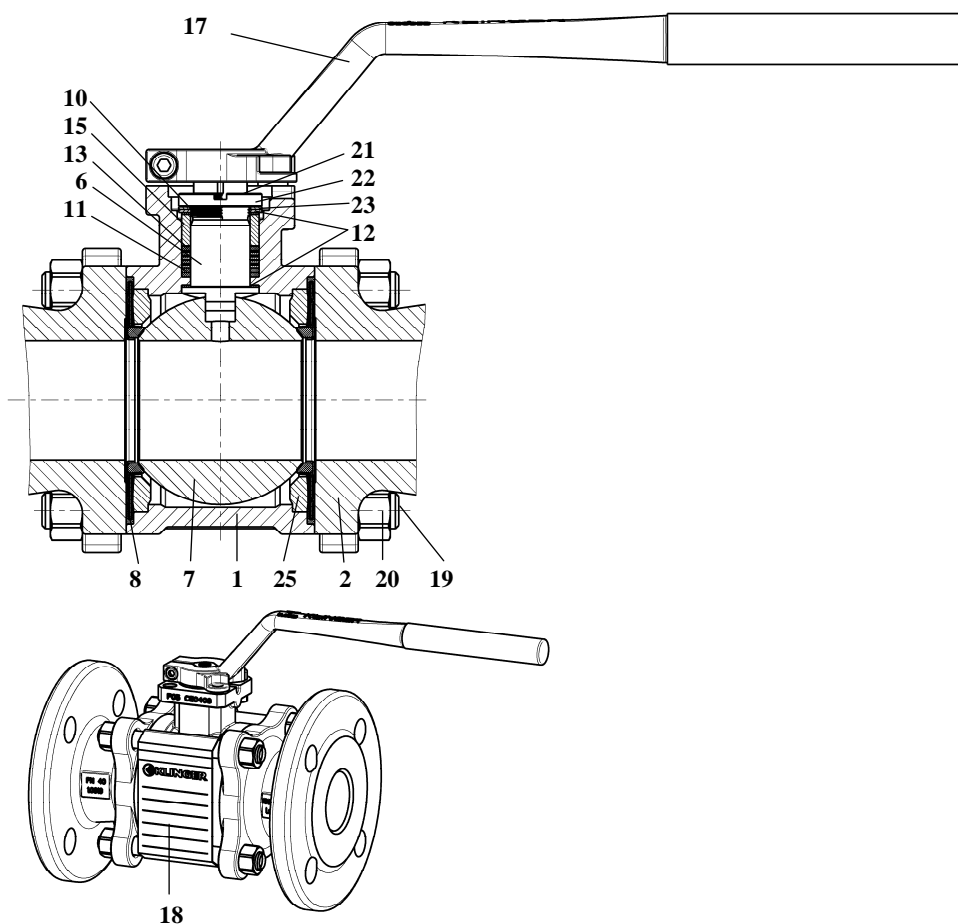
Cast iron	GG – 25	0.6025
Carbon steel	GS – C25N	1.0619
Stainless steel	G-X 6Cr NiMo 1810	1.4408 ¹⁾

Symbol	Body/end piece	Internal parts	Colour/surface treatment
III	Carbon steel/cast iron	No NF components	Anthracite (Zn Fe phrf)
VIII	Carbon steel	No NF Components	Anthracite (Zn Fe phrf)
X	Stainless steel	Components in contact with medium: Stainless steel	bright pickled
Xc	Stainless steel	Stainless steel	bright pickled

(doesn't apply to hand lever)

¹⁾ Approval in cryogenic temperature range acc. to pressure-/temperature-diagram (see catalogue)
(Application limits acc. to AD-Merkblatt W 10 – technical sheet for the acceptance of facilities)

Designations of Parts and Materials:

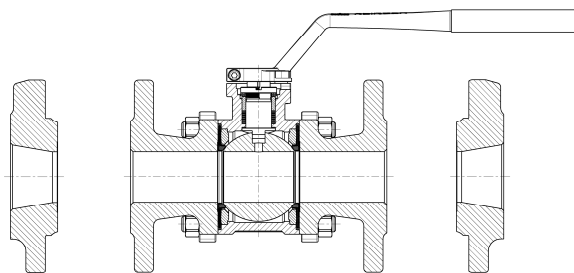


item	Standard Components	Materials		
		Mat. VIII	Mat. Xc	Mat. III
1	Body	1.0619 Zn/Fe phrf	1.4408 pickled.	1.0619 Zn/Fe phrf
2	End piece	1.0619 Zn/Fe phrf	1.4408 pickled.	0.6025 (0.7040) Zn/Fe phrf
6	Operating stem	1.4104	1.4571	1.4104
7	Ball	1.4401 (1.4408 DN 65 upwards *)		
8	Sealing element	Xc - KFC		
10	Loading ring	1.4404		
11	Stuffing box	K – Flon / 4401 / Grafit *)		
12	Slip ring	KFC – 25		
13	Antistatic ring	1.4401		
15	Fem. support ring	1.4404		
17	Hand lever	WCB / 1.4006 / 1.4408		
18	Type plate (no plate in standard version)	1.4310		
19	Screw bolt	8.8-A2L	A4-70	8.8-A2L
20	Hexagonal nut	8-A2L	A 4	8-A2L
21	Stuffing box nut	1.4404		
22	Belleville washer	1.4310		
23	Disc	A 4		
25	Support ring	Sint D10/Sint C39	1.4404	-----

