FS-HP 0001-GB-11.01/GP

FLOWSEAL

Butterfly Valves
Series HP

CRANE®

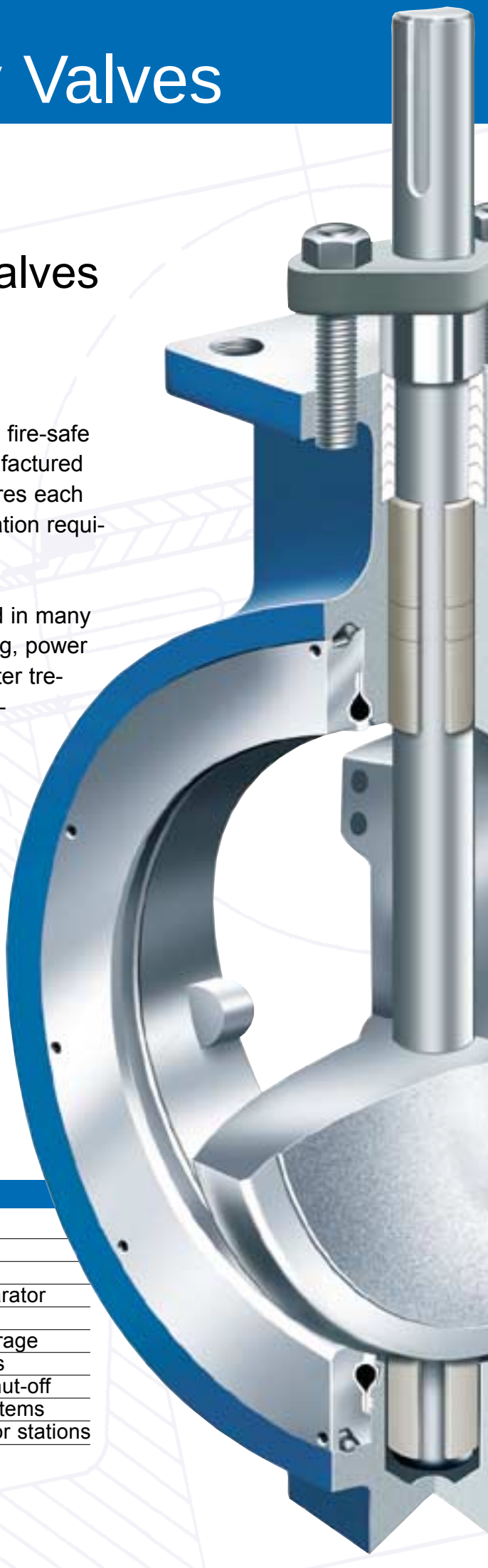
FLOWSEAL-Butterfly Valves Series HP

High Performance process valves for industrial applications

Areas of application
Flowseal is a leading provider of soft seat, metal seat and fire-safe high performance butterfly valves. Our products are manufactured under an ISO 9001 Quality Assurance Program that ensures each valve we produce meets or exceeds your exacting application requirements.

Flowseal high performance butterfly valves are a standard in many industries including heating, ventilating and air conditioning, power generation, hydrocarbon processing, water and waste water treatment, and marine and commercial shipbuilding. Our products are also installed in applications as diverse as food and beverage processing, snowmaking and pulp and paper production. Configurations are available for harsh conditions as well as applications requiring nominal pressure and temperature ratings.

As part of Crane Valve Group, Flowseal high performance butterfly valves an backed by the resources and experience of one of the world's largest valve producers with a delivery and quality track record that is unparalleled in the industries we serve.



Main areas of application:

- Chemical
- Marine and Shipbuilding
- Petroleum Refining
- Power Generation
- Pulp and Paper
- Commercial Constructions
- Transmission
- Mining
- Snowmaking Systems
- Water and Sewage

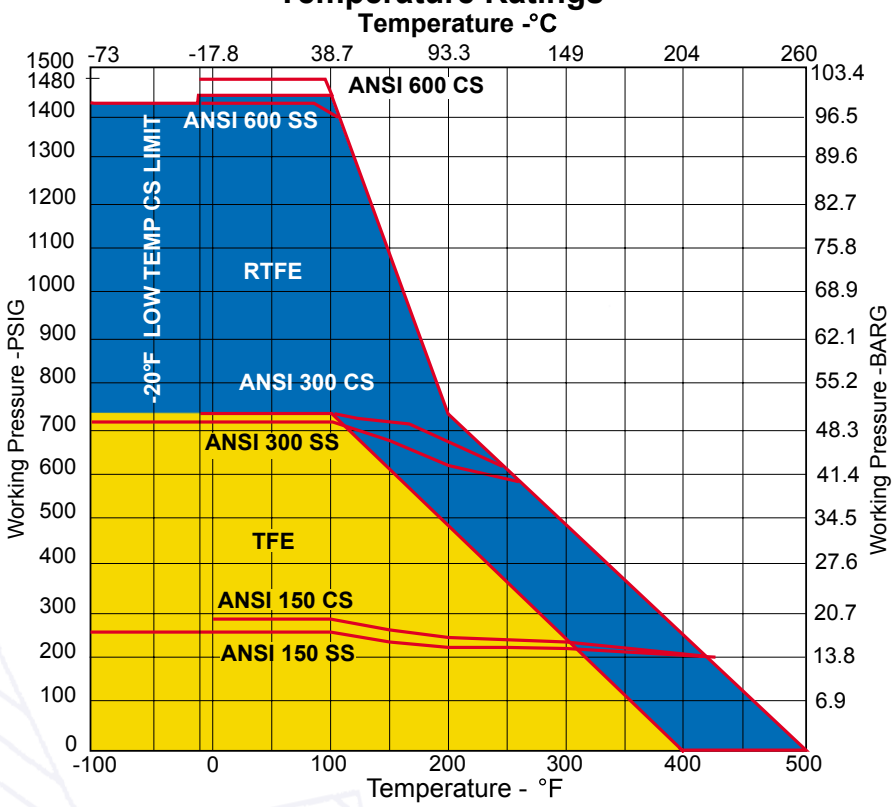
Applications:

- Gas dryer / separation
- Waste water discharge
- Hot water
- Sugar / molasses separator
- Fresh and sea water
- Jet and Diesel fuel storage
- Fire protection systems
- Bottom ash / fly ash shut-off
- Chemical recovery systems
- Natural gas compressor stations

For highest demands over a wide range of pressures and temperatures

Pressure / Temperature Ratings:
As temperature increases, the pressure retaining capability of materials decreases. The graph below illustrates the pressure/temperature ratings of the Flowseal ANSI Class 150, Class 300 and Class 600 for sizes 2“ to 48“.

ANSI B16.34 Body and Flowseal Soft Seat Pressure - Temperature Ratings



The heavy lines define the ratings of the carbon steel and stainless steel valve body (or "shell") in conformance to ANSI B16.34. The shaded areas define the ratings of the soft seat.

Seat ratings are based on differential pressure with the disc in the fully closed position.

Soft Seat Design

The Flowseal Soft Seat valve provides a bi-directional bubble tight shutoff (zero leakage) by the use of a patented seat. This unique seat design creates a self-energized seal in vacuum-to-low pressure applications. Under higher pressure conditions, the seat is also designed to permit, confine and direct movement of the against the disc edge, up to the full ANSI Class 150, 300 and 600 Cold Working Pressures.

DISC SPACERS
Disc is centered by use of thrust spacers around shaft in sizes 2" to 5". Disc position stops or thrust bolt arrangements are used for larger valve sizes.

WEDGE PINS
Provide positive mechanical attachment of disc to shaft.

RETAINER RING
Retains seat in valve. Standard surface finish is 125 to 200 AARH and is compatible with both standard gaskets and spiral wound gasket designs. Outside diameter is recessed within gasket sealing surface to prevent external leakage.

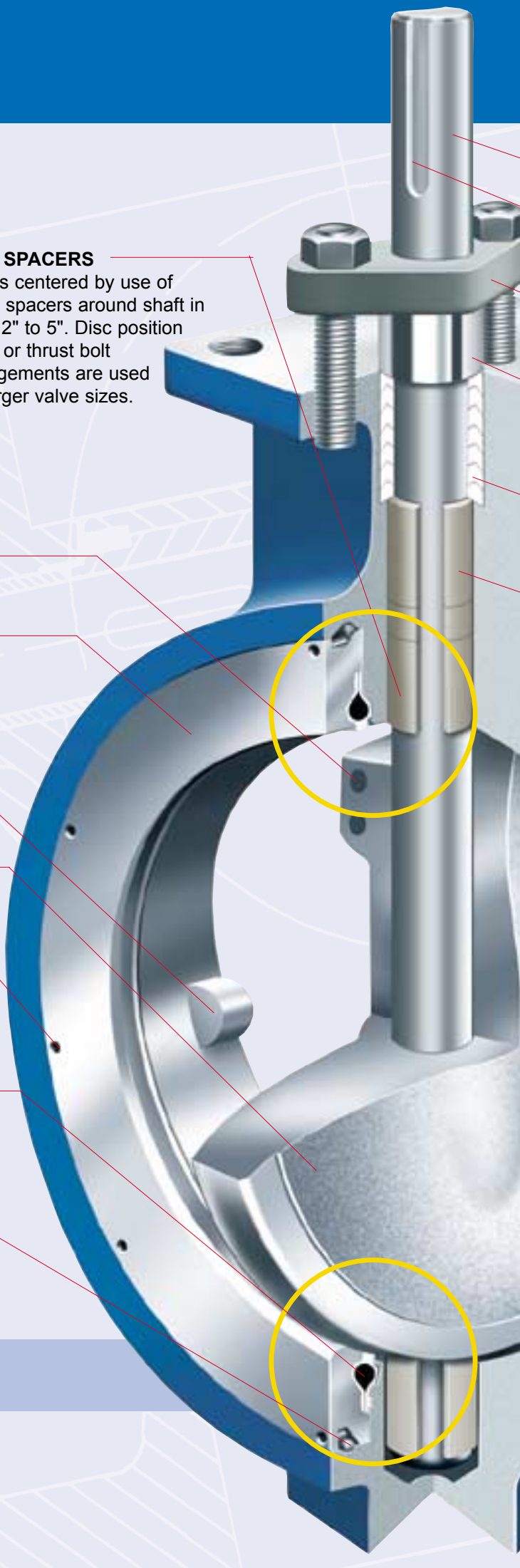
OVERTRAVEL STOP
Prevents disc from rotating into wrong quadrant.

