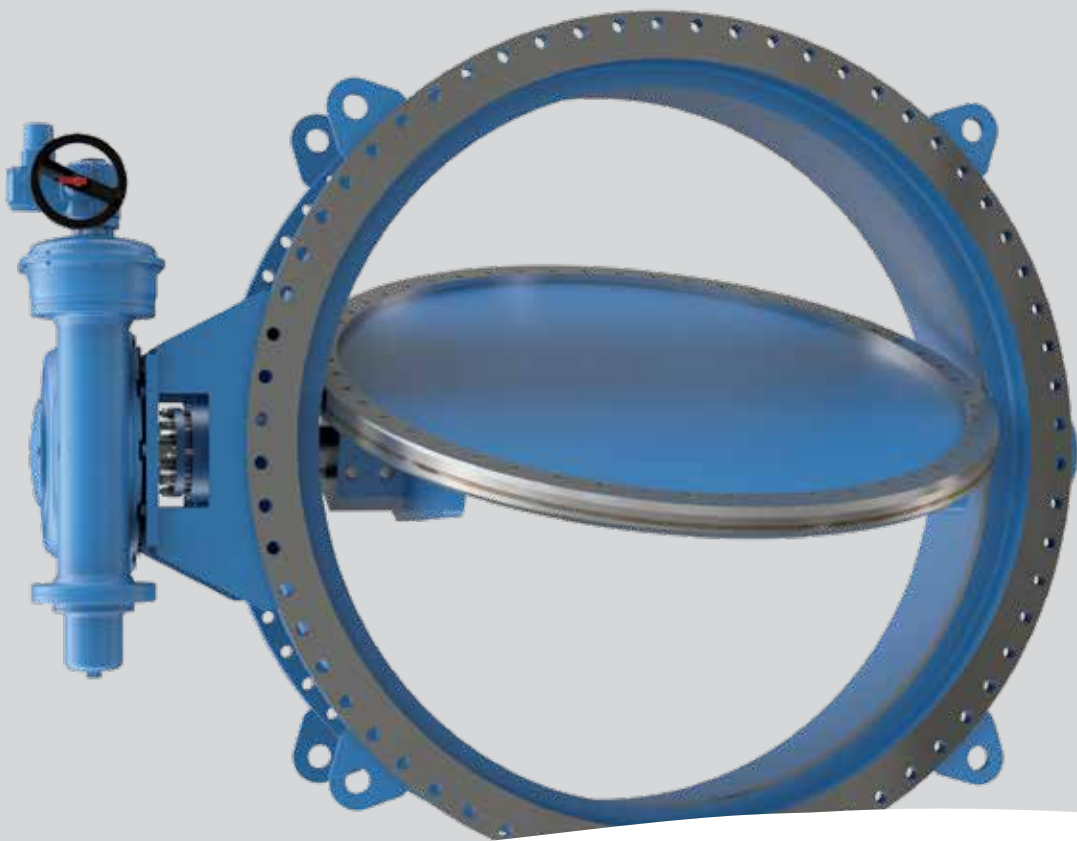


brands you trust.



Krombach® Large Bore Valves from DN700/28"  
AK120 (DOV) Double Offset Valves  
AK110 (TOV) Triple Offset Valves

**CRANE**®

# Double Offset and Triple Offset Valves Overview

Backed by Crane's 160-year tradition of engineering excellence, Krombach® brand butterfly valves from Crane ChemPharma & Energy deliver superior solutions to a range of industrial applications. Available in both Double Offset (DOV) and Triple Offset (TOV) designs, Krombach's vast experience in the power and water markets ensures exceptional quality and reliable solutions in the industry's most demanding applications.



Applications that require "bubble-tight" shutoff demand the superior sealing capabilities of Triple Offset butterfly valves. While traditional butterfly valves can likewise suffer in volatile chemical applications and are prone to clogs in particulate media, Triple Offset valve technology delivers superior performance and protection in the industry's most demanding environments.