*) in the interest of technical progress: designs and dimensions are subject to modification

Type OVERVIEW

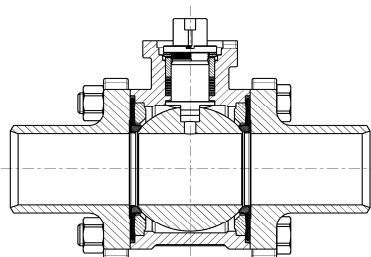
KHA-FK
KHA-FL
Flange
EN 1092-1
EN 1092-2



Over all length: DIN 3202-1 F1 or EN 558-1 Gr. 1
Over all length: DIN 3202-1 F4 or EN 558-1 Gr.27

KHA-SL

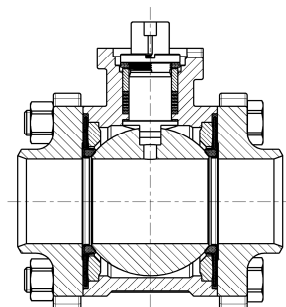
Welding end
EN 12627
(DIN 3239)



Over all length: DIN 3202-S10 (DN 15–40 / 20R15–40R32)
Over all length: ANSI B 16.10 CI 300 (DN50-125 / 50R40-100R80)

KHA-SK

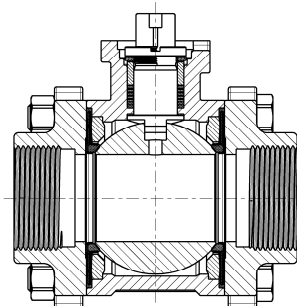
Welding end
EN 12627
(DIN 3239)



Over all length: DIN 3202-2 S13
Over all length: ANSI B 16.10 CI 300 (DN50 R40)

KHA-G

Threaded end
ISO 228/1



Over all length: DIN 3202 part 4 M4

Further information, as product features, dimensions, equipment and fields of application can be gathered from the product catalogue.

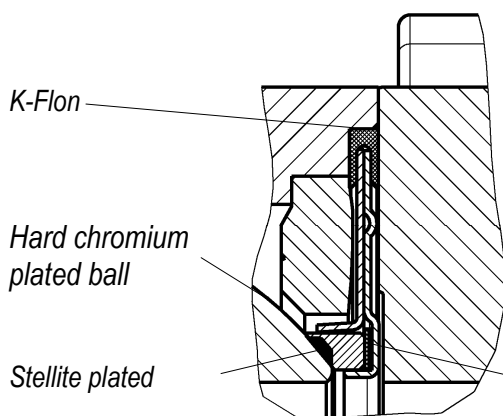
TYPE OVERVIEW SEALING ELEMENTS FOR SPECIAL APPLICATIONS AND OPERATING CONDITIONS

Due to the modular system of construction the sealing system of KHE ball valves can be adapted easily for special applications. This applies also to ball valves already installed in a system.

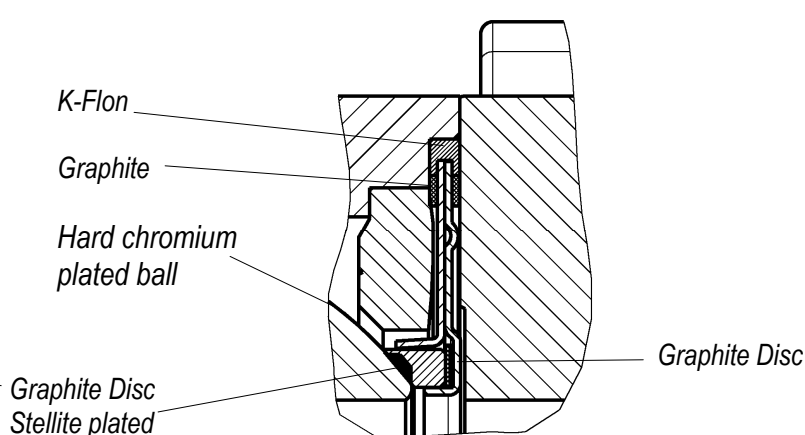
ATTENTION: Ball and sealing ring must be greased during installation

METALLIC SEALING ELEMENT

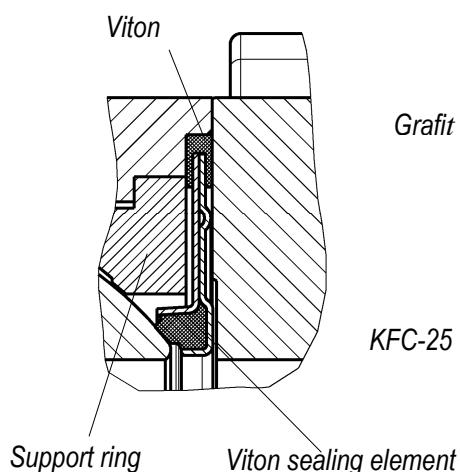
Used for abrasive fluids



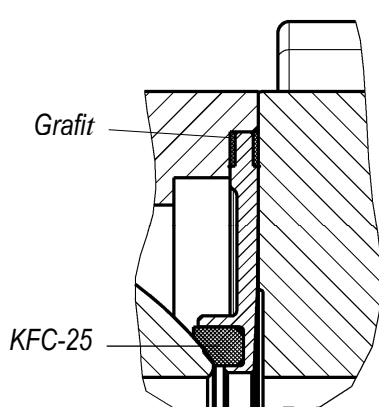
METALLIC – SPEZIAL Temp. 400° C SEALING ELEMENT



