KLINGER Fluid Control

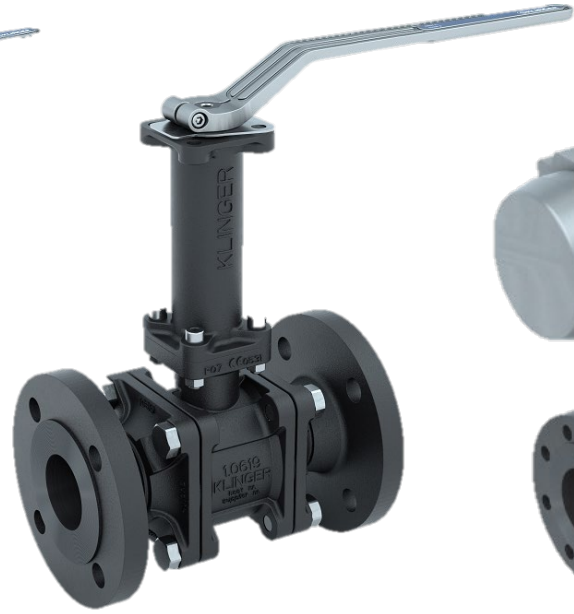
KLINGER FLUID CONTROL

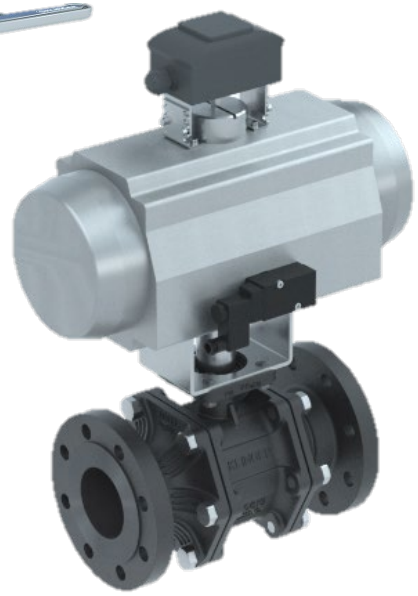
KHA ball valve „Advanced“

KHA ADVANCED

Agenda

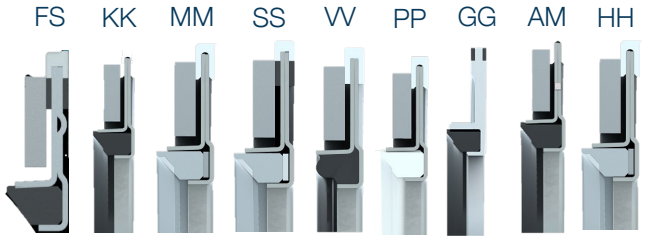
- Construction
- Benefits sealing elements
- Competitor comparison of sealing systems
- Special versions
- Operating torques
- Pneumatic actuators AIR TORQUE
- Electric actuators AUMA
- Maintenance
- Applications

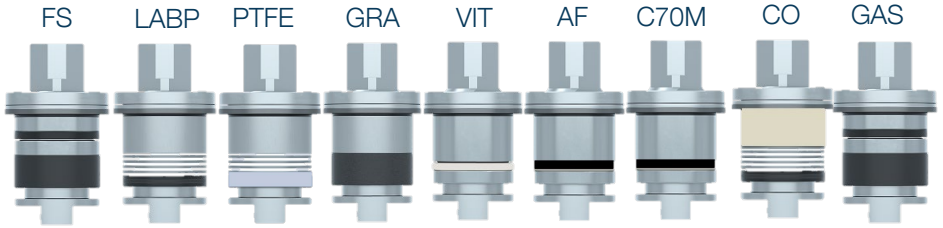


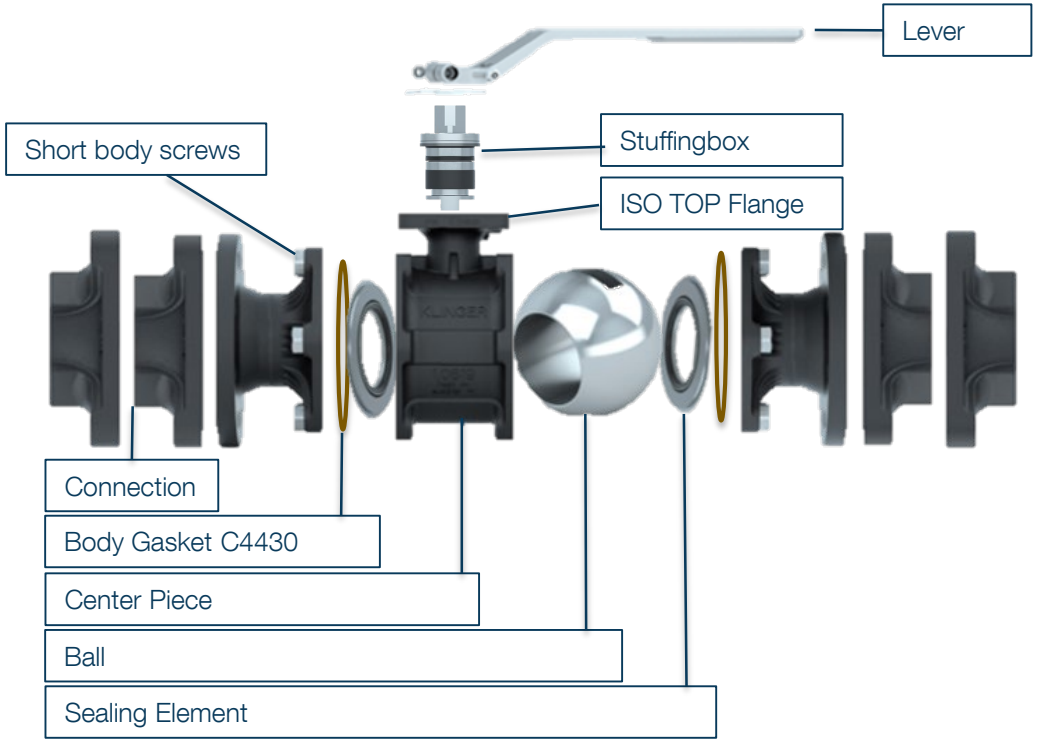


BALLOSTAR KHA

Modular construction



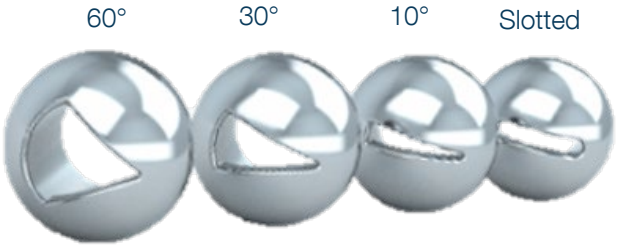




Mech. Gear

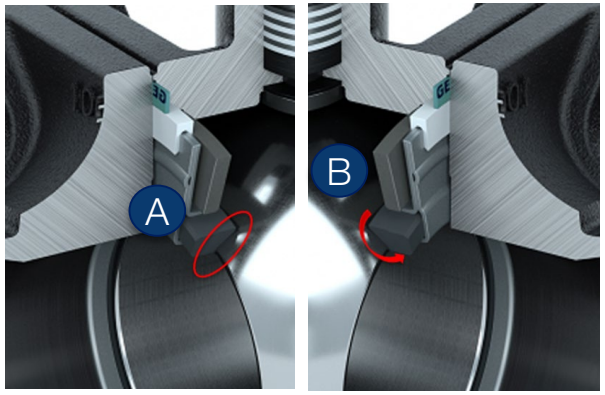
El. Actuator

Pneum. Actuator

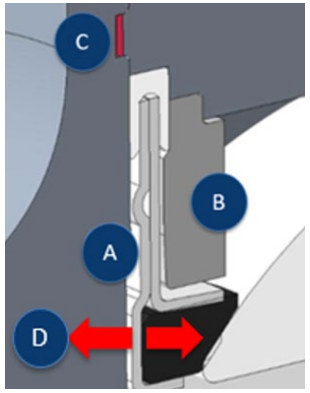


BALLOSTAR KHA

Benefits sealing elements

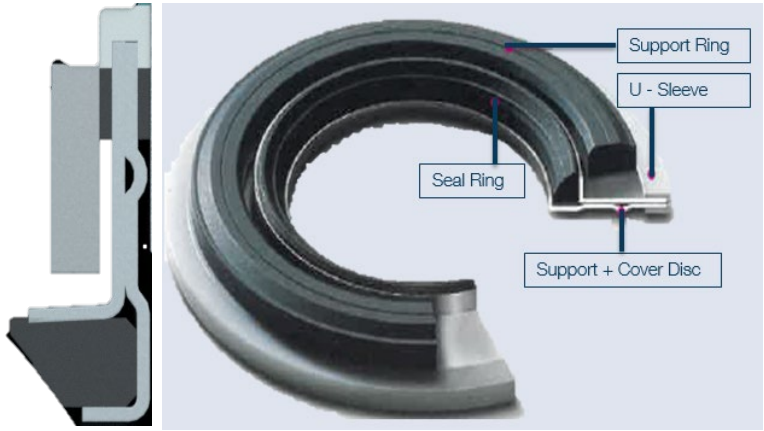


Due to the spring loads of the sealing elements and the position of the seal ring on the ball surface, possible particles in the media which can lead to damages on the ball will be absorbed (A). If the cavity pressure is higher than the spring force of the downstream sealing element, this element will lift off the ball and drain the cavity pressure in the pipe line (B). After that, the sealing element will move back in original position. This effect is only possible with the elastic design of these sealing elements.

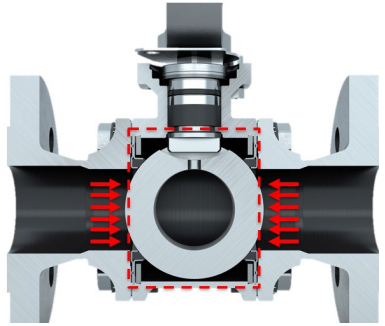


No coil springs:
The prestressed diaphragm springs (A) ensure the contact of the seat with the ball.
The fluid and possible impurities can circulate behind the diapgram springs. There is no retention zone and no clogging (Insensitive to impurities). The support ring (B) protect the sealing element against possible mechanical loads. An additional C4430 gasket (C) on housing pitch ensures increased tightness to atmosphere.

Preloaded diaphragm:
The absorption area of the medium pressure is not limited to the ball area, but encompasses the entire sealing element. In the event of an increase of differential pressure, the additional forces increase as well – the preloaded diaphragm springs (D) which press against the ball are subsequently relieved and service live further improved.



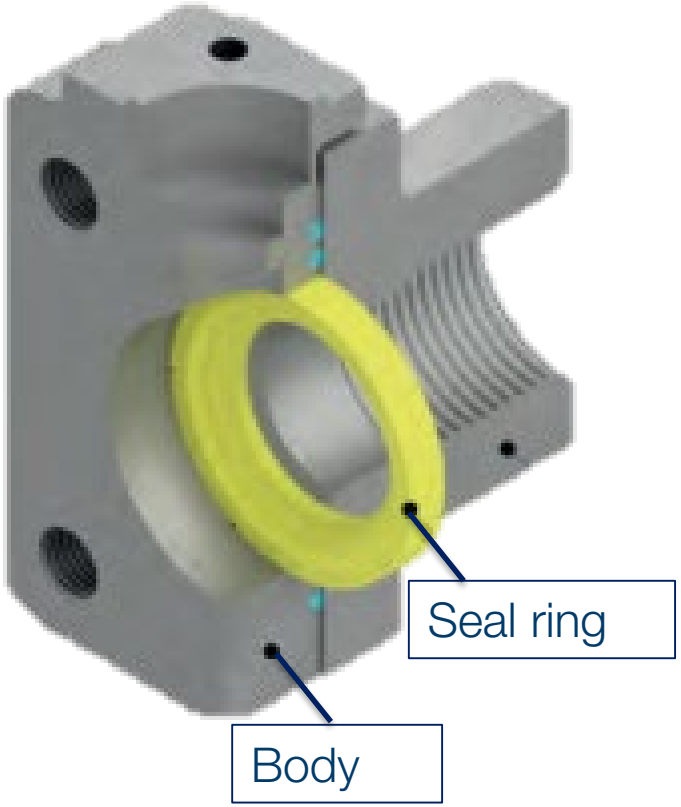
The multi part design of the sealing element combines elastic and robust properties. The seal ring is chambered from 3 sides (protected) by cover and support disc for high stability and to avoid plastic deformation. For higher mechanical resilience, an additional support ring is used (support ring is not necessary when using one part sealing element design). This structure is also appropriate for pressure and temperature changes with no relaxation and perfect sealing characteristics.



