



R**ANGER**

VALVE AMERICA

API 609
Triple Offset Valve

ASME CLASS 150 - 300#



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API 609 TRIPLE OFFSET VALVE

The Ranger triple offset butterfly valve has been designed to withstand the rigorous conditions that are associated within the refining, chemical, petrochemical, oil and gas processes. Utilizing the triple offset, elliptical sealing geometry concept, in conjunction with a laminated/solid floating seat ring and a robust construction, this valve is capable of achieving bi-directional, zero leakage shutoff capabilities, low operating torques and practically zero sealing face wear, even after extensive cycling.

With the correct combination of trim and stem bearing materials, the metal to metal seat sealing design enables the valve to operate under severe service, high and low pressure and temperature operating conditions.

TRIPLE OFFSET GEOMETRY

The triple offset geometry, see Figure A, has two offsets in the stem/disc alignment, created by offsetting the stem in two axis, see Offset 1/2. The third offset, which is the geometry of the sealing surface, is an offset, right angled conical shaped profile machined into the body and seat sealing components by using the same angled fixture to ensure that both sealing geometries are identical.

The optimal seat angle is between 15 to 20 degrees, which eliminates binding of the seal ring to the body seat during the open/close cycles, see Offset 3.

FIRST OFFSET

The centre of the stem is offset behind of the centre line of the seal ring/body seat interface, along the valve bore

centre line. This offset offers a very basic “cam” motion which will ensure that the seal ring makes 100% contact with the body seat when closed. By having only a single offset, there will be 100% disc interference through 60 degrees of rotation at the beginning/end of each open/close cycle.

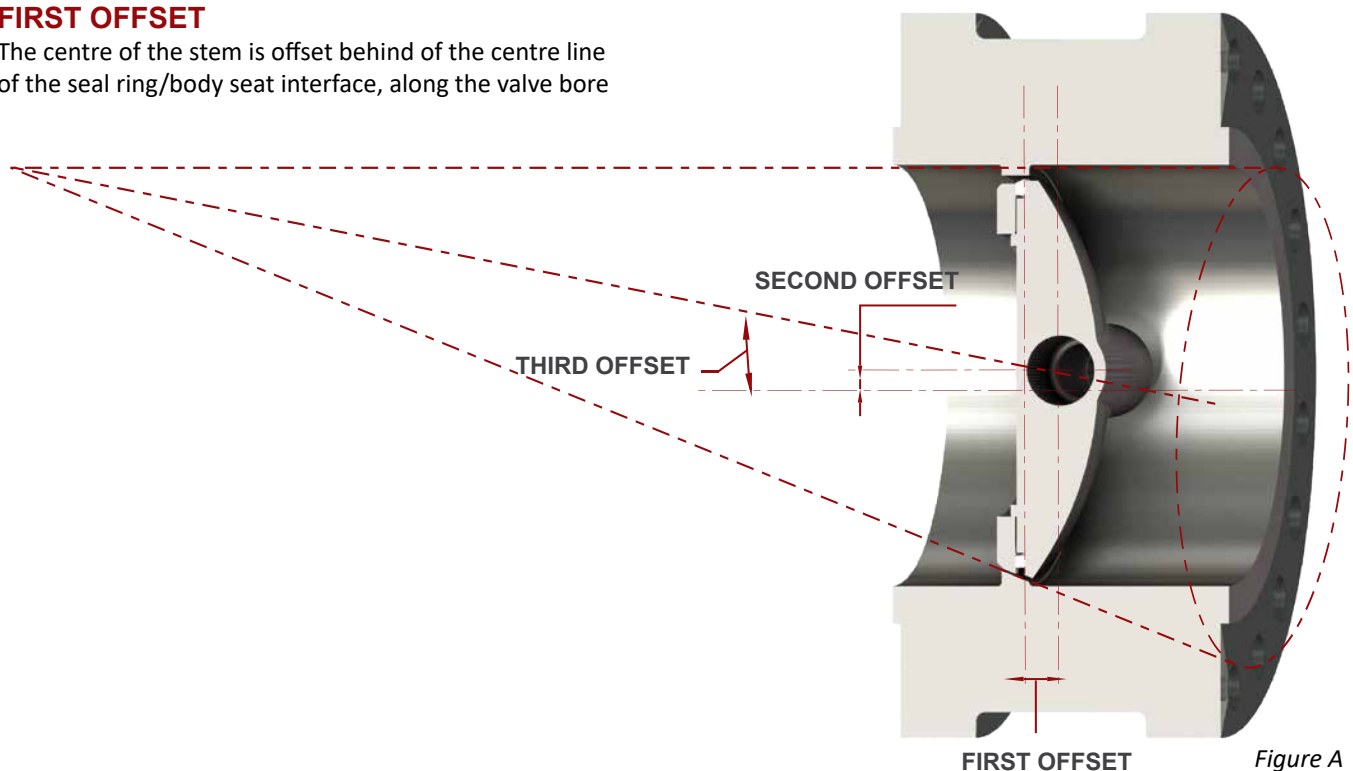
SECOND OFFSET

The centre of the stem is offset from the seal ring/valve bore centre line. With the stem now being offset in two planes, the disc will now function in a more perfect “cam” motion, with the opposite sealing ring faces, perpendicular to the stem, enscribing different arc radii.

These two offsets ensure that the seal ring can move freely away from/into the body seat with minimal interference and that the correct body/seal ring interface contact area is always maintained. By having only a double offset, there will be 100% disc interference through 10 degrees of rotation at the beginning/end of each open/close cycle.