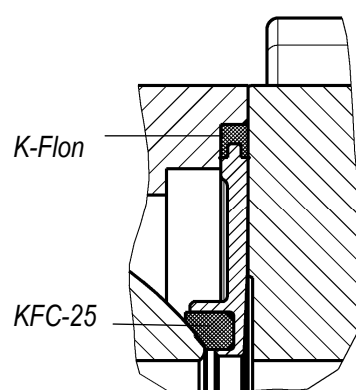
VITON Sealing Element



FIRE-SAFE Sealing Element



One part sealing element

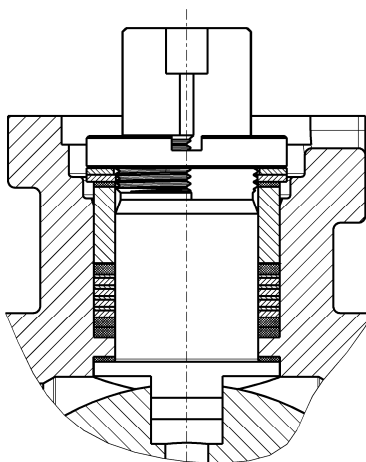


More than 250°C
Temperature changes (150°C)

Low and High Vacuum Range,
Gaseous Media

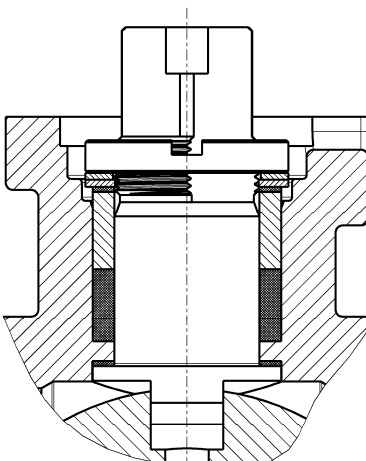
TYPE OVERVIEW STUFFING BOXES

Labyrinth Stuffing Box



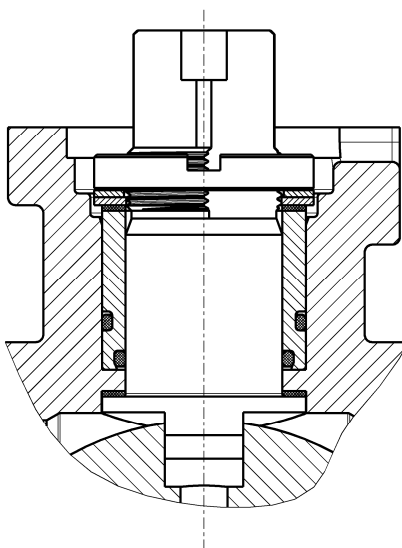
Fields of application:
Standard, performed for the
most conditions

