

# KLINGER VALVES FOR DISTRICT HEATING



## AGENDA

- 1 - DH OVERVIEW
- 2 - LOCATION & REQUIREMENTS
- 3 - KLINGER PRODUCTS



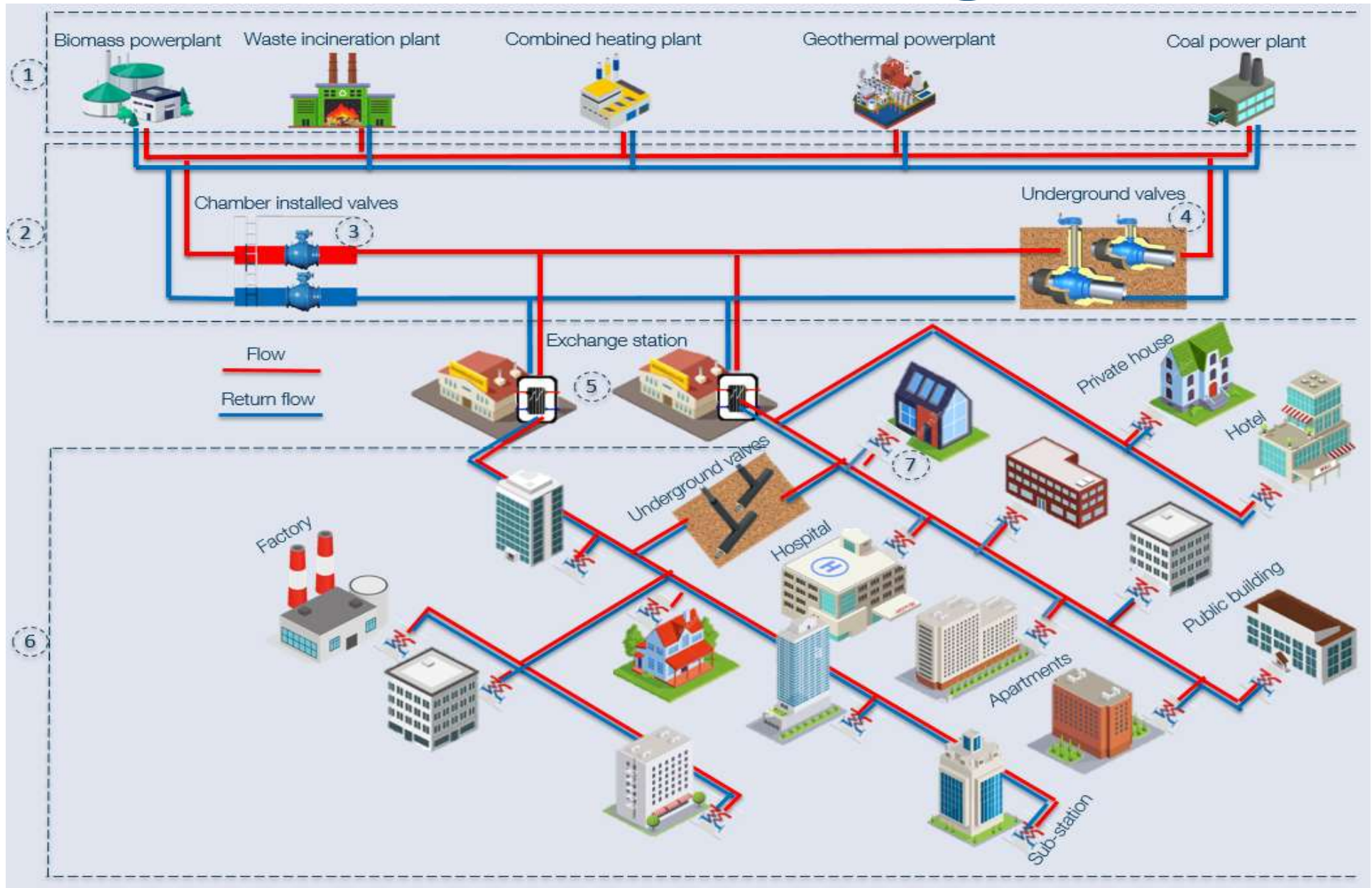
# KLINGER VALVES FOR DISTRICT HEATING



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# DH-NETWORK, OVERVIEW



## DESCRIPTION LOCATION (1)

Heat production – Heat will be provided from different heating plants through natural gas, coal or waste combustion, through biomass and geothermal and supplied to the primary network. On the heat production side mainly large ball valves (DN400 – DN800) are used.

## DESCRIPTION LOCATION (2,3 & 4)

The primary pipe network usually runs with hot water with around 120°C to 180°C in flow direction (local differences are possible) . Return flow temperatures are usually in the range of 65°C. The operating pressure is around max. 23 bars and the test pressure around 38 bars. The main pipes have a diameter of DN400 to DN800 and are tested (weld seam test). Thermal insulation by means of mineral wool and bitumen roofing felt for overhead lines and cellar lines with aluminium sheet sheathing. Insulation blankets made of glass silk fabric and insulating felt for fittings.

The primary network also includes valves, compensators and fixed points in manholes. Valves in inspection chambers below ground level are installed to manage the network and to have safety shut off possibilities. Also underground installed valves in regular distances are used within the primary network.

## DESCRIPTION LOCATION (5)

Also within the primary network exchange stations are located to transform high to lower pressure and temperature and are the connection points between primary and secondary network. Usually nearly all diameters of valves in different versions are used in exchange stations.

## DESCRIPTION LOCATION (6)

The secondary network supplies the customers with heat and runs with around 60°C to 90°C in flow direction (local differences are possible) . The operating pressure is around max. 6 to 10 bars. It consists mainly of pre-insulated composite casing systems with steel service pipe, PU foam as thermal insulation and PE protective casing firmly connected to each other. Pre-tensioned and laid in the ground with special sand bedding. Service valves up to max. DN250 also laid directly in the ground. From DN300 in accessible shaft structures.

## DESCRIPTION LOCATION (7)

Sub stations are the connection between secondary network and the end user. The pressures and temperatures are lower and around 60°C and max. 10bars. Also the lines sizes are smaller (below DN150).

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# LOCATION: HEATING PLANT



## District heating water:

### Media properties and effects on valves:

Hot water, softened, desalinated, deionised, with alkalisating agents, high working temperature and pressure (range 120°C to 220°C, PN25), Temperature fluctuations, heat changes causes pipeline forces, very low operating cycles

### - Requirements for valves:

Leakage rate A, robust valve body and reliable sealing system, long service life and easy handling, guaranteed function also at low operating cycles (no blocking) and stable torque, optional: Double Block & Bleed functionality (certified), SIL2, possibility to install mech. gears, electric or pneumatic actuators, line sizes DN15 to DN800

### Suitable KLINGER products for district heating water:

- Ball valve KH(SV)I DN150 - DN1000, KHSVI fully welded, DB&B available for all versions, soft seated KFC, leakage rate A, carbon steel body, SIL 2
- Ball valve Monoball KHO, DN20 to DN250/DN25R20 to 300R250, fully welded, soft seated KFC, leakage rate A, carbon steel body SIL 2
- Ball valve KHA DN15 to DN125, DB&B available on demand, soft seated KFC, leakage rate A, carbon steel body, SIL 2



