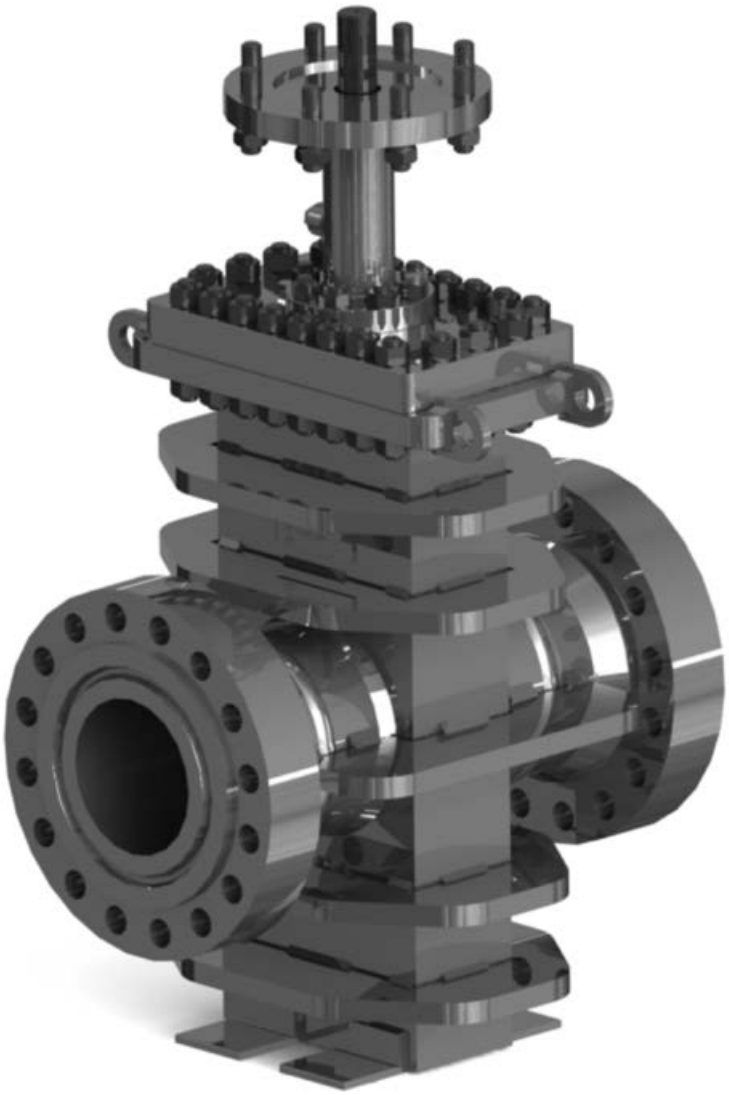
FLOWSERVE

TECHNICAL BULLETIN

Valbart™
Through conduit slab gate valve

FCD VBENTB1013-01-A4 - (9/16)



Experience in Motion

Valbart Through Conduit Slab Gate Valve

The Valbart TCSGV is a fabricated body through conduit slab gate valve manufactured and tested in accordance with API 6D, latest edition. Its design is fully compliant to ASME Section VIII, Division 1 (ASME Boiler and Pressure Vessel Code: Rules for Construction of Pressure Vessels). Additionally, the design meets API 6D isolation features of block and bleed, double isolation bleed (DIB - 1), double block and bleed, cavity relief, and other requirements commonly specified in the pipeline industry.

The through conduit slab gate design features a full-bore diameter, which makes it suitable for use in pigging applications. Valbart slab gate valves are engineered to achieve tight shutoff at high and/or low pressures in liquid or gas services. Spring-energized seats (Figure 1) and a floating slab gate provide low as well as high-pressure sealing integrity.

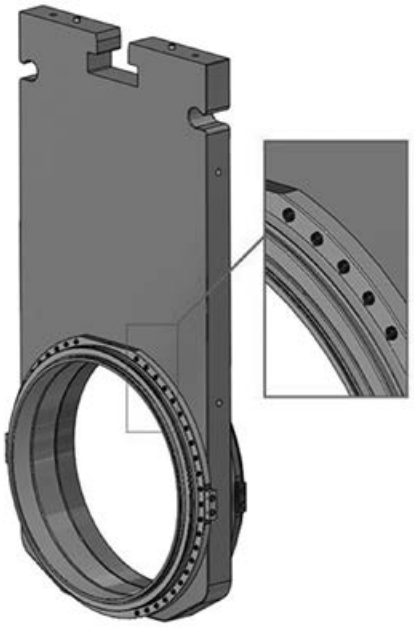


Figure 1: Spring-energized floating seat detail

Through Conduit Slab Gate Sealing Mechanism

The spring-energized seat of the TCSGV is designed to push against the slab gate for positive sealing and continuous contact, even at low pipeline pressures. The floating slab and seats enable fluid pressure to assist the sealing by compressing the slab into the seat tighter as pipeline pressure increases.

Medium- to high-pressure sealing is accomplished by the upstream seat pressure sealing against the slab. Even the downstream seat is dynamically energized by the upstream pressure, due to the floating slab as shown in Figure 2. A double-sealing barrier is provided against the upstream pressure.

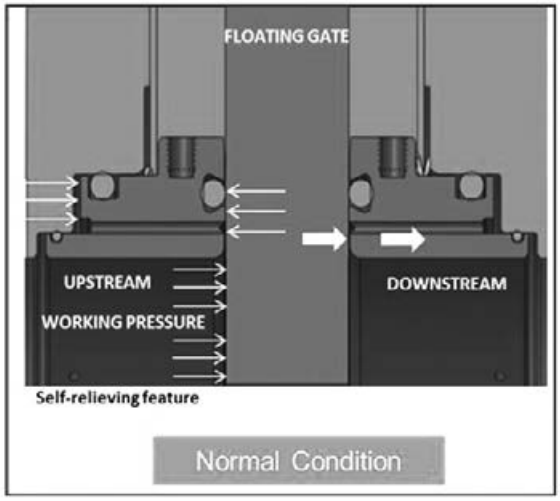


Figure 2: TCSGV sealing

The sealing mechanism of the TCSGV operates as follows:

- Slab gate moves up and down and enables open and close positions of the valve
- Springs on the seat rings help in sealing at low pressures; self-energized seal is achieved at slightly higher line pressures
- Both seats and gate are floating, allowing simultaneously upstream and downstream sealing
- Bore sealing mechanism by position; no wedging effect required

Slab Gate Applications

Through conduit slab gate valves are typically used in the oil and gas industry for installation in liquid products and secondary recovery, midstream and downstream pipelines. Typical applications include, but are not limited to:

- Mainline block valves
- Tank and station valves
- Manifold valves
- Launcher/receiver trap valves
- Meter bypass valves
- Emergency shutdown valves
- Transmission and distribution pipelines

The TCSGV engineered bore sealing mechanism is primary metal-to-metal and secondary soft, which provides reliable soft sealing and uncompromised metal sealing for severe/heavy-duty services involving:

- Abrasive fluids/sandy services
- High-temperature services
- Service conditions requiring full reliability such as emergency shutdown valves (ESDV)