DISC
360° uninterrupted spherical edge for sealing. Profile is designed for maximum flow and equal percentage control.

SET SCREWS
Cone point screws force wedge ring outward to lock seat retainer in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.

SOFT-SEAT
Patented bi-directional seat with encapsulated elastomeric o-ring core for resiliency. Common seat materials include TFE, RTFE and UHMWPE.

WEDGE RING
Stainless steel band wedged between valve body and retainer ring by set screws to lock seat and retainer ring in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.through 30". Socket head cap screws are used on valve sizes 36" and larger.



BLOW OUT PROOF SHAFT
Solid shaft provides alignment and rigid support for disc.

KEY
Square key valve-to-operator
connection provides an externally controlled failure point upon over-torquing.

GLAND FLANGE
Applies load against packing gland to prevent external leakage. Fully adjustable.

PACKING GLAND
Separate part from gland flange,
preventing uneven load distribution against packing.

PACKING
Chevron design TFE prevents external leakage out valve neck to full ANSI hydrostatic shell test pressures (150% of C.W.P.).

BEARINGS
Both above and below the disc, bearings are of composite design: PTFE bonded to epoxy- glass filament wound ring. Used to align shaft, with high capacity, low wear and low friction coefficient.

End Seal Variation
The ANSI 150 14" through 24" sizes feature a two-piece shaft design. The lower shaft utilizes an end seal in the body to prevent external leakage. The component parts include an end seal, an end cap and end cap bolts.

Lower Packing Variation
The ANSI 150 30" through 48"; ANSI 300 14" through 30"; ANSI 600 10" through 16" sizes feature a two-piece shaft design which utilizes a lower packing seal in the valve body to prevent external leakage. The component parts are of the same design used in the packing assembly in the top of the valve body neck.

BODY
ANSI B16.34 design in either wafer or lug configuration.

Principle of Sealing

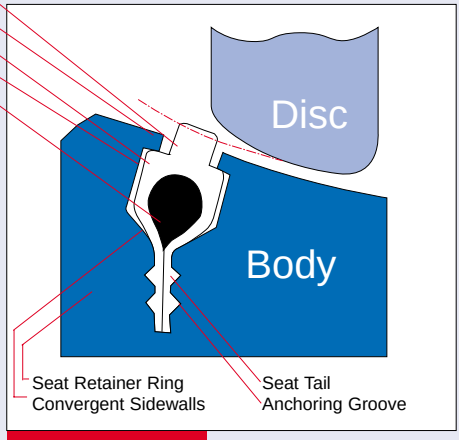


Figure 1

Disc open
In Figure 1, the disc and seat are not engaged. In this position, the shoulders of the seat are forced against the cavity shoulders by the compression of the o-ring. The seat is recessed inside the seat cavity and acts as a gasket in the anchoring groove area. The seat cavity is sealed from exposure from the process fluid and protects the seat from abrasion and wear. The o-ring, which is completely encapsulated by the seat, is also isolated from exposure to the process fluid.

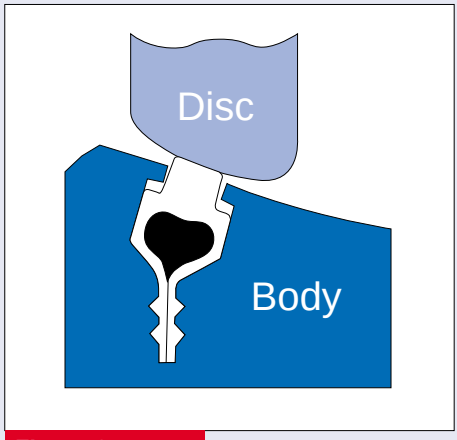


Figure 2

Disc closed, Self-Energized Seal
In Figure 2, the Flowseal disc and seat are engaged, and the process fluid is under low pressure. The edge of the disc, with a larger diameter than the seat tongue, directs movement of the seat radially outward, causing the seat to compress against the convergent sidewalls of the cavity.
The elastomeric o-ring imparts a mechanical pre-load between the disc and seat tongue as it is compressed and flattened by the disc; this is the self-energized mode for sealing at vacuum-to-60 psig. As the seat moves radially outward, the seat shoulders move away from the cavity shoulders and open the cavity to the process media.

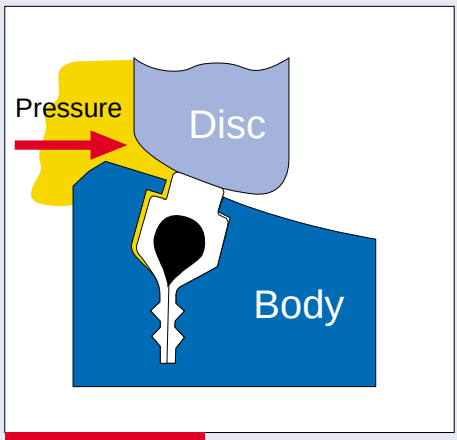


Figure 3

Disc Closed, Pressure-Energized Seal (Seat Upstream)
As line pressure increases, the process fluid enters the sidewall area and applies a load against the parallel-spaced sidewall and convergent sidewall of the seat. The seat and cavity design permits the seat to move axially to the down-stream sidewall, but confines the movement and directs the movement radially inward towards the disc; the higher the line pressure, the tighter the seal between the disc and seat. Because the o-ring is elastic, it is able to flex and deform under loads and return to original shape after removal of the load; it is the rubber which deforms, not the thermoplastic material. This dynamic seal, patented by Flowseal, is totally unique among high performance butterfly valves.

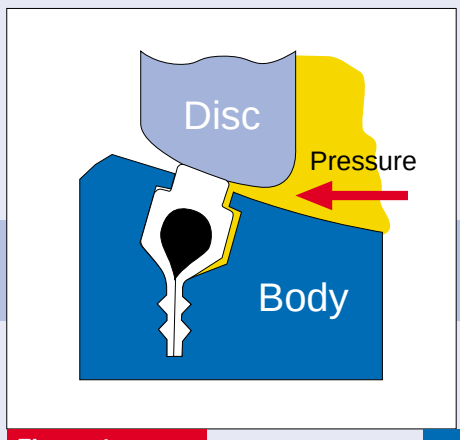


Figure 4

Disc Closed, Pressure-Energized Seal (Seat Downstream)
The Flowseal valve is bi-directional (in some instances, modifications may be required to operate this arrangement for dead end service). The cavity and seat sidewalls are symmetrically designed to permit, confine and direct movement of the seat to the disc to dynamically seal with line pressure in the reverse direction. The disc edge is the segment of a sphere, and the seat is angled towards the disc edge to seal with pipeline pressure in either direction. Recommended installation direction is "SUS" (seat up-stream), as in Figure 3.

Fire Flow Design

The Flowseal Fire-Flow™ high performance butterfly valve (HPBFV) is a fire-safe, soft seat quarter-turn valve.

The Fire-Flow™ design incorporates a patented seat which function together to seal off pipeline flow. In normal operation, the soft seat provides a bi-directional "bubble tight" shutoff (zero leakage); in conformance to industry firesafe requirements.

DISC SPACERS
Disc is centered by use of thrust spacers around shaft in sizes 2" to 5". Disc position stops or thrust bolt arrangements are used for larger valve sizes.

WEDGE PINS
Provide positive mechanical attachment of disc to shaft.

RETAINER RING
Retains seat in valve. Standard surface finish is 125 to 200 AARH and is compatible with both standard gaskets and spiral wound gasket designs. Outside diameter is recessed within gasket sealing surface to prevent external leakage.