## Steam:

### Media properties and effects on valves:

Steam in different conditions (wet steam, super heated, saturated), different working temperatures, pressure hammers after too fast closing

### Requirements for valves:

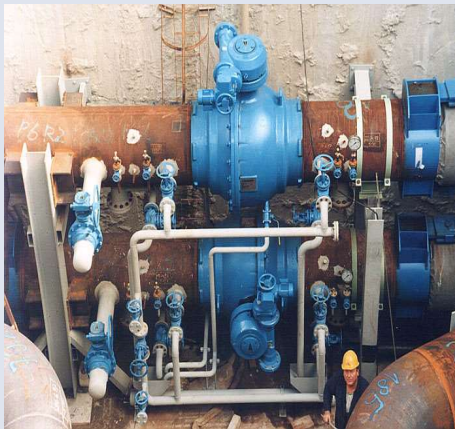
Leakage rate A, high temperature range, regulation version for smooth opening / closing

### Suitable KLINGER product for steam:

- Piston valve KVN, DN15 to 200 (-85°C to 400°C), Leakage rate A, SIL 2



# LOCATION: CHAMBER/GALLERY INSTALLATION, PRIMARY NETWORK



District heating water:

Media properties and effects on valves:

Hot water, softened, desalinated, deionised, with alkalisating agents, impurities and abrasive particles from the pipeline present in the district heating water, abrasive solids can clog the sealing system and cavity of a valve, high working temperature and pressure (range 120°C to 220°C, PN25), temperature fluctuations, heat changes causes pipeline forces, very low operating cycles, difficult installation location – hard to access due to installation in chambers, maintenance only at high costs possible, leakage to atmosphere

Requirements for valves:

Leakage rate A, no leakage to atmosphere, robust valve body and reliable sealing system (insensitive to pipe forces, temperature changes and impurities), long service life and easy handling, guaranteed function also at low operating cycles (no blocking) and stable torque, optional: Double Block & Bleed functionality (certified), SIL2, possibility to install mech. gears, electric or pneumatic actuators, flexible gear and shaft options, line sizes DN15 to DN800

Suitable KLINGER products for district heating water:

- Ball valve KH(SV) DN150 - DN1000, KHSVI fully welded, DB&B available for all versions, soft seated KFC, leakage rate A, carbon steel body, SIL 2
- Ball valve Monoball KHO, DN20 to DN250/DN25R20 to 300R250, fully welded, soft seated KFC, leakage rate A, carbon steel body SIL 2
- Ball valve KHA DN15 to DN125, DB&B available on demand, soft seated KFC, leakage rate A, carbon steel body, SIL 2
- Piston valve KVN, DN15 to 200 (-85°C to 400°C), Leakage rate A, SIL 2



# LOCATION: EXCHANGE STATION – PRIMARY NETWORK



District heating water:

Media properties and effects on valves:

Hot water, softened, desalinated, deionised, with alkalisating agents, impurities and abrasive particles from the pipeline present in the district heating water, abrasive solids can clog the sealing system and cavity of a valve, high working temperature and pressure (range 120°C to 220°C, PN25), temperature fluctuations, heat changes causes pipeline forces, low operating cycles

Requirements for valves:

Leakage rate A

Robust valve body and reliable sealing system (insensitive to pipe forces, temperature changes and impurities), long service life and easy handling, function of the valve must be guaranteed also at low operating cycles (no blocking), optional: Double Block & Bleed functionality (certified), SIL2, possibility to install mech. gears, electric or pneumatic actuators, line sizes DN15 to DN800

Suitable KLINGER products for district heating water:

- Ball valve KH(SV) DN150 - DN1000, KHSVI fully welded, DB&B available for all versions, soft seated KFC, leakage rate A, carbon steel body, SIL 2
- Ball valve Monoball KHO, DN20 to DN250/DN25R20 to 300R250, fully welded, soft seated KFC, leakage rate A, carbon steel body SIL 2
- Ball valve KHA DN15 to DN125, DB&B available on demand, soft seated KFC, leakage rate A, carbon steel body, SIL 2
- Piston valve KVN, DN15 to 200 (-85°C to 400°C), Leakage rate A, SIL 2





# LOCATION: UNDERGROUND INSTALLATION – PRIMARY NETWORK



District heating water:

Media properties and effects on valves:

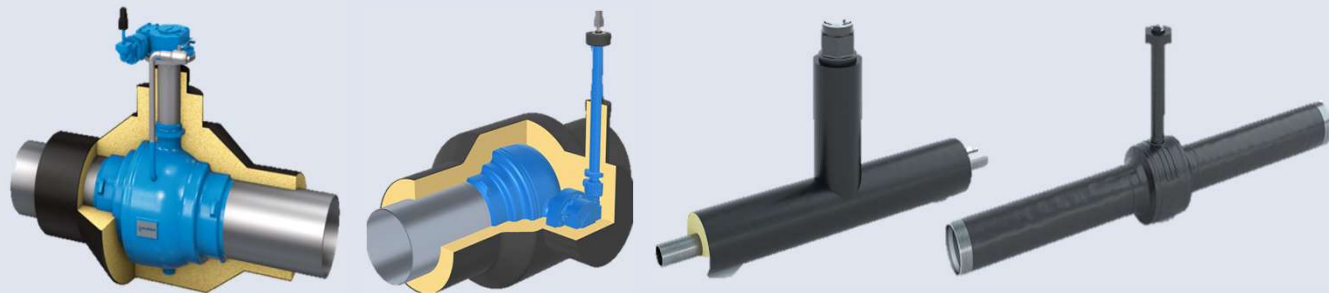
Hot water, softened, desalinated, deionised, with alkalisating agents, high working temperature and pressure (range 120°C to 220°C, PN25), temperature fluctuations, abrasive solids can clog the sealing system and cavity of a valve, heat changes causes pipeline forces, installation underground, very low operating cycles, when installed underground, additional forces (compression, tensile or bending) will be applied on the valve due to movement of the ground, maintenance or valve exchange connected with high effort and costs

Requirements for valves:

Tested and certified acc. EN488:2019 and EHP003, fully welded valve with isolation jacket – flexible solutions, leakage rate A, no leakage to atmosphere, robust valve body & reliable sealing system (resistant to pipe forces and temperature changes), long service life (maintenance free) and easy handling, guaranteed function also at low operating cycles (no blocking) and stable torque, SIL2, possibility to install mech. gears, electric or pneumatic actuators, line sizes DN150 to DN800

Suitable KLINGER products for district heating water:

- Ball valve KHSVI DN150 – DN800, fully welded, as option pre-isolated in 3 different versions, DB&B available, soft seated KFC, carbon steel body, EN488:2019 & EHP003 certificate
- Ball valve Monoball KHO, DN20 to DN250/DN25R20 to 300R250, fully welded, as option pre-isolated, soft seated KFC, carbon steel body, EN488:2019 & EHP003 certificate



# LOCATION: SUB STATION- SECONDARY NETWORK



## District heating water:

### Media properties and effects on valves:

Hot water, softened, desalinated, deionised, with alkalisng agents, impurities and abrasive particles from the pipeline present in the district heating water, lower working temperature and pressure (60°C to 100°C, PN16)