TCSGV Design Features

- **Fabricated body construction with engineered ribs profile [Figure 3]:**
  The through conduit slab gate valve has a robust fabricated design with a high strength over weigh ratio. The engineered ribs profile is a result of extensive finite element analysis for optimizing strength over weight and ensuring that material is placed where needed. This minimizes body and seat deflection and ensures solid sealing performance up to the valve's rated pressure.
- **Bi-directional, bubble-tight sealing [Figure 4]:**
  Valve seats are designed to seal against upstream or downstream pressure sources in either direction with the cavity vented.
- **Block and bleed (BB) types A and B (API 6D):**
  In its closed position, at least one sealing surface provides sealing against pressure from one end of the valve (P_A or P_B) with the body cavity vented ($P_C = 0$).
- **Double block and bleed (DBB) types A and B (API 6D) [Figure 5]:**
  In its closed position, two seating surfaces provide sealing against pressure from both ends of the valve, with a means of venting or bleeding pressure in the cavity between the seating surfaces.
- **Double isolation and bleed (DIB) types A and B (API 6D) [Figure 6]:**
  In its closed position, each of the two seating surfaces provides a seal against pressure from a single source, with a means of venting or bleeding pressure in the cavity between the seating surfaces.

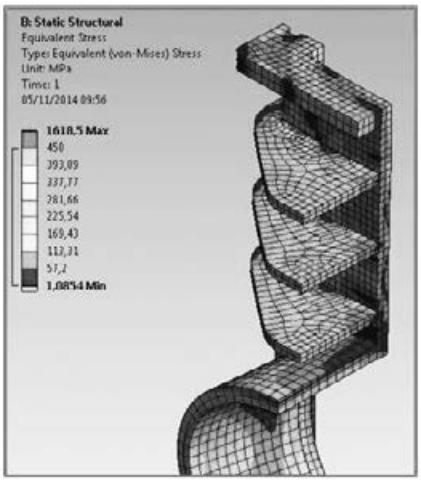


Figure 3: FEA analysis on slab gate valve body

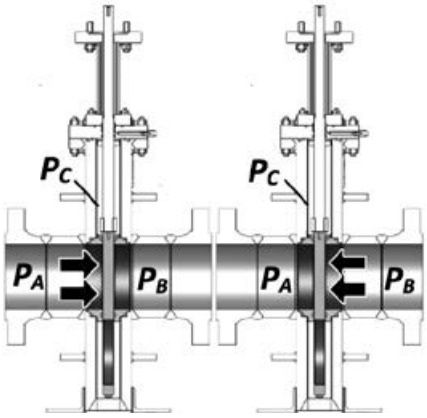


Figure 4: Bi-directional sealing
P_A = upstream pressure
P_B = downstream pressure
P_C = cavity pressure

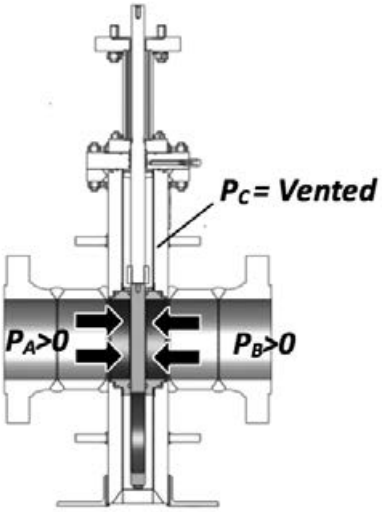


Figure 5: DBB — upstream side (P_A) and downstream side (P_B) simultaneously isolated with cavity vented

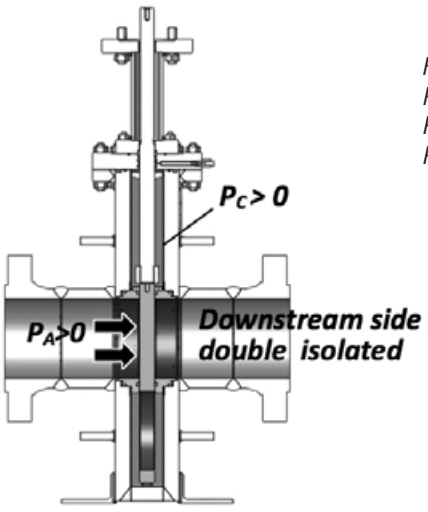


Figure 6: DIB — Down-stream seat provides isolation against cavity pressure

- **Self-relieving as per API 6D, last edition [Figure 7]:**
  Excess cavity pressure is relieved by the valve seat to the pressurized side, ensuring double isolation at the downstream end.
- **Pressure-energized floating seat:**
  The floating seat design and piston effect force generated by the line pressure ensure continuous and uniform contact between the seat and slab gate, proportional to the line pressure.
- **Advanced slab guiding system [Figure 8]:**
  The slab gate guiding system supports the weight of the slab and eliminates damage to the seats caused by its weight. It allows for the valve to be mounted in both vertical and horizontal orientations without compromising sealing performance.

  The slab guiding system consists of two bars that keep the slab in position within the valve body to ensure precise opening and closing.
- **Bore sealing by stem position:**
  No wedging effect and operating thrust, regardless of the temperature range.
- **No side loads to the stem [Figure 9]:**
  The floating seat and gate design ensures low operating thrust. The stem is guided by a low-friction, coated bearing.

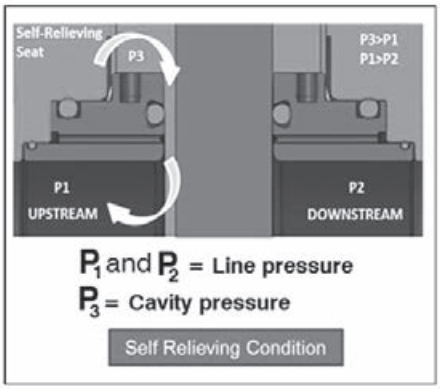


Figure 7: Self-relieving mechanism

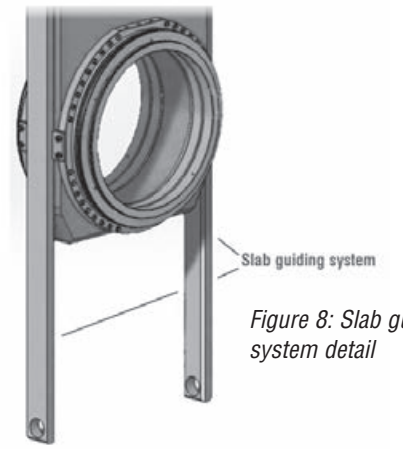


Figure 8: Slab guiding system detail

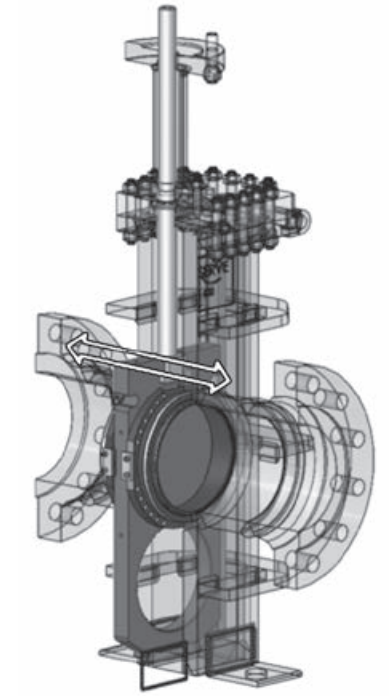


Figure 9: Slab and seats floating motion

- **Self-cleaning seat:**
  The collection of dust and debris in the soft sealing area is eliminated by the metal seat that also acts as a scraper (self-cleaning seat) to remove any debris and dust that has accumulated on the slab.