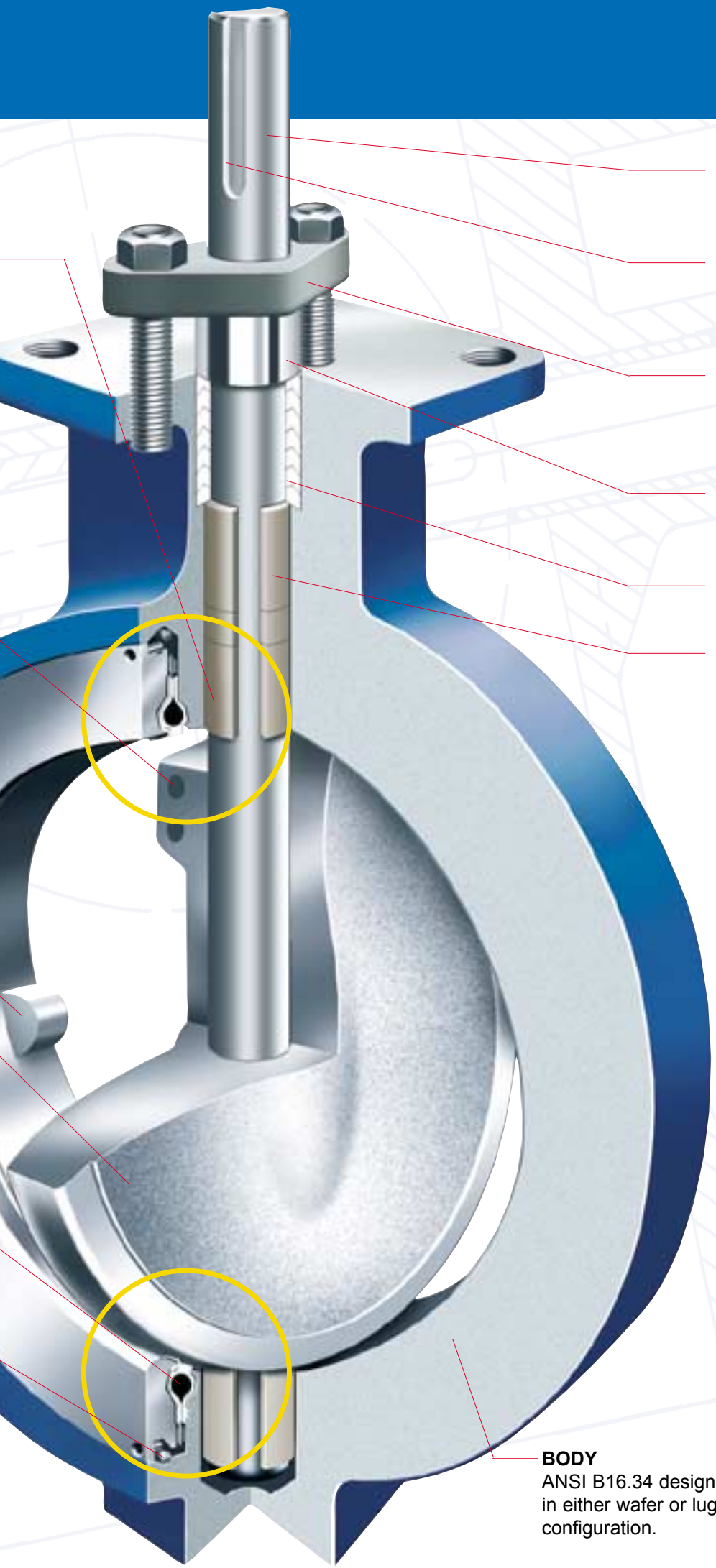
OVERTRAVEL STOP
Prevents disc from rotating into wrong quadrant.

DISC
360° uninterrupted spherical edge for sealing. Profile is designed for maximum flow and equal percentage control.

SET SCREWS
Cone point screws force wedge ring outward to lock seat retainer in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.

FIRE–FLOW SEAT
Patented bi-directional soft seat design for zero-leakage in normal operation and a metal-to-metal seal after fire, meeting or exceeding industry "fire-safe" specifications.

WEDGE RING
Stainless steel band wedged between valve body and retainer ring by set screws to lock seat and retainer ring in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.through 30". Socket head cap screws are used on valve sizes 36" and larger.



BLOW OUT PROOF SHAFT
Solid shaft provides alignment and rigid support for disc.

KEY
Square key valve-to-operator connection provides an externally controlled failure point upon over-torquing.

GLAND FLANGE
Applies load against packing gland to prevent external leakage. Fully adjustable.

PACKING GLAND
Separate part from gland flange, preventing uneven load distribution against packing.

PACKING
Standard material is graphite.

BEARINGS
Both above and below the disc, bearings are of composite design: PTFE bonded to epoxy-glass filament wound ring. Used to align shaft, with high capacity, low wear and low friction coefficient.

End Seal Variation
The ANSI 150 14" through 24" sizes feature a two-piece shaft design. The lower shaft utilizes an end seal in the body to prevent external leakage. The component parts include an end seal, an end cap and end cap bolts.

BODY
ANSI B16.34 design in either wafer or lug configuration.

Principle of Sealing

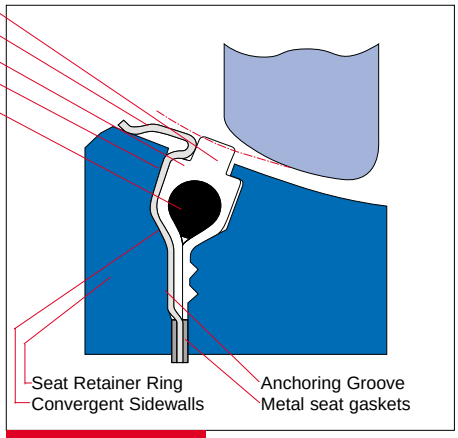


Figure 1

DISC OPEN, Normal Operation
In Figure 1, the disc and seat assembly are not engaged. In this position, the metal seat acts to keep the soft seat inside the seat cavity while the soft seat shoulders seal the cavity from exposure to the process fluid. (The o-ring is under tension and imparts a load against the soft seat.) The soft seat is protected from abrasion and wear because it is recessed inside the seat cavity area. The o-ring is isolated from exposure to the fluid because it is completely encapsulated by the seat tails which act as a (soft) gasket in the anchoring groove area. The metal seat gaskets add further high temperature protection past the anchoring grooves.

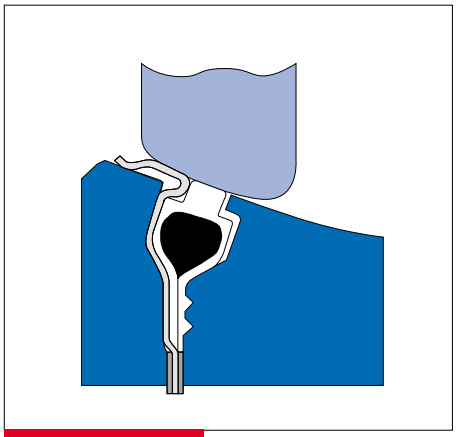


Figure 2

Disc Closed, Normal Operation
In Figure 2, the disc and seat assembly are engaged; both the metal seat and the Ssoft seat are in contact with the disc. Under little to no pressure conditions, the metal and soft seats are self-energized. The disc edge, with a larger diameter than the seat tongues, moves the seats radially outward; the metal seat shape, with a mechanical and dynamic flexibility, is designed to be hoop-loaded and impart a spring force against the disc, while the soft seat o-ring is stretched and flattened (without deformation of the thermoplastic material) and imparts a mechanical pre-load against the disc. With increased line pressure, the process fluid enters the cavity sidewall area and applies loads against the seat sidewalls. The cavity design permits the seats to move toward the downstream sidewalls, but confines and directs the movement radially inward towards the disc; the higher the pressure the tighter the seal between the disc and seats.The symmetrical shape and angle of the cavity permit the seal to be bi-directional.

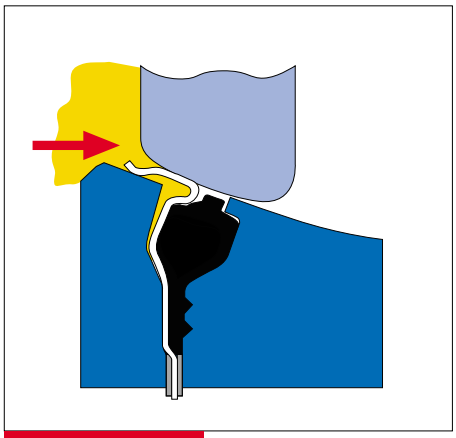


Figure 3

Disc Closed, After Fire (Seat Upstream)
After a fire, with partial or complete destruction of the soft seat, the metal seat maintains metal-to-metal contact with the disc and restricts leakage of the process fluid in conformance to industry fire-safe requirements. With little or no line pressure, the spring force and hoop load of the metal seat maintain a "line contact" seal against the disc edge. Under higher pressures,the process fluid enters the cavity sidewall areas and applies loads against the seat sidewalls (Figure 3). The geometry of the metal seat permits the seat to move axially, but directs the movement radially inward toward the disc; The higher the pressure, the tighter the line contact seal. Graphite gaskets, on both sides of the metal seat tail, seal the anchoring groove and prevent leakage of the process fluid.

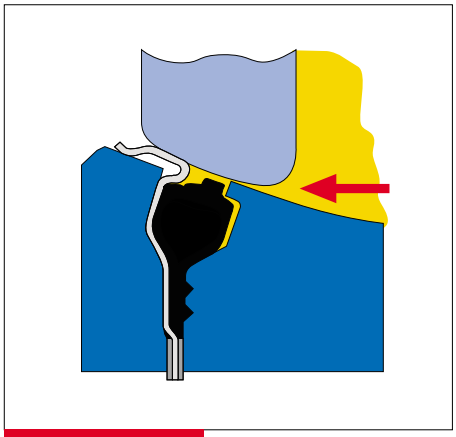


Figure 4

Disc Closed, After Fire (Seat Downstream)
The Flowseal Fire-Flow™ valve is bi-directional, however, modifications are required to operate for bi-directional dead end service. The angle and shape of the cavity and metal seat maintains metal-to-metal contact in the event of partial or complete soft seat destruction with line pressure in the reverse direction (Figure 4). While the preferred flow direction is "seat upstream" (SUS), the bi-directional seat design is both self-energized and pressure-energized if the flow direction is "seat downstream" (SDS).