Graphite stuffing box



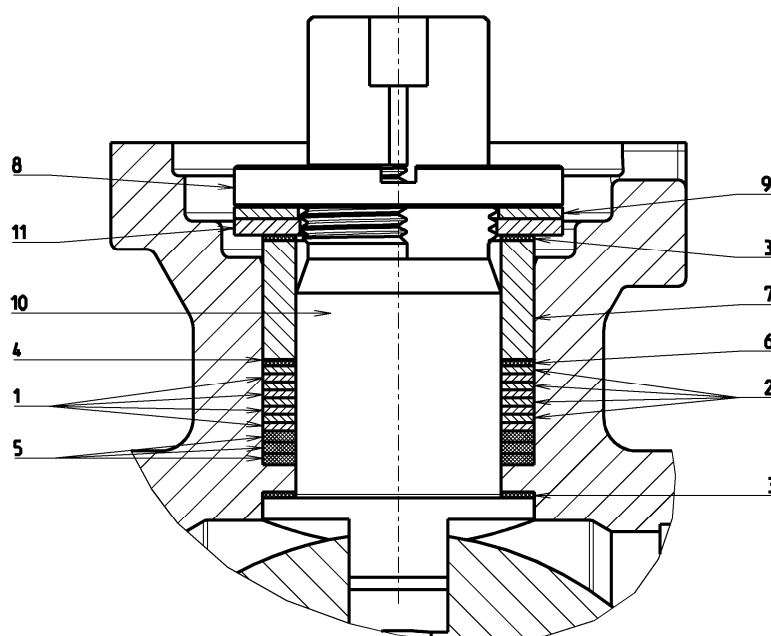
Fields of application:
High Temperatur

O-ring Stuffing box



Fields of application:
Low- and High Vacuum
Gaseous Media

COMPONENTS OF LABYRINTH STUFFING BOX

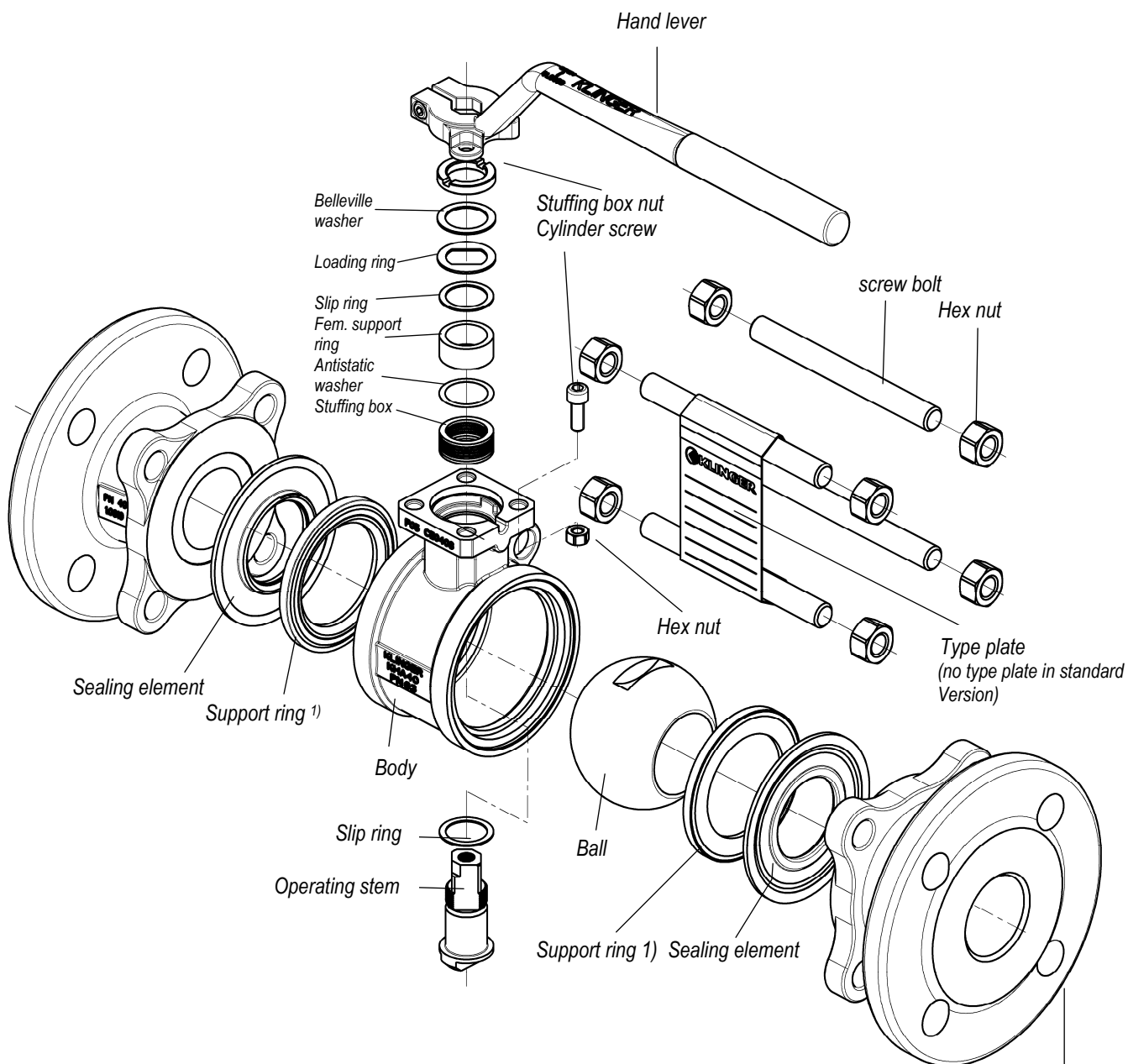


DN	item 1	item 2	item 3	item 4	item 5	item 6
15	10/14x0,5	10/14x0,4	10,1/14x0,5	10,5/14,2x0,1	10/14x2	10/14x1,5
10, 25	26/21x0,7	16/21x0,5	16/21x0,5	16,5/21,2x0,1	26/21x2	26/21x1
32, 40	20/26x1,0	20/26x0,5	20/26x0,7	20,5/26,2x0,1	20/26x2	20/26x2
50, 65	25/33x1,0	25/33x1,0	25/33x0,7	25,5/33,2x0,1	25/33x2	25/33x1
80, 100	30/40x1,5	30/40x1,0	30,5/40,3x0,1	30,5/40,3x0,1	30/40x2	30/40x2
125	34/45x1,5	34/45x1,0	34,5/45,3x0,1	34,5/45,3x0,1	34/45x2	34/45x2