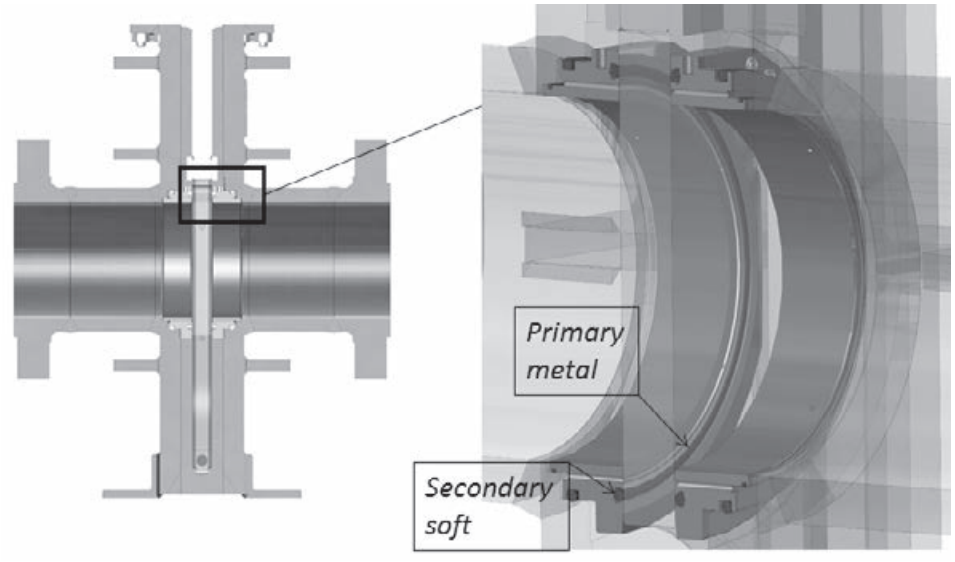


Figure 10: Self-cleaning seat

- **Top-entry design:**
  Simplified maintenance and repair is enabled by the top-entry design that allows for easy access to valve components while the valve is still in-line. Equipment downtime is dramatically reduced, as trim and internal components can be replaced with ease in a relatively short period of time.

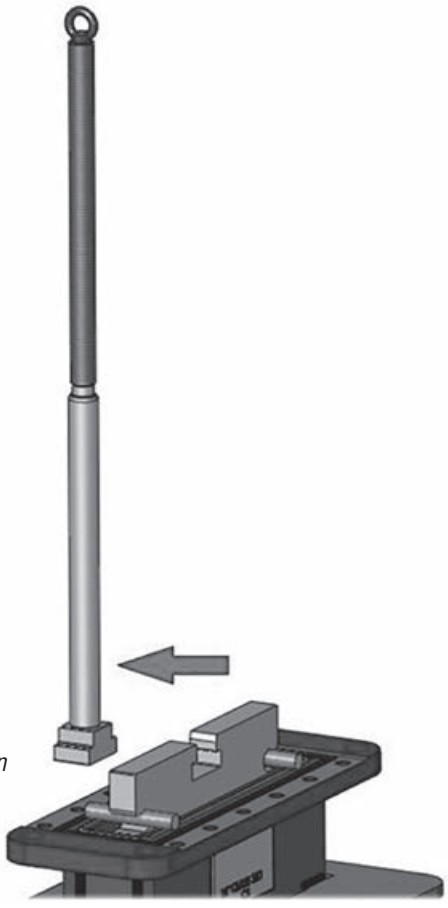


Figure 11: Top-entry design

- **Blowout-proof stem design [Figure 12]:**
  The TCSGV's stem design — retained in the stem cover as per API 6D requirements — improves personnel and plant safety.

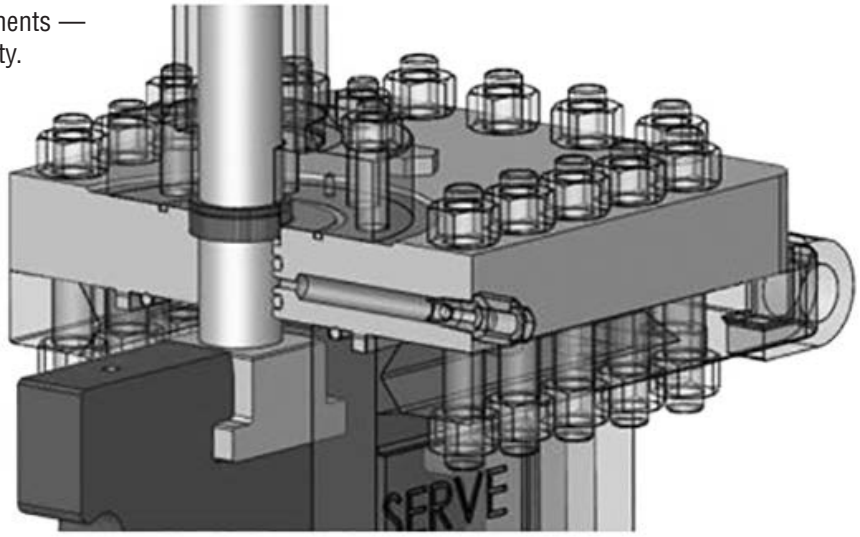


Figure 12: Blowout-proof stem design

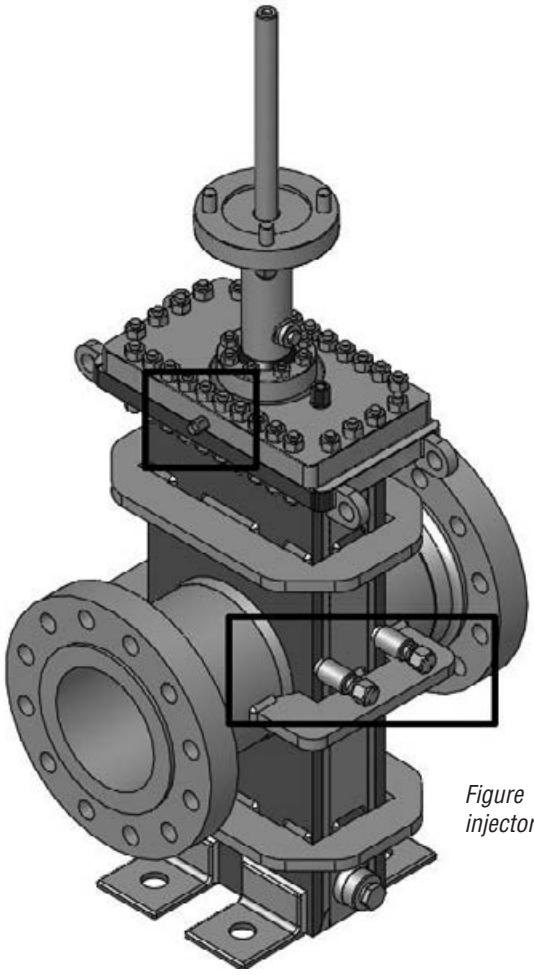


Figure 13: Sealant injectors

- **Sealant injectors:**
  The Valbart TCSGV incorporates a seat and stem sealant injector design to enable the injection of sealant to restore the valve's sealing capability.