Both types DOV and TOV will be used in every application where "bubble-tight" shut off is required. Due to the different sealing technologies, both types together fill the wide temperature range. While for higher temperatures (above 150°C / 300°F) the resilient seted DOV have reached their technical limit, the TOV is recommended. Krombach metallic sealing TOV are applicable for temperatures up to 550°C/ 1100°F.

## Locations



# Double Offset and Triple Offset Valves Mode of Operation

## What is a DOV?

To allow for easy seat displacement, the valve is designed with a double offset (DOV= double offset valves). The shaft is offset from the centerline of the bore (first offset), and the centerline of the disc seat and body seal (second offset). Together, the offsets create an eccentric disc movement that lifts the seat out of the seal, resulting in friction during the first 10 degrees of opening and final 10 degrees of closing.

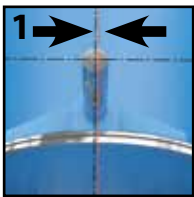


Figure 1: First offset of the shaft to the centerline of the bore

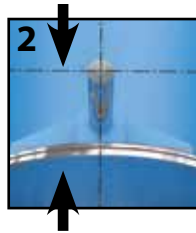


Figure 2: Second offset from the centerline of the disc seat and body seal

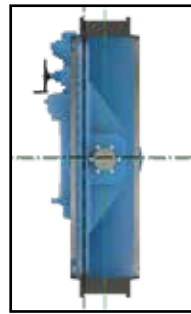


Figure 3: Double-offset butterfly valve design

## What is a TOV?

The valve is designed with a triple offset (TOV= triple offset valves), where the third offset is the geometric design of the disc and the seat. Both components are machined into an offset conical profile, resulting in a right-angle cone. This ensures nearly friction-free operation of the 90° movement. The contact is made in only the final point of closure, acting as a mechanical travel stop. This prohibits over-travel of the disc.

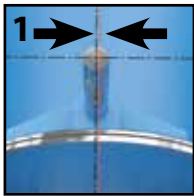


Figure 4: First offset of the shaft to the centerline of the bore

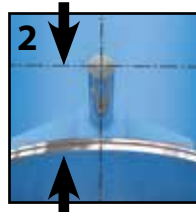


Figure 5: Second offset from the centerline of the disc seat and body seal

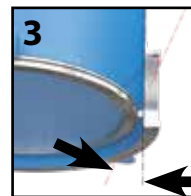


Figure 6: Third offset "right-angled cone" seat design

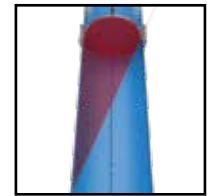


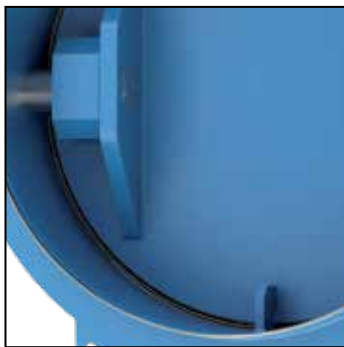
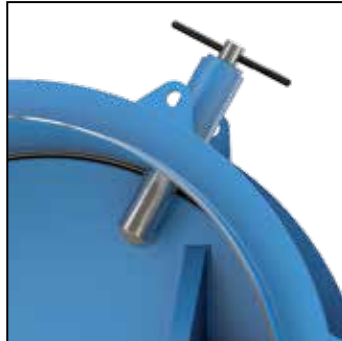
Figure 7: Details of the geometric sealing design. Both components are machined into an offset conical profile, resulting in a right-angle cone.

## When is it necessary to use triple offset butterfly valve rather than a double offset valve?

A triple eccentric or triple offset butterfly valves should be used when the application requires bubble tight shut-off but does not allow the use of a rubber-lined butterfly valve due to low/high temperatures and high pressure.

## Double Offset Valves Design Features

**Single- or bidirectional locking device** secures disc position while maintenance is performed, facilitating in-line repair and enhancing safety.