DN	15	20,25	32,40	50,65	80,100	125
piece item 1	3	4	4	4	4	6
piece item 2	3	4	4	4	4	6
piece item 3	2	2	2	2	2	2
piece item 4	1	1	1	1	1	1
piece item 5	1	2	2	3	2	5
piece item 6	1	1	1	1	1	1

item 1	Stuffing box lamella	K-flon	KLN 2440/3
item 2	Loading ring	1.4401	KLN 2436
item 3	Slip ring	KFC-25	KLN 2435/3
item 4	Antistatic washer	1.4401	KLN2434
item 5	Slip ring	Grafit	KLN2435/4
item 6	Slip ring	Grafit	KLN2435/4
item 7	Fem. support ring	1.4404	
item 8	Stuffing box nut	1.4404	
item 9	Belleville washer	1.4310	
item 10	Operating stem	1.4104/1.4571	
item 11	Loading ring	1.4401	

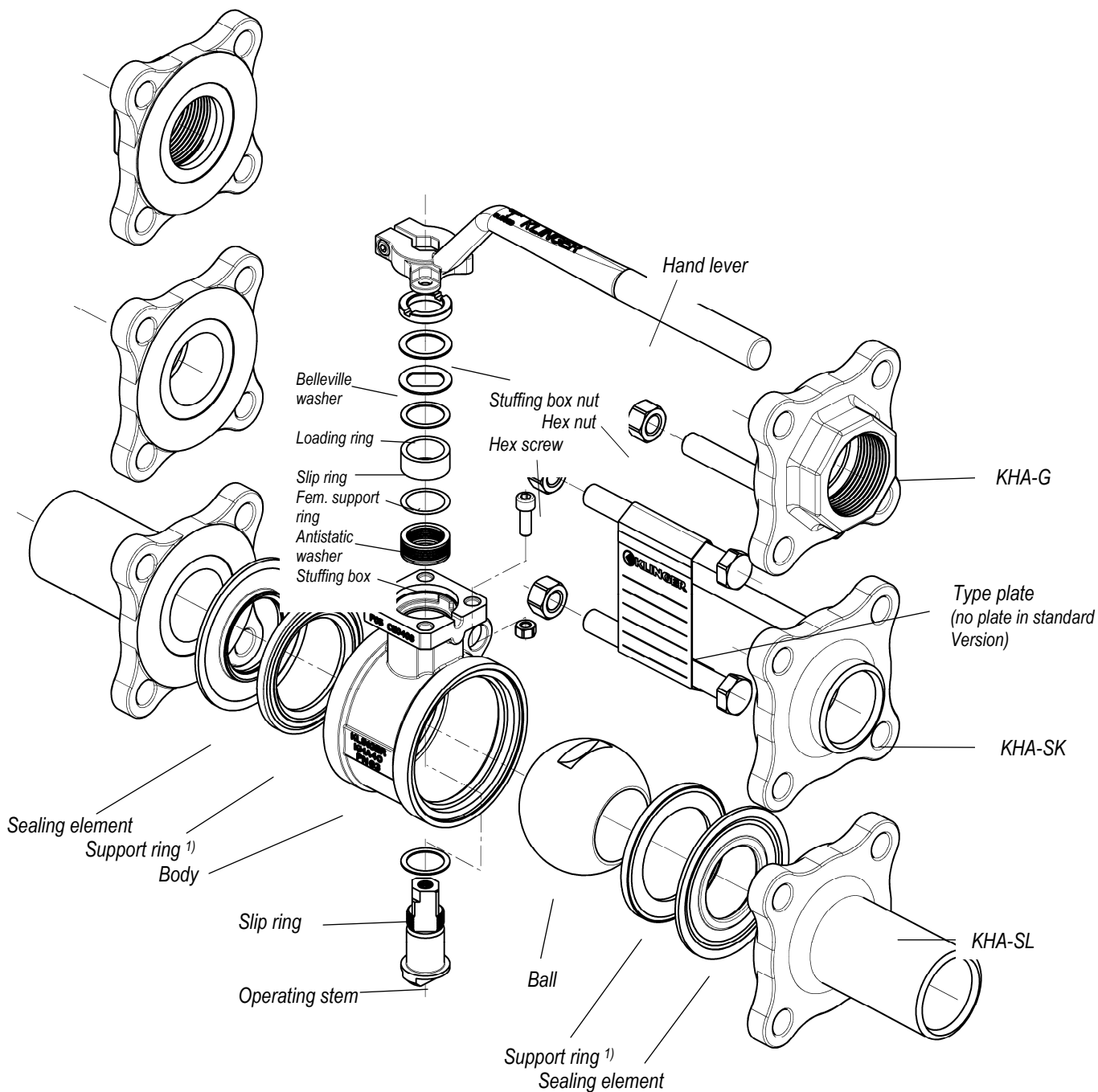
Exploded View Type: KHA-FL KHA-FK



KHA-FL
KHA-FK

1) ATTENTION: When one part sealing element mounted, support ring is not necessary.

**Exploded View Type: KHA-G
KHA-SK
KHA-SL**



1) ATTENTION: When one part sealing element mounted, support ring is not necessary.

INSTALLATION OF VALVE

Ballostar ball valves can be installed in any position. Always install in OPEN position.

ATTENTION: Make sure, that you use the metal part of the hand lever and not the plastic cover to bear or lift the valve.

Valves of the type **KHA-FL, -FK, -SL, -G**, can be installed in pipelines completely assembled.