Seat Design

The TCSGV's seat design is a solid metal single piston effect seat, including grease injector holes as a standard feature. Figure 14 shows the seat design along with seat housing components, and Figure 15 illustrates the stem and body to the bonnet sealing arrangement design, stem guiding system and emergency seal injection point.

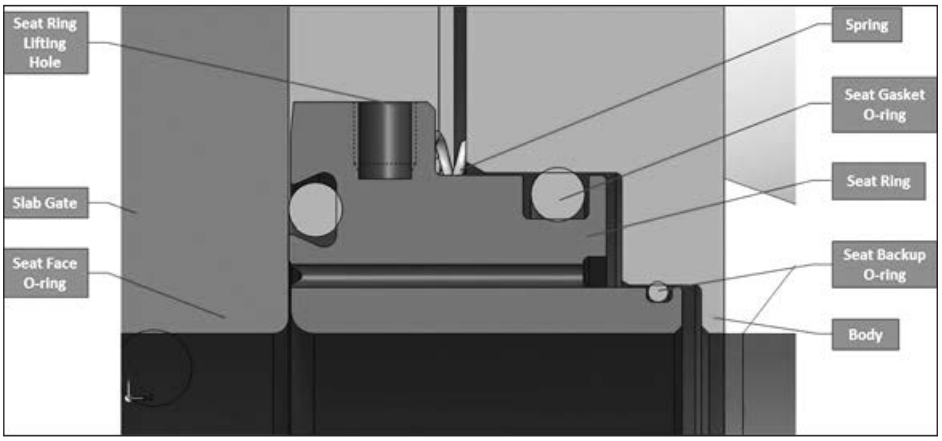


Figure 14: Seat and seat housing details

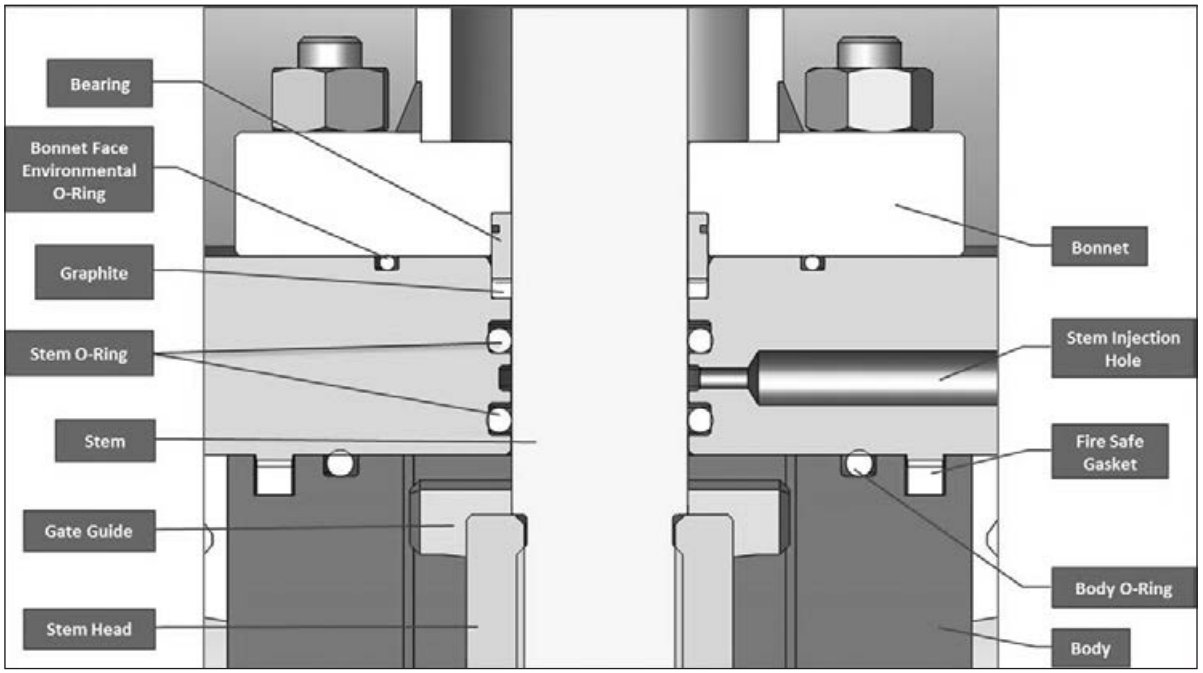


Figure 15: Stem and body to bonnet sealing arrangement design, stem guiding system and emergency seal injection point

TCSGV Specifications

Table 1: Specification compliance summary

Sizes	4 through 30 inches[1]
Pressure Ratings	ANSI Classes 150 through 1500
Design	API 6D, ASME VIII
End Connection	Flanged RF/RJ, butt-weld, hub end
Face to Face	As per API 6D — B16.10 — manufacturer std. or special request
Trim Area	Full bore or reduced bore to API 6D dimensions or at special request
Stem Seal	Elastomeric material Graphite packing or PTFE or combination composition at request
Flow Direction	Bi-directional
Leakage Rates	API 6D, ISO 5208 (Rate A soft seat; Rate D metal seat)
Operating Temperatures Range	-29 to 190°C[2] (-20.2 to 374°F)
Design Temperatures Range	-46 to 210°C[2] (-50.8 to 410°F)
Fire-safe	API 607 / 6FA
Fugitive Emissions	ISO 15848 — 2 Class B

(1) Contact Flowserve for larger sizes.
(2) Special design available upon request for handling higher or lower temperatures.