### Requirements for valves:

Leakage rate A, SIL 2, robust valve body and reliable sealing system (insensitive to impurities), long service life and easy handling, optional: Double Block & Bleed functionality (certified), low pressure drop, possibility to install mech. gears, electric or pneumatic actuators, line sizes DN15 to DN200

### Suitable KLINGER products for district heating water:

- Ball valve Monoball KHO, DN20 to DN250/DN25R20 to 300R250, fully welded, soft seated KFC, carbon steel body
- Ball valve KHA DN15 to DN125, 3 piece design, DB&B available, soft seated KFC, carbon steel body



## Steam:

### Media properties and effects on valves:

Steam in different conditions ,different working temperatures, pressure hammers after too fast closing

### Requirements for valves:

Leakage rate A, high temperature range, regulation version for smooth opening / closing

### Suitable KLINGER product for steam:

- Piston valve KVN, DN15 to 200 (-85°C to 400°C), leakage rate A, SIL 2



# KLINGER VALVES FOR DISTRICT HEATING



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# BALLOSTAR KH(SV)I PRIMARY NETWORK:



## PRODUCT ADVANTAGES

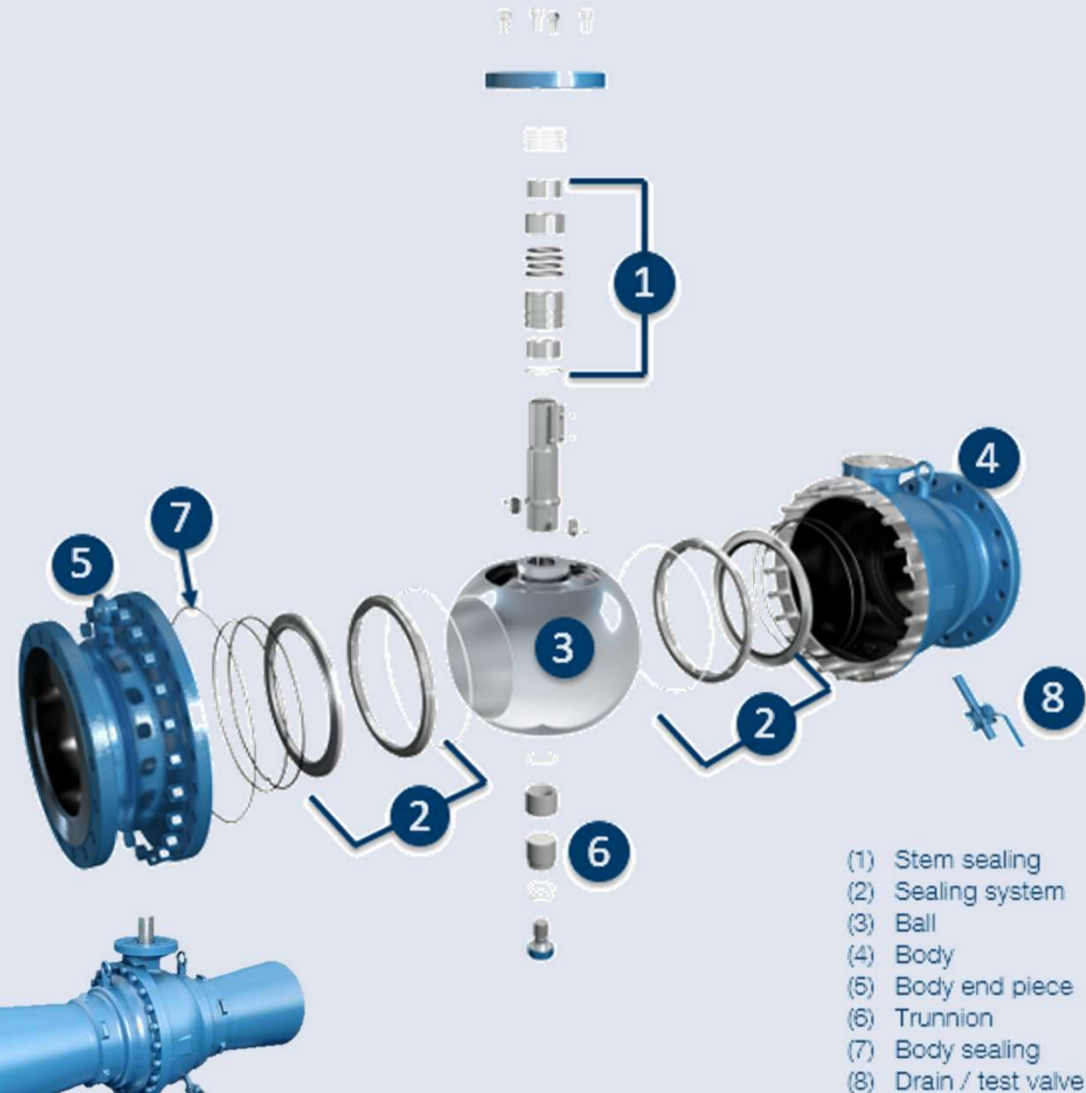
- Maintenance free
- Bidirectional flow
- Trunnion mounted with cylindrical bore
- Sealing elements protected against pressure hammers
- Double block & bleed function (TÜV certified)
- High degree of resistance against pipeline forces
- Subsequent automation possible

## SPECIAL TYPES

- High temperature version up to +260°C
- Metal seats for abrasive media
- Oxygen version
- Fire safe version
- Gas version