Lower Packing Variation
The ANSI 150 30" through 48"; ANSI 300 14" through 30"; ANSI 600 10" through 16" sizes feature a two-piece shaft design which utilizes a lower packing seal in the valve body to prevent external leakage.
The component parts are of the same design used in the packing assembly in the top of the valve body neck.

pecifications

Design:	ANSI B16.34 MSS SP-68 MIL-V-24624 API 609
Face to Face:	API 609
Flange connection:	ANSI B16.5 MSS SP-44
Testing:	MSS SP-61 API 598 ANSI / FCI 70-2
Fire-Safe Testing:	API 607
Marking:	MSS SP-25
Quality control:	MIL-I-45208 A MSS SP-6 MSS SP-55 ISO 9001

Actuation Options

REVO Pneumatic Actuators

- Compact rack and pinion design
- Travel stops in both directions
- Corrosion protection
- NAMUR solenoid and accessory mounting
- Extruded aluminium body with anodizing

Worm Gear Operators

With standard aluminum handwhweel

- High temperature service
- Buried service
- Submersible service
- Marine service

Optional accessories

- Chain wheel
- Output or input shaft extention
- Military operator
- AWWA operator

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CRANE

Model Soft Seat

FS-HP/DB-0002-GB/02.02/GP

Model Numbers

VALVE SIZE				VALVE TYPE			MATERIALS OF CONSTRUCTION						FEATURES		
H	1	2	–	1	W	A	1	2	1	T	T	G	F	P	0
1	2	3		4	5	6	7	8	9	10	11	12	13	14	15

1.*[1] Type H = Flowseal HP

2, 3. Size Code	
02 = 2“ (DN 50)	14 = 14“ (DN 350)
25 = 2 1/2“ (DN 65)	16 = 16“ (DN 400)
03 = 3“ (DN 80)	18 = 18“ (DN 450)
04 = 4“ (DN 100)	20 = 20“ (DN 500)
05 = 5“ (DN 125)	24 = 24“ (DN 600)
06 = 6“ (DN 150)	30 = 30“ (DN 750)
08 = 8“ (DN 200)	36 = 36“ (DN 900)
10 = 10“ (DN 250)	42 = 42“ (DN 1000)
12 = 12“ (DN 300)	48 = 48“ (DN 1200)

4. Body Class Code		
0	=	150 PSI Max. Diff. Pressure
1	=	ANSI 150
3	=	ANSI 300
6	=	ANSI 600

5. Body Type Code		
W	=	Wafer
L	=	Lugged

6. Shaft Design Code
A = Straight
2“ - 24“ ANSI 150
2“ - 12“ ANSI 300
2“ - 8“ ANSI 600
C = Balanced
30“- 48“ ANSI 150
14“- 30“ ANSI 300
10“- 16“ ANSI 600

7. Body Material Code		
1	**=**	**Carbon Steel**
2	=	316 SS
3	=	Monel
4	=	Alloy 20
5	=	Alum Bronze MIL-B-24480
8	=	Alum Bronze B148 ASTM C958
H	=	Hastelloy C
X	=	Special

Note *1: „H“ means only for identification Flowseal HP Description on the nameplate without „H“
Note 2: Use of 316 SS shaft will lower shutoff differentials. Consult factory

8. Disc Material Code		
0	=	Alum Bronze/ENP B148 C958
2	**=**	**316 SS**
3	=	Monel
4	=	Alloy 20
5	=	Alum Bronze MIL-B-24480
7	=	316 SS Nitrided
8	=	Alum Bronze B148 ASTM C958
9	=	316 SS/ENP
H	=	Hastelloy C
J	=	Hastelloy C/ENP
X	=	Special

9. Shaft Material Code		
1	**=**	**17-4PH SS**
2	=	316 SS (Note 2)
3	=	Monel
4	=	Alloy 20
6	=	Inconel 718/750
7	=	Ferralium A479
0	=	Nitronic 50
H	=	Hastelloy C
X	=	Special

10. Seat Material Code		
T	**=**	**TFE**
R	=	RTFE
L	=	Polyethylene (UHMWPE)
F	=	Fire Flow (TFE & Metal)
B	=	Fire Flow (RTFE & Metal)
M	=	Inconel
S	=	300 SS
C	=	Fire Flow (TFE & Monel)
J	=	Fire Flow (RTFE & Monel)
H	=	Fire Flow (TFE & Hastelloy C)
K	=	Fire Flow (RTFE & Hastelloy C)
O	=	Steam Seat
X	=	Special

11. Packing Material Code		
T	**=**	**TFE**
G	=	Graphite
F	=	Fire-Flow
X	=	Special

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12. Bearing Material Code		
G	**=**	**Glass Backed TFE**
H	=	316 SS Backed TFE
F	=	Fire-Flow (Garfil & 316 SS)
S	=	Stainless Steel Nitrided
B	=	Bronze
K	=	Monel
J	=	Hastelloy C Backed TFE
X	=	Special

13. Actuator Type Code		
F	=	Bare Shaft (Order to Crane ”B”)
H	=	Ratchet Handle
G	=	Worm Gear (Order to Crane ”3”)
L	=	Ratchet Handle w/Lock
T	=	Throttle
X	=	Other

14, 15. Special Feature Code		
P0	=	Standard unidirectional Dead-End Service (PED)
A0	=	Oxygen Service
B0	=	Bi-Directional
C0	=	Chlorine Service
E0	=	Bi-directional Dead-End Service (PED)
F0	=	Flat Face
M0	=	Mil-V-24624
N0	=	NACE-Construction
S0	=	60-125 AARH Facing
V0	=	Vacuum Service
X0	=	Special Feature Further Description Required

Note: Please use the code „P0“ or „E0“ when ordering CE Marked Products according PED

Bold = Standard materials

Example: H121WA121TTGF00

TYPICAL SPECIFICATION

1.0 Scope

This specification covers the design and testing of high pressure offset seat butterfly valves.

2.0 Applicable Standards

The following standards shall apply

ANSI B16.5: Pipe Flanges and Flanged Fittings (24“ size and smaller).

ANSI B16.34: Valves-Flanged and Buttwelding End.

MSS SP-25: Standard Marking System for Valves, Fittings, Flanges and Unions.

MSS SP-61: Pressure Testing of Steel Valves.

MSS SP-68: High Pressur-Offset Seat Butterfly Valves.

API 609: Butterfly Valves, Lug-Type and Wafer-Type.

3.0 Design Requirement

3.1 Valves shall be High Performance Butterfly with offset seat and eccentric shaft. They shall be capable of sealing against full differential pressure in either flow direction.

3.2 Valve seat shall be both self and pressure energized with an elastomeric core. The self energizing member shall be isolated from the line media.

3.3 Valves shall have retained top and bottom low friction bearings.

3.4 Shaft design shall be single or dual piece.

3.5 Retainer rings must be recessed in the body so that the line gasket prevents any potential external leakage.

3.6 Valves shall have internal stop to prevent disc over-travel.

3.7 Valves shall be Flowseal or approved equal.

4.0 Materials

4.1 Valves shall be constructed of new material.

4.2 Carbon steel valves shall be constructed from materials below:

4.2.1 Body-ASTM A105 or A216 Gr. WCB.

4.2.2 Disc-ASTM A182 F316 or A351 Gr. CF8M.

4.3 Stainless steel valves shall be constructed from materials below:

4.3.1 Body-ASTM A 182 Gr. F316 or A351 Gr. CF8M.

4.3.2 Disc-ASTM A182 Gr. F316 or A351 Gr. CF8M.

4.4 Shafts shall be ASTM A564 type 630 H 1150 or 316 SS.

5.0 Inspection and Test

5.1 Valves shall be hydrostatically shell tested per ANSI B16.34 and MSS SP-61.

5.2 Valves shall be seat tested per MSS SP-61. No leakage is permitted for resilient seated valves.

5.3 API 598 testing available upon request.

CRANE

Model Fire-Flow

FS-HP/DB-0003-GB/02.02/GP

Model Numbers

VALVE SIZE				VALVE TYPE				MATERIALS OF CONSTRUCTION							FEATURES			
H	1	2	–	1	W	A	–	1	9	1	F	F	F	–	F	P	0	
1	2	3		4	5	6		7	8	9	10	11	12		13	14	15	

1.*[1] Type H = Flowseal HP

2, 3. Size Code	
02 = 2“ (DN 50)	14 = 14“ (DN 350)
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04 = 4“ (DN 100)	20 = 20“ (DN 500)
05 = 5“ (DN 125)	24 = 24“ (DN 600)
06 = 6“ (DN 150)	30 = 30“ (DN 750)
08 = 8“ (DN 200)	36 = 36“ (DN 900)
10 = 10“ (DN 250)	42 = 42“ (DN 1000)
12 = 12“ (DN 300)	48 = 48“ (DN 1200)

4. Body Class Code		
0	=	150 PSI Max. Diff. Pressure
1	=	ANSI 150
3	=	ANSI 300
6	=	ANSI 600

5. Body Type Code		
W	=	Wafer
L	=	Lugged

6. Shaft Design Code
A = Straight
2“ - 24“ ANSI 150
2“ - 12“ ANSI 300
2“ - 8“ ANSI 600
C = Balanced
30“- 48“ ANSI 150
14“- 30“ ANSI 300
10“- 16“ ANSI 600

7. Body Material Code		
1	**=**	**Carbon Steel**
2	=	316 SS
3	=	Monel
4	=	Alloy 20
5	=	Alum Bronze MIL-B-24480
8	=	Alum Bronze B148 ASTM C958
H	=	Hastelloy C
X	=	Special