The Ballostar KHA ball valve utilizes spring loads in two sealing elements for the function of the valve which results in an sealing chamber in which the loads of the sealing elements simultaneously work bidirectionally. When connecting the flanges with the centre piece the forces of the preloaded springs are released and press the sealing rings to the ball. This happens irrespective of whether there is fluid pressure or not. The forces still act at very low differential pressures and vacuum.

COMPETITOR

Seal ring construction

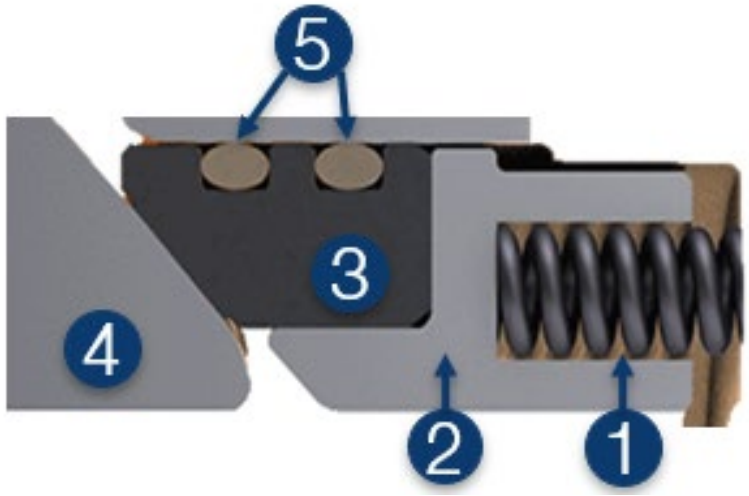


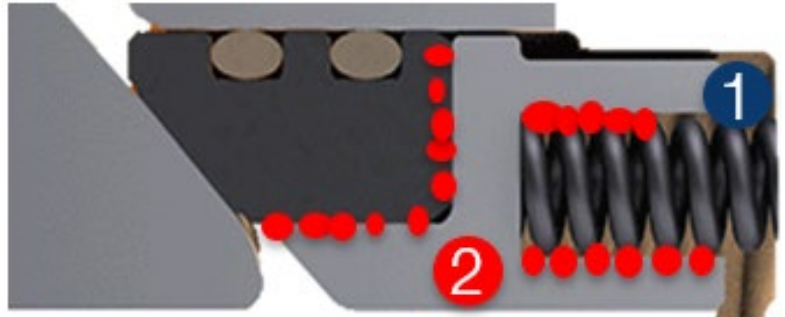
Properties and disadvantage

- Two soft seal rings Inline – max. 220°C
- Rings are pressed into body and flange (with a defined surface pressure)
- Rigid rings leads to higher torque due to thermal expansion→ Actuator sizing higher
- Also plastic deformation can occur due to higher temperatures
- Lower operating cycles due to higher torque and deformation of seal rings
- Vulnerable due to impurities

COMPETITOR

Spring loaded sealing system





Properties:
Seat material PTFE + C
Type of seat: spring loaded
Temperature range: -20°C to +200°C

Setup:
(1) Spring
(2) Seal ring support
(3) Seal ring PTFE + C
(4) Ball A350LF2 + ENP coating
(5) Backup O-ring

Function & disadvantage:

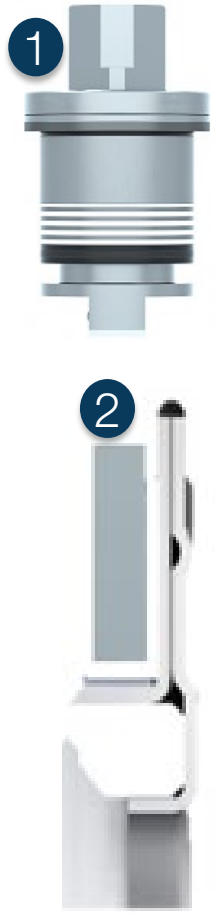
(1) The sealing system has spring loaded properties . Applied contact forces are distributed only linear.

(2) The system is susceptible to solids and can easily become clogged, which can lead to a blockage of the valve. Furthermore particles can come into the cavity which leads to corrosion.

SPECIAL VERSION

Low temperature version -196°C

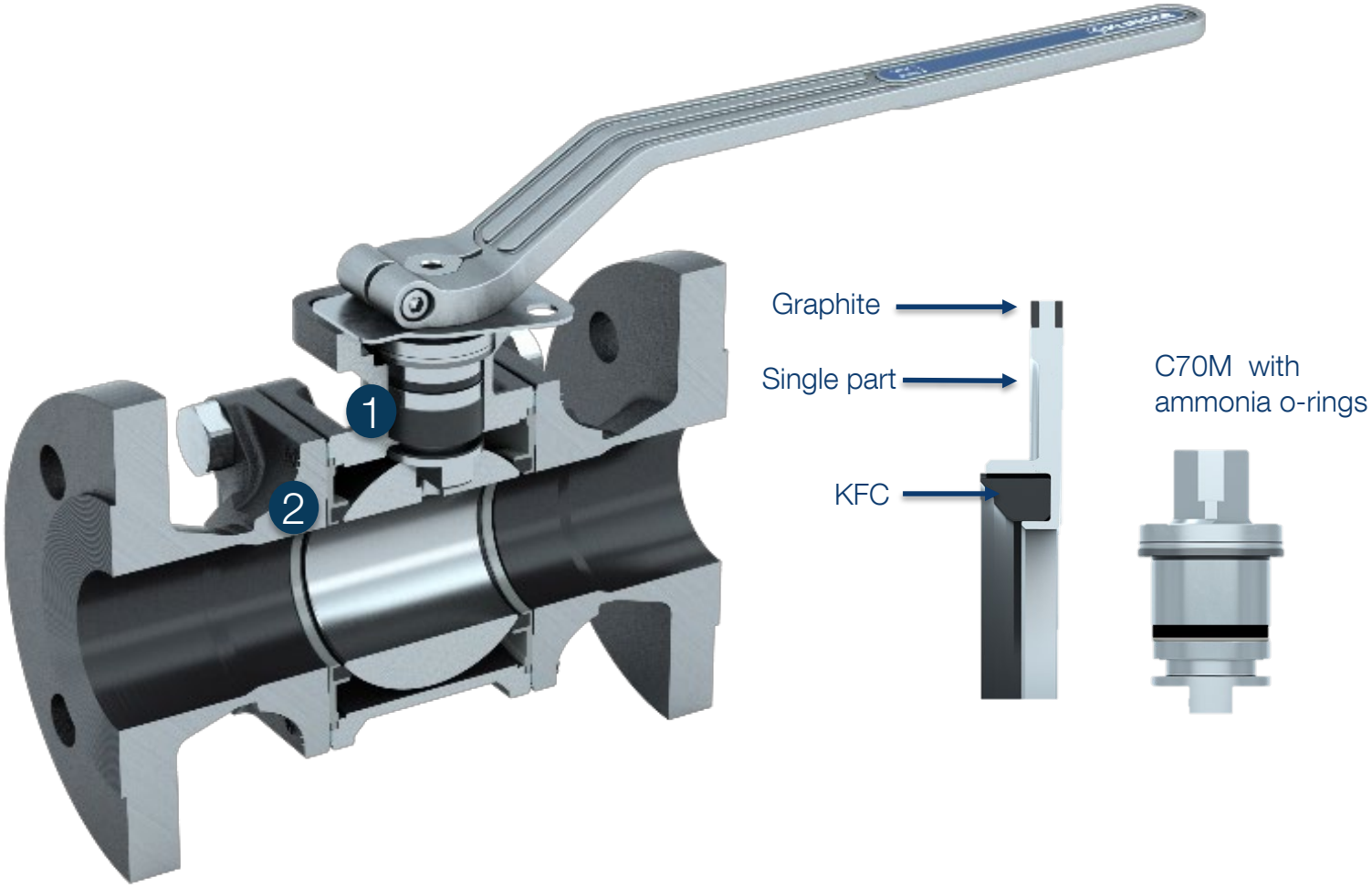
- Body material stainless steel only
- (1) Stuffingbox standard Labyrinth
- (2) Sealing elements PTFE
- (3) Connections: F, S, G
- Full bore
- Pressure stage PN40
- Temperature range -196°C to 200°C
- Oil and grease free
- With drilling in upstream sealing element for pressure relief
- (4) With stem extension for low temperature



SPECIAL VERSION

Ammonia version -35°C to +125°C

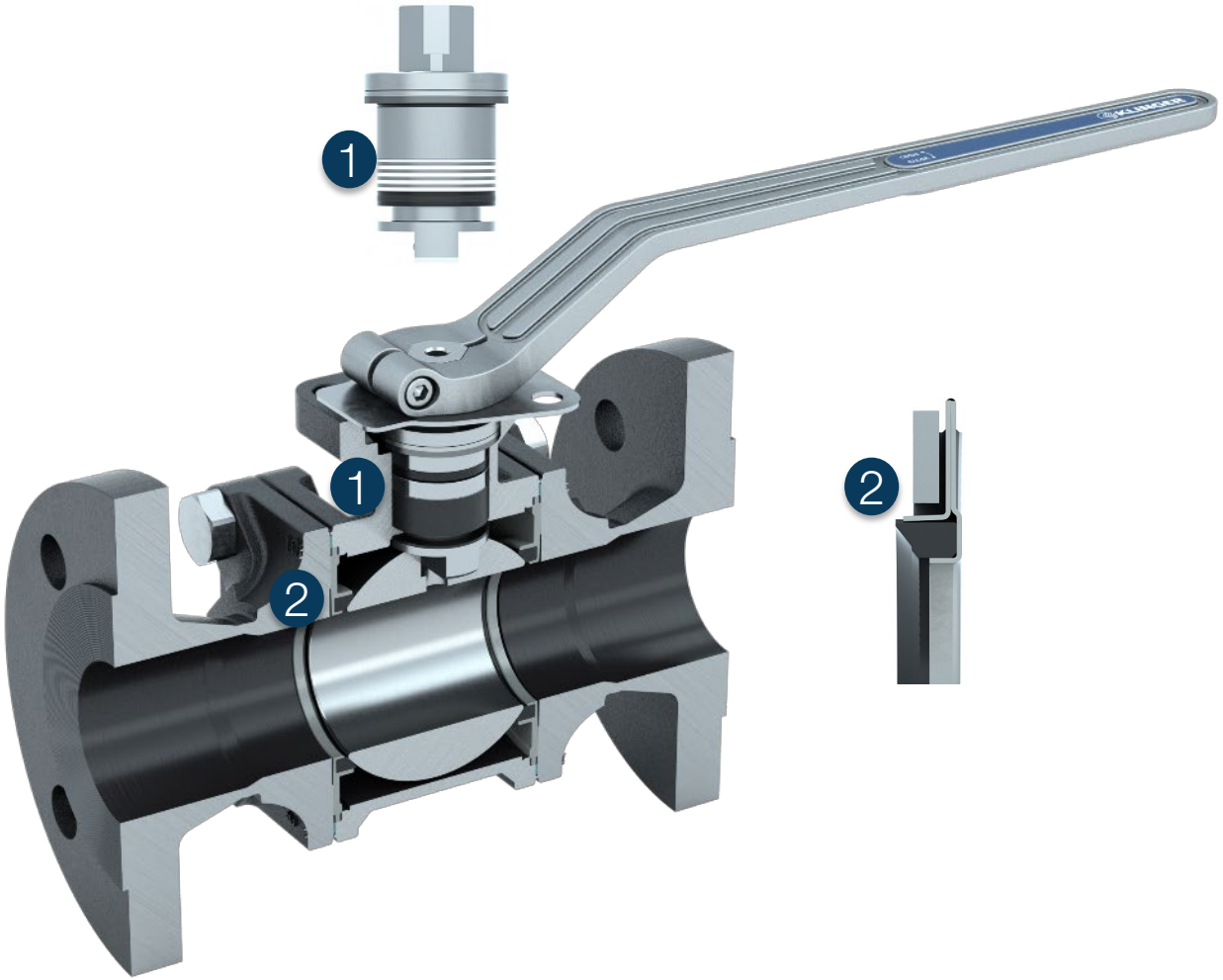
- Body material carbon or stainless steel
- (1) Stuffingbox C70M for ammonia
- (2) Sealing elements GG (KFC single part)
- With drilling in upstream sealing element for pressure relief
- Connections: F, S, G
- Full bore
- Temperature range stainless steel body -35°C to 125°C
- Temperature range carbon steel body-20°C to 125°C
- Pressure stage PN40