INSTALLATION for BUTTWELDED VALVES for KLINGER BALLOSTAR-A BALL-VALVES DN 15 – 125 with butt weld ends

General Information:

All Ball Valves with butt weld ends are suitable for each tube, provided welding has been performed according to current professional standard. The welding- and quality standards have to be followed strictly.

Materials used for Buttweld- ends:

Material		code Nr.						
Klinger		DIN	C %	Si %	Mn %	Cr %	Mo %	Ni %
VIII	GS-C25 N	1.0619 *)	0,18-0,23	0,30-0,60	0,50-1,10	≤0,30		
Xc	G-X6CrNiMo1810	1.4408 **)	≤0,07	≤1,5	≤1,5	18,0-20,0	2,5-3,0	10,0-12,0

***) P-Content to be max. 0,045 %, S-Content to be max. 0,030 %

*) P-Content to be max. 0,020 %, S-Content to be max. 0,015 %

Type KHA-SK (short over-all length)

High temperatures during the welding process bring risk of damaging the sealing element. Swivle out the center part and displace with the spacer sleeve (Tab. 2). Weld while the spacer sleeve is fixed, use appropriate professional welding method!

Remove spacer sleeve after weld joints cooled down and swivel back the centre part into original position between the weld ends. The weld ends have to be positioned parallel to pipe axis.

Bring Ball Valve into **CLOSE POSITION**, tighten body by connecting bolts crosswise, acc. to the required torque (Table 1 page 7)

Not necessary for KHA-SK with Fire safe sealing elements.

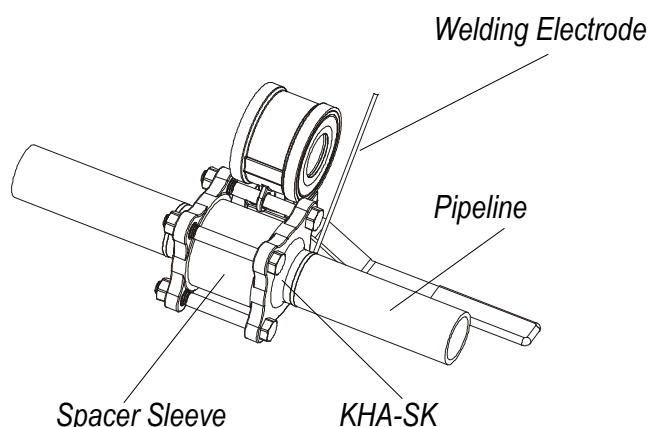


Table 2 Spacer Sleeve (length, pipe dimension)

DN *)	L	Pipe
15	26,8 ^{+0,1}	33,7 x 2,6
20	35,6 ^{+0,1}	42,4 x 2,6
25	41,9 ^{+0,1}	48,3 x 2,6
32	49,9 ^{+0,1}	60,3 x 2,9
40	63,4 ^{+0,1}	76,1 x 2,9
50	77,9 ^{+0,2}	88,9 x 3,2
65	93,9 ^{+0,2}	114,3 x 3,6
80	111,8 ^{+0,2}	139,7 x 4,0
100	132 ^{+0,2}	177,8 x 5,0
125	171,8 ^{+0,2}	219,1 x 6,3

Type KHA-SL (long overall length)

This type of valve can be weld in to the pipeline complete assembled (long overall length!). It is not allowed to exceed the temperature of +200°C in a distance of -20mm to the body. Check temperature. It is advisable to cool the body. Check torque of connection bolts after welding cooled down (acc. to page 7, table 1).

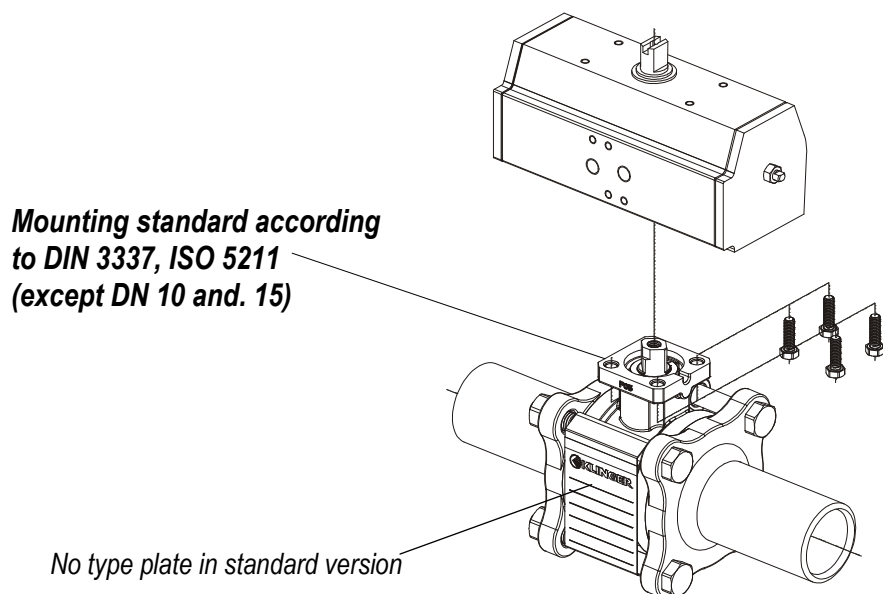
Assembling and dismantling

Assembling and dismantling instructions of the different compounds are given in a separate sheet packed in the original Klinger Spare part kits.