Note *1: „H“ means only for identification Flowseal HP Description on the nameplate without „H“
Note 2: Use of 316 SS shaft will lower shutoff differentials. Data sheet Pressure / Temperature Ratings

8. Disc Material Code		
0	=	Alum Bronze/ENP B148 C958
2	=	316 SS
3	=	Monel
4	=	Alloy 20
5	=	Alum Bronze MIL-B-24480
7	=	316 SS Nitrided
8	=	Alum Bronze B148 ASTM C958
9	**=**	**316 SS/ENP**
H	=	Hastelloy C
J	=	Hastelloy C/ENP
X	=	Special

9. Shaft Material Code		
1	**=**	**17-4PH SS**
2	=	316 SS (Note 2)
3	=	Monel
4	=	Alloy 20
6	=	Inconel 718/750
7	=	Ferralium A479
0	=	Nitronic 50
H	=	Hastelloy C
X	=	Special

10. Seat Material Code		
T	=	TFE
R	=	RTFE
L	=	Polyethylene (UHMWPE)
F	**=**	**Fire-Flow (TFE & Metal)**
B	=	Fire-Flow (RTFE & Metal)
M	=	Inconel
S	=	300 SS
C	=	Fire Flow (TFE & Monel)
J	=	Fire-Flow (RTFE & Monel)
H	=	Fire-Flow (TFE & Hastelloy C)
K	=	Fire-Flow (RTFE & Hastelloy C)
X	=	Special

11. Packing Material Code		
T	=	TFE
G	=	Graphite
F	**=**	**Fire-Flow**
X	=	Special

CRANE

12. Bearing Material Code		
G	=	Glass Backed TFE
H	=	316 SS Backed TFE
F	**=**	**Fire-Flow (Garfil & 316 SS)**
S	=	Stainless Steel Nitrided
B	=	Bronze
K	=	Monel
J	=	Hastelloy C Backed TFE
X	=	Special

13. Actuator Type Code		
F	=	Bare Shaft (Order to Crane ”B”)
H	=	Ratchet Handle
G	=	Worm Gear (Order to Crane ”3”)
L	=	Ratchet Handle w/Lock
T	=	Throttle
X	=	Other

14, 15. Special Feature Code		
P0	=	Standard unidirectional Dead-End Service (PED)
A0	=	Oxygen Service
B0	=	Bi-Directional
C0	=	Chlorine Service
E0	=	Bi-directional Dead-End Service (PED)
F0	=	Flat Face
M0	=	Mil-V-24624
N0	=	NACE-Construction
S0	=	60-125 AARH Facing
V0	=	Vacuum Service
X0	=	Special Feature Further Description Required

Note: Please use the code „P0“ or „E0“ when ordering CE Marked Products according PED

Bold = Standard materials

Example: H121WA191FFFF00

TYPICAL SPECIFICATION

1.0 Scope

This specification covers the design and testing of high pressure offset seat butterfly valves.

2.0 Applicable Standards

The following standards shall apply

ANSI B16.5: Pipe Flanges and Flanged Fittings (24“ size and smaller).

ANSI B16.34: Valves-Flanged and Buttwelding End.

MSS SP-25: Standard Marking System for Valves, Fittings, Flanges and Unions.

MSS SP-61: Pressure Testing of Steel Valves.

MSS SP-68: High Pressure-Offset Seat Butterfly Valves.

API 609: Butterfly Valves, Lug-Type and Wafer-Type.

API 607: Fire Test for Soft-Seated Quarter Turn Valves.

3.0 Design Requirement

3.1 Valves shall be High Performance Butterfly with offset seat and eccentric shaft. They shall be capable of sealing against full differential pressure in either flow direction.

3.2 Valve seat shall be both self and pressure energized with an elastomeric core. The self energizing member shall be isolated from the line media.

3.3 Valves shall have retained top and bottom low friction bearings.

3.4 Shaft design shall be single or dual piece.

3.5 Retainer rings must be recessed in the body so that the line gasket prevents any potential external leakage.

3.6 Valves shall have internal stop to prevent disc over-travel.

3.7 Valves shall be Flowseal or approved equal.

4.0 Materials

4.1 Valves shall be constructed of new material.

4.2 Carbon steel valves shall be constructed from materials below:

4.2.1 Body-ASTM A105 or A216 Gr. WCB.

4.2.2 Disc-ASTM A182 F316 or A351 Gr. CF8M.

4.3 Stainless steel valves shall be constructed from materials below:

4.3.1 Body-ASTM A182 Gr. F316 or A351 Gr. CF8M.

4.3.2 Disc-ASTM A182 Gr. F316 or A351 Gr. CF8M.

5.0 Inspection and Test

5.1 Valves shall be hydrostatically shell tested per ANSI B16.34 and MSS SP-61.

5.2 Valves shall be seat tested per MSS SP-61. No leakage is permitted for resilient seated valves.

5.3 API 598 testing available upon request.

5.4 Flowseal Fire-Flow ™ valves qualified to API 607 fire test standard.

CRANE®

Flow Coefficients Model Soft Seat / Fire-Flow

C_V FACTORS

C_V (Coefficient of Volume) is the number of U.S. gallons per minute of water required to pass through a valve with a pressure drop of 1 psi.
The chart below records this C_V factor for the Flowseal valve classes and sizes at ten degree increments between open and closed. The values shown are for the valve installed in the seat upstream („SUS“) position.

Degree Open % Full C_V		10° 1.5%	20° 6%	30° 14%	40° 25.2%	50° 38%	60° 55%	70° 75%	80° 97%	90° 100%
2“	150	1.5	6	14	25	39	56	76	99	102
	300	1.4	6	13	24	36	52	71	95	100
	600	1.4	5	13	23	35	51	70	90	93
2-1/2“	150	2.2	9	21	37	56	80	110	142	146
	300	2.1	8	19	34	52	75	102	136	143
	600	2.0	8	19	33	51	73	100	130	133
3“	150	3.4	14	32	57	87	125	171	221	228
	300	3.2	13	30	53	81	117	159	212	223
	600	3.1	12	29	52	79	114	156	202	208
3-1/2“	150	5.3	21	49	88	132	192	261	338	349
	300	4.8	19	45	80	121	176	240	320	336
4“	150	6.8	27	63	114	171	248	338	437	451
	300	6.2	25	58	104	157	228	310	414	435
	600	5.8	23	54	98	147	213	290	375	387
5“	150	10.8	43	100	180	271	392	535	692	714
	300	9.8	40	92	165	248	361	491	655	688
6“	150	16.5	66	154	278	419	607	827	1070	1103
	300	14.9	60	139	250	377	546	744	992	1041
	600	14.7	59	137	247	372	538	734	950	979
8“	150	30.9	124	289	520	784	1135	1584	2002	2064
	300	27.3	109	255	459	692	1001	1365	1820	1911
	600	26.8	107	250	451	679	983	1341	1734	1788
10“	150	52.8	211	492	886	1336	1934	2638	3411	3517
	300	45.6	183	426	767	1156	1673	2282	3042	3194
	600	41.2	165	384	692	1044	1511	2060	2665	2747
12“	150	72.6	290	677	1219	1838	2660	3628	4690	4837
	300	63.3	253	590	1063	1602	2319	3163	4217	4428
	600	58.4	233	545	981	1479	2140	2918	3774	3891
14“	150	90	392	914	1646	2481	3592	4898	6530	6857
	300	81	326	760	1368	2063	2986	4072	5430	5702
	600	73	292	682	1228	1838	2680	3655	4727	4873
16“	150	132	531	1230	2229	3361	4865	6634	8845	9287
	300	109	435	1015	1827	2755	3988	5438	7850	8243
	600	96	385	899	1619	2423	3533	4818	6231	6424
18“	150	171	684	1596	3873	4332	6270	8550	11270	11400
	300	139	555	1295	2331	3515	5088	6938	9250	9712
20“	150	207	828	1932	3478	5244	7590	10350	13800	14420
	300	158	630	1470	2646	3990	5775	7875	10150	10658
24“	150	315	1260	2940	5292	7890	11550	15750	21000	22050
	300	242	966	2254	4057	6118	8855	12075	16100	16205
30“	150	491	1965	4585	8253	12445	18012	24563	32750	34388
	300	404	1614	3766	6779	10222	14795	20175	26900	28245
36“	150	707	2830	6602	11884	17920	25938	35370	45745	47160
42“	150	963	3851	8987	16176	24392	35304	48143	62264	64190
48“	150	1258	5030	11738	21128	31859	46111	62881	81324	83840

C_f FACTORS

The critical flow factor, C_f, expresses the valve pressure recovery ratio. It is equivalent to F_L in ISA nomenclature.

DISC DEGREE OPENING	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°
SEAT UPSTREAM	.95	.91	.84	.81	.78	.80	.77	.74	.74	.73	.70	.66	.63	.60	.57	.53
SEAT DOWNSTREAM	.94	.89	.84	.82	.80	.77	.75	.72	.69	.66	.63	.60	.58	.55	.54	.53

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CRANE

Model Soft Seat / Fire-Flow

Pressure/Temperature Ratings

As temperature increases, the pressure retaining capability of materials decreases. The graph below illustrates the pressure/temperature ratings of the Flowseal ANSI Class 150, Class 300 and Class 600.