## PRODUCT DETAILS

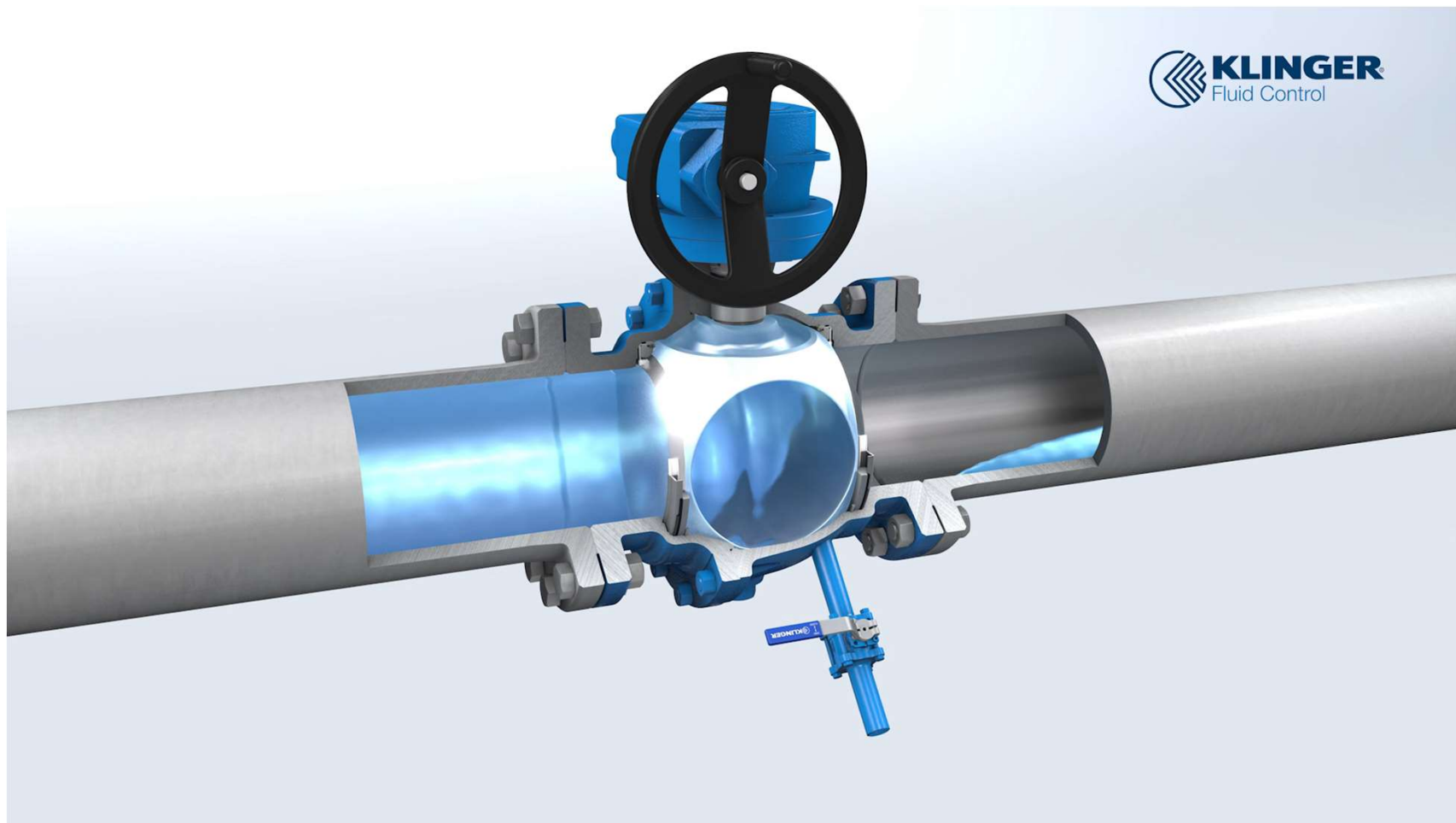
- PN 16/25/40
- DN150 – 1000
- Material cast and stainless steel
- Temperature range -45°C to +260°C
- Designs: Flanged version full / reduced bore, version with weld ends full / reduced bore, fully welded version
- Types: two piece KHI, KHSVI, KHSVI-WVS



- (1) Stem sealing
- (2) Sealing system
- (3) Ball
- (4) Body
- (5) Body end piece
- (6) Trunnion
- (7) Body sealing
- (8) Drain / test valve



# SEAT SEALING



# THE BALL

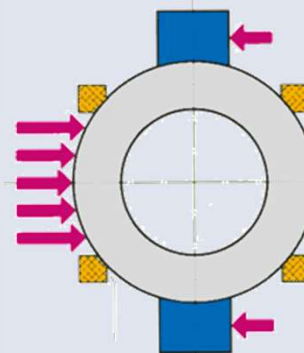
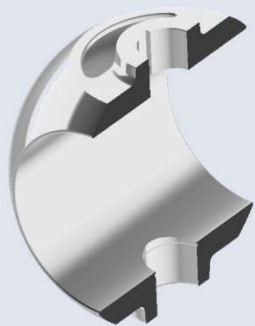
	Execution	Hardness	Surface roughness (RZ)
<b>KLINGER®</b>	Hard chrome plated	800 – 1000 HV	0,6 µm
Competitor	Nickel plated	500 – 650 HV	5,6 µm
	Stainless steel	300 – 350 HV	3,5 µm