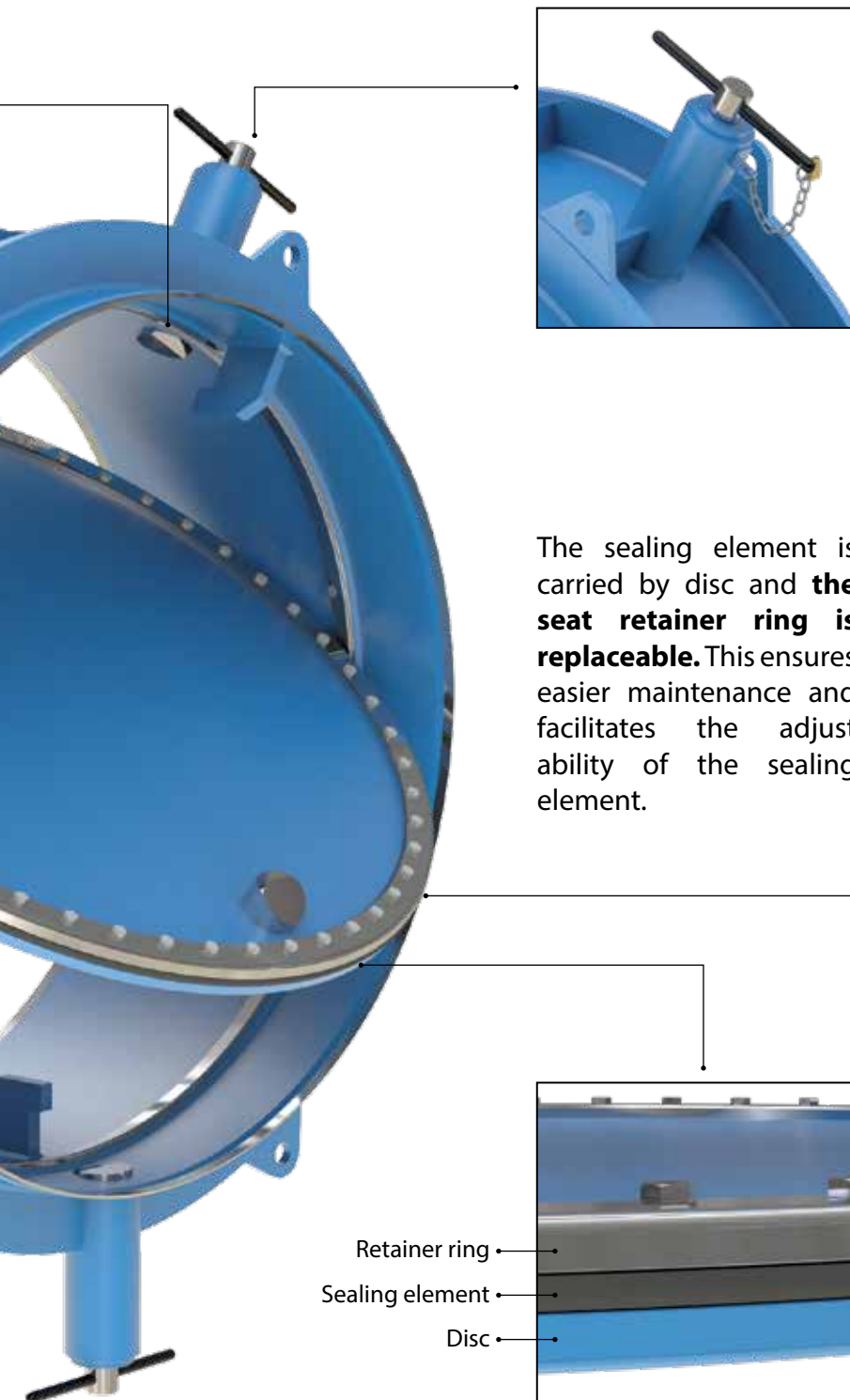


**Welded design** increases versatility to meet several design standards in face to face dimensions, pressure ratings and pipe connection.

- DIN
- ANSI/ASME
- AWWA

**Top mounting flange in accordance with ISO 5211** is suitable for manual gear, electric, hydraulic and pneumatic actuation.