SPECIAL VERSION

Oxygen version

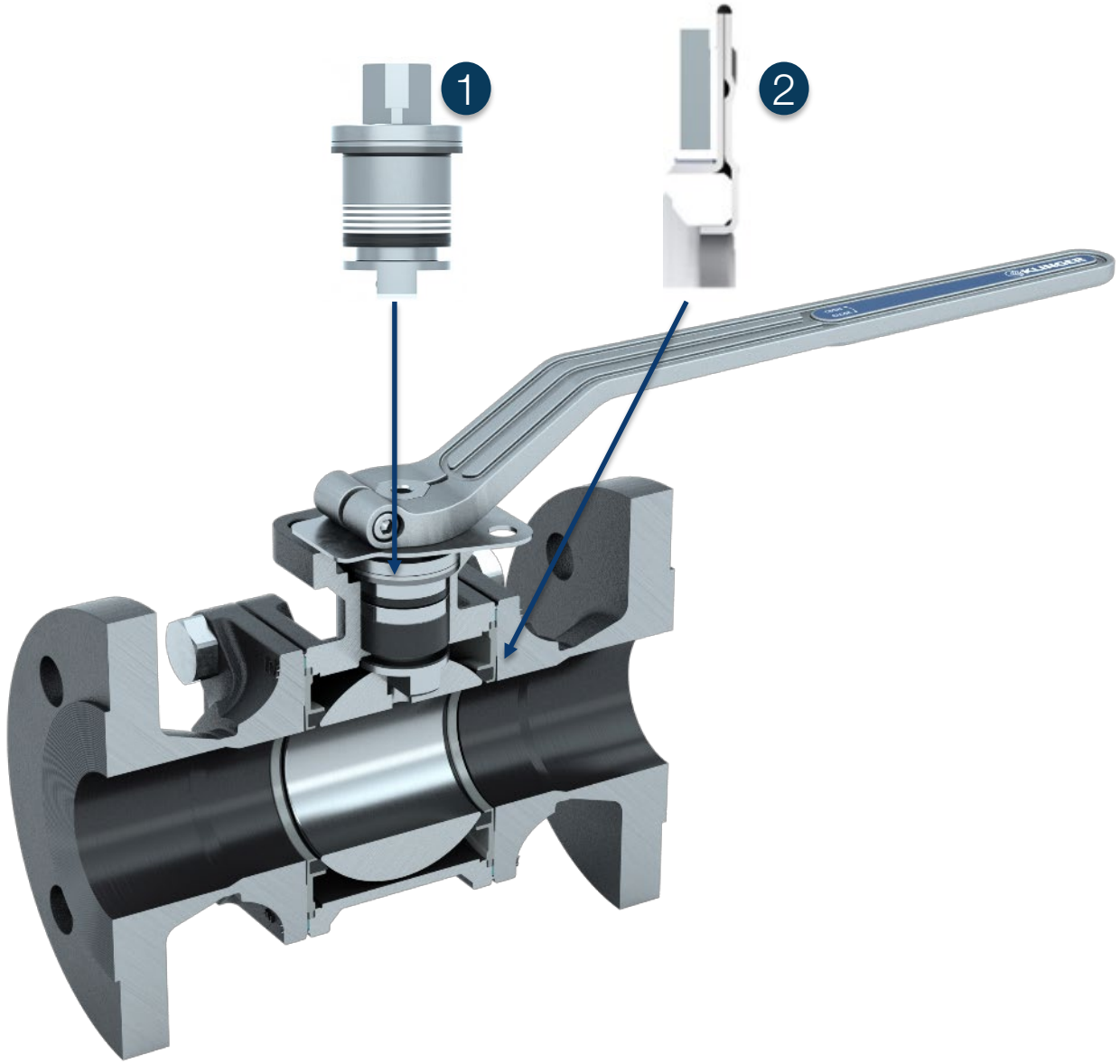
- Body material carbon & stainless steel
- (1) Stuffingbox Labyrinth
- (2) Sealing element standard KFC
- Connections: F, S, G
- Full bore
- Oil and grease free
- P/T limit carbon steel body: max. 60°C and max.10 bar
- P/T limit stainless steel body: max. 60°C and max.40 bar



SPECIAL VERSION

For hydrogen peroxide

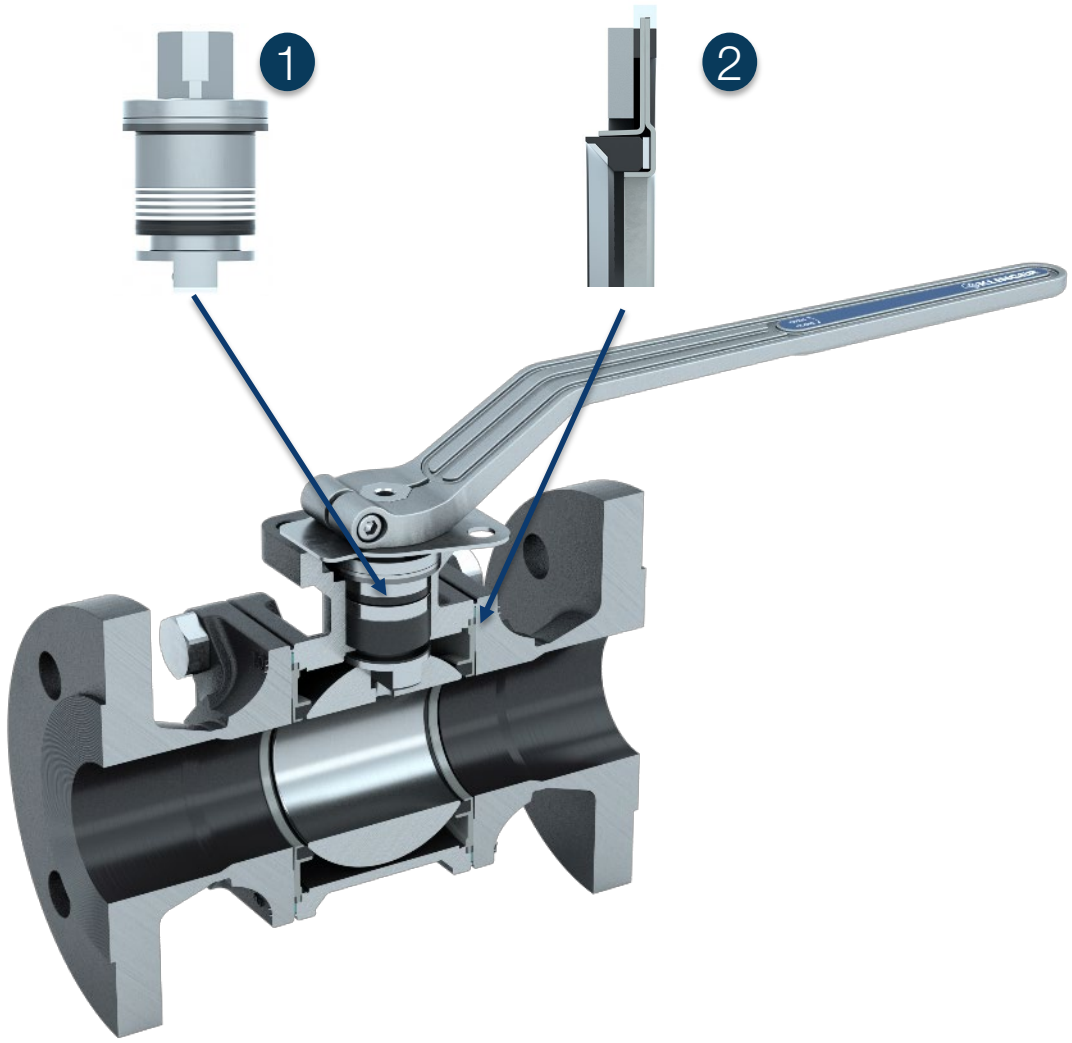
- Body material stainless steel
- (1) Stuffingbox pure PTFE
- Oil and grease free
- (2) Sealing element PTFE
- Upstream sealing element with pressure relief drilling to compensate quick expansion of the media
- Connections: F, S,G
- Full bore



SPECIAL VERSION

For black liquor

- Body material stainless steel
- (1) Stuffingbox standard Labyrinth
- (2) Sealing element metal
- Connections: F ,S ,G
- Full bore



KLINGER BALLOSTAR KHA

Operating torques

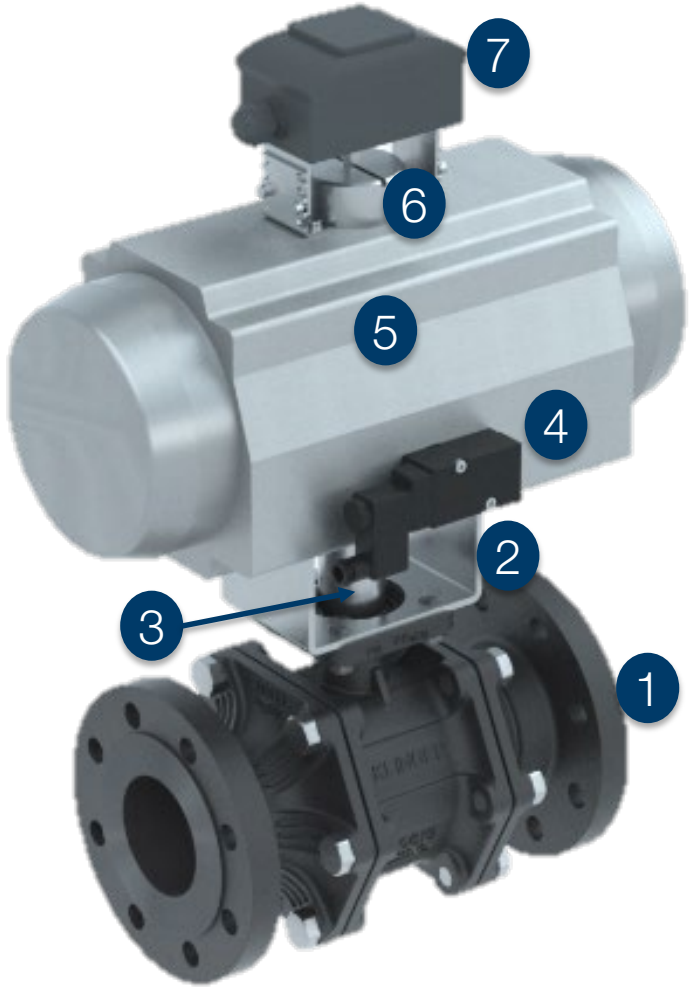
Operating torques PTFE											
bar	0	5	10	16	20	25	30	40	50	63	100
KHA-15	5	6	6	6	6	6	6	7	7	8	9
KHA-20	11	11	11	12	12	12	13	13	14	15	17
KHA-25	13	14	14	16	16	17	18	20	22	24	
KHA-32	15	17	18	19	20	22	23	26	28	32	
KHA-40	21	24	26	29	31	33	35	40	45	51	
KHA-50	30	33	36	40	42	45	48	54			
KHA-65	51	56	62	68	72	78	83	94			
KHA-80	72	86	99	115	126	140	153	180			
KHA-100	120	138	156	177	191	209	227	263			
KHA-125	203	238	274	317	345	381	416	488			
Operating torques KFC											
bar	0	5	10	16	20	25	30	40	50	63	100
KHA-15	6	6	6	7	7	7	7	8	8	9	10
KHA-20	12	12	13	13	13	14	14	15	16	16	19
KHA-25	14	15	16	17	18	19	20	22	24	27	
KHA-32	17	18	20	22	23	24	26	28	31	35	
KHA-40	25	28	31	34	36	39	42	47	53	60	
KHA-50	37	41	44	49	52	55	59	66			
KHA-65	60	66	73	80	85	91	98	110			
KHA-80	96	114	132	154	168	186	204	240			
KHA-100	160	184	208	236	255	279	303	350			
KHA-125	270	318	365	422	460	508	555	650			
Operating torques Metal											
bar	0	5	10	16	20	25	30	40	50	63	100
KHA-15	8	8	8	9	9	9	9	10	11	12	14
KHA-20	15	16	16	17	18	19	19	21	22	24	29
KHA-25	18	19	21	23	24	25	27	29	32	36	
KHA-32	25	27	28	30	32	33	35	38	42	46	
KHA-40	40	45	50	55	59	64	69	78	88	100	
KHA-50	55	64	74	85	93	102	111	130			
KHA-65	85	102	119	139	153	169	186	220			
KHA-80	140	173	205	244	270	303	335	400			
KHA-100	250	294	338	390	425	469	513	600			
KHA-125	450	580	710	866	970	1100					