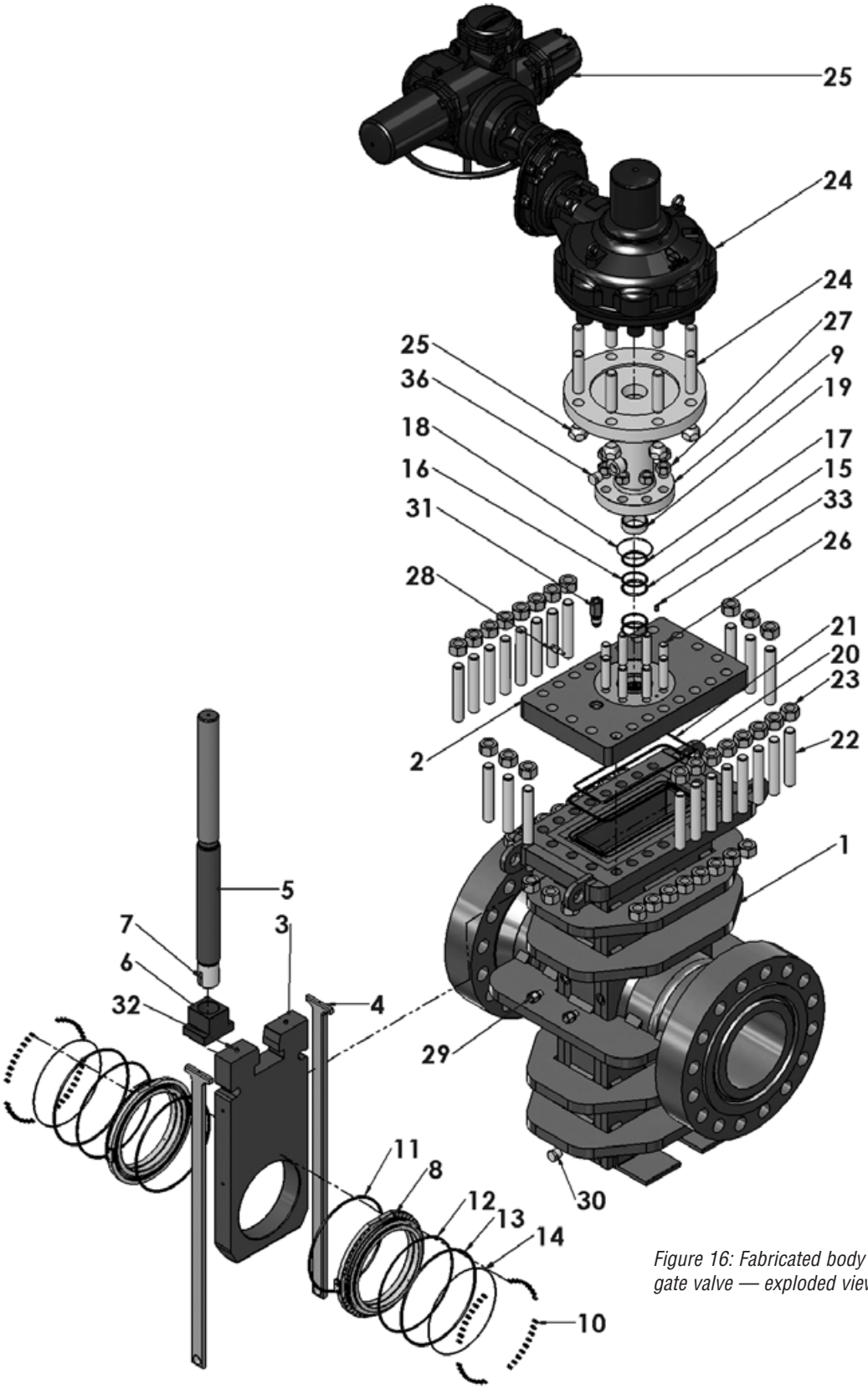


Figure 16: Fabricated body slab gate valve — exploded view

TCSGV Bill of Materials

N°	COMPONENT	MATERIAL
1	BODY	ASTM A516 Gr. 70
2	BONNET	ASTM A516 Gr. 70
3	SLAB	ASTM A516 Gr. 70 + ENP
4	SLAB GUIDE	ASTM A516 Gr. 70 + ENP
5	STEM	ASTM A 322 Gr. 4140 + ENP
6	STEM HEAD	ASTM A 322 Gr. 4140 + ENP
7	STEM HEAD PIN	CARBON STEEL
8	SEAT	ASTM A 105 + ENP
9	YOKE	ASTM A516 Gr.70 + A106 Gr. B (PIPE)
10	SPRING	INCONEL® X-750
11	SEAT FACE O-RING	VITON® / HNBR
12	SEAT GASKET O-RING	VITON / HNBR
13	SEAT GASKET BACK-UP RING	PEEK®(1)
14	SEAT BACK-UP O-RING	VITON / HNBR
15	STEM O-RING	VITON / HNBR
16	STEM BACK-UP RING	PEEK(1)
17	STEM FIRE-SAFE GASKET	GRAPHITE
18	ENVIRONMENTAL O-RING	VITON / HNBR
19	STEM BEARING	CARBON STEEL + ENP
20	BONNET GASKET	VITON / HNBR
21	BONNET FIRE-SAFE GASKET	GRAPHITE
22	BODY TO BONNET STUD	ASTM A193 Gr. B7M
23	BODY TO BONNET NUT	ASTM A194 Gr. 2HM
24	YOKE TO GEAR STUD	ASTM A193 Gr. B7M
25	YOKE TO GEAR NUT	ASTM A194 Gr. 2HM
26	YOKE TO BONNET STUD	ASTM A193 Gr. B7M
27	YOKE TO BONNET NUT	ASTM A194 Gr. 2HM
28	STEM INJECTION FITTING	SS316L
29	SEAT INJECTION FITTING	SS316L(2)
30	DRAIN FITTING	ASTM A105
31	BLEEDER	SS316L
32	SOCKET HEAD SLAB SCREWS	STAINLESS STEEL
33	SPRING DOWEL PIN	CARBON STEEL