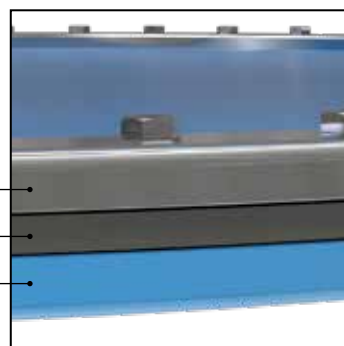


**Safety lock** for locking device optional available prevents accidental opening

The sealing element is carried by disc and **the seat retainer ring is replaceable**. This ensures easier maintenance and facilitates the adjustability of the sealing element.



Retainer ring  
Sealing element  
Disc



**Different materials** for sealing element available in

**EPDM**

-18°C to 104°C / 0°F to 220°F

**NBR**

-10°C to 80°C / 14°F to 180°F

**FKM**

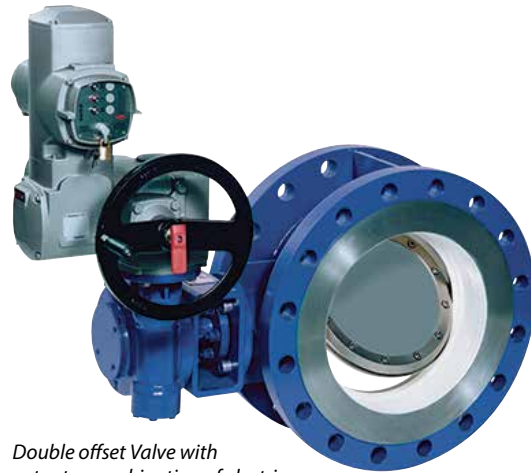
-20°C to 200°C / -4°F to 392°F

*(The application might change the temperature range)*

# Double Offset Valves Features and Benefits

## Key Features

- ❶ **Rubber-lined sealing element** Rubber-lined sealing on the disc facilitates maintenance, reduces friction between seat and seal in the first 10 degrees on opening and last 10 degrees of closing. This extends the service life.
- ❷ Available in single or bidirectional configurations, the **locking device** secures disc position while maintenance is performed on the disc, facilitating in-line repair and enhancing safety.
- ❸ **Rubber lined** options deliver superior performance and protect sensitive valve components in corrosive applications.



*Double offset Valve with actuator combination of electric actuator with gear box*

## Materials\*

| Material of construction | DIN EN Material No                  | ASME (Grade) |
|--------------------------|-------------------------------------|--------------|
| Body                     | 1.0038                              | A283 (C)     |
| Disc                     | 1.0038                              | A283 (C)     |
| Retainer ring            | 1.0038                              | A283 (C)     |
| Sealing element          | EPDM / NBR / FKM                    |              |
| Body seat                | 1.4301                              | A479 (304)   |
| Shaft                    | 1.4021                              | A276 (420)   |
| Shaft sealing (O-ring)   | NBR / FKM                           |              |
| Bushing                  | bronze / PTFE-sinter                |              |
| Paint                    | zinc powder<br>1-layer epoxy coated |              |

*\* other materials upon request*



*Complete assembled "mounting ready" combination of double eccentric butterfly valve with hydraulic actuated fall weight actuator.*