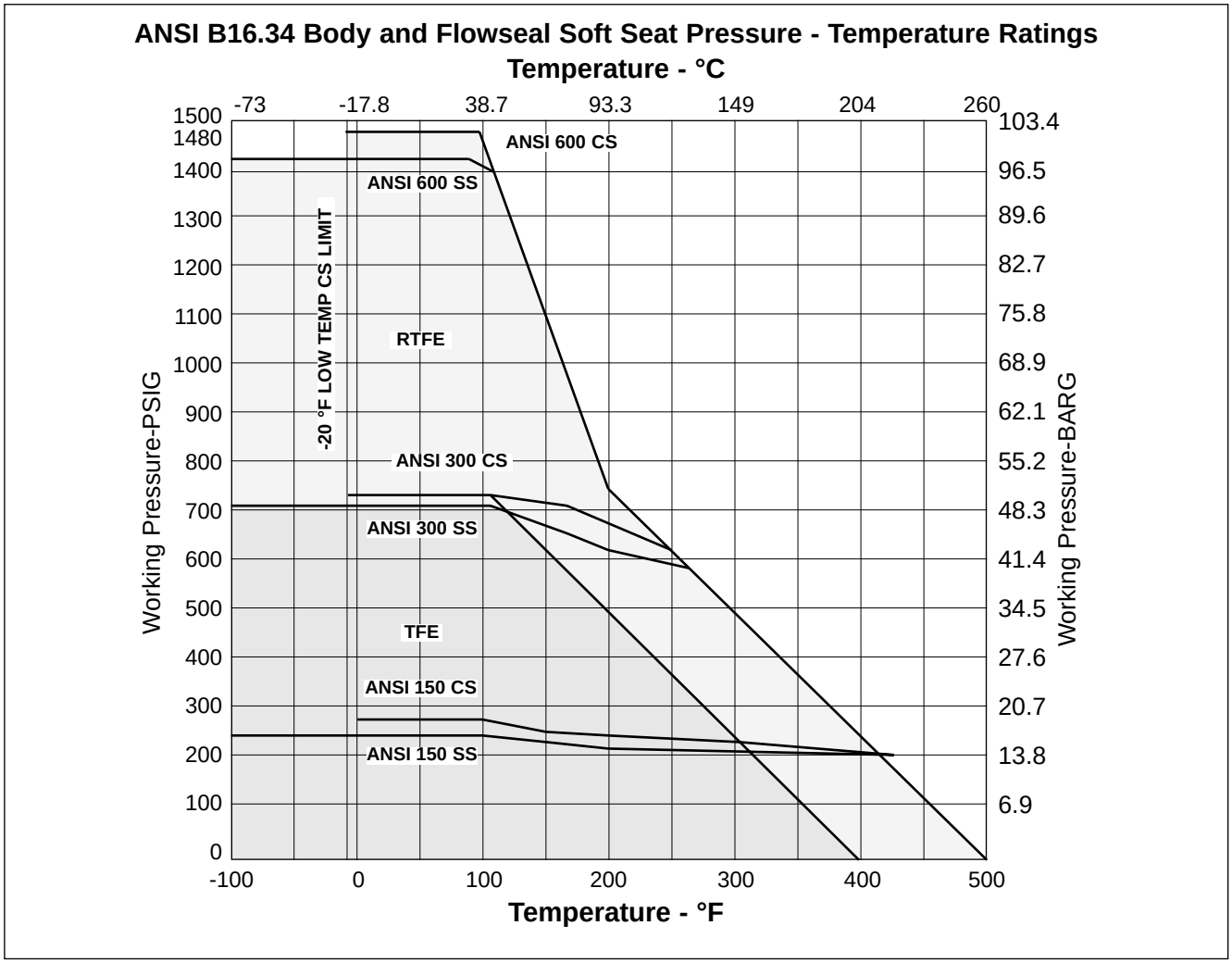
The heavy lines define the ratings of the carbon steel and stainless steel valve body (or „shell“) in conformance to ANSI B16.34. The shaded areas define the ratings of the TFE and RTFE Seat materials.

Seat ratings are based on differential pressure with the disc in the fully closed position.*

Steam Service

TFE seated valves are rated for 50 psi (3,4 bar) saturated steam.

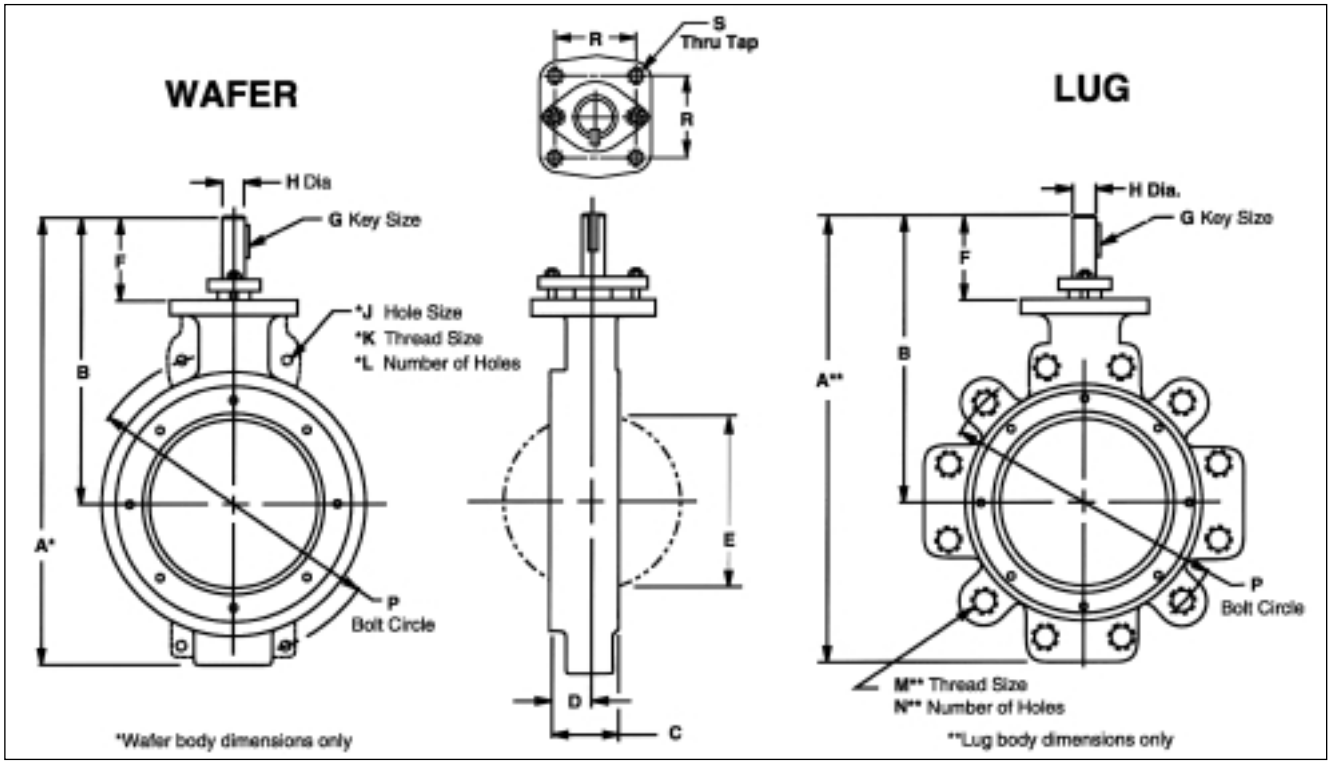
Valves with „O“ seat configuration (RTFE seat / AFLAS O ring) are rated to 100 psi (6,9 bar) steam service.



*Valves with 316 SS shafts are rated for maximum pressure differentials of 150 psi for Class 150, 300 psi for Class 300, and 600 psi for Class 600.

Model Soft Seat / Fire-Flow

Dimensions in mm



ANSI Class150

SIZE		WAFER	LUG																WEIGHT (Kg)	
DN	Inch	A*	A**	B	C	D	E	F	G	H	J*	K*	L*	M**	N**	P	R	R[1)]	S	WAFER	LUG
50	2“	269	269	193	44	27	44	85	4,8	12,7	-	-	-	5/8-11	4	120,7	57,2	R2	3/8-16	3,6	5,0
65	2,5“	262	262	193	48	28	53	85	4,8	12,7	-	-	-	5/8-11	4	139,7	57,2	R2	3/8-16	3,6	5,0
80	3“	295	304	218	49	30	70	91	4,8	15,9	-	-	-	5/8-11	4	152,4	57,2	R2	3/8-16	5,0	5,9
100	4“	328	344	239	54	32	92	93	4,8	15,9	-	-	-	5/8-11	8	190,5	57,2	R2	3/8-16	7,7	11,4
125	5“	369	385	261	57	34	116	97	6,4	19,1	-	-	-	3/4-10	8	215,9	57,2	R2	3/8-16	9,1	13,6
150	6“	399	405	275	59	35	141	97	6,4	19,1	-	-	-	3/4-10	8	241,3	57,2	R2	3/8-16	13,6	15,9
200	8“	452	456	303	64	38	185	97	9,5	25,4	-	-	-	3/4-10	8	298,5	57,2	R2	3/8-16	20	22
250	10“	504	530	329	71	43	234	104	9,5	31,8	oval	-	2	7/8-9	12	362,0	82,6	R3	3/8-16	32	41
300	12“	634	634	393	82	47	283	123	9,5	38,1	oval	-	2	7/8-9	12	431,8	82,6	R3	3/8-16	50	58
350	14“	689	689	408	92	56	324	122	9,5	38,1	oval	-	4	1-8	12	476,3	82,6	R3	3/8-16	61	83
400	16“	804	804	498	102	59	370	176	12,7	44,5	oval	-	4	1-8	16	539,8	108,0	R4	1/2-13	83	114
450	18“	877	877	542	114	62	416	187	12,7	50,8	thru	-	4	1 1/8-8	16	577,9	108,0	R4	1/2-13	106	139
500	20“	932	932	578	127	75	467	194	19,1	57,2	-	1 1/8-8	4	1 1/8-8	20	635,0	127,0	R5	3/4-10	145	188
600	24“	1056	1056	638	154	79	556	200	19,1	63,5	-	1 1/4-8	4	1 1/4-8	20	749,3	127,0	R5	3/4-10	229	319
750	30“	1323	1323	745	171	90	711	222	19,1	76,2	-	1 1/4-8	4	1 1/4-8	28	914,4	127,0	R5	3/4-10	420	513
900	36“	1645	1645	829	213	110	855	207	25,4	95,3	-	1 1/2-8	4	1 1/2-8	32	1085,9	177,8	R7	1-8	740	858
1050	42“	1860	1860	956	235	128	1024	244	25,4	114,3	-	1 1/2-8	4	1 1/2-8	36	1257,3	177,8	R7	1-8	1124	1226
1200	48“	2035	2035	1064	270	143	1149	270	31,8	127,0	-	1 1/2-8	4	1 1/2-8	44	1422,4	228,6	R9	1-8	1278	1401

[1)] Only for identification mounting brackets.