THIRD OFFSET

The body/seal ring cone axis is offset from the centre line of the stem so as to provide a conical sealing surface that allows the seal ring to rotate in and out of the body seat without any interference. By having a triple offset, there will be 0% disc interference through 90 degrees of rotation.



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TRIPLE OFFSET FUNCTION

The triple offset function produces an ellipsoidal sealing geometry, with an almost zero friction free, stroking motion between the body seat and seal ring throughout the complete open/close cycles. Operating torque is therefore reduced with minimal seat/seal ring wear allowing the same materials to be used for the seat and seal ring. A

Opening Cycle

At the beginning of this cycle, during the first few degrees of movement, the seal ring lifts in a straight forward direction away from all contact points with the body seat. As the sealing force is torqued induced, when the disc is opened the operating torque quickly reduces, making the valve easy to operate throughout the complete open position.

Closing Cycle

At the end of this cycle, during the last few degrees of movement, the seal ring again moves in a straight forward direction towards the body seat until full contact is made at all points. At this point of contact, the seal ring uses the body seat as a mechanical stop, which allows the seal ring to repeatedly stop in the same position during closure. This results in no over-travel of the disc/seal ring and no separate mechanical stops being required in the valve body or in the actuator.

Due to the sealing force being torque induced, as the closing torque is increased, the sealing force is increased as the seal ring is pressed harder to the body seat face to ensure a uniform seal contact. This action along with the floating, self centering seat design, allows the valve to achieve a repeatable, fully bi-directional, zero leakage seal.

LAMINATED SEAL RING

A laminated seal ring design is the first preferred choice when selecting the seat sealing advantages of a triple offset valve. This type of seal can deliver bi-directional, zero leakage throughout low/high pressures and temperatures in a mild severe line medium and is inherently fire-safe due to the materials of construction.

SOLID SEAL RING

A solid seal ring design is selected primarily for use in severe operating conditions where there are hard pieces of debris in the line medium. This seal type can also deliver bi-directional, zero leakage throughout low/high pressures and temperatures and it is also inherently fire-safe. This seal ring does not have the flexibility of the laminated seal ring as the hard faced material is susceptible to cracking under excessive and repeating flexing.

KEY FEATURES

- **Design:** API 609 Category B
- **Size range:** 2" to 48" / DN50 to DN1200
- **Pressure range:** Class 150 to 300
- **Temperature range:** -318 to +1200 °F / -196 to +650 °C
- **Fire test:** API 6FA
- **Fugitive emission:** MESC 77/312 - EPA 21
- **Pressure testing standard:** API 598

Additional Features

- Triple offset sealing geometry with bi-directional, zero leak sealing capability
- Friction free operation
- Low operating torque
- Fire safe due to all metal construction
- Hard faced body seat
- Stainless steel + graphite laminated seal ring for mild severe service
- Solid stainless steel + hard face seal ring for very severe service
- Anti blowout stem
- Operator mounting flange as per ISO 5211



36" Class 150 TOVs at the factory.

TRIPLE OFFSET FEATURES

STEM

A one-piece forging, the TOV stem is able to withstand any deflection imposed by the full line pressure on the disc.

ANTI-BLOWOUT STEM

The Ranger TOV has three retention methods to prevent stem ejection including:

1. A split retaining ring at the bottom of the stem, and a blind flange on the bottom of the body casting.
2. Upper and lower stem-to-disc taper retaining bolts.
3. A shoulder on the stem engages with the stuffing box gland, which in turn is held in place by the gland flange and gland flange nuts, prevents the stem from being ejected through the top of the valve body

TOP FLANGE

The ISO 5211 design provides easy installation of lever, gearbox, pneumatic or electric actuator.

EXTENDED BEARING

Precisely machined, the TOV bearing is key in reducing friction generated by the shaft while also ensuring a reduced torque.

TORQUE INDUCED SEALING

The term, torque induced sealing, means that the higher the closing torque is, the tighter the seal is. The closing torque is generated through the closing action of the gearbox and/or the line pressure acting upon the disc.

PERFORMANCE PACKING

Top and bottom ring have preformed graphite to meet low fugitive emissions requirement.

DISC FRAME DESIGN

Routine maintenance to complete disassembly can be performed on site without special tools.