# Double Offset Valves Technical Specifications

## Sizes

| DN<br>(mm) | NPS<br>(inch) | Operating Pressure |                 |                   |                   |                   |
|------------|---------------|--------------------|-----------------|-------------------|-------------------|-------------------|
|            |               | 2,5 bar<br>36 psi  | 6 bar<br>90 psi | 10 bar<br>150 psi | 16 bar<br>200 psi | 25 bar<br>350 psi |
| 700        | 28            | ●                  | ●               | ●                 | ●                 | ●                 |
| 750        | 30            | ●                  | ●               | ●                 | ●                 | ●                 |
| 800        | 32            | ●                  | ●               | ●                 | ●                 | ●                 |
| 900        | 36            | ●                  | ●               | ●                 | ●                 | ●                 |
| 950        | 38            | ●                  | ●               | ●                 | ●                 | ●                 |
| 1000       | 40            | ●                  | ●               | ●                 | ●                 | ●                 |
| 1050       | 42            | ●                  | ●               | ●                 | ●                 | -                 |
| 1150       | 46            | ●                  | ●               | ●                 | ●                 | -                 |
| 1200       | 48            | ●                  | ●               | ●                 | ●                 | -                 |
| 1250       | 50            | ●                  | ●               | ●                 | ●                 | -                 |
| 1350       | 54            | ●                  | ●               | ●                 | ●                 | -                 |
| 1400       | 56            | ●                  | ●               | ●                 | -                 | -                 |
| 1500       | 60            | ●                  | ●               | ●                 | -                 | -                 |
| 1600       | 64            | ●                  | ●               | ●                 | -                 | -                 |
| 1650       | 66            | ●                  | ●               | ●                 | -                 | -                 |
| 1800       | 72            | ●                  | ●               | ●                 | -                 | -                 |
| 1950       | 78            | ●                  | ●               | -                 | -                 | -                 |
| 2000       | 80            | ●                  | ●               | -                 | -                 | -                 |
| 2100       | 84            | ●                  | ●               | -                 | -                 | -                 |
| 2200       | 88            | ●                  | ●               | -                 | -                 | -                 |
| 2250       | 90            | ●                  | ●               | -                 | -                 | -                 |
| 2400       | 96            | ●                  | ●               | -                 | -                 | -                 |
| 2550       | 102           | ●                  | ●               | -                 | -                 | -                 |
| 2600       | 104           | ●                  | ●               | -                 | -                 | -                 |
| 2700       | 108           | ●                  | ●               | -                 | -                 | -                 |
| 2800       | 112           | ●                  | ●               | -                 | -                 | -                 |
| 2850       | 114           | ●                  | ●               | -                 | -                 | -                 |
| 2900       | 116           | ●                  | ●               | -                 | -                 | -                 |
| 3000       | 120           | ●                  | ●               | -                 | -                 | -                 |
| 3200       | 128           | ●                  | ●               | -                 | -                 | -                 |
| 3400       | 136           | ●                  | ●               | -                 | -                 | -                 |
| 3500       | 138           | ●                  | ●               | -                 | -                 | -                 |
| 3600       | 142           | ●                  | ●               | -                 | -                 | -                 |

## Connections

- Flanged design according to DIN EN 1092-1, ASME B 16.47-RF, and AWWA C207
- Buttwelded Ends\*  
*\* either Krombach design or customer requirements*

## Face to Face Dimensions

- Face to face dimensions according to DIN EN 558-1 R14, ASME 16.10, and AWWA C504

## Temperature

- Liner EPDM  
-18°C to 104°C / 0°F to 220°F\*
- Liner NBR  
-10°C to 80°C / 14°F to 180°F\*
- Liner FKM  
-20°C to 200°C / -4°F to 392°F\*  
*\* the application might reduce the applicable temperature range*

## Applications

- Cooling water cycle isolation (Power industry)
- Drinking water pump stations
- Desalination plants

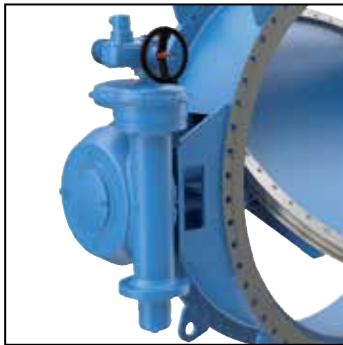
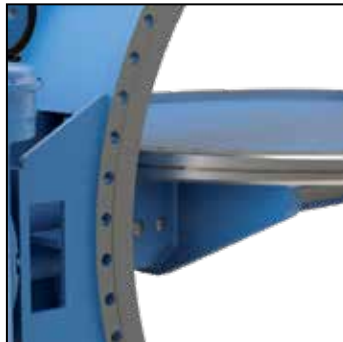
## Options