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CRANE

Model Soft Seat / Fire-Flow

Dimensions in mm

ANSI Class 300

SIZE		WAFER	LUG																WEIGHT (Kg)	
DN	Inch	A*	A**	B	C	D	E	F	G	H	J*	K*	L*	M**	N**	P	R	R[1)]	S	WAFER	LUG
50	2“	269	269	193	44	27	44	85	4,8	12,7	-	-	-	5/8-11	8	127,0	57,2	R2	3/8-16	3,6	5,0
65	2,5“	262	262	193	48	28	53	85	4,8	12,7	-	-	-	3/4-10	8	149,4	57,2	R2	3/8-16	3,6	5,0
80	3“	295	304	218	49	30	70	91	4,8	15,9	-	-	-	3/4-10	8	168,3	57,2	R2	3/8-16	5,4	7,7
100	4“	328	344	239	54	32	92	93	4,8	15,9	-	-	-	3/4-10	8	200,0	57,2	R2	3/8-16	7,7	10,9
125	5“	369	385	261	57	34	116	97	6,4	19,1	-	-	-	3/4-10	8	235,0	57,2	R2	3/8-16	9,1	13,6
150	6“	405	414	275	58	35	141	97	9,5	25,4	-	-	-	3/4-10	12	269,9	57,2	R2	3/8-16	13,6	22
200	8“	460	495	310	73	39	179	104	9,5	31,8	-	-	-	7/8-9	12	330,2	82,6	R3	3/8-16	24	36
250	10“	549	561	361	83	43	229	123	9,5	38,1	-	1-8	2	1-8	16	387,4	82,6	R3	3/8-16	40	52
300	12“	721	721	455	92	47	272	175	12,7	44,5	-	1 1/8-8	4	1 1/8-8	16	450,9	108,0	R4	1/2-13	69	90
350	14“	871	871	501	117	63	307	187	12,7	50,8	-	1 1/8-8	4	1 1/8-8	20	514,4	108,0	R4	1/2-13	129	147
400	16“	969	969	554	133	66	348	199	19,1	57,2	-	1 1/4-8	4	1 1/4-8	20	571,5	127,0	R5	3/4-10	153	182
450	18“	1023	1023	584	149	77	395	200	19,1	63,5	-	1 1/4-8	4	1 1/4-8	24	628,7	127,0	R5	3/4-10	178	235
500	20“	1108	1108	638	160	82	437	222	19,1	76,2	-	1 1/4-8	4	1 1/4-8	24	685,8	127,0	R5	3/4-10	232	334
600	24“	1268	1268	718	183	92	523	226	25,4	88,9	-	1 1/2-8	4	1 1/2-8	24	812,8	177,8	R7	1-8	333	463
750	30“	1585	1585	810	226	112	692	229	25,4	114,3	-	1 3/4-8	4	1 3/4-8	28	997,0	177,8	R7	1-8	792	974

ANSI Class 600

SIZE		WAFER	LUG																WEIGHT (Kg)	
DN	Inch	A*	A**	B	C	D	E	F	G	H	J*	K*	L*	M**	N**	P	R	R[1)]	S	WAFER	LUG
50	2“	269	269	193	44	27	44	85	4,8	12,7	-	-	-	5/8-11	8	127,0	57,2	R2	3/8-16	5,0	5,9
65	2,5“	262	262	193	48	28	54	85	4,8	12,7	-	-	-	3/4-10	8	149,4	57,2	R2	3/8-16	5,0	5,9
80	3“	295	307	218	54	30	64	91	4,8	15,9	-	-	-	3/4-10	8	168,3	57,2	R2	3/8-16	5,9	8,2
100	4“	367	379	249	64	36	87	97	6,4	19,1	-	-	-	7/8-9	8	215,9	57,2	R2	3/8-16	13,6	24
150	6“	439	469	297	78	43	132	104	9,6	31,8	29	1-8	2	1-8	12	292,1	82,6	R3	3/8-16	19	39
200	8“	542	559	355	102	47	160	123	9,6	38,1	-	-	-	1 1/8-8	12	349,3	82,6	R3	3/8-16	33	58
250	10“	791	791	455	117	51	202	175	12,7	44,5	-	1 1/4-8	4	1 1/4-8	16	431,8	108,0	R4	1/2-13	77	106
300	12“	884	884	511	140	64	246	191	19,1	57,2	-	1 1/4-8	4	1 1/4-8	20	489,0	127,0	R5	3/4-10	111	172
400	16“	-	1124	645	178	89	320	238	19,1	76,2	-	-	-	1 1/2-8	20	603,3	127,0	R5	3/4-10	-	531

[1)] Only for identification mounting brackets.

NOTES:

1. General

a. Standard valves tested to MSS-SP-61. API-598 testing available on request.
b. Valves for installation between DIN and JIS flanges available on application.
C. Dimensions shown are for reference only. Certified drawings available on application.

2. For 2“ through 24“ sizes:

a. Face-to-face dimensions (C) meet, within specified tolerance, MSS-SP-68 and API-609 requirements.
b. Valves are designed for installation between ANSI B16.5 flanges.

3. For 30“ through 48“ sizes:

a. Valves are designed for installation between ANSI/ASME B16.47 Class A flanges. (Class B on request)

4. For MIL SPEC valves, see Flowseal Marine Product Brochure.

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Valve Torque Tables Model Soft Seat

All Torque Values ANSI Class 150/300/600 in Nm

DN	Inch	ANSI	Installation in prefered direction (Seat Upstream) static pressure in bar											
			5	10	15	20	28	34	41	48	51	69	83	102
50	2“	150	17	18	19	20	-	-	-	-	-	-	-	-
		300	25	25	30	34	50	59	68	80	82	-	-	-
		600	28	28	37	46	61	71	76	81	82	85	100	117
65	2,5“	150	22	27	32	37	-	-	-	-	-	-	-	-
		300	25	25	30	34	50	59	68	80	82	-	-	-
		600	28	28	37	46	61	71	76	81	82	85	100	117
80	3“	150	22	27	32	37	-	-	-	-	-	-	-	-
		300	25	25	30	34	50	59	68	80	82	-	-	-
		600	28	28	37	46	61	71	76	81	82	85	100	117
100	4“	150	26	35	44	52	-	-	-	-	-	-	-	-
		300	29	29	44	59	69	76	90	110	118	-	-	-
		600	39	39	48	56	69	79	89	98	101	121	142	167
125	5“	150	55	78	96	115	-	-	-	-	-	-	-	-
		300	68	68	77	85	107	127	151	185	196	-	-	-
150	6“	150	55	78	96	115	-	-	-	-	-	-	-	-
		300	68	68	77	85	107	127	151	185	196	-	-	-
		600	81	81	96	111	134	151	176	201	211	251	295	347
200	8“	150	82	116	143	173	-	-	-	-	-	-	-	-
		300	114	114	159	204	221	276	318	384	411	-	-	-
		600	161	161	2001	240	302	349	415	481	509	616	733	873
250	10“	150	156	216	271	316	-	-	-	-	-	-	-	-
		300	204	204	260	316	435	525	608	737	790	-	-	-
		600	269	269	342	415	532	619	743	867	919	1119	1338	1600
300	12“	150	219	304	387	467	-	-	-	-	-	-	-	-
		300	316	316	385	453	695	846	972	1288	1386	-	-	-
		600	430	430	562	693	902	1059	1281	1503	1598	1957	2348	2819
350	14“	150	246	341	436	532	-	-	-	-	-	-	-	-
		300	468	468	610	751	976	1154	1369	1690	1812	-	-	-
		600	550	550	756	902	1183	1393	1691	1988	2115	2596	3122	3752
400	16“	150	368	511	654	797	-	-	-	-	-	-	-	-
		300	695	695	925	1154	1584	1931	2221	2764	2971	-	-	-
450	18“	150	559	861	1163	1465	-	-	-	-	-	-	-	-
		300	860	860	1178	1495	1934	2307	2713	3332	3579	-	-	-
500	20“	150	657	1087	1215	1695	-	-	-	-	-	-	-	-
		300	1260	1260	1697	2133	2829	3566	4106	4862	5222	-	-	-
600	24“	150	1284	2073	2863	3652	-	-	-	-	-	-	-	-
		300	2304	2304	3181	4057	5458	6652	8066	9621	10353	-	-	-
750	30“	150	2867	3656	5649	6438	-	-	-	-	-	-	-	-
		300	4062	4062	5608	7154	10000	12396	14168	17729	19106	-	-	-
900	36“	150	4526	5315	8371	9160	-	-	-	-	-	-	-	-
1050	42“	150	6445	7234	11678	12468	-	-	-	-	-	-	-	-
1200	48“	150	9057	9847	16180	16970	-	-	-	-	-	-	-	-

Torques shown are for on/oft applications and include sizing margins appropriate to normal liquid and gas applications. For severe services, or unusual fluids or slurries, consult factory.