CARBIDE ALLOY SEAT

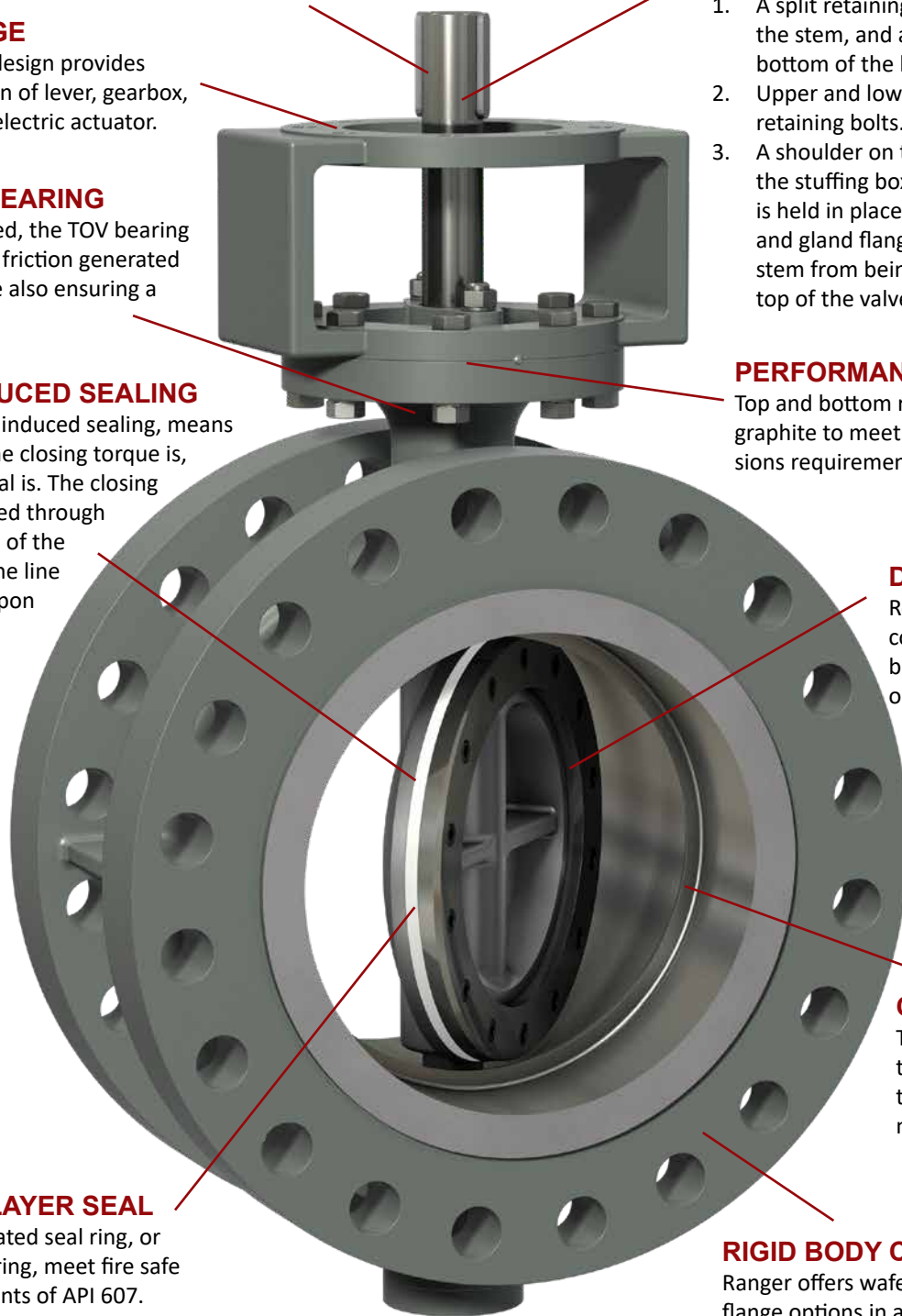
The entire surface is hardness treated to extend the life of the valve and reduce maintenance requirements.

MULTI-LAYER SEAL

The laminated seal ring, or solid seal ring, meet fire safe requirements of API 607.