- Electric heat tracing/jacket to prevent freezing in low-temperature applications
- Stem extension with stuffing box possible upon request
- Hard-rubber lined version available for seawater applications (specification of rubber lining depending on application)

*\* other sizes available on request*

## Triple Offset Valves Design Features

**No contact** between sealing elements during 90° operation reduces wear and maintenance over a long life time.

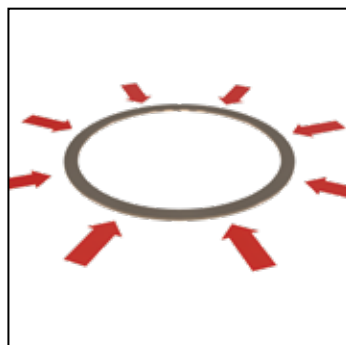


**Top mounting flange in accordance with ISO 5211** is suitable for manual gear, electric, hydraulic and pneumatic actuation.

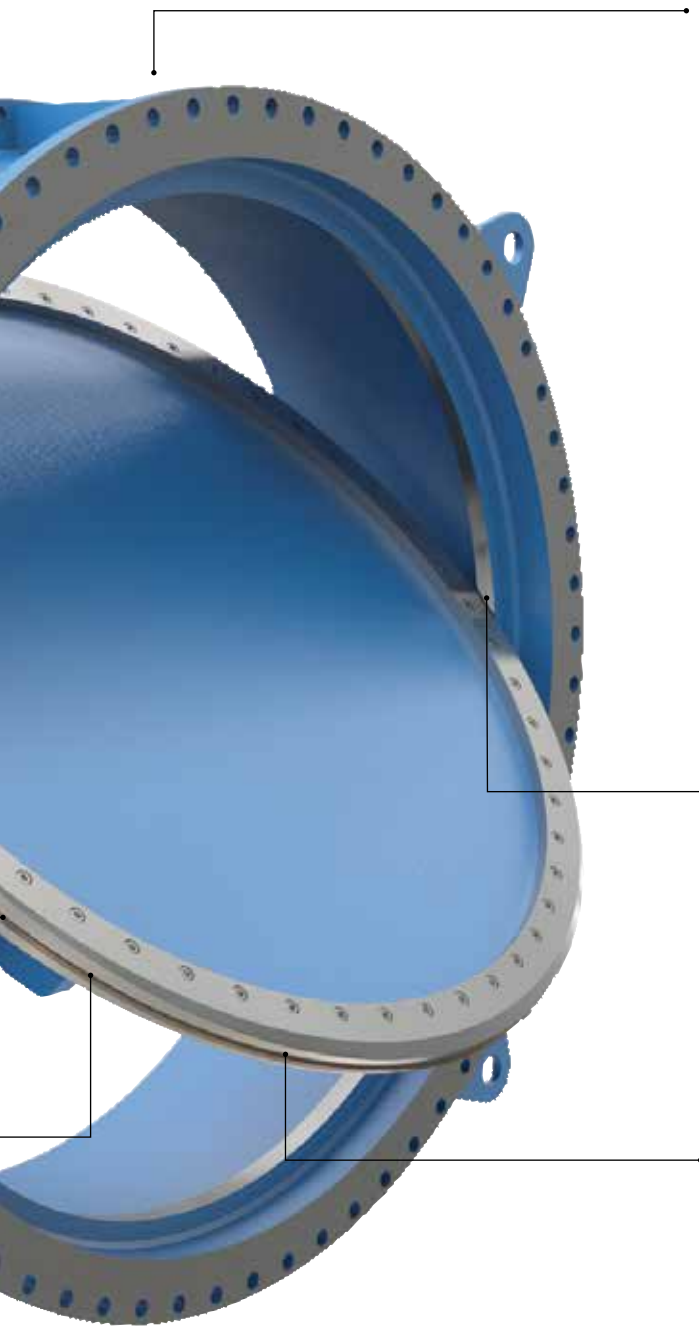


### Torque-generated sealing

Unlike position-seated ball valves, resilient seated butterfly valves and plug valves, the Krombach TOV is seated with the application of torque. The right-angle conical design enables sealing by contact, rather than through the friction generated by the elastic deformation of the seat.