Safety factor:

- To size an actuator, first the operating torque at the expected differential pressure has to be selected out of the valve torque table and multiplied with a safety factor. The working differential pressure should be known by the end user.
- The saftey factor ensure, when the valve has an unexpected higher torque due to different reasons, that the actuator still have enough force reserve to open or close the valve.
- Safety factors can be different and are media related but usually a factor 1,5 is used.

PNEUM. ACTUATOR AIR TORQUE

Basic configuration



(1) KLINGER KHA ball valve with flanged, weld and threaded ends. Body materials 1.0619 or 1.4408. Different styles of stuffingboxes and sealing elements combined depending on application. ISO TOP flange on valve acc. ISO5211 as a standard.

(2) Mounting bracket: material galvanised steel. Stainless steel bracket on demand. Purpose: “Cooling” distance between valve and actuator at high service temperatures and transition piece if F size of ISO TOP flange and actuator connection is not matching.

(3) Coupling: Adaptor between stem of the valve (square end) and actuator connection (different connection possibilities).

(4) Option: Solenoid valve directly mounted on actuator. Different solenoid designs available.

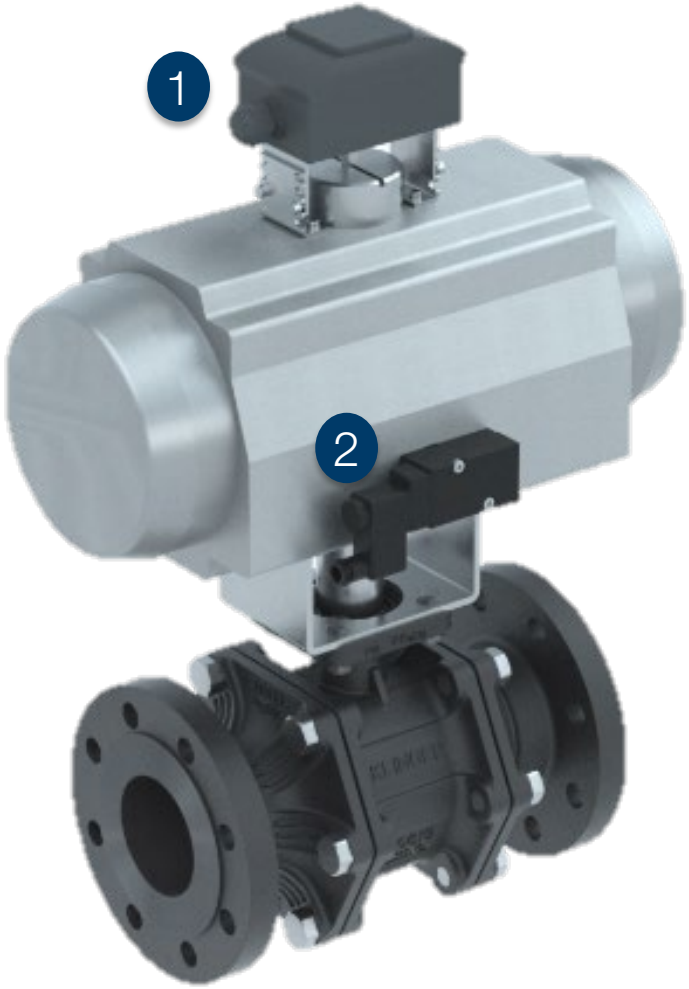
(5) Pneumatic actuator “AIR TORQUE”, single or double acting for different air supplies.

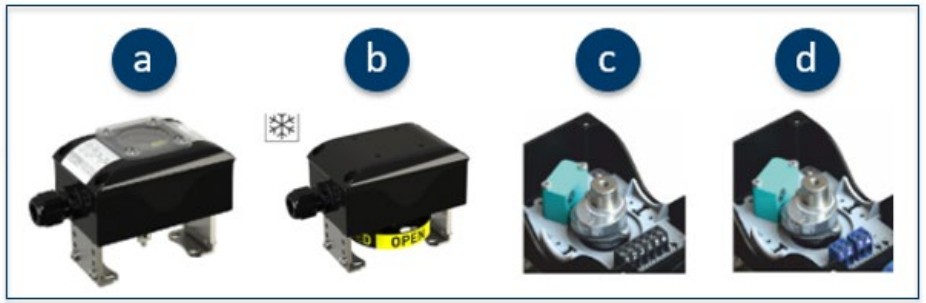
(6) Position indicator for OPEN/CLOSE.

(7) Option: Limit switch box – different designs available.

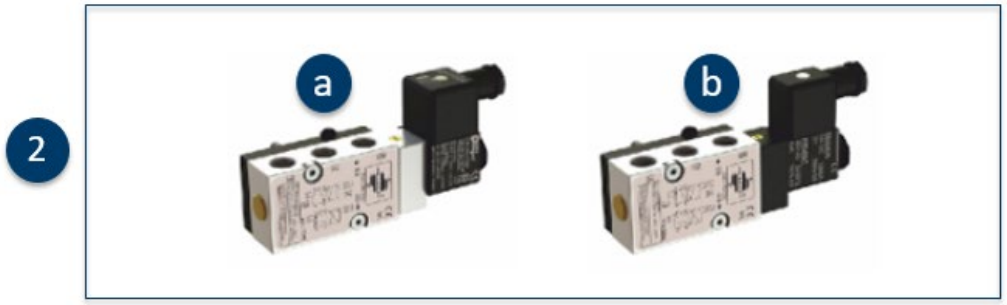
PNEUMATIC ACTUATORS

Options & accessories





- (a) Standard limit switch box 24V or 230V with mechanical switches
- (b) Ex limit switch box (EEx d IIC T6) with mechanical switches
- (c) Limit switch box with inductive limit switches
- (d) Ex limit switch box (EEx ia IIC T6) with inductive switches



- (a) Standard solenoid valve 24V or 230V
- (b) Ex solenoid valve (EEx ia IIC T6) 24V

PNEUMATIC ACTUATORS

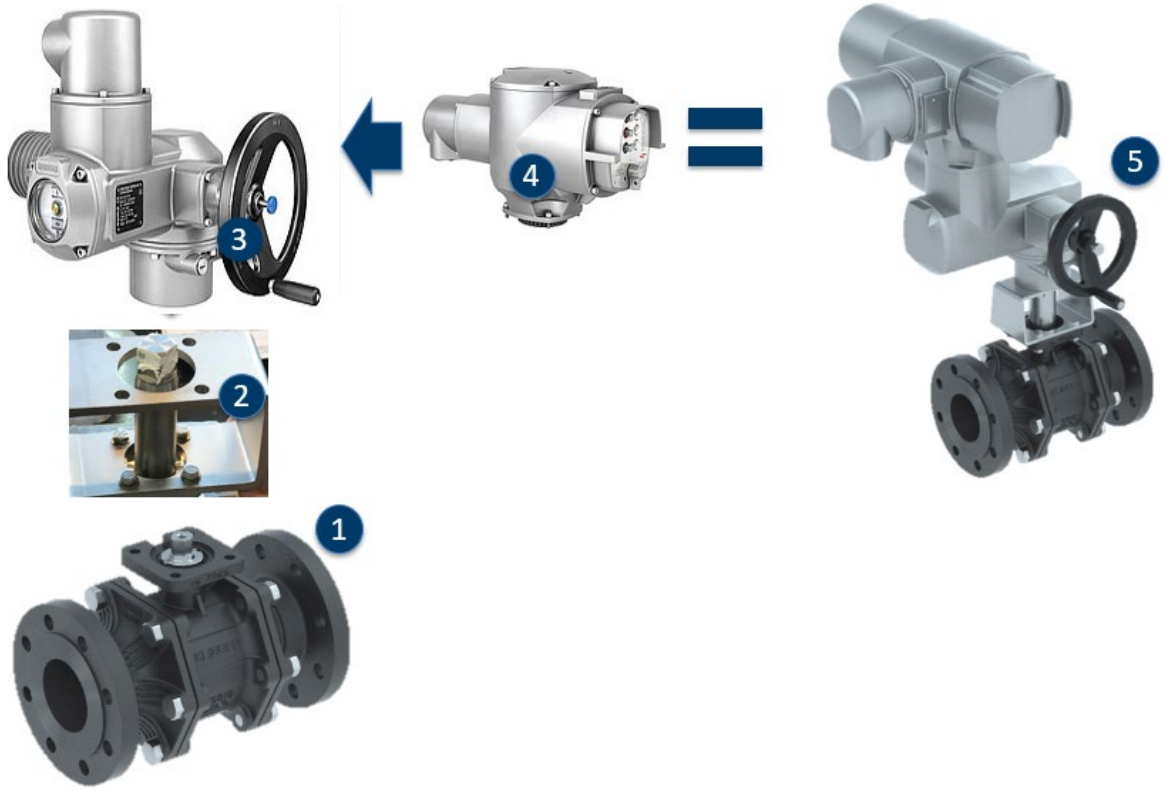
Sizing single and double acting actuators Air Torque

Size	Actuator type, single acting for PN16	Actuator type, single acting for PN40	Safety factor
DN15	AT101U-SR10	AT101U-SR10	1,5
DN20	AT201U-SR10	AT201U-SR10	
DN25	AT251U-SR10	AT251U-SR10	
DN32	AT251U-SR10	AT301U-SR10	
DN40	AT301U-SR10	AT351U-SR10	
DN50	AT351U-SR10	AT401U-SR10	
DN65	AT451U-SR10	AT451U-SR10	
DN80	AT501U-SR10	AT601U-SR10	
DN100	AT601U-SR10	AT651U-SR10	
DN125	AT651U-SR10	AT701U-SR10	

Size	Actuator type, double acting for PN16	Actuator type, double acting for PN40	Safety factor
DN15	AT051U-DA	AT051U-DA	1,5
DN20	AT101U-DA	AT101U-DA	
DN25	AT101U-DA	AT201U-DA	
DN32	AT201U-DA	AT201U-DA	
DN40	AT201U-DA	AT251U-DA	
DN50	AT251U-DA	AT301U-DA	
DN65	AT301U-DA	AT351U-DA	
DN80	AT401U-DA	AT451U-DA	
DN100	AT451U-DA	AT501U-DA	
DN125	AT551U-DA	AT601U-DA	