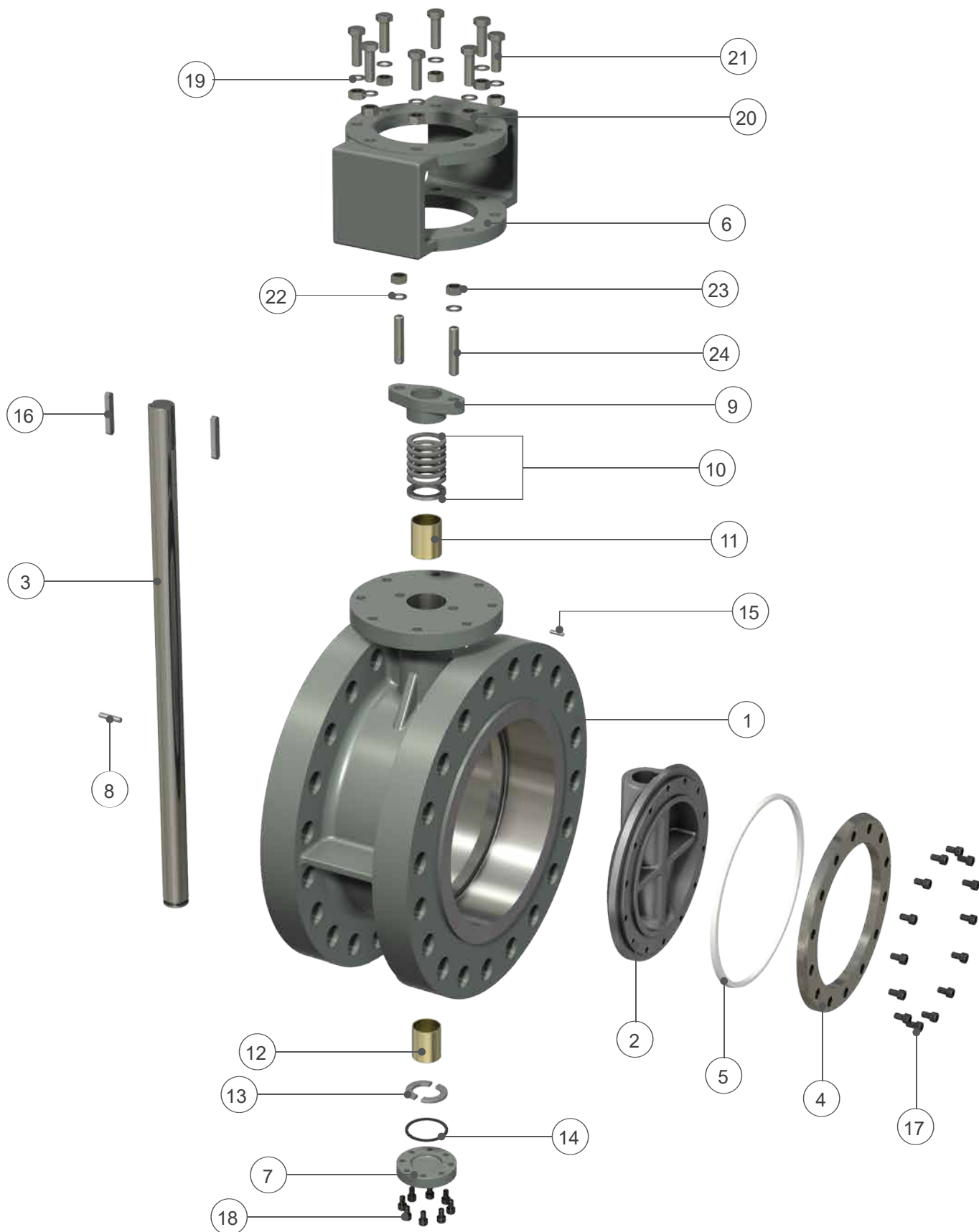
RIGID BODY CONSTRUCTION

Ranger offers wafer, lug, and double flange options in a range of materials with a temperature range from -196 to 550 ° C.



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API 609 TRIPLE OFFSET VALVE



API 609 TRIPLE OFFSET VALVE

| Item | Description | Temperature-29~425° | Temperature-196~538° | Temperature-196~538° |
|------|---------------------|---------------------|----------------------|----------------------|
| | | CS | CF8 | CF8M |
| 1 | Body | A216 WCB | A351 CF8 | A351 CF8M |
| 2 | Disc | A216 WCB | A351 CF8 | A351 CF8M |
| 3 | Shaft | A182 F6a | A182 F304 | A182 F316 |
| 4 | Retainer | A105 CS+ENP | SS 304 | SS 316 |
| 5 | Seal Ring | SS316+Flex graphite | SS316+Flex graphite | SS316+Flex graphite |
| 6 | Yoke | A216 WCB | A216 WCB+ENP | A216 WCB+ENP |
| 7 | Bottom Cover | A105 CS | SS 304 | SS 316 |
| 8 | Hinge Pin | A276 410 | SS 304 | SS 316 |
| 9 | Packing Gland | A216 WCB | A351 CF8 | A351 CF8M |
| 10 | Packing | Flex graphite | Flex graphite | Flex graphite |
| 11 | Front Axial Bushing | B148 C95500 | B148 C95500 | B148 C95500 |
| 12 | Rear Axial Bushing | B148 C95500 | B148 C95500 | B148 C95500 |
| 13 | Split Ring | SS 304 | SS 316 | SS 316 |
| 14 | Seal Gasket | SS304+Flex graphite | SS304+Flex graphite | SS316+Flex graphite |
| 15 | Loose-proof Pin | A276 410 | SS 304 | SS 304 |
| 16 | Key | AISI 1045 | AISI 1045 | AISI 1045 |
| 17 | Screw | A193 B8 | A193 B8 | A193 B8M |
| 18 | Bolt | A193 B7 | A193 B8 | A193 B8M |
| 19 | Spring Gasket | AISI 1566 | AISI 1566 | AISI 1566 |
| 20 | Nut | A194 2H | A194 8 | A194 8M |
| 21 | Bolt | A193 B7 | A193 B8 | A193 B8M |
| 22 | Gasket | A105 CS | SS 304 | SS 316 |
| 23 | Nut | A194 2H | A194 8 | A194 8M |
| 24 | Stud | A193 B7 | A193 B8 | A183 B8M |

Note: Materials for specific applications are available on request.

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QUOTED STANDARDS

| |
|--|
| Pressure & Temperature Standard: ASME B16.34 |
| Flange Diameter Standard: ASME B16.5, ASME B16.47, BS EN 1092 |
| Face-to-face Standard: API 609, MSS SP-68, ISO 5752, BS EN 558 |
| Pressure Test Standard: API 598 |

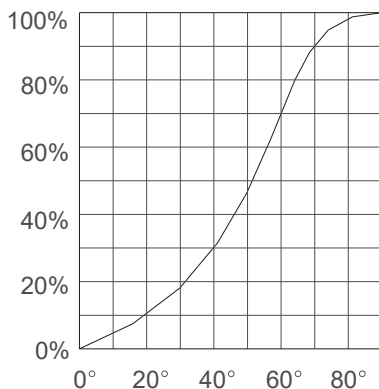
OPERATING PARAMETERS

| Class, PN | | CLASS | |
|---------------------|--|-------|------|
| | | 150 | 300 |
| Test Pressure (Mpa) | Shell test | 3.0 | 7.7 |
| | Seal test | 2.2 | 5.65 |
| Medium | Water/Steam, Oil Products, Acid Alkali, Seawater etc. | | |
| Temperature | -46 ~ 425°C | | |
| Operation | Manual, Worm, Gear, Electric, Pneumatic, Hydraulic Operation | | |

KEY COMPONENTS AND STANDARD MATERIALS

| Description | Material |
|-------------|---------------------------------------|
| Body | WCB, CF8, CF8M, CF3, CF3M, LCC |
| Disc | WCB, CF8, CF8M, CF3, CF3M, LCC |
| Stem | F6a, F304, F316, F304L, F316L, 17-4PH |
| Seal ring | 304, 316, 304L, 316L, PTFE |
| Packing | Flex Graphite, PTFE |