MOUNTING OF ACTUATOR

Preparations:

Type and Dimension of the actuator is determined by the required torque for operating the ball valve. The torque values of valve and actuator can be taken from the torque tables. Attention should be paid to the operating conditions.



Take notice of the actuator position!

(Remember: the actuator has to be in "OPEN"-position during the assembly)

Direct mounting of actuators (as shown on the picture above) is only recommended for temperatures beneath 80°C. KLINGER recommends to use mounting kits with bracket and coupling, if the connection-holes of actuator and valve do not match or high operating temperatures occur.

Installation:

- Turn both valve and actuator into "OPEN"-position.
 - Install actuator in the correct position (**ATTENTION:** valve closes with **clock wise** rotation). Make sure, that the 90° rotation precisely complies with the end positions "OPEN" respective "CLOSE".
 - Perform an operational test
-

Minimum Torques for KLINGER-Ballostar-A

Torques [Nm] with sealing element KFC 25

			differential pressure [bar]										
			0	5	10	16	20	25	30	40	50	63	100
nominal diameter	1/2"	15	6	6,2	6,4	6,6	6,8	7	7,2	7,6	8	8,5	10
	3/4"	20	12	12,4	12,7	13,1	13,4	13,8	14,1	14,8	15,5	16,4	19
	1"	25	14	15	16,1	17,3	18,1	19,2	20,2	22,3	24,3	27	
	1 1/4"	32	17	18,4	19,9	21,6	22,7	24,1	25,6	28,4	31,3	35	
	1 1/2"	40	25	27,8	30,6	33,9	36,1	38,9	41,7	47,2	52,8	60	
	2"	50	37	40,6	44,3	48,6	51,5	55,1	58,8	66			
	2 1/2"	65	60	66,3	72,5	80	85	91,3	97,5	110			
	3"	80	96	114	132	153,6	168	186	204	240			
	4"	100	160	183,8	207,5	236	255,0	278,8	302,5	350			
	5"	125	270	317,5	365	422	460	507,5	555	650			

Torques [Nm] with sealing element PTFE

			differential pressure [bar]										
			0	5	10	16	20	25	30	40	50	63	100
nominal diameter	1/2"	15	5,4	5,6	5,8	6	6,1	6,3	6,5	6,8	7,2	7,7	9
	3/4"	20	10,8	11,1	11,4	11,8	12,1	12,4	12,7	13,3	14	14,8	17,1
	1"	25	12,6	13,5	14,5	15,6	16,3	17,2	18,2	20	21,9	24,3	
	1 1/4"	32	15,3	16,6	17,9	19,4	20,4	21,7	23	25,6	28,2	31,5	
	1 1/2"	40	21,3	23,6	26	28,8	30,7	33,1	35,4	40,1	44,9	51	
	2"	50	30,3	33,3	36,3	39,9	42,2	45,2	48,2	54,1			
	2 1/2"	65	51	56,3	61,6	68	72,3	77,6	82,9	93,5			
	3"	80	72	85,5	99	115,2	126	139,5	153	180			
	4"	100	120	137,8	155,6	177	191,3	209,1	226,9	262,5			
	5"	125	202,5	238,1	273,8	316,5	345	380,6	416,3	487,5			

Torques [Nm] with sealing element Metal , Metal Special

			differential pressure [bar]										
			0	5	10	16	20	25	30	40	50	63	100
nominal diameter	1/2"	15	7,5	7,8	8,2	8,5	8,8	9,1	9,5	10,1	10,8	11,6	14
	3/4"	20	15	15,7	16,4	17,2	17,8	18,5	19,2	20,6	22	23,8	29
	1"	25	18	19,4	20,9	22,6	23,7	25,1	26,6	29,4	32,3	36	
	1 1/4"	32	25	26,7	28,3	30,3	31,7	33,3	35	38,3	41,7	46,0	
	1 1/2"	40	40	44,8	49,5	55,2	59	63,8	68,6	78,1	87,6	100	
	2"	50	55	64,4	73,8	85	92,5	101,9	111,3	130			
	2 1/2"	65	85	101,9	118,8	139	152,5	169,4	186,3	220			
	3"	80	140	172,5	205	244	270	302,5	335	400			
	4"	100	250	293,8	337,5	390	425	468,8	512,5	600			
	5"	125	450	580	710	866	970	1100					

Torques [Nm] with sealing element Viton

			Differenzdruck [bar]			
			0	5	10	16
nominal diameter	1/2"	15				
	3/4"	20				
	1"	25	14	15,9	17,8	20
	1 1/4"	32	18	20,2	22,4	25
	1 1/2"	40	25	29,7	34,4	40
	2"	50	40	49,4	58,8	70
	2 1/2"	65	55	72,2	89,4	110
	3"	80	100	150	200	260
	4"	100	160	219,4	278,8	350
	5"	125				

KLINGER recommends to use a safety-factor of 1,5 (= +50%) for calculation

INITIATING OPERATION

After installation and before initiating operation make sure to:

- *Remove solid parts from the pipeline, which are not components of the fluid.*
- *Perform a functional test*
- *Perform a pressure test*

Please notice that damages, which are caused by impurities or solid parts in the fluid/medium, are excluded from warranty!