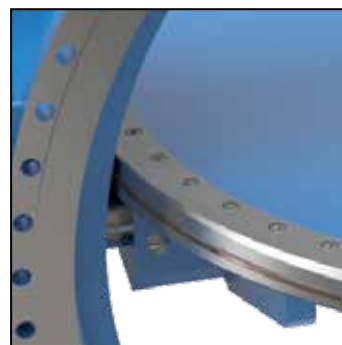
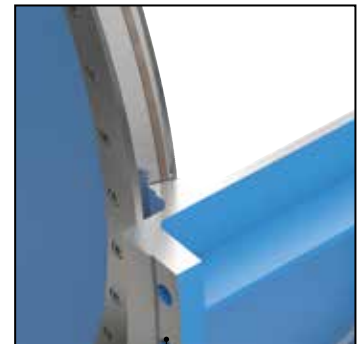




**Welded design** offers the versatility to meet several design standards regarding face-to-face dimensions, pressure rating and pipe connection.

- DIN
- ANSI/ASME
- AWWA

**Metal-to-metal sealing facilitates** superior bubble-tight protection and ensures zero leakage even in harsh media. Valve features are free of elastomers and other materials typically affected by corrosion.



The sealing element is carried by disc and **the seat retainer ring is replaceable**. This ensures easier maintenance and facilitates the adjustability of the sealing element.