CV GRAPH



$$Cv = qv \sqrt{\frac{G}{\Delta p}}$$

Cv- Flow Coefficient

Qv- Volumetric Flow

ΔP- Pressure Loss of Valves

G- Relative Density of Water =1

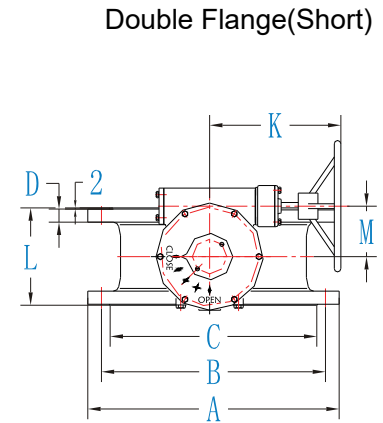
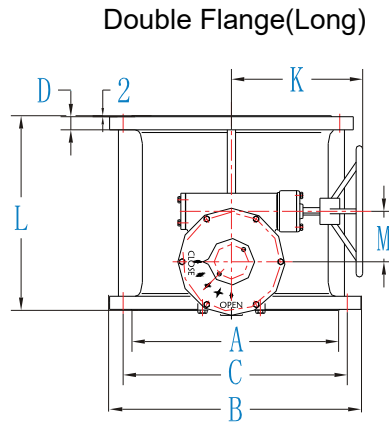
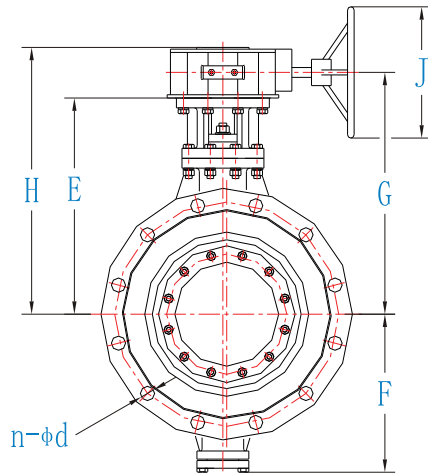
FLOW COEFFICIENT

| Size | Cv |
|------|-------|
| Inch | |
| 3 | 175 |
| 4 | 300 |
| 6 | 740 |
| 8 | 1350 |
| 10 | 2120 |
| 12 | 3600 |
| 14 | 4640 |
| 16 | 6290 |
| 18 | 8660 |
| 20 | 11600 |
| 24 | 16190 |
| 30 | 30000 |
| 36 | 41600 |
| 42 | 57300 |
| 48 | 75000 |



ANSI DOUBLE FLANGE METAL SEAL BUTTERFLY VALVE

ASME CLASS 150-300, 3" - 48"

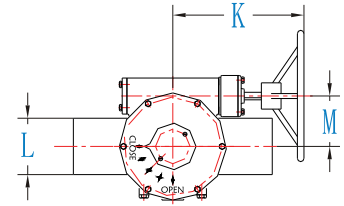
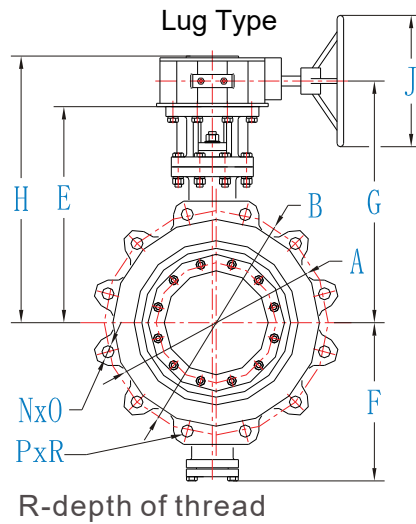
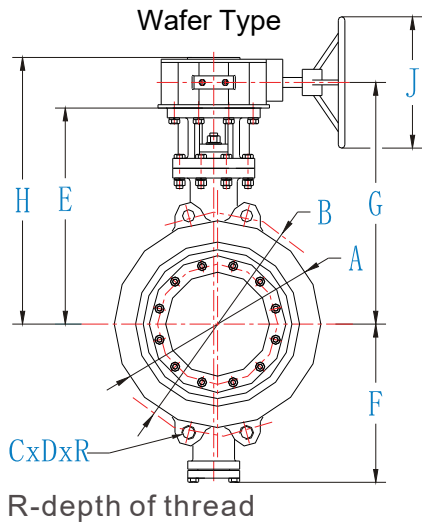