ELECTRIC ACTUATOR AUMA

AUMA actuator SQ sizing



(1) Stem of KHA with square end and ISO TOP flange.
(2) Bracket and coupling
(3) El. Mech. Actuator AUMA type “SQ”, “SQR” or “SQExC”.
(4) Actuator control AUMA type “AM” or “AC”.
(5) Complete AUMA unit: mech. Gear + actuator + actuator control

AUMA actuator type „SQ“ KHA PN25-KFC		
Size	Actuator type	Closing time (sec.)
DN15 to 65	SQ 05.2	4 - 22
DN80	SQ 07.2	5,6 - 32
DN100	SQ 10.2	11 - 63
DN125	SQ 10.2	16 - 63

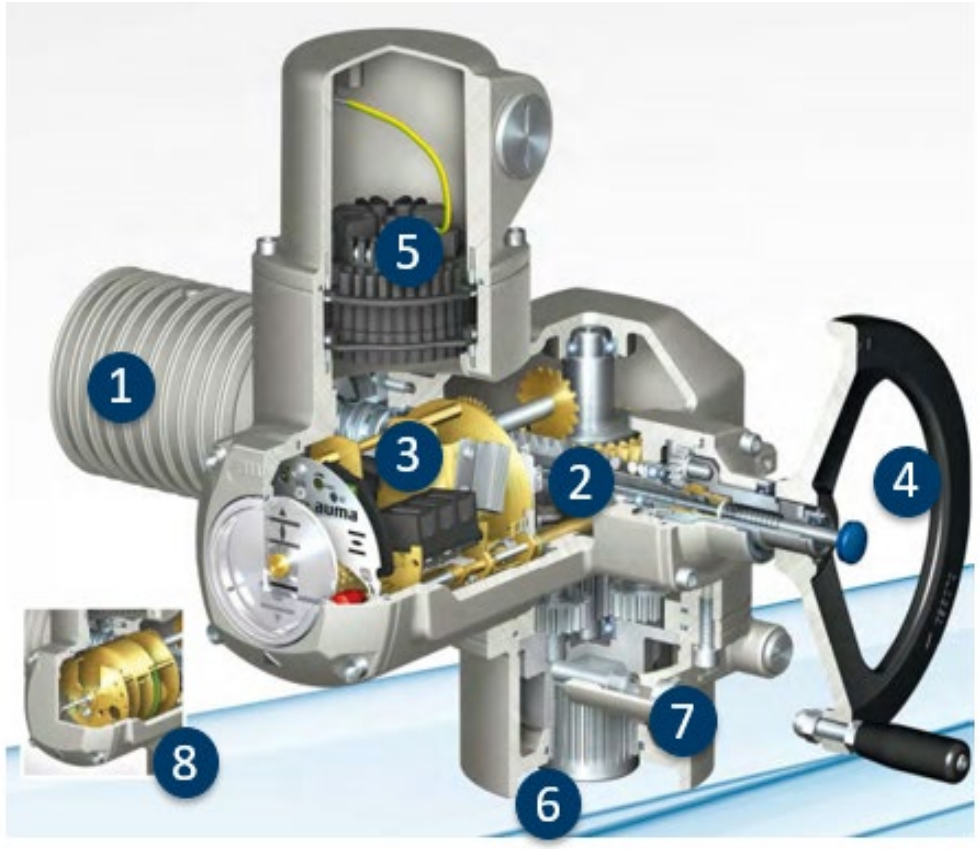
AUMA actuator type „SQ“ KHA PN40-KFC		
Size	Actuator type	Closing time (sec.)
DN15 to 50	SQ 05.2	4 - 22
DN65 & 80	SQ 07.2	5,6 - 32
DN100	SQ 10.2	11 - 63
DN125	SQ 12.2	32 - 63

AUMA actuator type „SQ“ KHA PN25-METAL		
Size	Actuator type	Closing time (sec.)
DN15 to 50	SQ 05.2	4 - 22
DN65 & 80	SQ 07.2	5,6 - 32
DN100	SQ 10.2	16 - 63
DN125	SQ 12.2	32 - 63

AUMA actuator type „SQ“ KHA PN40-METAL		
Size	Actuator type	Closing time (sec.)
DN15 to 50	SQ 05.2	4 - 22
DN65	SQ 07.2	8 - 32
DN80	SQ 10.2	16 - 63
DN100	SQ 12.2	22 - 63
DN125	GS63.3 + SA07.6	35

AUMA SQ ACTUATOR

Construction



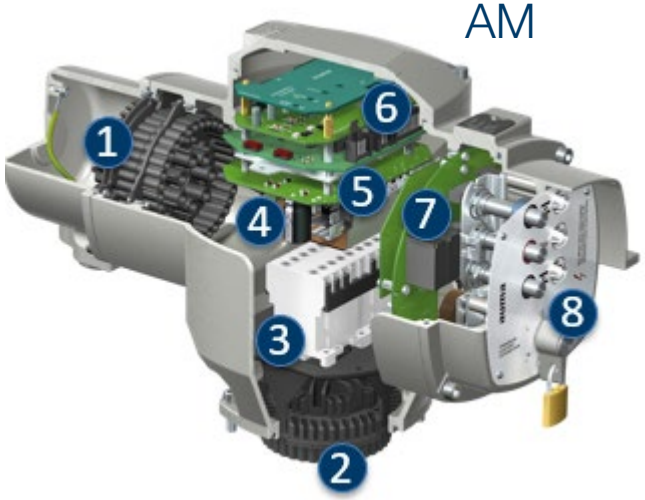
Standard configuration:
For OPEN/CLOSE applications – type SQR for regulating applications and type SQE for ATEX on demand.
Standard voltage 400V and 230V.
Heater in the switch compartment - Self-regulating PTC heater, 5 - 20 W, 110 - 250 V AC/DC.
Operation mode: Short-time duty S2 - 15 min, class A and B according to EN 15714-2.
Travel switches: Single switch (1 NC and 1 NO) per end position, not galvanically isolated.
Torque switches: Single switch (1 NC and 1 NO) per direction, not galvanically isolated.
Ambient temperature –30 °C bis +70 °C.
Protection class IP68 with AUMA three-phase motor.
Corrosion protection “KS” suitable for use in areas of high salt load, almost constant condensation and heavy contamination.
Color: AUMA silver-grey (similar to RAL 7037).
(1) Motor
(2) Worm gear
(3) Electro-mechanical signalling and control unit (RWG) for actuator control type “AM” and 4-20mA signal
(4) Handwheel for emergency operation
(5) Electrical connection
(6) Valve connection
(7) Mech. end stopps
(8) Electronic signalling and control unit (MWG) for actuator control type “AC” for demanding applications and bus-systems

AUMA ACTUATOR CONTROLS

Construction

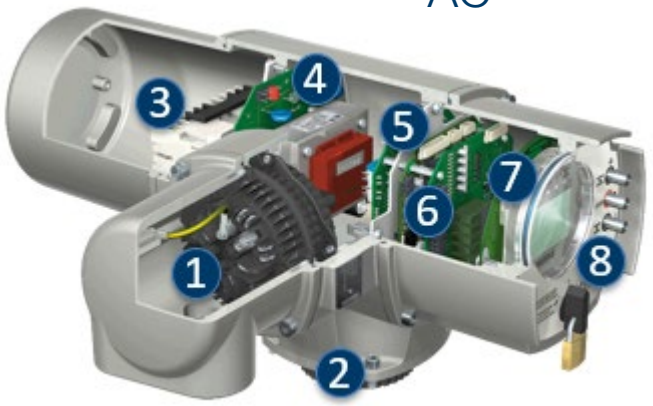
[1] Actuator control type „AM“ for OPEN/CLOSE applications. An electronic signalling and control unit “RWG“ (EWG) must be used.
[2] Actuator control type „AC“ for demanding applications and bus-systems. An electronic signalling and control unit “MWG“ must be used.

AM



[1] Plug-in electrical connection
[2] Plug-in connector to the actuator
[3] Reversing contactors or thyristors
[4] Power supply unit for 24 V DC supply
[5] Logic board
[6] Interface
[7] Local controls board
[8] Local controls unit

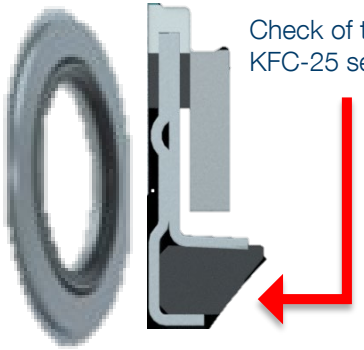
AC



[1] Plug-in electrical connection
[2] Plug-in connector to the actuator
[3] Reversing contactors or thyristors
[4] Power supply unit for 24 V DC supply
[5] Logic board
[6] Interface
[7] Local controls board
[8] Local controls unit

MAINTENANCE

Visual inspection of sealing elements, ball and body before maintenance



Check of the surface of KFC-25 seal ring

No wear or metal shavings should be visible on the seal ring surface

No damage like grooves, scratches or holes should be visible on the seal ring surface

Check of the surface of the stainless steel ball. The surface should be smooth and shiny

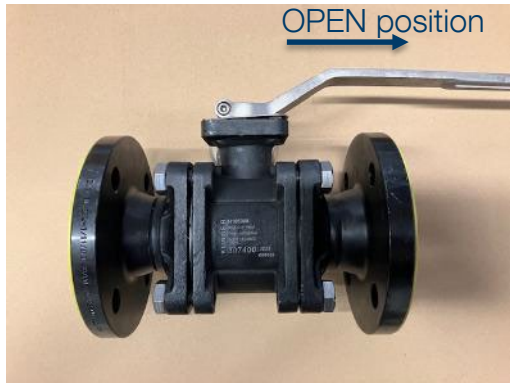
No wear like scratches, unevenness or perforations should be visible

No metal shavings, impurities or any similar should be visible in the body or cavity

MAINTENANCE

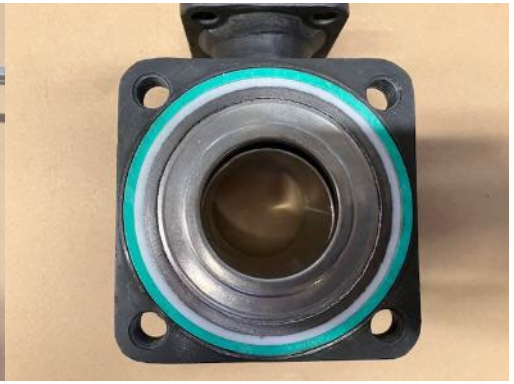
Replacement of sealing elements

1) Bring valve into OPEN position
2) Depressurize line



3) Loosen all housing connection screws

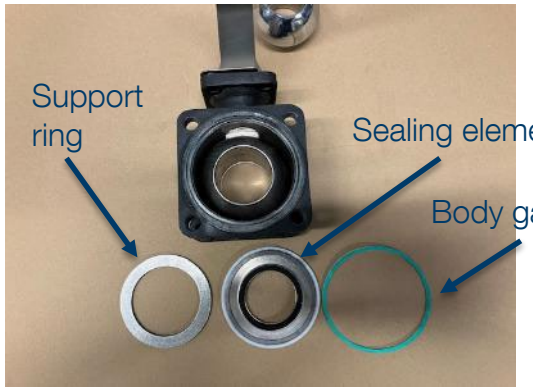
4) Remove process connection



MAINTENANCE

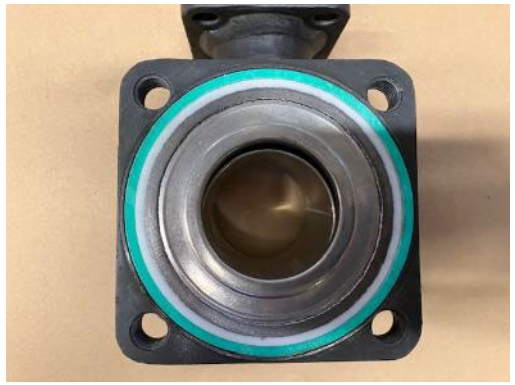
Replacement of sealing elements

5) Remove sealing elements, supporting rings and body gaskets
6) Bring the ball into the CLOSED position