(1) Only for ASME class 1500 and above
(2) Upstream check valve included

Typical Materials of Construction

Table 2: Trim chart summary

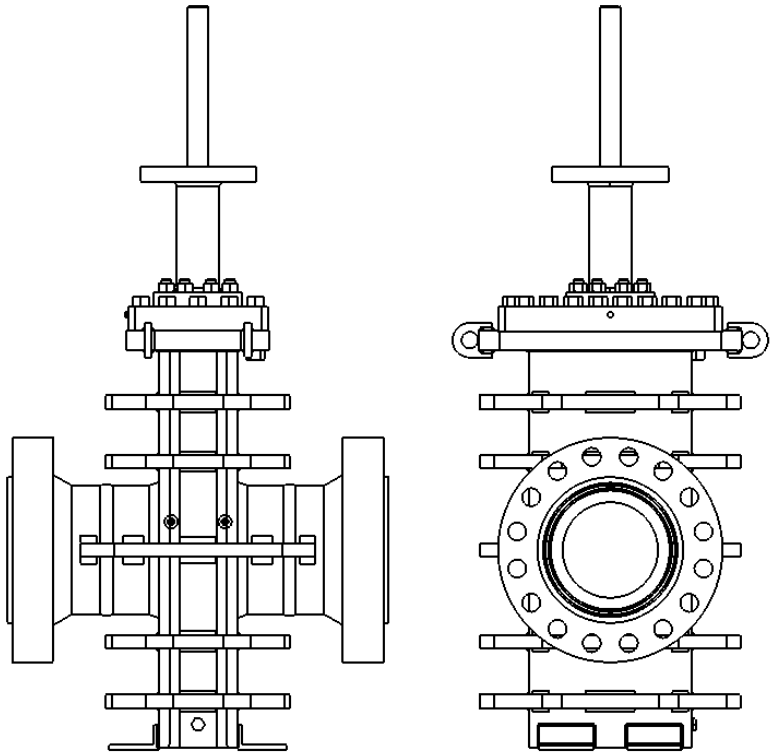
Part No.	Part Name	Standard (Hydrocarbon) Carbon Steel (-29 to 190°C) (-20.2 to 374°F)	Low-Temp. Carbon Steel (-46 to 190°C) (-50.8 to 374°F)	Corrosive Brine (-29 to 190°C) (-20.2 to 374°F)	Sour NACE Stainless Steel	Low-Temp. NACE Sour Carbon Steel (-46 to 190°C) (-50.8 to 374°F)
1	Body	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70
2	Slab gate	A516 Gr. 70 + ENP or A105 + ENP	A516 Gr. 70 + ENP or A105 + ENP	A516 Gr. 70 + ENP or A105 + ENP	Duplex stainless steel	A516 Gr. 70 + ENP or A105 + ENP
3	Seat	A516 Gr. 70 + ENP or A105 + ENP	A516 Gr. 70 + ENP or A105 + ENP	A516 Gr. 70 + ENP or A105 + ENP	Duplex stainless steel	A516 Gr. 70 + ENP or A105 + ENP
4	Seat springs	Inconel X-750	Inconel X-750	Inconel X-750	Inconel X-750	Inconel X-750
5	Body ribs	A516 Gr. 70	A516 Gr.70	A516 Gr.70	A516 Gr.70	A516 Gr.70
6	Bonnet flange	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105
7	Bonnet	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105	A516 Gr. 70 or A105
8	Stem head	A322 Gr. 4140 + ENP	A322 Gr. 4140 + ENP	A322 Gr. 4140 + ENP	Duplex stainless steel	A322 Gr. 4140 + ENP
9	Stem	A322 Gr. 4140 + ENP	A322 Gr. 4140 + ENP	A322 Gr. 4140 + ENP	Duplex stainless steel	A322 Gr. 4140 + ENP
10	Studs	A193 B7 / B7M	A320 L7M	A193 B7 / B7M	A193 B7M / A320 L7M	A320 L7M
11	Nuts	A194 2H / 2HM	A194 2HM	A194 2H / 2HM	A194 2H / 2HM	A194 2HM
12	Drain	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
13	Vent	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
14	Yoke pipe	A106 Gr. B	A106 Gr. B	A106 Gr. B	A106 Gr. B	A106 Gr. B
15	Yoke flanges	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70
16	Body flanges	A105	A105	A105	A105	A105
17	Body pup	A106 Gr. B	A106 Gr. B	A106 Gr. B	A106 Gr. B	A106 Gr. B
18	Gate guide	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70	A516 Gr. 70
---	O-ring	Viton	Viton	Viton / HNBR	HNBR	HNBR
--	Sealant injector fittings	316 SS	316 SS	316 SS	316 SS	316 SS
--	Stem bearing	Cs ENP coated	Cs ENP coated	Cs ENP coated	316 SS ENP coated	Cs ENP coated

General notes

- *Impact test for carbon steel is required for design temperature lower than -29°C (-20.2°F).*
- *Metal-to-metal seats are available where sandy service is specified. For metal-seated valve, seat sealing area and gate are tungsten carbide coated (TCC).*
- *Thermoplastic seated design is available upon request.*

Configurations and Options

Available Configurations



Pressure class	Size Range
150# – 900#	4” – 30” (1)
1500#	4” – 12”(1)
2500#	(2)

(1) Contact Flowserve for larger sizes.
(2) Sizes available upon request.

Flow direction	
Bidirectional	✓

End connection	
Butt-Weld	✓
Flanged RF / RJ	✓
Hub	✓

Seating	
Eleastomeric seated	✓
Metal seated	✓
Thermoplastic seated	✓

Gaskets	
Elastomeric seals	✓
Fire-safe graphite	✓

Acting	
Standard	✓
Reverse	✓

Operating standard temperature range	-29 to 190 [°C] (1)

(1) Standard temperature range. Wider temperature range available upon request.

Ends

Valve ends can be manufactured to several configurations to comply with customer requests. Flanged RF and RTJ are manufactured to ASME B16.5 up to 24" (MSS SP-44 for 22") or ASME B16.47 for sizes above 24". Butt-weld ends are manufactured to ASME B16.25. Hub ends for clamped connections are available as per customer specifications. Other types of pipe ends are available upon request.

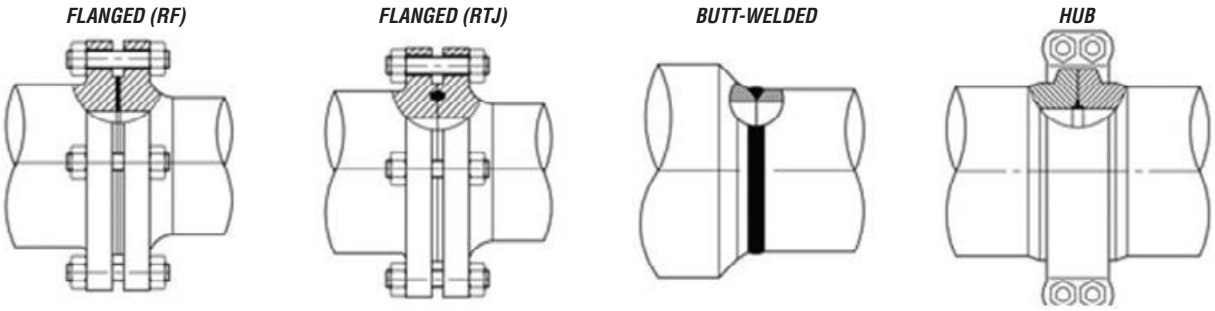


Figure 17: Applicable end connections

Extended Stem

Valves installed underground or in remote locations can be operated with an optional extended stem. Valves for cryogenic or low-temperature service are supplied with extended bonnets.

Stem Back Seat

Stem sealing is in the fully retracted position for in-service maintenance.

Reduced Bore Design

Reduced body bore is available.

Actuation

Hand-operated valves are supplied with handwheel or multi-turn gear operator based on the size, rating and customer requirements.

The gear operator is used for valve sizes larger than 6"– 600# and 10"– 300#.

Valves can be supplied with the following actuation configurations:

- Electric actuators
- Pneumatic actuators
- Hydraulic actuators
- Gas over oil actuators

Engineering Data

Valve testing
100% of the Flowserve-manufactured slab gate valves are tested in accordance with API 6D prior to shipping.

Standard performance tests
- Visual and dimensional check
- High-pressure hydrostatic shell test
- High-pressure hydrostatic seat test
- Low-pressure pneumatic seat test
- Double block and bleed
- Cavity relief seat test

Qualification & certifications
- API 6D monogram
- Fire-safe – API 607/API 6FA
- Fugitive emissions – BS EN ISO 15848-2