Pressure rating: ASME CLASS 150-300 Flange dimension: ASME B16.5 & ASME B16.47

| Size | L | | A | B | C | D | n-Φd | E | F | G | H | J | K | M |
|-----------|-------|-------|-------|-------|-------|------|---------|-------|-------|-------|-------|-------|-------|-------|
| | Long | Short | | | | | | | | | | | | |
| CLASS 150 | | | | | | | | | | | | | | |
| 3" | 7.99 | 4.49 | 7.48 | 6.00 | 5.00 | 0.69 | 4-0.75 | 8.19 | 4.84 | 9.57 | 11.14 | 5.91 | 5.83 | 1.77 |
| 4" | 9.02 | 5.00 | 9.06 | 7.50 | 6.19 | 0.88 | 8-0.75 | 8.98 | 5.63 | 10.35 | 11.93 | 11.81 | 5.83 | 1.77 |
| 6" | 10.51 | 5.51 | 11.02 | 9.50 | 8.50 | 0.94 | 8-0.89 | 11.14 | 6.85 | 12.52 | 14.49 | 11.81 | 9.37 | 2.48 |
| 8" | 11.50 | 5.98 | 13.58 | 11.75 | 10.63 | 1.06 | 8-0.89 | 12.40 | 8.19 | 14.06 | 15.75 | 11.81 | 9.37 | 2.48 |
| 10" | 12.99 | 6.50 | 15.94 | 14.25 | 12.75 | 1.13 | 12-1 | 13.98 | 9.29 | 15.63 | 17.32 | 11.81 | 8.90 | 3.07 |
| 12" | 14.02 | 7.01 | 19.09 | 17.00 | 15.00 | 1.19 | 12-1 | 15.63 | 10.71 | 17.60 | 20.55 | 11.81 | 10.63 | 4.72 |
| 14" | 15.00 | 7.48 | 21.06 | 18.75 | 16.25 | 1.31 | 12-1.12 | 17.80 | 12.60 | 19.96 | 22.52 | 15.75 | 13.46 | 4.72 |
| 16" | 15.98 | 8.50 | 23.43 | 21.25 | 18.50 | 1.38 | 16-1.12 | 19.57 | 14.02 | 21.61 | 24.29 | 27.56 | 16.85 | 4.72 |
| 18" | 17.01 | 8.74 | 25.00 | 22.75 | 21.00 | 1.50 | 16-1.26 | 20.87 | 14.80 | 22.91 | 25.59 | 27.56 | 16.85 | 4.96 |
| 20" | 17.99 | 9.02 | 27.56 | 25.00 | 23.00 | 1.63 | 20-1.26 | 22.20 | 16.02 | 24.25 | 27.91 | 15.75 | 12.20 | 4.96 |
| 24" | 20.00 | 10.51 | 32.09 | 29.50 | 27.25 | 1.81 | 20-1.38 | 26.06 | 18.58 | 28.62 | 32.52 | 15.75 | 15.16 | 5.98 |
| 30" | 24.02 | 12.52 | 38.75 | 36.00 | 33.75 | 2.94 | 28-1.38 | 29.45 | 22.44 | 32.60 | 36.46 | 27.56 | 21.46 | 7.48 |
| 36" | 27.99 | 12.99 | 46.00 | 42.75 | 40.25 | 3.56 | 32-1.61 | 35.04 | 26.77 | 41.73 | 47.40 | 27.56 | 26.38 | 10.39 |
| 42" | - | 16.14 | 53.00 | 49.50 | 47.00 | 3.81 | 36-1.61 | 39.09 | 30.47 | 45.79 | 51.46 | 27.56 | 26.38 | 10.39 |
| 48" | - | 18.50 | 59.50 | 56.00 | 53.50 | 4.25 | 44-1.61 | 42.52 | 33.94 | 46.54 | 53.39 | 29.53 | 25.98 | 9.06 |
| CLASS 300 | | | | | | | | | | | | | | |
| 3" | 11.10 | 4.49 | 8.27 | 6.63 | 5.00 | 1.06 | 8-0.89 | 8.19 | 4.84 | 9.57 | 11.14 | 5.91 | 5.83 | 1.77 |
| 4" | 12.01 | 5.00 | 10.04 | 7.87 | 6.19 | 1.19 | 8-0.89 | 8.98 | 5.63 | 10.35 | 11.93 | 11.81 | 5.83 | 1.77 |
| 6" | 15.87 | 5.51 | 12.60 | 10.63 | 8.50 | 1.38 | 12-1 | 11.14 | 6.85 | 12.52 | 14.49 | 11.81 | 9.37 | 2.48 |
| 8" | 16.46 | 5.98 | 14.96 | 13.00 | 10.63 | 1.56 | 12-1 | 12.40 | 8.19 | 14.06 | 15.75 | 11.81 | 9.37 | 2.48 |
| 10" | 17.99 | 6.50 | 17.52 | 15.25 | 12.75 | 1.81 | 16-1.12 | 13.98 | 9.29 | 15.63 | 17.32 | 11.81 | 8.90 | 3.07 |
| 12" | 19.76 | 7.01 | 20.47 | 17.75 | 15.00 | 1.94 | 16-1.26 | 15.63 | 10.71 | 17.60 | 20.55 | 11.81 | 10.63 | 4.72 |
| 14" | 30.00 | 7.48 | 23.03 | 20.25 | 16.25 | 2.06 | 20-1.26 | 17.80 | 12.60 | 19.96 | 22.52 | 15.75 | 13.46 | 4.72 |
| 16" | 32.99 | 8.50 | 25.59 | 22.50 | 18.50 | 2.19 | 20-1.38 | 19.57 | 14.02 | 21.61 | 24.29 | 27.56 | 16.85 | 4.72 |
| 18" | 35.98 | 8.74 | 27.95 | 24.75 | 21.00 | 2.31 | 24-1.38 | 20.87 | 14.80 | 22.91 | 25.59 | 27.56 | 16.85 | 4.96 |
| 20" | 39.02 | 9.02 | 30.51 | 27.00 | 23.00 | 2.44 | 24-1.38 | 22.20 | 16.02 | 24.25 | 27.91 | 15.75 | 12.20 | 4.96 |
| 24" | 45.00 | 10.51 | 36.02 | 32.00 | 27.25 | 2.69 | 24-1.61 | 26.06 | 18.58 | 28.62 | 32.52 | 15.75 | 15.16 | 5.98 |
| 30" | 55.00 | 17.72 | 42.99 | 39.25 | 33.75 | 3.62 | 28-1.89 | 29.45 | 22.44 | 32.60 | 36.46 | 27.56 | 21.46 | 7.48 |
| 36" | 67.99 | 20.08 | 50.00 | 46.00 | 40.25 | 4.11 | 32-2.13 | 35.04 | 26.77 | 41.73 | 47.40 | 27.56 | 26.38 | 10.39 |