KLINGER KHI

Hollow /guide tube

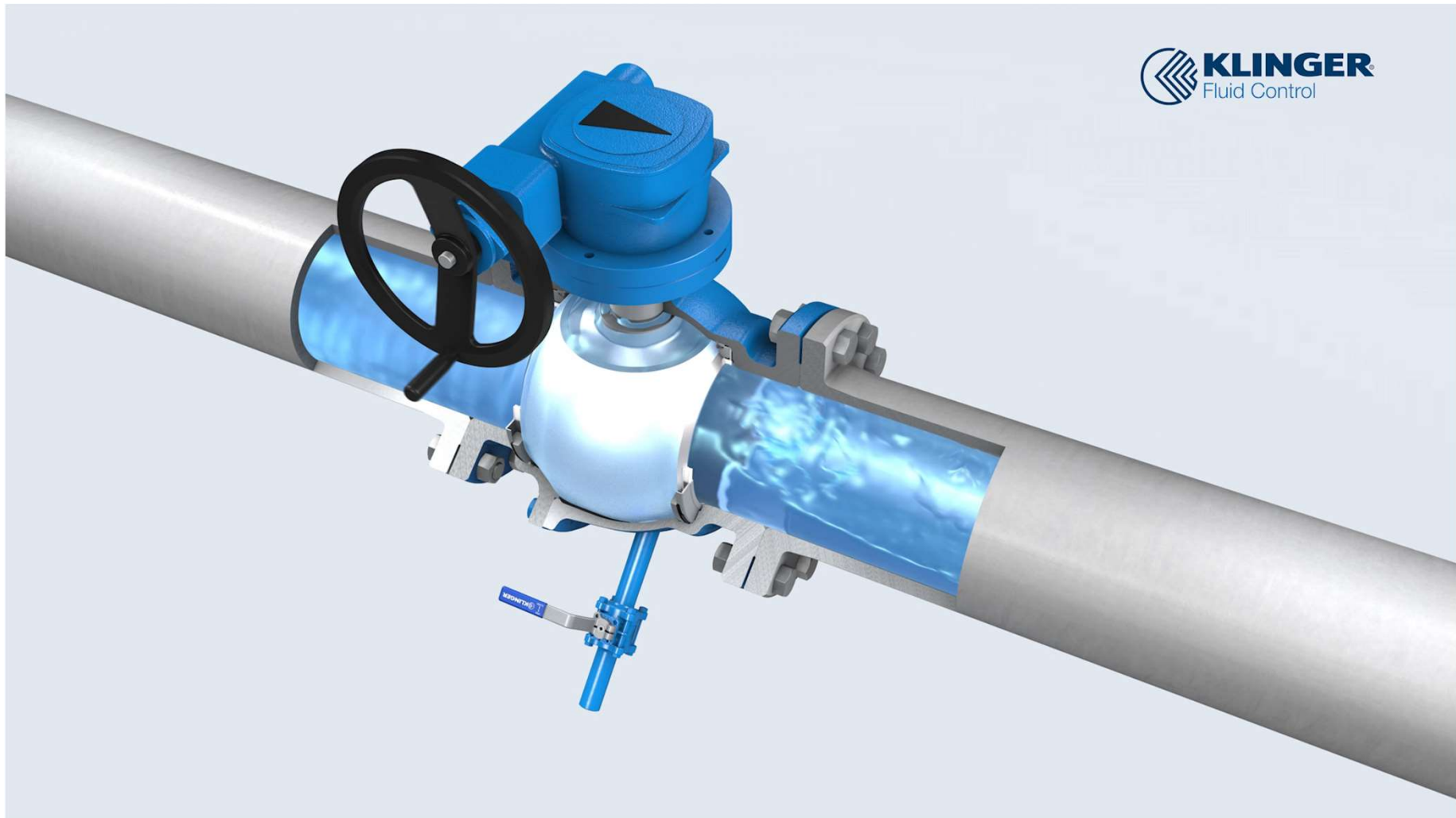
Hollow ball

Equal force absorbtion in bearing

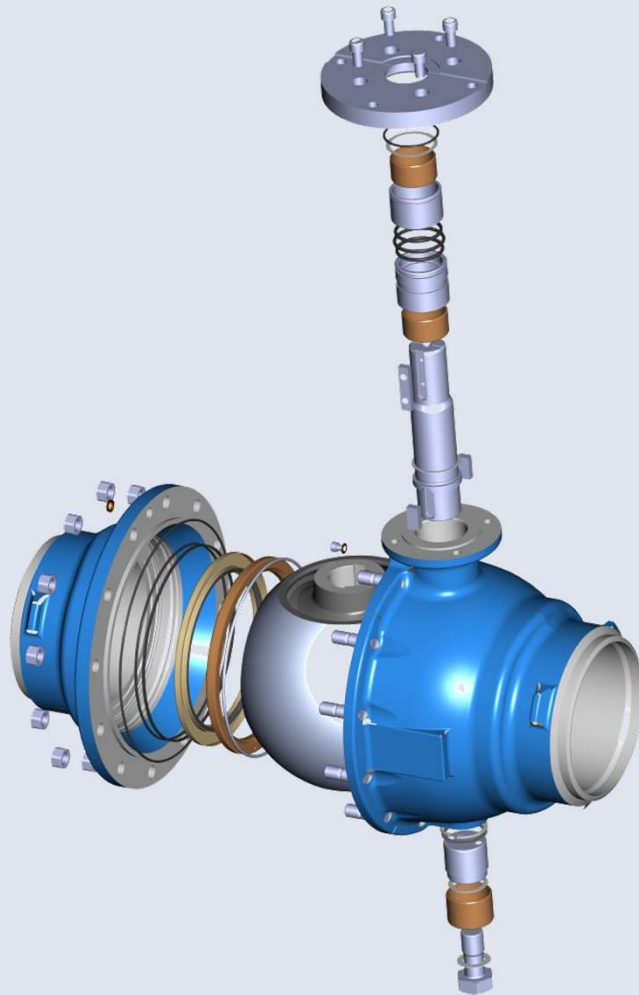


- » Ductile graphite iron ball with chrome coating
- » Chrome layer is harder than ANY stainless steel ball
- » Highest resistance against different chemical, corrosive (media) and mechanical (solids) loads
- » Very corrosion resistant