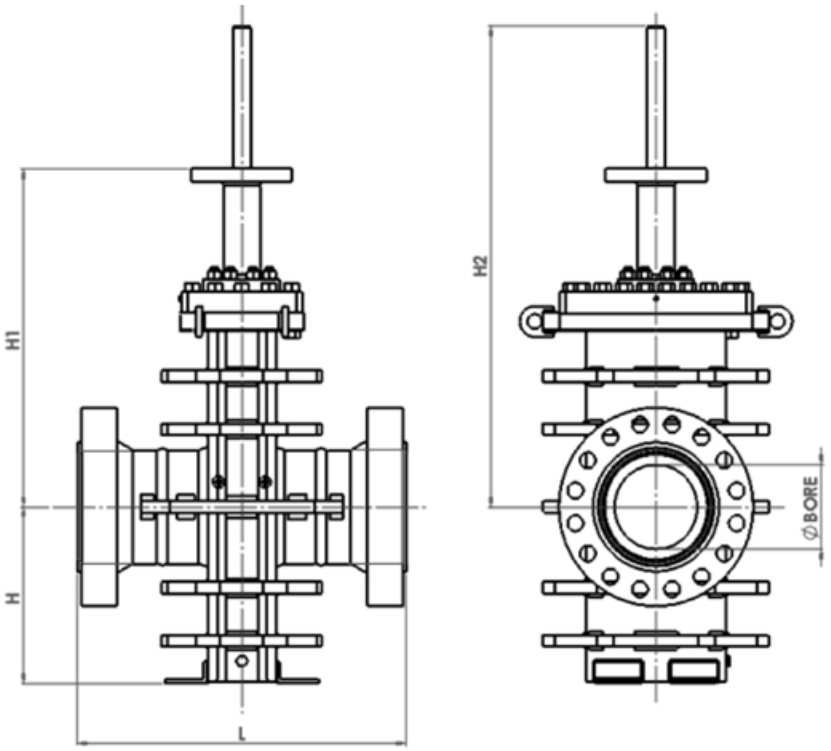
Leakage Rates
Table 3: Leak rate specification compliance

Standard	Soft seated	Metal seated	Cryogenic
API 6D	ISO 5208 RATE A	ISO 5208 RATE D	(1)
(1) Please consult the factory.			
Note: Leakage rates mentioned above are standard. Stricter leakage rates can be achieved upon request			

Testing Pressures
Table 4: API 6D standard testing pressure values

ASME Class	Bopy hydrotest pressure		Seat hydrotest pressure		Pneumatic seat test pressure	
	bar	psi	bar	psi	bar	psi
150	30	435	22	319	5.5	80
300	77,55	1124	57	825		
600	155,1	2249	114	1649.5		
900	232,65	3373.5	171	2474		
1500	387,5	5619	284.5	4125		
2500	646,35	9372	474	6873		
Typically only – Rating pressure could change for different materials						
Conversion factors: 1 bar = 14.5 psi						

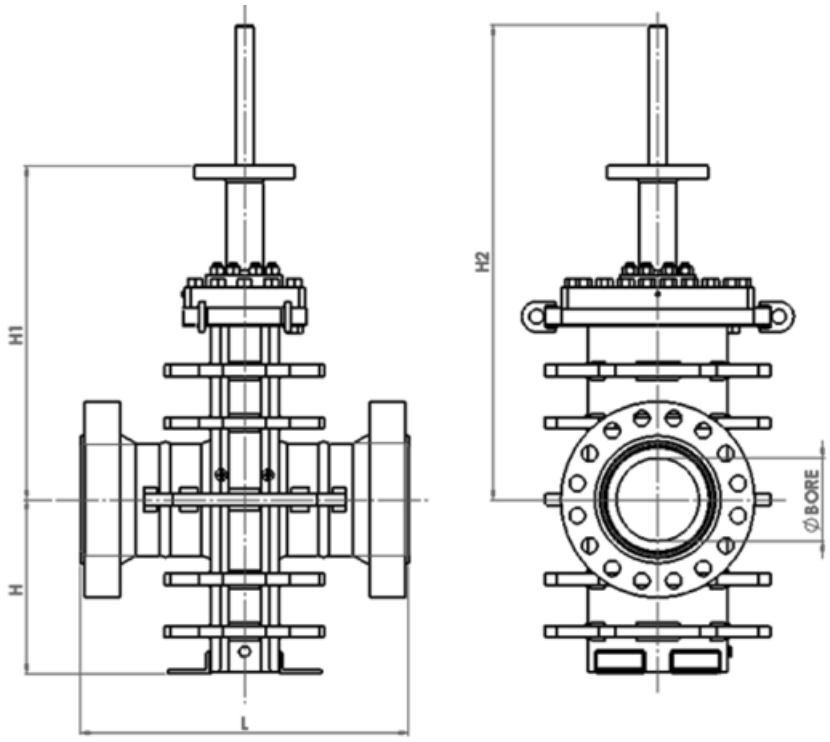
Dimensions and Weights — Class 150



NOMINAL VALVE SIZE ["]	NOMINAL BORE PASSAGE [mm] - [IN]		L [mm] - [IN]						H [MM] - [IN]		H1 [mm] - [IN]		H2 [MM] - [IN] -stem fully extended-		Weight			
			RF		WE		RJ								- RF / RJ- [kg] – [lb]		- BW- [kg] – [lb]	
4	100	*3,94*	229	*9,02*	305	*12,01*	241	*9,49*	248	*9,74*	502	*19,76*	697	*27,44*	158	*348,3*	145,5	*320,8*
6	150	*5,94*	267	*10,50*	403	*15,88*	279	*11,00*	323	*12,70*	612	*24,09*	871	*34,29*	219	*482,8*	205,1	*452,2*
8	201	*7,94*	292	*11,50*	419	*16,50*	305	*12,00*	417	*16,42*	758	*29,84*	1071	*42,17*	305	*672,4*	284,3	*626,9*
10	252	*9,94*	330	*13,00*	457	*18,00*	343	*13,50*	494	*19,43*	923	*36,34*	1287	*50,67*	429	*945,7*	404,1	*891*
12	303	*11,94*	356	*14*	502	*19,76*	368	*14,5*	578	*22,75*	1058	*41,65*	1562,5	*61,51*	585	*1289,7*	538	*1186,2*
14	334	*13,19*	381	*15,00*	572	*22,50*	394	*15,50*	619	*24,37*	1146	*45,12*	1594	*62,76*	659	*1452,8*	593	*1307,3*
16	385	*15,19*	406	*16,00*	610	*24,00*	419	*16,50*	699	*27,50*	1271	*50,04*	1773	*69,80*	825	*1818,8*	772,7	*1703,6*
18	436	*17,19*	432	*17,00*	660	*26,00*	445	*17,50*	778	*30,61*	1408	*55,43*	1964	*77,32*	967	*2131,9*	919,6	*2027,4*
20	487	*19,19*	457	*18,00*	711	*28,00*	470	*18,50*	858	*33,78*	1543	*60,75*	1954	*76,91*	1158	*2552,9*	1108,6	*2444,1*
24	589	*23,19*	508	*20,00*	813	*32,00*	521	*20,50*	1032	*40,63*	1822	*71,73*	2540	*100,01*	1843	*4063,1*	1827,3	*4028,6*
30	735	*28,94*	610	*24,00*	914	*36,00*	631,4 (1)	*24,85*	1295	*50,98*	2277	*89,64*	3251	*127,99*	3688,6	*8132,1*	3484,1	*7683,3*