ANSI WAFER & LUG TYPE METAL SEAL TOV

ANSI CLASS 150-300, 3" - 48"



Pressure rating: ASME CLASS 150-300 Flange dimension: ASME B16.5 ASME B16.47

| Size | L | A | B | C | D | E | F | G | H | J | K | M | N | O | P | R |
|------------------|-------|-------|-------|---|------------|-------|-------|-------|-------|-------|-------|-------|----|------------|---|------|
| CLASS 150 | | | | | | | | | | | | | | | | |
| 3" | 1.89 | 5.00 | 6.00 | 4 | 0.75 | 8.19 | 4.84 | 9.57 | 11.14 | 5.91 | 5.83 | 1.77 | 4 | 5/8 11UNC | | |
| 4" | 2.13 | 6.18 | 7.50 | 4 | 0.75 | 8.98 | 5.63 | 10.35 | 11.93 | 11.81 | 5.83 | 1.77 | 8 | 5/8 11UNC | | |
| 6" | 2.24 | 8.50 | 9.50 | 4 | 0.89 | 11.14 | 6.85 | 12.52 | 14.49 | 11.81 | 9.37 | 2.48 | 8 | 3/4 10UNC | | |
| 8" | 2.52 | 10.63 | 11.75 | 4 | 0.89 | 12.40 | 8.19 | 14.06 | 15.75 | 11.81 | 9.37 | 2.48 | 8 | 3/4 10UNC | | |
| 10" | 2.80 | 12.76 | 14.25 | 4 | 1.00 | 13.98 | 9.29 | 15.63 | 17.32 | 11.81 | 8.90 | 3.07 | 12 | 7/8 9UNC | | |
| 12" | 3.19 | 15.00 | 17.00 | 4 | 1.00 | 15.63 | 10.71 | 17.60 | 20.55 | 11.81 | 10.63 | 4.72 | 12 | 7/8 9UNC | | |
| 14" | 3.62 | 16.26 | 18.75 | 4 | 1.12 | 17.80 | 12.60 | 19.96 | 22.52 | 15.75 | 13.46 | 4.72 | 12 | 1 8UNC | | |
| 16" | 4.02 | 18.50 | 21.25 | 4 | 1 8 UNC | 19.57 | 14.02 | 21.61 | 24.29 | 27.56 | 16.85 | 4.72 | 16 | 1 8UNC | 4 | 0.79 |
| 18" | 4.49 | 20.98 | 22.75 | 4 | 1 1/8 8 UN | 20.87 | 14.80 | 22.91 | 25.59 | 27.56 | 16.85 | 4.96 | 16 | 1 1/8 8UN | 4 | 0.79 |
| 20" | 5.00 | 22.99 | 25.00 | 4 | 1 1/8 8 UN | 22.20 | 16.02 | 24.25 | 27.91 | 15.75 | 12.20 | 4.96 | 20 | 1 1/8 8UN | 4 | 0.98 |
| 24" | 6.06 | 27.24 | 29.50 | 4 | 1 1/4 8UN | 26.06 | 18.58 | 28.62 | 32.52 | 15.75 | 15.16 | 5.98 | 20 | 1 1/4 8UN | 4 | 0.98 |
| 30" | 6.50 | 23.11 | 36.00 | 8 | 1 1/4 8UN | 29.45 | 22.44 | 32.60 | 36.46 | 27.56 | 21.46 | 7.48 | 28 | 1 1/4 8UN | 8 | 1.10 |
| 36" | 7.87 | 40.24 | 42.75 | 8 | 1 1/2 8 UN | 35.04 | 26.77 | 41.73 | 47.40 | 27.56 | 26.38 | 10.39 | 32 | 1 1/2 8 UN | 8 | 1.26 |
| 42" | 9.88 | 47.01 | 49.50 | 8 | 1 1/2 8 UN | 39.09 | 30.47 | 45.79 | 51.46 | 27.56 | 26.38 | 10.39 | 36 | 1 1/2 8 UN | 8 | 1.42 |
| 48" | 10.87 | 53.50 | 56.00 | 8 | 1 1/2 8 UN | 42.52 | 33.94 | 46.54 | 53.39 | 29.53 | 25.98 | 9.06 | 44 | 1 1/2 8 UN | 8 | 1.50 |
| CLASS 300 | | | | | | | | | | | | | | | | |
| 3" | 1.89 | 5.00 | 6.63 | 4 | 0.89 | 8.19 | 4.84 | 9.57 | 11.14 | 5.91 | 5.83 | 1.77 | 8 | 3/4 10UNC | | |
| 4" | 2.13 | 6.18 | 7.87 | 4 | 0.89 | 8.98 | 5.63 | 10.35 | 11.93 | 11.81 | 5.83 | 1.77 | 8 | 3/4 10UNC | | |
| 6" | 2.32 | 8.50 | 10.63 | 4 | 3/4 10UNC | 11.14 | 6.85 | 12.52 | 14.49 | 11.81 | 9.37 | 2.48 | 12 | 3/4 10UNC | 4 | 0.71 |
| 8" | 2.87 | 10.63 | 13.00 | 4 | 7/8 9UNC | 12.40 | 8.19 | 14.06 | 15.75 | 11.81 | 9.37 | 2.48 | 12 | 7/8 9UNC | 4 | 0.79 |
| 10" | 3.27 | 12.76 | 15.25 | 4 | 1 8UNC | 13.98 | 9.29 | 15.63 | 17.32 | 11.81 | 8.90 | 3.07 | 16 | 1 8UNC | 4 | 0.79 |
| 12" | 3.62 | 15.00 | 17.75 | 4 | 1 1/8 8 UN | 15.63 | 10.71 | 17.60 | 20.55 | 11.81 | 10.63 | 4.72 | 16 | 1 1/8 8UN | 4 | 0.98 |
| 14" | 4.61 | 16.26 | 20.25 | 4 | 1 1/8 8 UN | 17.80 | 12.60 | 19.96 | 22.52 | 15.75 | 13.46 | 4.72 | 20 | 1 1/8 8UN | 4 | 0.98 |
| 16" | 5.24 | 18.50 | 22.50 | 4 | 1 1/4 8UN | 19.57 | 14.02 | 21.61 | 24.29 | 27.56 | 16.85 | 4.72 | 20 | 1 1/4 8UN | 4 | 0.98 |
| 18" | 5.87 | 20.98 | 24.75 | 4 | 1 1/4 8UN | 20.87 | 14.80 | 22.91 | 25.59 | 27.56 | 16.85 | 4.96 | 24 | 1 1/4 8UN | 4 | 1.10 |
| 20" | 6.26 | 22.99 | 27.00 | 4 | 1 1/4 8UN | 22.20 | 16.02 | 24.25 | 27.91 | 15.75 | 12.20 | 4.96 | 24 | 1 1/4 8UN | 4 | 1.18 |
| 24" | 7.13 | 27.24 | 32.00 | 4 | 1 1/2 8 UN | 26.06 | 18.58 | 28.62 | 32.52 | 15.75 | 15.16 | 5.98 | 24 | 1 1/2 8 UN | 4 | 1.18 |