Make sure that the surfaces of the body mid section and end pieces are free of impurities

7) Install new sealing elements, supporting rings and body gaskets (moistening the body gasket for better adhesion)

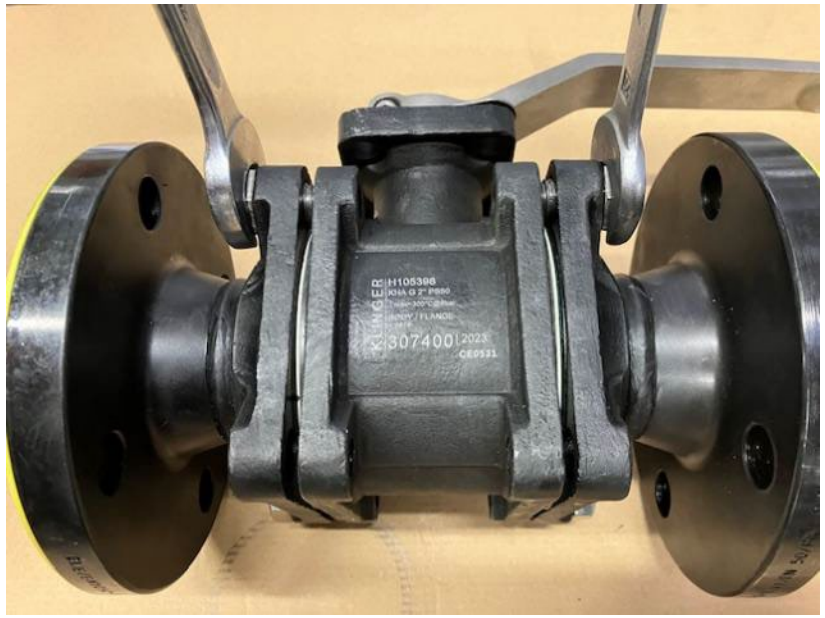


MAINTENANCE

Replacement of sealing elements

8) Reinsert body midsection between the connectors and tighten lightly → Make sure that sealing elements, supporting rings and body gaskets are centered

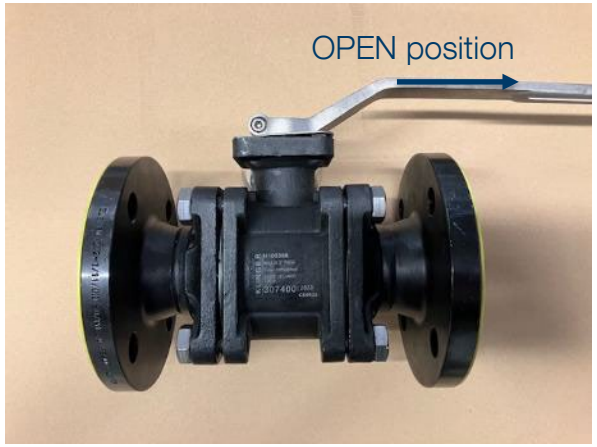
9) Tighten screws crosswise in accordance with required tightening torque as listed in manual
(10) Function test



MAINTENANCE

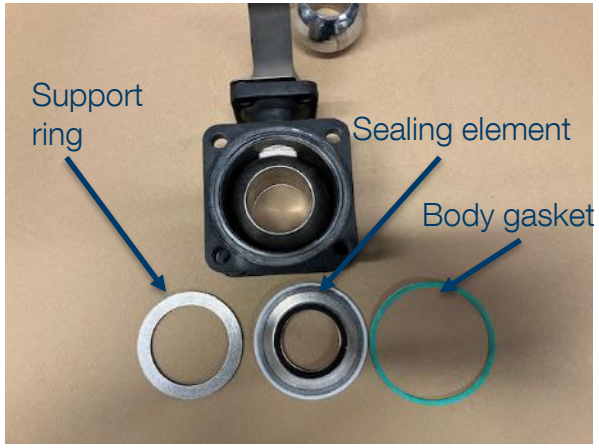
Replacement of stuffingbox

1) Bring the valve into the OPEN position
2) Depressurize the line
3) Remove the valve from the line



4) Remove the body connection screws

5) Remove sealing elements ,supporting rings and body gasket from the body midsection



Make sure that the surfaces of the body mid section is free of impurities

MAINTENANCE

Replacement of stuffingbox

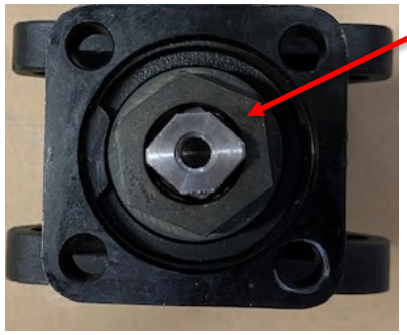
6) Bring the ball into the CLOSED position and remove

7) Remove the handle

CLOSE position – after valve is closed, remove the ball

8) Remove the stuffing box nut

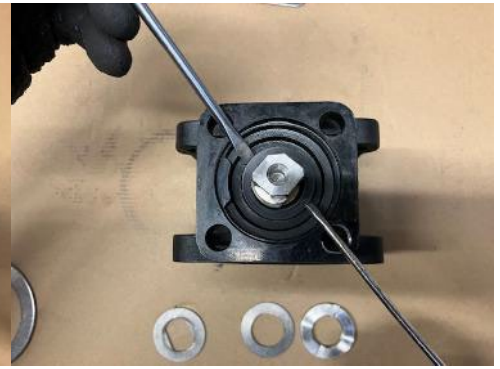
Use retightening tool to remove Stuffingbox nut

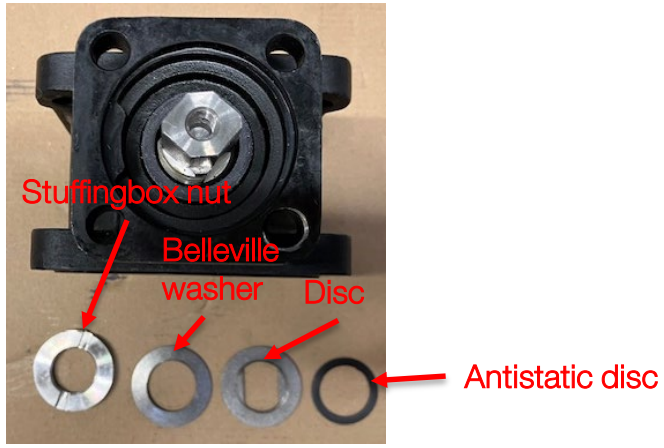


MAINTENANCE

Replacement of stuffingbox

9) Remove belleville washer, disc, washer, and antistatic disc (re-use belleville washer, disc, antistatic disc and stuffingbox nut afterwards)





10) Remove the operating stem by hammer it out slightly with a rubber hammer

MAINTENANCE

Replacement of stuffingbox

11) Remove the stuffing box by using the handle of a screw driver

Also remove the graphite ring by using a screw driver
Make sure that this ring is removed completely

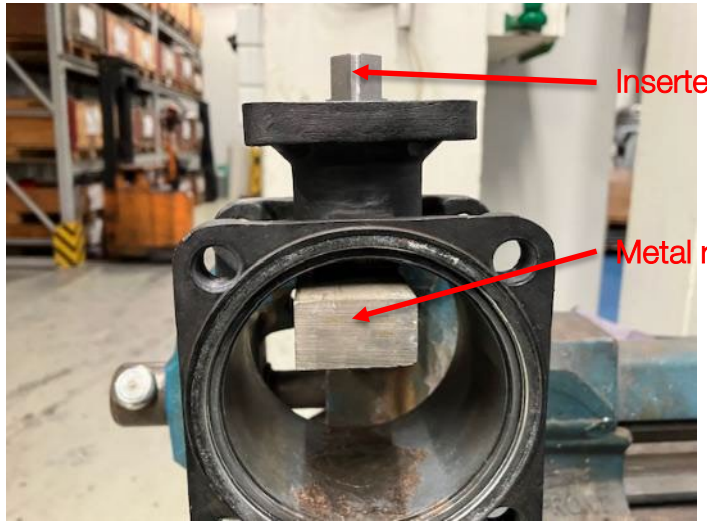
MAINTENANCE

Replacement of stuffingbox

12) Replace the AFLAS O-Rings from the stuffingbox and replace

13) Re-insert the stem in the center piece

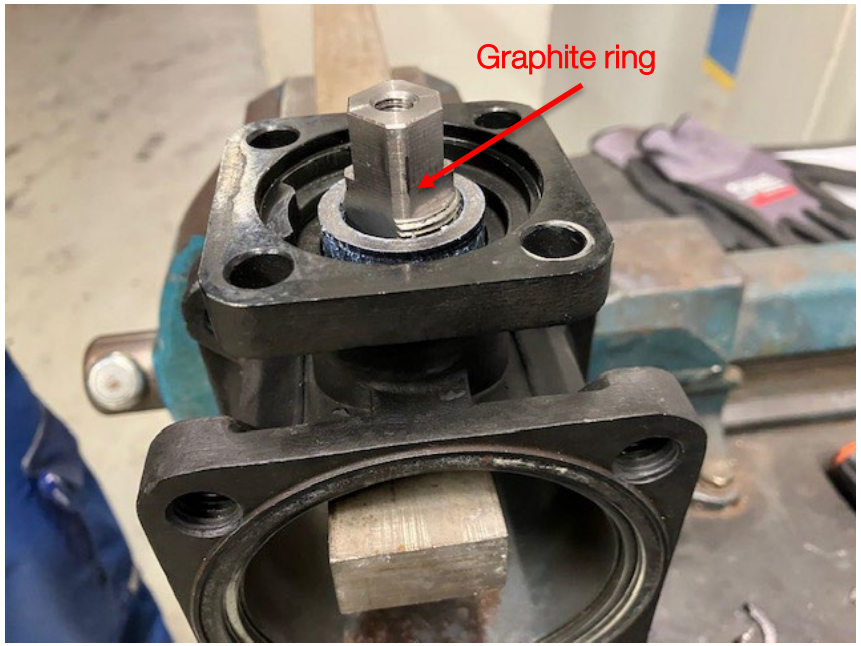
14) Clamp a metal rod in a vice and place the center piece with inserted stem on it



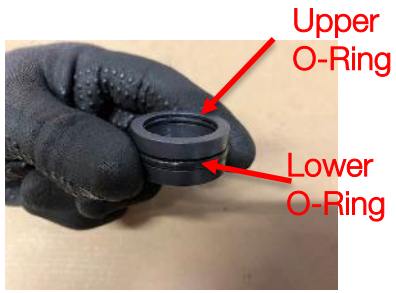
MAINTENANCE

Replacement of stuffingbox

15) Place new graphite ring



16) Place new Stuffingbox on top of graphite ring



MAINTENANCE

Replacement of stuffingbox

16) use a ratchet nut to carefully hammer in the graphite ring and the stuffing box