## KLINGER BALLOSTAR® KHI DB&B



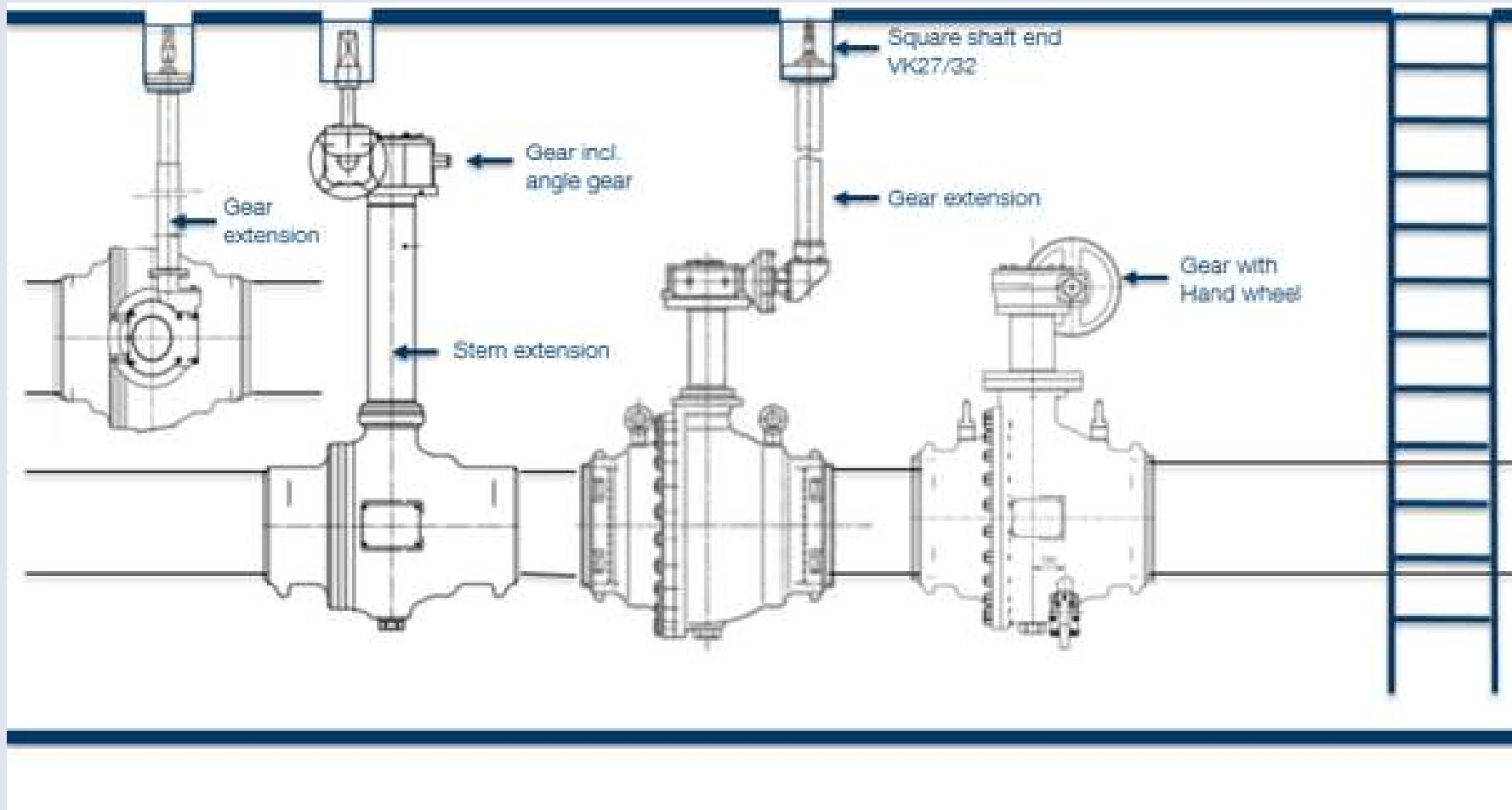
# OPERATING CYCLES / LIFE SPAN



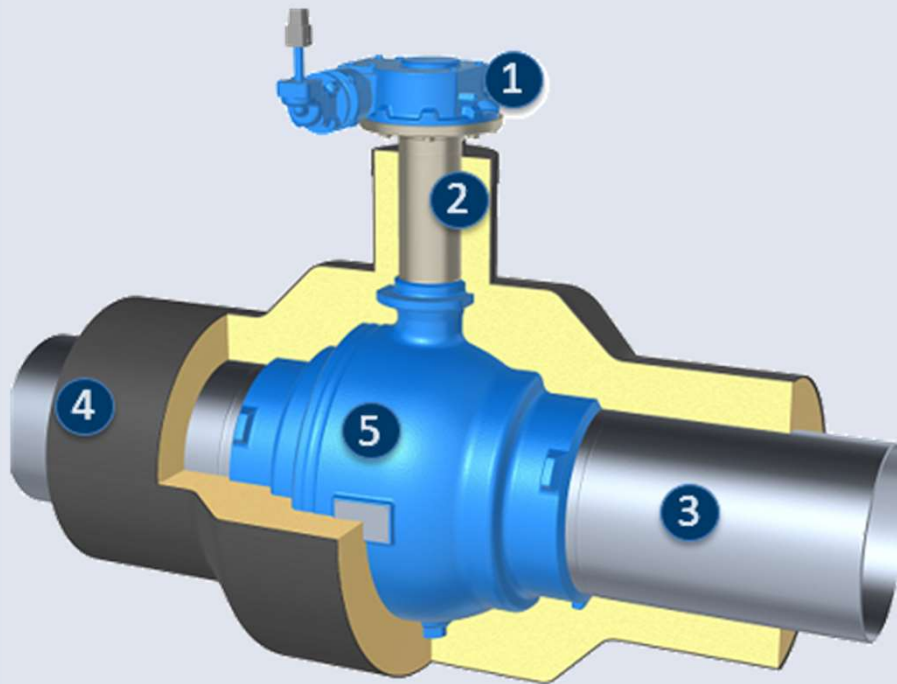
- » KLINGER BALLOSTAR ball valves are basically maintenance free
- » If necessary, stem o-rings can be changed inline
- » One operation per year is recommended (ball should left the seat for a few degrees only)
- » 5000 operations in one go were tested with air without any wear
- » 56 operations with different forces (tensile, compressive and bending) were tested with water 90°C and 25bar acc. EN488:2015 during 1 week
- » Estimated life time 25 to 30 years based on experience



## FLEXIBLE GEARS & STEM EXTENSIONS:



# UNDERGROUND SOLUTION KHSVI:



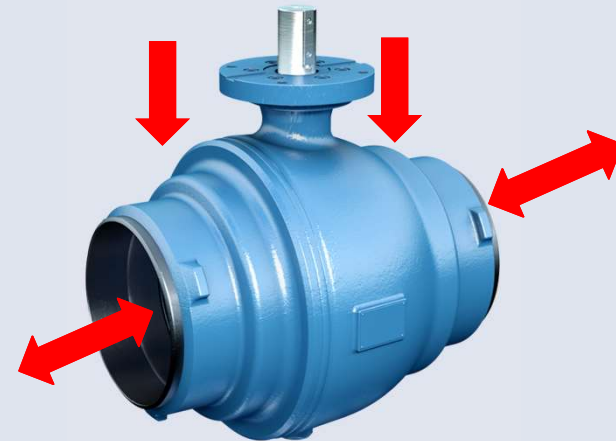
- 1 Mech. gear “Rotork” or AUMA with angle gear – top mounted with square end SW27/32 for T- wrench operation.
- 2 Isolation Extension acc. EN488:2019 fully welded. Standard height 375 mm for size DN150 – 400 and 425mm for size DN500 and above. Special heights on demand.
- 3 Body extension pipe to overall length 2000mm (size DN150 – 400) or 2400mm (size 500 and above) with X-ray testing.
- 4 HDPE Isolation, Thickness “Row 2”. Incl. alarm system “Nordic”.
- 5 KHSVI fully welded acc. EN488:2019, DN150 to 800, PN25.
- 6 Optional: Service valves KHM in stainless steel DN50 with weld end and threaded end and cover plug. Incl. pipe with 1000mm length made of carbon steel.



# EN488:2019 CERTIFICATE KH(SV)I



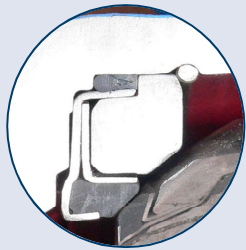
Test with compressive, tensile and bending forces



In order to increase operational safety, the requirements regarding buried shut-off valves are constantly increased. Meeting these requirements is achieved through the utilization of special valves with particularly rigid and deformation-free bodies. The corresponding technical requirements and test methods for shut-off valves directly buried within district heating networks are defined in the EN 488. Increased compressive forces as well as new bending movements for valves were already defined in the 2011 predecessor version of the standard. The tensile forces, however, remained unchanged. Compared to 2011, some requirements have now again been made stricter. The number of operations during the type approval test, for example, has been increased and all tests must be carried out on the same valve. Furthermore, the end of the last 100 mm of the spindle / shaft construction must feature corrosion protection.

KLINGER Ballostar® KHSVI VVS ball valves are successfully tested and certified by the TÜV Austria on the company-own multi-function test stand under inclusion of the expanded requirements of EN 488:2019.

# KH(SV)I DN150 – 800 BENEFITS



## Seal system

Seal system for high temperature → Valid from -45°C to 260°C  
 Elastic, robust sealing elements → Insensitive to impurities  
 Seal system/ball trunnion mounted → Low torque  
 Bidirectional flow → Can be pressurized from both sides  
 Metal sealing elements → For solids and abrasive particles in the media



## Ball

Spheroidal steel chrome coated (30µm), one piece (casted) → Scratch proof (hard surface), corrosion resistant, insensitive to solids, no sticking of media particles on the surface  
 Full, cylindrical bore → No turbulences, laminar flow, low pressure drop



## Body

Compact, casted body → Insensitive to pipeline forces  
 Top flange acc. ISO 5211 → Easy installation of actuators  
 Easy handling → Installation in every position possible  
 Fully welded version → Only one welding in flow direction  
 Drain/ test cock available → Double Block & Bleed functionality, TÜV confirmed, max. safety at maintenance



## Quality

Long service life → Reduction of maintenance cycles  
 Service friendly → Top O-ring on stem is changeable inline  
 Testing acc. EN12266-1, P10,P11,P12 → Leakage rate A

# KHO MONOBALL PRIMARY/SECONDARY NETWORK



#### The Monoball KHO standard designs:

- » Size range DN15 – DN125, body carbon steel, floating ball
- » Connections: Flanges, weld ends or flange /weld end
- » Pressure classes PN16 and 40
- » Operation with hand lever
- » Housing cast steel
- » Full and reduced bore
- » Temperature range -5°C to +200°C
- » Floating ball

#### Construction Monoball KHO:

- » Pre - stressed sealing elements with stainless steel belleville washer
- » Triple shaft sealing
- » Robust housing out of casting material
- » Operating shaft stainless steel
- » Blow out safe stem
- » Fully welded
- » EN488:2019 and EHP003 certified, meets requirements of AGFW FW401 – part5

# KHO MONOBALL PRIMARY/SECONDARY NETWORK



## The Monoball KHO underground design:

- » Size range DN25 – DN125 operation with socket key
- » Size range DN100 – DN250 operation with slip on gear box
- » Body carbon steel
- » Floating ball
- » Pressure class PN25/40
- » Connection: weld ends
- » Full bore
- » Temperature range -5°C to +200°C

## Construction Monoball KHO:

- » Pre - stressed sealing elements with stainless steel belleville washer
- » Triple shaft sealing
- » Robust housing out of casting material
- » Operating shaft stainless steel
- » Blow out safe stem
- » Fully welded
- » HDPE Isolation on demand
- » With pipe extension 1500 and 1800mm depending on line size
- » EN488:2019 and EHP003 certified, meets requirements of AGFW FW401 – part5

# KHO MONOBALL BENEFITS

## (1) Sealing elements:

- » Design is elastic, robust, reliable and insensitive to impurities and pressure shocks → high lifetime.
- » Bi- directional flow.