PART NUMBER CONFIGURATION

| | | | | | | | | | | | | | |
|----------|-----------|-----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| T | DS | 60 | R | 03 | R | G | W | W | 1 | A | 1 | A | A |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

| 1-VALVE TYPE | 2-BODY CONSTRUCTION | 3-NOMINAL SIZE |
|-------------------------------------|---|--|
| TOV = Triple Offset Butterfly Valve | DS = Double Flanged (short) DL = Double Flanged (long) W = Wafer L = Lug | 30 = 3" 140 = 14" 280 = 28" 40 = 4" 160 = 16" 300 = 30" 60 = 6" 180 = 18" 320 = 32" 80 = 8" 200 = 20" 360 = 36" 100 = 10" 240 = 24" 420 = 42" 120 = 12" 260 = 26" 480 = 48" |

| 4-CONNECTION | 5-PRESSURE | 6-SERVICE |
|-----------------------------|----------------------------------|---|
| R = RF B = BW J = RTJ | 01 = 150 03 = 300 06 = 600 | L = Low Temp. NACE N = Regular Temp. NACE A = Corrosive NACE R = Regular Temp. O = Oxygen C = Cryogenic H = High Temp. V = Vacuum X = Special |

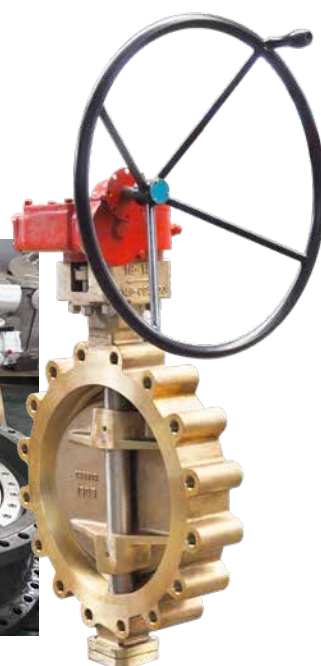
| 7-OPERATOR | 8-BODY MATERIAL | 9-DISC MATERIAL |
|--|--|--|
| G = Gear B = Bare Stem A = Actuator E = Extended* *Add "E" to designate extended top works i.e. GE equals extended gear | W = WCB L = LCC S = CF8M (316) A = WCC B = LCB C = WC6 D = WC9 E = C5 F = CF3 (304L) | G = CF3M(316L) H = CN7M I = CF8C (347SS) J = Duplex K = Super Duplex M = Monel N = NiAlBz X = Special |

| 10-SHAFT MATERIAL | 11-SEAT MATERIAL | 12-SEAL RING |
|--|--|---|
| 1 = F6A 2 = F304 3 = F316 4 = F304L 5 = F316L 6 = 17-4PH 99 = As per service requirements X = Special | A = 316 B = 316 + Stellite 6 99 = As per service requirements X = Special | 1 = 316+Flex Graphite 2 = 316 Solid Ring 3 = 316 Solid Ring + Stellite 6 99 = As per service requirements X = Special |

| 13-SEAT MATERIAL | 14-BUSHING MATERIAL |
|---|---|
| A = Flex Graphite B = PTFE 99 = As per service requirements | A = B148 C95500 99 = As per service requirements |

Example valve figure number: TDS60R03RGWW1A1AA

Triple Offset Butterfly valve, double flanged short pattern, 6", raised face end connection, 300 AMSE, Regular temp., gear operator, WCB body and WCB disc, F6A shaft, 315 seat, 316 plus flex graphite seal, flex graphite seat, and B148 C95500 bushing.



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