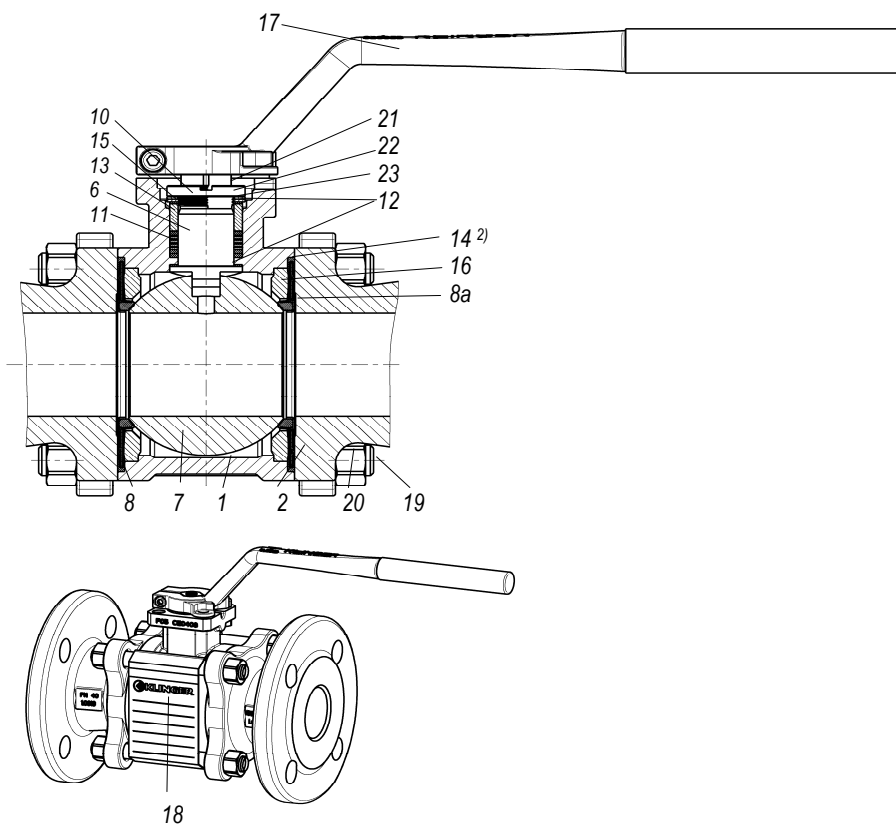
SAFETY INSTRUCTIONS

In general the usage and operation of these valves is without any risks. But remember yourself to act with caution and care:

- *Make sure, that you choose the correct type of ball valve which meets the requirements of your application and operating conditions.
Take care of the **safety instructions** and pressure/temperature limits.
Use the product catalogue to select the best suitable material for your field of application*
- ***Before installing and dismantling the valve the line is drained and not pressurized.***
- *Do not loose any screws on parts which are under pressure, unless this task is specified in the mounting and treatment instructions.*
- *The assembling and service tasks should be performed only by qualified people.*
- *Make sure that all connections are duly tightened, after the dismantling process.*
- *Do not open any screws, bolts or nuts by force.*
- ***ATTENTION*** *when opening drain cocks – **DANGER** fluid is released.*
- ***ATTENTION*** *– take care of moving/movable parts! Especially if ball valves are equipped with electric or pneumatic actuator.*

This mounting and treatment instructions have to be referred to those employees who are operating or maintaining these types of ball valves!

Sealing elements for special application KFC/M



item	Standard Components	Materials		
		VIII	Xc	III
1	Body	1.0619 Zn/Fe phrf	1.4408 geb.	1.0619 Zn/Fe phrf
2	End piece	1.0619 Zn/Fe phrf	1.4408 geb.	0.6025 (0.7040) Zn/Fe phrf
6	Operating stem	1.4104	1.4571	1.4104
7	Ball	1.4401 (1.4408) DN 65 (upwards) Fe/Cr 30µm		
8	Sealing element	Xc/KFC		
8a	Sealing element	Xc/M		
10	Loading ring	1.4404		
11	Stuffing box	K – Flon/Xc/Grafit		
12	Slip ring	KFC – 25		
13	Antistatic ring	1.4401		
2)14	Gasket	Graphit SLS		
15	Fem. support ring	1.4404		
16	Support ring	SintD10/SintC39	1.4404	-----
17	Hand lever	WCB/1.4006/1.4408		
18	Type plate (no plate in standard version)	1.4310		
19	Screw bolt	8.8-A2L	A4-70	8.8-A2L
20	Hexanal nut	8-A2L	A 4	8-A2L
21	Stuffing box nut	1.4404		
22	Belleville washer	1.4310		
23	Disc	A 4		

2) Pos.14 only for old version (3 part KHI) or specials applications

*) in the interest of technical progress: designs and dimensions are subject to modification