## (2) Stem sealing:

- » Triple stem sealing ensures maximum safety, top O- ring can be changed inline.

## (3) Ball:

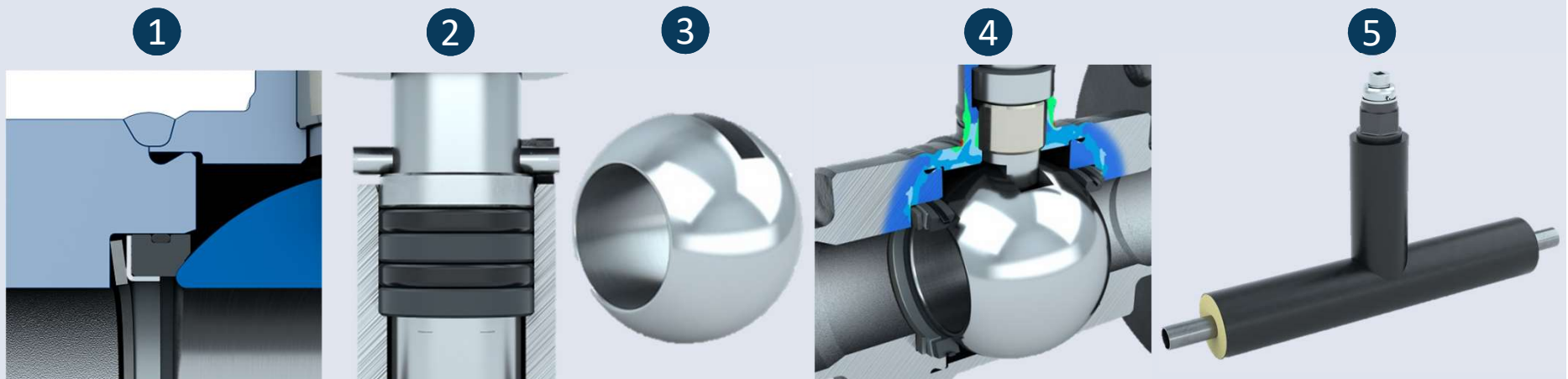
- » Standard ball made of stainless steel 1.4401 /1.4408 / AISI 304L→ high resistance to chemical media and mechanical loads.
- » The ball has a cylindrical passage which ensures laminar flow without turbulences.
- » Larger ball ensures higher sealing surface of the seal ring.
- » Ensures low pressure drop and lower pumping energy.

## (4) Body:

- » Compact casted body→ Insensitive to pipeline forces and tension optimised construction.
- » Dome connection is of the middle piece is casted – no welding seam directly on the middle piece for the dome pipe.
- » Each body welding seam is completely welded through the entire cross section → no possibility of crack corrosion.

## (5) Quality

- » Certified acc. EN488:2019 and EHP003, maintenance free and long service life, fully isolated solutions available.



# BALL VALVE BALLOSTAR® KHA PRIMARY/SECONDARY NETWORK



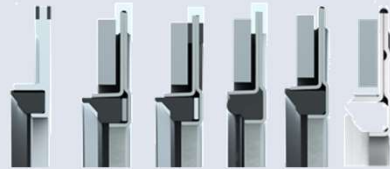
## Design data:

- » Line size range: DN15 – DN125, ½" – 5"
- » Pressure classes: PN 16, 25, 40 and 63 or ANSI150 and 300
- » Temperature range: -196°C to +400°C
- » Connections: DIN or ANSI Flanges, weld ends, threaded ends BSP or NPT or mixed
- » Body materials: carbon steel 1.0619, stainless steel 1.4408, and duplex
- » Ball bearing: floating ball, trunnion mounted or double block & bleed
- » Ball version: Standard solid ball or V-Port balls in 10°, 30°, 60° and slotted cuttings for control applications; material: acid prove stainless steel
- » Operation: with hand lever or with installed gear, electric and pneumatic actuator on demand
- » Passage: Full bore
- » Standard version: → Fire safe acc. to API607 7th edition and EN10497:2010 and TA- Luft / ISO15848
- » Corrosion protection: New KACP protection (equal C3)
- » Marking: Laser marking on center piece acc. EN19





# KHA BENEFITS



## (1) Sealing elements:

- » High temperature range  $-196^{\circ}\text{C} - 400^{\circ}\text{C}$  → achievable with different sealing element versions
- » Wide range of different sealing element types → easy adaptable for many different applications
- » Design is elastic, robust, reliable and insensitive to impurities and pressure shocks → high lifetime
- » Additional C4430 gaskets on housing pitch → improved tightness to atmosphere



## (2) Stuffingboxes:

- » Wide range of different stuffingbox types → easy adaptable for many different applications
- » Easy combinable with all types of sealing elements in one valve construction
- » New aflas / graphite stuffingbox → Fire safe and TA Luft / ISO15848 approved



## (3) Ball:

- » Standard ball made of stainless steel 1.4401 or 1.4408 → high resistance to chemical media and mechanical loads
- » By using of metal sealing elements, the ball is chrome coated → Insensitive for solids, no sticking of media particles on the surface
- » Cylindrical bore → No turbulences, laminar flow, low pressure drop
- » Different ball bearings → floating ball or trunnion mounted
- » V – port balls in  $10^{\circ}$ ,  $30^{\circ}$ ,  $60^{\circ}$  and slotted cutting on demand → for control applications with different flow characteristics



## (4) Body

- » Compact casted center piece → Insensitive to pipeline forces
- » Short housing screws → high mechanical stability at thermal expansion due to temperature changes
- » ISO TOP flange for every line size → Easy installation of additional equipment like gears and actuators
- » Valve could be installed in any position → easy handling
- » Modular valve construction → Max. flexibility to adopt the valve to many different applications



## (5) Quality

- » In standard version fire safe and TA Luft / ISO15848 approved
- » Inline service possible → service and cost efficient
- » Long service life → Reduction of maintenance costs
- » Spare parts are quick available
- » Double block & bleed version for all sizes → TÜV confirmed, max. safety for maintenance, drainage of the cavity in closed position

# KLINGER PISTON VALVE PRIMARY / SECONDARY NETWORK:

## PRODUCT ADVANTAGES

- Excellent control characteristics
- Low maintenance
- Reliably tight in the bore and to atmosphere in accordance with EN12266-1 – leakage rate A
- Suitable for steam condensate-alternating operation as well as temperature shock operations
- No erosion on sealing surface
- Revisable without removal from pipe system
- Fire Safe
- Aútomatable

## SPECIAL TYPES

- Oxygen version (oil and grease free)
- TA Luft
- Regulation design
- Heating jacket