Ratchet nut

Slightly hammer in graphite ring and stuffing box

MAINTENANCE

Replacement of stuffingbox

17) Install antistatic disc, washer, belleville washer and Stuffingbox nut

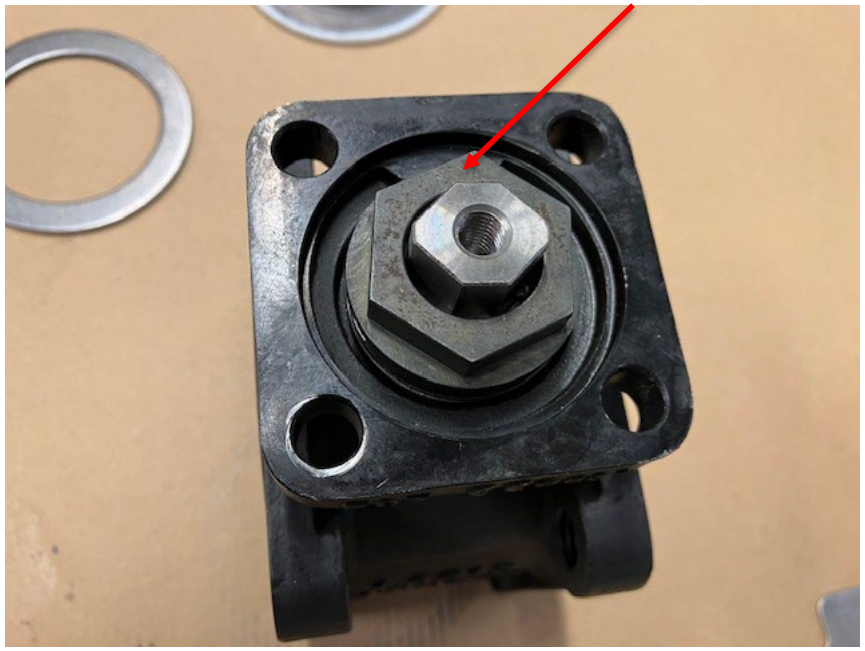
MAINTENANCE

Replacement of stuffingbox

18) Place retightening tool on Stuffingbox nut and tighten with the right torque

After that insert ball, place body gasket, support ring and sealing element of both sides and assemble the process connections to the center piece with the right torque

Retightening tool



Use the right torque

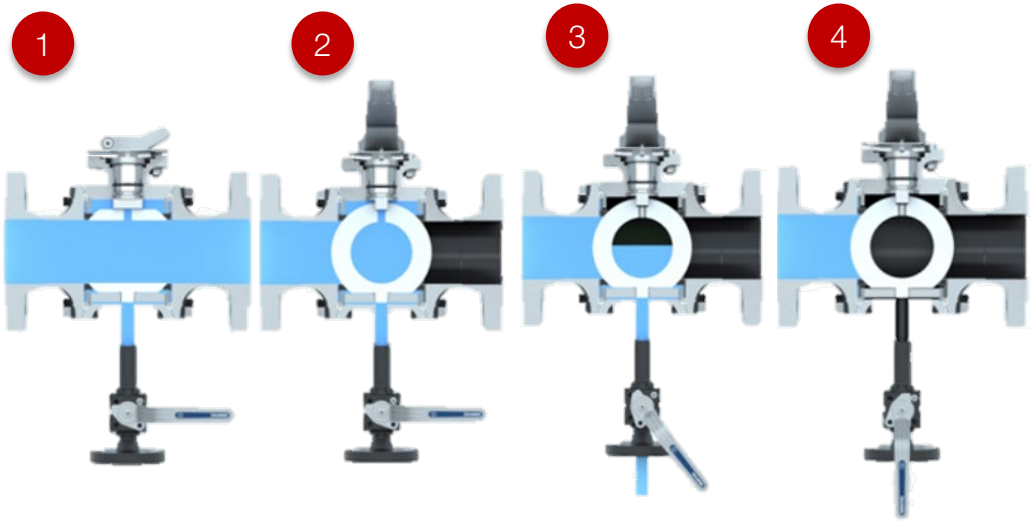
MAINTENANCE

Tightening torques & wrench sizes

nominal width mid-body section	15	20	25	32	40	50	65	80	100	125
tightening torque gland nut (Nm)	5	15	15	25	25	20	20	40	40	40
recommended tightening torque for body screws Xc (Nm)	10	25	25	40	55	80	70	100	145	145
allen key size cylinder head screw stop	8	10	10	13	13	13	13	19	19	19
width hexagon body screw KHA-FL,S,G	10	13	13	17	19	22	19	24	24	24

APPLICATION

DN15 – DN125 for district heating water and steam



Ball valve design „KHA“ Double Block & Bleed:

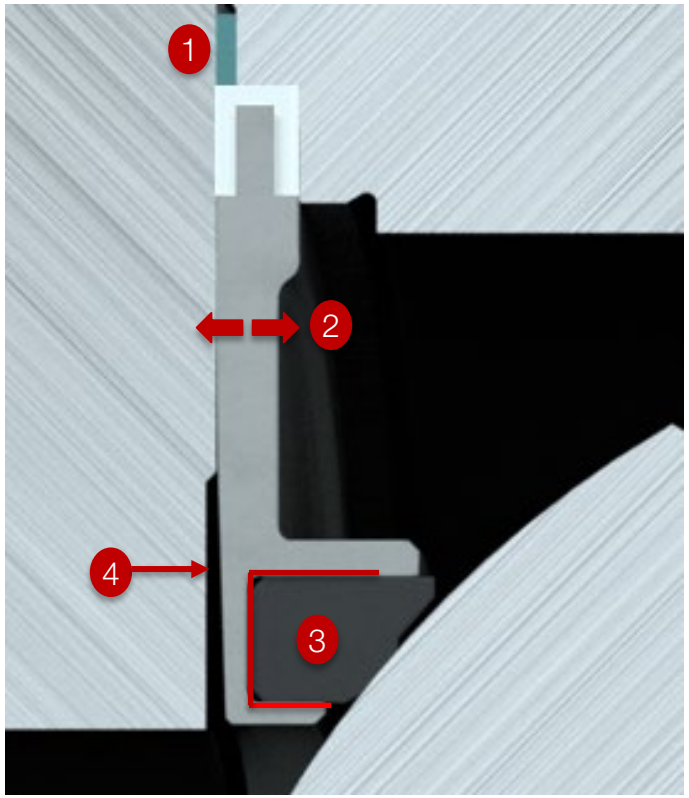
- Line size range DN15 to DN125.
- Pressure stage max. PN40.
- 3-piece design, body materials 1.0619, 1.4408, duplex.
- Soft seated KFC
- Bidirectional flow.
- Flanges acc. EN1092-1, Body length acc. EN558-1, GR1.
- Temperature range max. -10°C to +160°C.
- Ball trunnion mounted.
- With drain/test valve for „Double Block & Bleed“.
- Leakage rate A acc. EN12266-1, P10, P11 und P12.

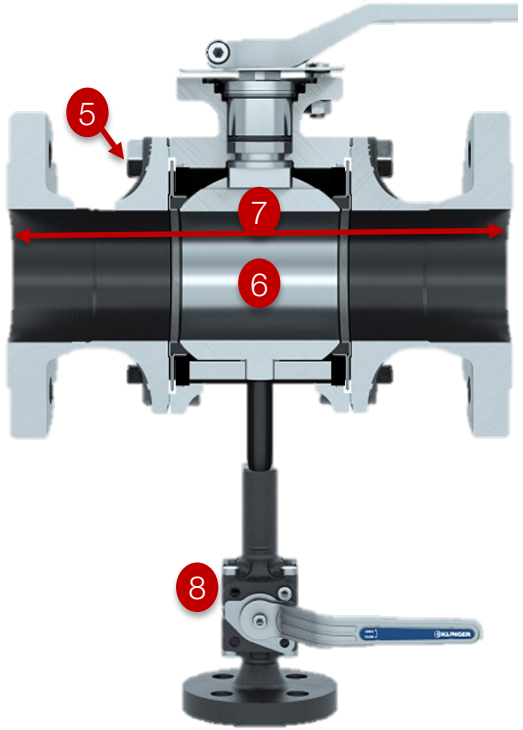
Function of drain/test valve:

- (1) Ball valve is in open position.
- (2) Ball valve is in closed position. Cavity and ball are filled with media.
- (3) Drain/test valve is completely open. Cavity and ball inner room will be drained.
- (4) The cavity and ball inner room are completely drained. If the drain / test valves stays in open position (at closed main valve), no media could remain in the cavity and ball inner room.

APPLICATION

Advantages





(1) Additional body flat gasket made of C4430 for increased tightness to atmosphere.

(2) The sealing element is one-piece and has elastic properties which are robust and flexible at the same time. Overall, the sealing element is insensitive to pressure shocks and temperature fluctuations.

(3) The KFC sealing ring is enclosed by the sealing element on 3 sides. This prevents the sealing ring from moving or flowing away.

(4) The space behind the sealing element offers enough room for the medium to circulate. This minimises clogging of the sealing seat.

(5) Short body screws for high mech. strength.

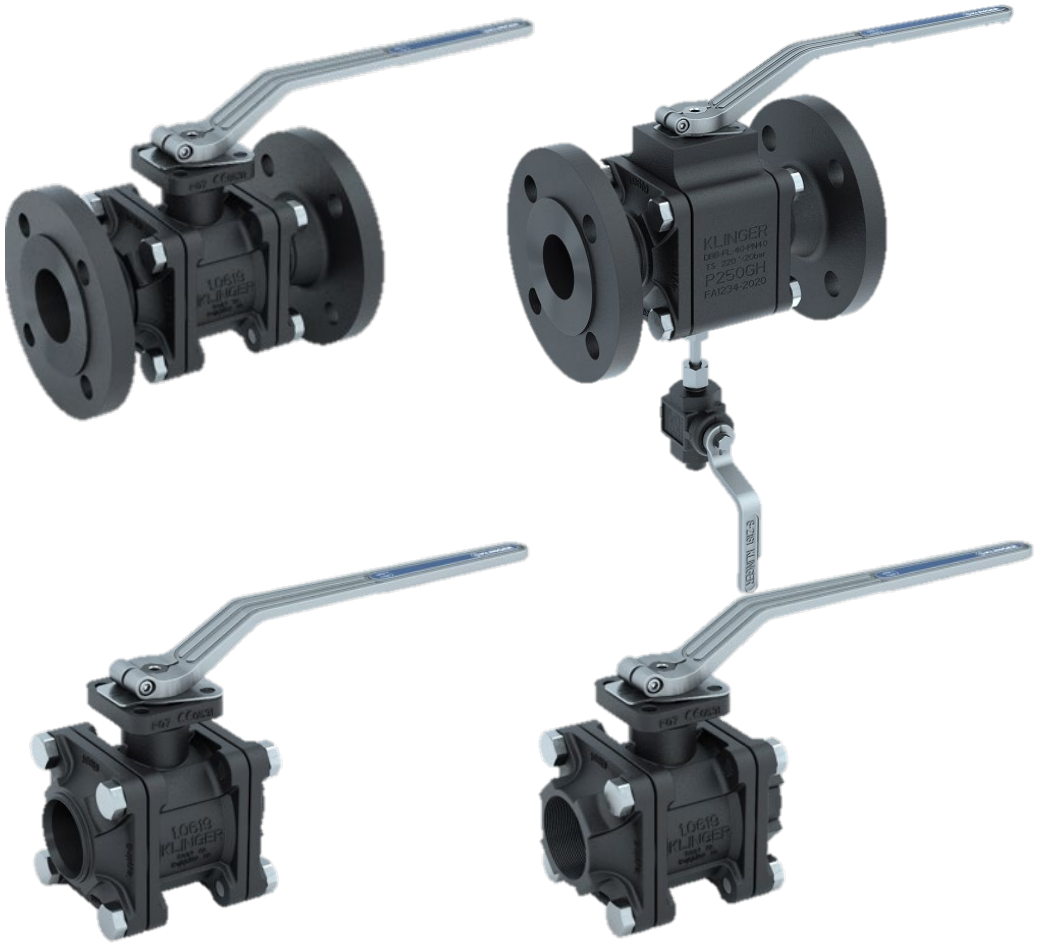
(6) The ball is cast in one piece and is very robust and insensitive to pressure shocks. The ball passage is cylindrical and straight, which prevents turbulence in the medium. This also reduces the pressure drop.

(7) Soft inner contours (no sharp corners or edges) of the valve.