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CRANE

Valves Torques Tables Model Fire-Flow

All Torque Values ANSI Class 150/300/600 in Nm

DN	Inch	ANSI	Installation in prefered direction (Seat Upstream) static pressure in bar											
			5 bar	10 bar	15 bar	20 bar	28 bar	34 bar	41 bar	48 bar	51 bar	69 bar	83 bar	102 bar
50	2“	150	46	49	52	55	-	-	-	-	-	-	-	-
		300	63	63	67	71	80	85	91	103	107	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
65	2,5“	150	51	55	58	62	-	-	-	-	-	-	-	-
		300	63	63	67	71	80	85	91	103	107	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
80	3“	150	51	55	58	62	-	-	-	-	-	-	-	-
		300	63	63	67	71	80	85	91	103	107	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
100	4“	150	66	73	81	88	-	-	-	-	-	-	-	-
		300	91	91	96	100	118	140	161	171	179	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
125	5“	150	160	172	185	197	-	-	-	-	-	-	-	-
		300	198	198	213	227	247	266	289	340	352	-	-	-
150	6“	150	160	172	185	197	-	-	-	-	-	-	-	-
		300	198	198	213	227	247	266	289	340	352	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
200	8“	150	232	266	300	334	-	-	-	-	-	-	-	-
		300	306	306	340	374	442	532	577	656	687	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
250	10“	150	404	462	520	577	-	-	-	-	-	-	-	-
		300	532	532	583	634	747	837	973	1052	1097	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
300	12“	150	564	660	755	851	-	-	-	-	-	-	-	-
		300	758	758	849	939	1222	1357	1602	1970	2079	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
350	14“	150	905	1030	1154	1278	-	-	-	-	-	-	-	-
		300	1030	1030	1154	1278	1483	1955	2319	2864	3030	-	-	-
		600	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.	o.r.
400	16“	150	1092	1346	1601	1855	-	-	-	-	-	-	-	-
		300	1346	1346	1601	1855	2554	3114	3582	4458	4735	-	-	-
450	18“	150	1685	1957	2228	2500	-	-	-	-	-	-	-	-
		300	1957	1957	2228	2500	3223	3845	4524	5553	5876	-	-	-
500	20“	150	2081	2680	3280	3879	-	-	-	-	-	-	-	-
		300	2680	2680	3280	3879	5142	6482	7466	8839	9352	-	-	-
600	24“	150	2844	4151	5457	6763	-	-	-	-	-	-	-	-
		300	4151	4151	5457	6763	9096	11086	13434	16035	17052	-	-	-
750	30“	150	5304	6921	8538	10155	-	-	-	-	-	-	-	-
		300	6921	6921	8538	10155	14285	17709	20242	25330	26955	-	-	-
900	36“	150	7637	9966	12295	14623	-	-	-	-	-	-	-	-
1050	42“	150	10395	13565	16734	19903	-	-	-	-	-	-	-	-

Torques shown are for on/off applications and include sizing margins appropriate to normal liquid and gas applications. For severe services, or unusual fluids or slurries, consult factory.

CRANE®

Model Soft Seat / Fire-Flow

Material Descriptions

Material Form	Description	Generic Name	Specification	Grade	Conditions/Comments
Casting	A216 WCB	Carbon Steel	ASTM A 216	WCB	Normalize & Temper
	A351 CF8M	Stainless Steel 316	ASTM A 351	CF8M	Solution Anneal
	A351 CN7M	Alloy 20	ASTM A 351	CN7M	Solution Anneal
	A352 LCB	Carbon Steel to -50F	ASTM A 352	LCB	Quench & Temper
	Mil-B-24480	Aluminum Bronze	MIL-B-24480A (SH)		
	QQ-N-288	Monel	QQ-N-288 / AMO 3	COM P. A	
Forging	A105	Carbon Steel	ASTM A 105		
	A182 F316	Stainless Steel 316	ASTM A 182	F316	
	A350 LF2	Carbon Steel to -50F	ASTM A 350	LF2	
	QQ-N-281	Monel	QQ-N-2810 / AMO 2	Class A Form 2	Anneal
Plate&Sheet	A240 316	Stainless Steel 316	ASTM A 240	316	
	A240 321	Stainless Steel 321	ASTM A 240	321	
	A515 70	Carbon Steel	ASTM A 515	70	
	A516 70	Carbon Steel to -50F	ASTM A 516	70	Normalize
	B127	Monel	ASTM B 127		
	B463 20CB	Alloy 20	ASTM B 463		
	INC 718	Inconel 718	ASTM B 670		Anneal/Age Harden
Barstock	NITR 50	Nitronic 50	ASTM A 479	XM19	
	A479 316	Stainless Steel 316	ASTM A 479	316	
	17-4 H1075	17-4PH	ASTM A 564	630	H1075
	17-4 H1150	17-4PH	ASTM A 564	630	H1150
	B473 20CB	Alloy 20	ASTM B 473		
	QQ-N-281	Monel	QQ-N-2810 / AMO2	Class A Form 1	Anneal
	INC 718	Inconel 718	ASTM A 637	718	
	C.S.	Carbon Steel	AS Available	Various	Low C (1018) Non-Press. Parts
	18-8 S.S.	Stainless Steel	AS Available	Various	300 Series (304) Non-Press. Parts
Tubular	A269	Stainless Steel	ASTM A 269	Various	300 Series Seamless Tubing
	A312 316	Stainless Steel 316	ASTM A 312	316	Pipe
	A511	Stainless Steel	ASTM A 511	Various	300 Series Seamless Tubing
Bolting	A193-87	Alloy Steel	ASTM A 193	B7	
	A193-B8M	Stainless Steel 316	ASTM A 193	B8M	
	ALY STL	Alloy Steel	SAE	5	Bracket & Accessory Bolting
	18-8 S.S.	Stainless Steel			300 Series Stainless Steel

FS-HP/DB-0011-GB/12.01/GP

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CRANE

Body and Components Pressure / Temperature Ratings

FS-HP/DB-0012-GB/12.01/GP

The charts below reflect the pressure/temperature ratings for Carbon Steel and Stainless Steel valves, in accordance with ANSI B16.34. The hydrostatic shell test is performed on the body at 150% of the Cold Working Pressure (C.W.P. is defined as the pressure rating between -29 to 38 °C) and the hydrostatic seat test is performed on the disc and seat at 110% of the Cold Working Pressure.

BODY RATING

°C	Maximum Non-Shock Working Pressure-Bars					
	Carbon Steel			316 SS		
ANSI Class	**150**	**300**	**600**	**150**	**300**	**600**
Hydrostatic Shell Test	30	77	153	29	75	150
Hydrostatic Seat Test	22	56.9	112.4	20.9	54.6	109.3
-29 to 38	19.6	51.1	102.1	19.0	49.6	99.3
50	19.2	50.1	100.2	18.4	48.1	96.3
100	17.7	46.4	92.8	16.2	42.2	84.4
150	15.8	45.2	90.5	14.8	38.5	77.0
200	14.0	43.8	87.6	13.7	35.7	71.3
250	12.1	41.7	83.4	12.1	33.4	66.8
300	10.2	38.7	77.5	10.2	31.6	63.3
350	8.4	37.0	73.9	8.4	30.4	60.8
400	6.5	34.5	69.0	6.5	29.1	58.2
425	5.6	28.8	57.5	5.6	28.7	57.3
450				4.7	28.1	56.2
500				2.8	26.8	53.7
525				1.9	25.8	51.6

COMPONENTS RATING*

Description & Material	Temperature °C
Seat Seal (Soft Seated)	
TFE	-73 to 204
RTFE	-73 to 260
UHMWPE	-73 to 93
Seat Seal (Fire-Flow)	
TFE/Inconel	-73 to 204
RTFE/Inconel	-73 to 260
Seat O-Ring	
Silicone (Standard with RTFE)	-73 to 260
Viton (Standard with TFE)	-46 to 204
Stem Packing	
TFE	-73 to 260
Graphite	-73 to 621
Shaft	
17-4PH H1150	-73 to 427
17-4PH H1150M	-73 to 427
316 Stainless Steel	-73 to 621
K-Monel 500	-73 to 621
Inconel 718	-73 to 621
Bearings	
TFE/Fiberglass Composite	-73 to 204
RTFE/316 Stainless Steel	-73 to 260
Bronze	-73 to 339
316 Stainless Steel/Nitrided	-73 to 538
Disc Treatment	
Electroless Nickel Plating	-73 to 399
Stellite	-73 to 621
Nitriding	-73 to 482

The chart at above reflects the maximum temperature ratings for individual components of the FLOWSEAL High Performance Butterfly Valve.
Special care should be taken when specifying component materials for valves at elevated temperatures.
Consult factory if additional information is required regarding the suitability of components for specific pressure/temperature applications.

*Refer to Pressure/Temperature graph for pressure limitations for a given temperature.

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