## PRODUCT DETAILS

- PN 16/40/63, Class 150/300
- DN15 – 200, ½" – 8"
- Material grey cast iron, nodular cast iron, cast steel, stainless steel
- Temperature range -10°C to +400°C
- Designs: Flanged version, Version with weld or threaded ends



# KVN DN15 – 200 BENEFITS



## Seal system

Reliable valve ring - piston design → Constant low torque, „self cleaning function“ for milky or cloudy liquids

High temperature → Valid up to 400°C media temperature



## Valve ring

Standard valve ring KX-GT (graphite with serrated stainless steel) → Valid up to 400°C, mechanical loadable – insensitive for pressure hammers

Valve ring type KX1 (graphite with serrated stainless steel + PTFE disc) → Valid up to 350°C, mechanical loadable – insensitive for pressure hammers, TA-Luft compliant



## Body

Compact casted body → Insensitive to pipeline forces, pressure balanced version available

Valve bonnet acc. ISO5211 → Easy installation for actuators

Easy handling → Installation in every position possible, flow direction marked with an arrow on body

Body construction → Valve rings are not located directly in the flow



## Quality

Long service life → Reduction of maintenance cycles

Service friendly → Inline service possible

Test acc. EN12266-1,P10,P11,P12 → Leakage rate A

Availability → All valve parts available as a spare part

## Options

Regulation version

Heating jacket

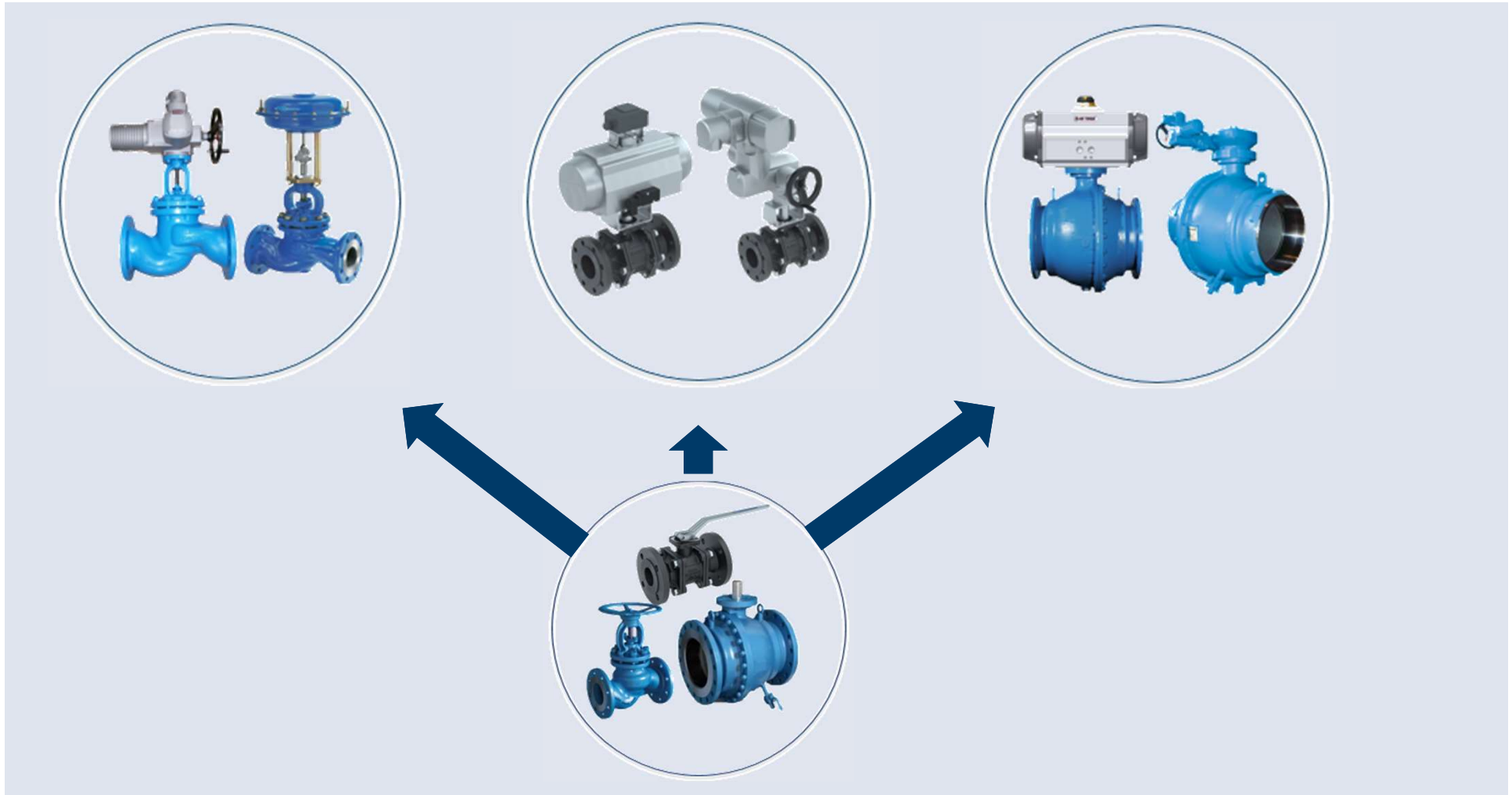
Oxygen version

# TESTING ACC. EN12266-1, P10, P11 & P12



Test	Test Duration		Test pressure and media
	DN 15 – 150	DN 200 – 300	
P10 (Strength)	1 Minute	2 Minutes	1,5x PN Water
P11 (Tightness)	1 Minute	2 Minutes	1,5x PN Water
P12 (Seat Tightness)	1 Minute	2 Minutes	6 bar ± 1bar Air or 1,1x PN Water

# AUTOMATION AUMA, AIR TORQUE & SART ACTUATORS



# WHAT IS A DURABLE VALVE FOR DISTRICT HEATING APPLICATIONS:



1

## Robust body:

Plant operators are concerned of high tension / compression & torsion forces under the effect of heat. To ensure that the valves remain operable over time, they are tested acc. EN488.2019. Advantages of casted material: tension free, no complex weldings.

2

## Trunnion mounted ball:

In order to avoid any deformation of the sealing elements and a risk of blocking of the ball, the sealing and guiding functions must be disassociated and trunnion mounted ball valves must be installed.

3

## Full bore:

There is no obstacle or reduced flow of the passage of the fluid. The flow is laminar. The pressure losses are minimal and the energy cost for handling the fluid is reduced. Also smaller pumps can be used.

4

## Reliable sealing system (leakage rate A):

The pre-stressed diaphragm springs ensure contact of seat with the ball. Seat is fully enclosed and fixed in the housing. Impurities can circulate easily behind the diaphragm springs – there is no retention zone.

5

## Double Block & Bleed:

Safest solution for maintenance and smallest installation space. After pressure relieve → the test valve allows to check the seat tightness.

6

## Easy handling:

The mounting direction is irrelevant for ball valves (bi- directional sealing) and any position (vertical, horizontal, oblique...). Extensions, gear boxes, actuators can be fitted for all valves equipped with an ISO top flange.

7

## Maintenance free:

KLINGER BALLOSTAR ball valves are basically maintenance free → estimated life time 25 to 30 years based on experience. If necessary, stem o-rings can be changed inline.