(8) The additional test/drain cock allows the cavity/ball to be drained and vented. No high internal pressure can occur. In the closed state and with the drain cock permanently open, maximum safety is ensured (no medium can pass through the valve) and it can be checked whether the sealing element on the inlet side is tight (permanent medium flow from the drain cock after a longer period of time = leakage of the sealing element on the inlet side).

APPLICATION

KHA for H2 electrolysis & infrastructure

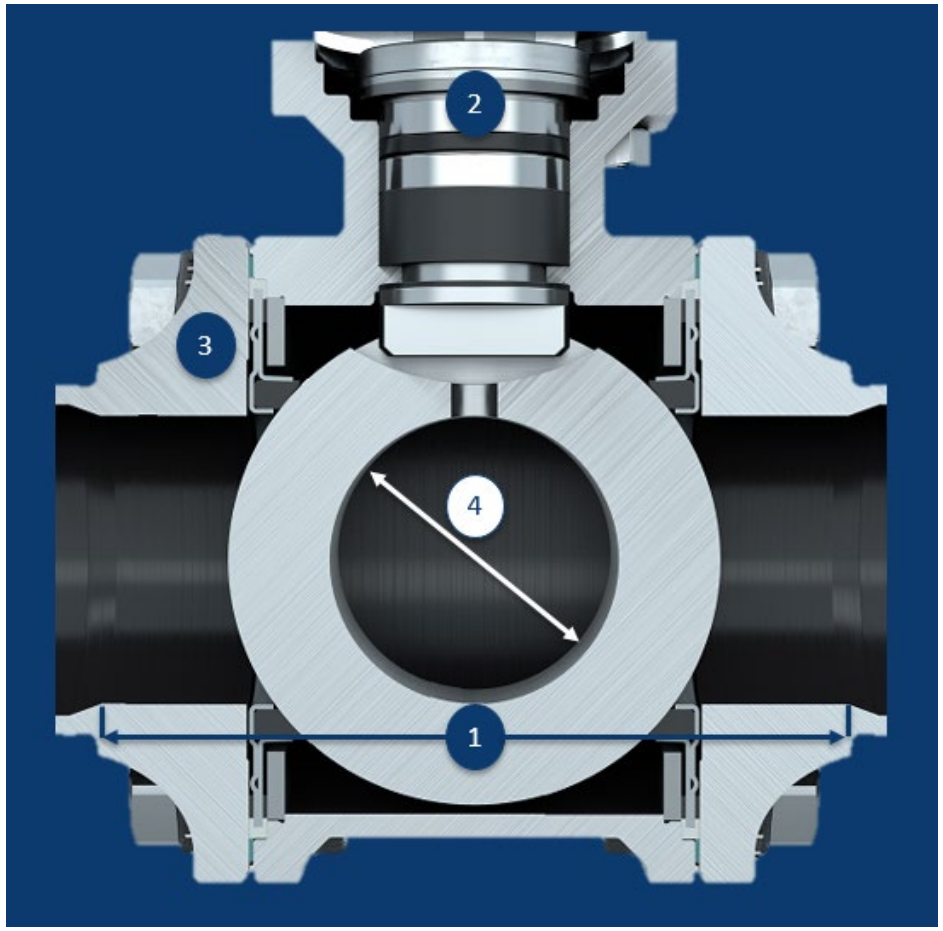


Product details KHA

- DN15 – DN125, ½“ – 5“
- Full bore
- Bidirectional flow
- Pressure classes: PN 16, 25, 40 and 63 or ANSI150 & 300
- Body materials: carbon steel 1.0619, stainless steel 1.4408, and duplex 1.4470
- Connections: DIN/ANSI Flanges, weld ends , threaded ends BSP or NPT or mixed
- Ball bearing: floating ball, trunnion mounted
- Additional flat gasket C4430 on housing pitch for increased tightness to atmosphere
- Seat ring KFC (PTFE based), Fire Safe design, leakage rate A
- Stuffingbox AFLAS/GRAPHITE, TA Luft, VDI2440 and ISO15848 compliant
- Fire Safe acc. API607 7th edition and EN10497:2010
- Temperature range: -20°C to +300°C
- Modular construction
- Short body screws for high mechanical stability at thermal expansion
- Corrosion protection: New KACP protection
- Option: Gas design acc. EN13774 & EN14141
- Option: Drain / test cock for double block & bleed
- Subsequent automation possible; ISO TOP connection acc. EN ISO5211
- Leakage rate A acc. EN12266-1
- Testing acc. EN12266-1, P10, P11 and P12

APPLICATION

Advantages



Product advantages

Body:

» Robust casted housing material is insensitive to pressure shocks

» No sharp body edges → lower the possibility of H2 penetration and embrittlement

» (1) Straight inner geometry to minimize the risk of H2 penetration and embrittlement

» Pipeline forces can be absorbed without any damage

» Long service life

Stuffingbox:

» (2) AFLAS/GRAPHITE stuffingbox → ISO15848, TA Luft and VDI2440 compliant

» Fire safe acc. to API607 7th edition and EN10497:2010

Sealing elements:

» (3) The flexible sealing system compensates temperature fluctuations and pressure shocks – no coil spring loaded system. The media pressure supports the sealing system and is insensitive to contamination.

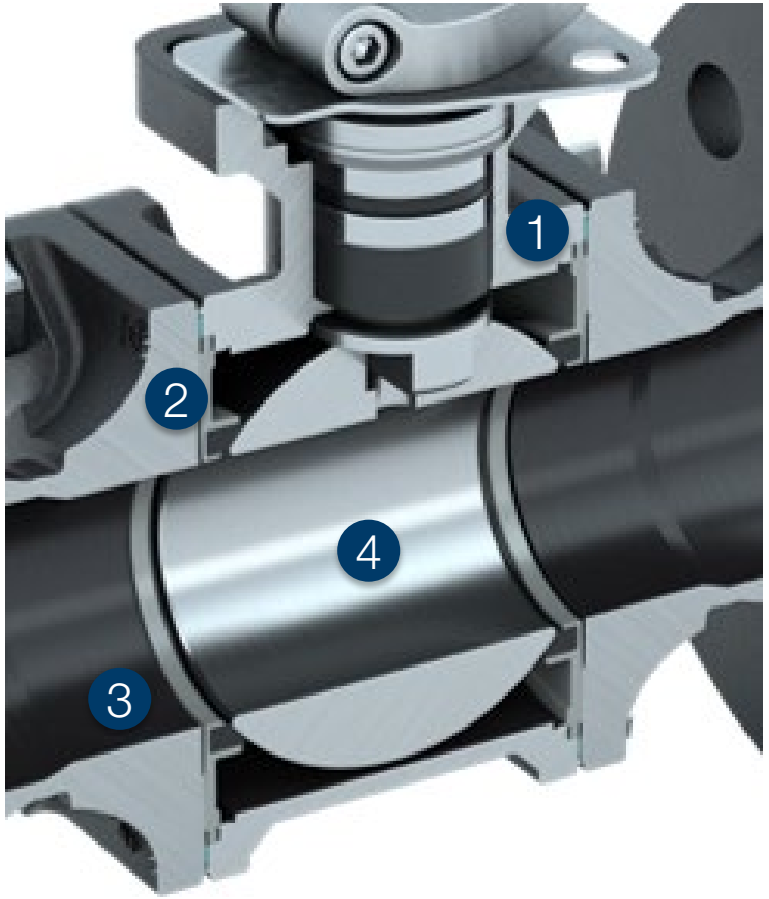
» Sealing ring is covered from 3 sides to prevent moving or flowing.

Ball

» (4) Solid ball made of stainless steel 1.4408 or 1.4401 with cylindrical passage ensures low pressure drop.

APPLICATION

Pulp & paper



For media:
Formic acid
Hydrochloric acid
Sulfuric acid

(1) Stuffingbox:
Aflas / graphite
(2) Sealing elements:
Soft seated KFC
(3) Body:
Stainless steel
Weld, flanged or threaded ends
(4) Ball:
Stainless steel

For oxygen use:
Valve is oil and grease free

For media:
Hydrogen peroxide

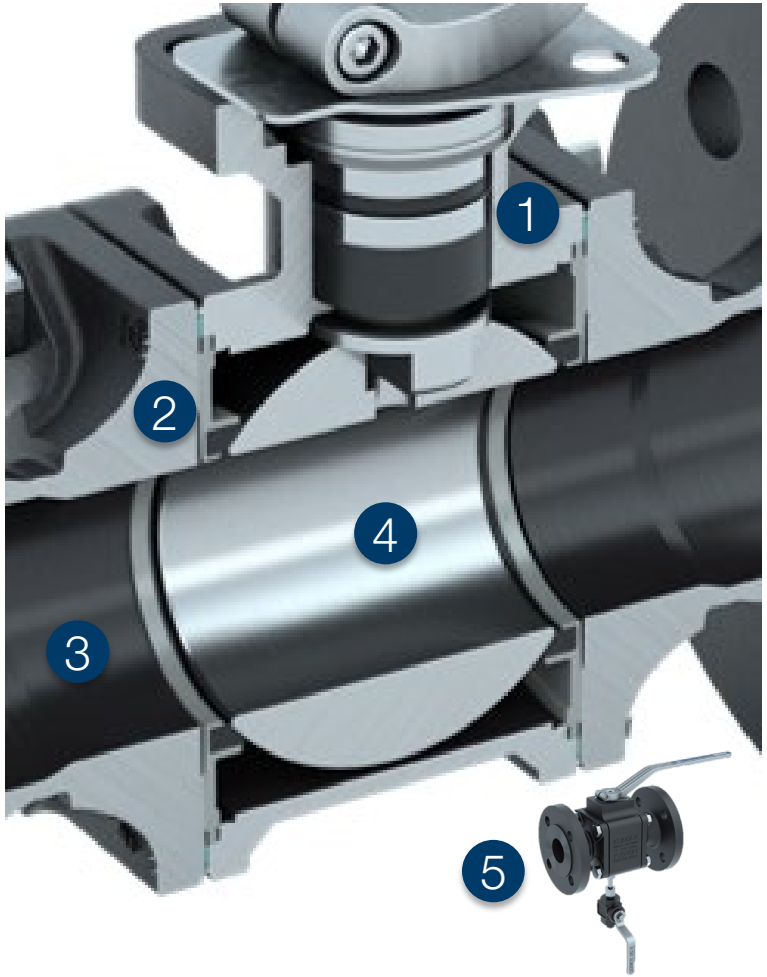
(1) Stuffingbox:
Pure PTFE
(2) Sealing elements:
Soft seated PTFE, upstream element with pressure relief drilling
(3) Body:
Stainless steel
Weld, flanged or threaded ends
(4) Ball:
Stainless steel

For media:
Black –green & white liquor
Waste water

(1) Stuffingbox:
Aflas / graphite
(2) Sealing elements:
Metal seated stainless steel
(3) Body:
Stainless steel or duplex
Weld, flanged or threaded ends
(4) Ball:
Stainless steel / duplex chrome coated

APPLICATION

Steel



For media:
Oxygen
Hydrochloric / formic acid
Natural/ coke oven gas
Blue acid gas
Saturated steam
Hydraulic oil (clean)

(1) Stuffingbox:
Aflas/graphite for hydrochloric, formic acid and steam
Viton for natural gas
Aflas for DBB for coke oven gas
PTFE labyrinth for oxygen
(2) Sealing elements:
Soft seated KFC
(3) Body:
Carbon or stainless steel
Weld, flanged or threaded ends
(4) Ball:
Stainless steel

For oxygen use:
Valve is oil and grease free

(5) Drain / test cock on demand for double block & bleed for coke oven gas

For media:
Blast furnace gas
Muddy water
Water with solids
Dirty oil with solids

(1) Stuffingbox:
Aflas / graphite standard

(2) Sealing elements:
Metal seated stainless steel
(3) Body:
Carbon or stainless steel
Weld, flanged or threaded ends
(4) Ball:
Stainless steel, chrome coated

THANKS FOR YOUR ATTENTION!

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