# Triple Offset Valves Features and Benefits

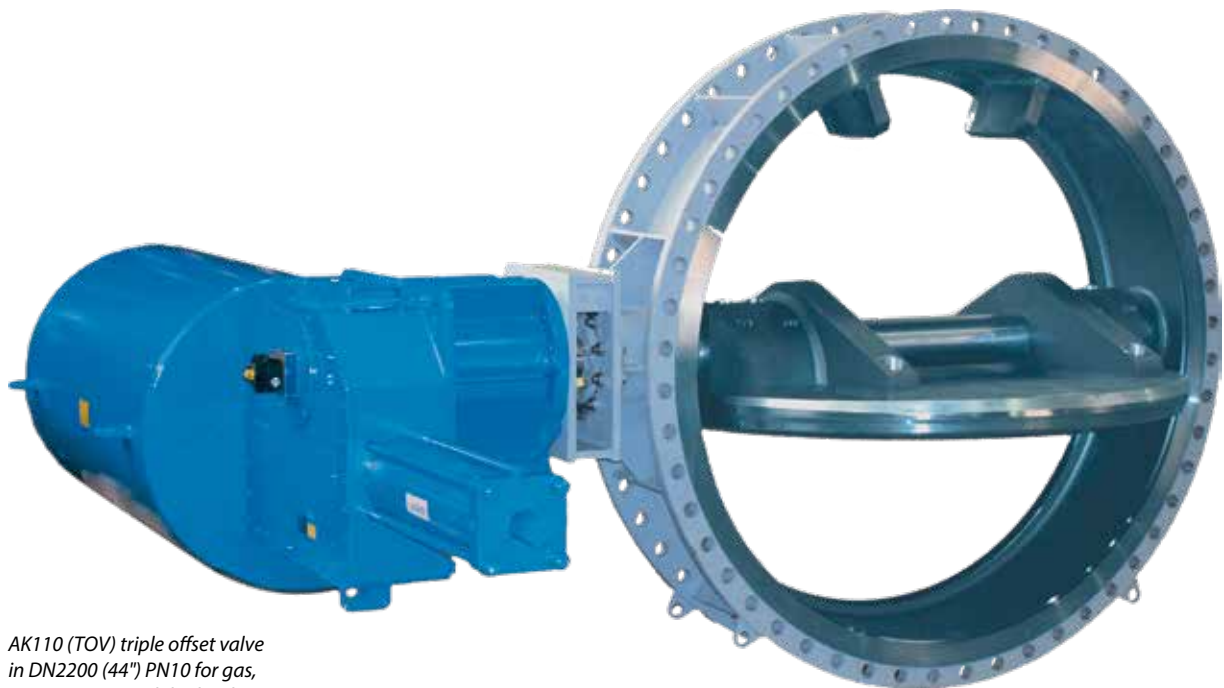
## Key Features

- ❶ **A wider seat angle** (24°) and self-releasing mechanism prevent excessive rubbing, sticking or galling of the laminated portion of the disc, enabling longer service life and lower operating torque with smaller actuators.
- ❷ **Metallic seat** offers superior leak protection in volatile high-pressure and temperature applications and are manufactured in accordance with ISO 5208 and EN 12266-2.
- ❸ **Self-centering disc** design ensures high-integrity in-line sealing even when the seal is offset, and delivers exceptional performance in high- temperature cycling.

## Materials

| Material of construction | DIN EN Material No                  | ASME (Grade)                 |
|--------------------------|-------------------------------------|------------------------------|
| Body                     | 1.0425                              | A515 (60)                    |
| Disc                     | 1.0425                              | A515 (60)                    |
| Retainer ring            | 1.0425                              | A515 (60)                    |
| Sealing element          | 1.4462 graphite                     | A182 (F60) graphite          |
| Body seat                | 1.4301                              | A479 (304)                   |
| Shaft                    | 1.4021                              | A276 (420)                   |
| Shaft sealing (Packing)  | graphite                            |                              |
| Bushing                  | 1.4301 hardened / bronze            | A479 (304) hardened / bronze |
| Paint                    | zinc powder<br>1-layer epoxy coated |                              |

\* other materials upon request



AK110 (TOV) triple offset valve in DN2200 (44") PN10 for gas, 300°C (572°F) with hydraulic actuator "fail close"

# Triple Offset Valves Technical Specifications

## Sizes

| DN<br>(mm) | NPS<br>(inch) | Operating Pressure |                   |                   |                   |
|------------|---------------|--------------------|-------------------|-------------------|-------------------|
|            |               | 2,5 bar<br>150 psi | 10 bar<br>150 psi | 16 bar<br>200 psi | 25 bar<br>350 psi |
| 700        | 28            | ●                  | ●                 | ●                 | ●                 |
| 750        | 30            | ●                  | ●                 | ●                 | ●                 |
| 800        | 32            | ●                  | ●                 | ●                 | ●                 |
| 900        | 36            | ●                  | ●                 | ●                 | ●                 |
| 1000       | 40            | ●                  | ●                 | ●                 | ●                 |
| 1200       | 48            | ●                  | ●                 | ●                 | ●                 |
| 1350       | 54            | ●                  | ●                 | ●                 | ●                 |
| 1400       | 56            | ●                  | ●                 | ●                 | ●                 |
| 1500       | 60            | ●                  | ●                 | ●                 | -                 |
| 1600       | 64            | ●                  | ●                 | ●                 | -                 |
| 1800       | 72            | ●                  | ●                 | -                 | -                 |
| 2000       | 80            | ●                  | -                 | -                 | -                 |
| 2100       | 84            | ●                  | -                 | -                 | -                 |
| 2400       | 96            | ●                  | -                 | -                 | -                 |

\* other sizes available on request

## Connections

- Flanged design according to DIN EN 1092-1, ASME B 16.47-RF, and AWWA C207
- Buttwelded Ends\*  
*\* either Krombach design or customer requirements*

## Face to Face Dimensions

- Face to face dimensions according to DIN EN 558-1, ASME 16.10, and AWWA C504

## Temperature

- -60°C to 450°C / -76°F to 840°F\*  
*\* the application might reduce the applicable temperature range*

## Applications

- Compressor blow-off (quick opening)
- Steam / combustion turbines
- Steam / combustion lines on an air condenser

## Options

- Electric heat tracing/jacket to prevent freezing in low-temperature applications
- Stem extension with stuffing box possible upon request
- Single or bidirectional locking device available



AK110 (TOV) Triple Offset Valve DN1800 PN6 with electric actuator



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