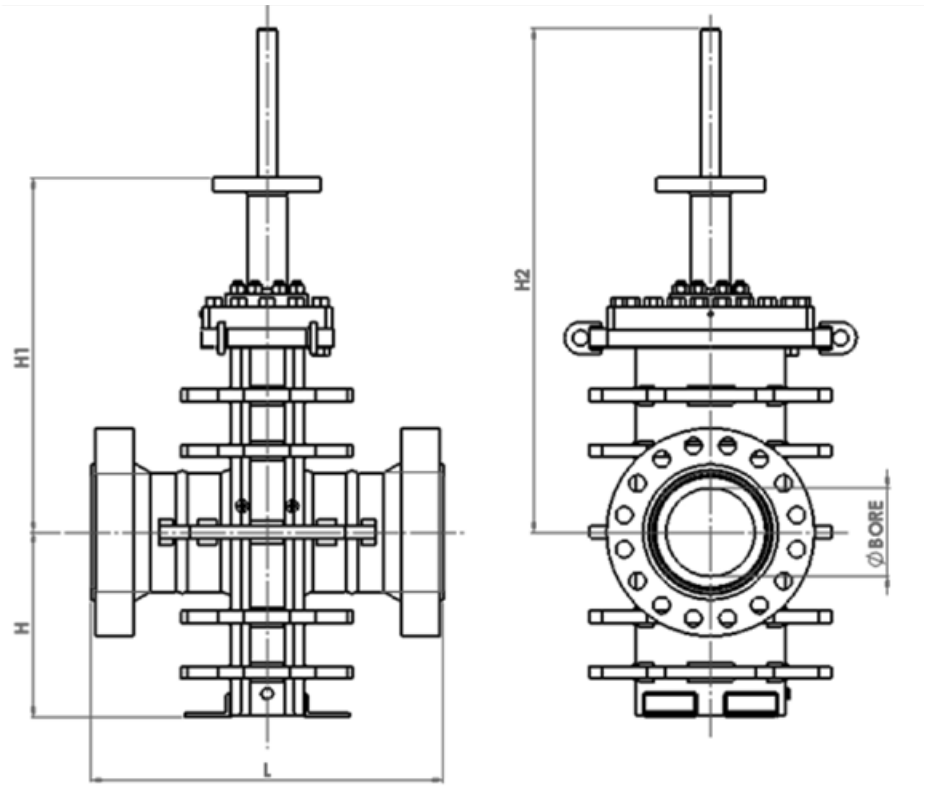
(1): Not specified by API 6D;

Dimensions and Weights — Class 300



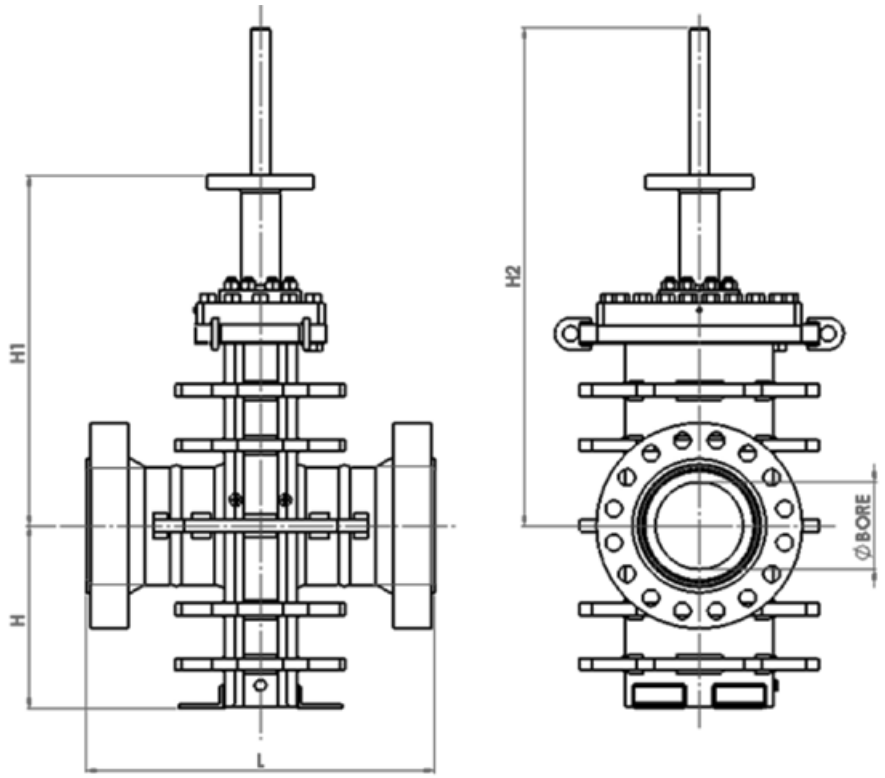
NOMINAL VALVE SIZE ["]	NOMINAL BORE PASSAGE [mm] - [IN]		L [mm] - [IN]						H [MM] - [IN]		H1 [mm] - [IN]		H2 [MM] - [IN] -stem fully extended-		Weight			
			RF		WE		RJ								- RF / RJ- [kg] – [lb]		- BW- [kg] – [lb]	
4	100	*3,94*	305	*12*	305	*12*	321	*12,63*	248	*9,74*	502	*19,76*	697	*27,44*	182	*401,2*	155,9	*343,8*
6	150	*5,94*	403	*10,50*	150	*15,88*	403	*11,00*	150	*5,94*	403	*6*	150	*5,94*	254,7	*561,6*	223,5	*492,7*
8	201	*7,94*	419	*16,50*	201	*16,50*	419	*12,00*	201	*7,94*	419	*8*	201	*7,94*	361	*795,8*	300,8	*663,2*
10	252	*9,94*	457	*18,00*	252	*18,00*	457	*18,63*	252	*9,94*	457	*10*	252	*9,94*	516,3	*1138,3*	424,6	*936,1*
12	303	*11,94*	502	*19,75*	303	*19,75*	502	*20,38*	303	*11,94*	502	*12*	303	*11,94*	558	*1230,1*	431	*950,3*
14	334	*13,19*	762	*30,00*	334	*30,00*	762	*30,63*	334	*13,19*	762	*14*	334	*13,19*	958	*2112*	759	*1673,4*
16	385	*15,19*	838	*33,00*	385	*33,00*	838	*33,63*	385	*15,19*	838	*16*	385	*15,19*	1190	*2623,5*	1014,3	*2236,2*
18	436	*17,19*	914	*36,00*	914	*36,00*	930	*36,63*	777,5	*30,6*	1418	*55,82*	2041	*80,35*	1525	*3362,0*	1262,6	*2783,5*
20	487	*19,19*	991	*39,00*	991	*39,00*	1010	*39,75*	867	*34,13*	1578	*62,13*	2208	*86,93*	2064	*4550,3*	1919,2	*4231,2*
24	589	*23,19*	1143	*45,00*	1143	*45,00*	1165	*45,88*	1030	*40,55*	1849	*72,80*	2608	*102,66*	2973	*6554,3*	2433,2	*5364,4*
30	735	*28,94*	1397	*55,00*	1397	*55,00*	1422	*56,00*	1295	*50,98*	2315,5	*91,16*	3375	*132,87*	5482,4	*12086,6*	5246,8	*11567,3*

Dimensions and Weights — Class 600



NOMINAL VALVE SIZE ["]	NOMINAL BORE PASSAGE [MM] - [IN]		L [MM] - [IN]						H [MM] - [IN]		H1 [MM] - [IN]		H2 [MM] - [IN] -stem fully extended-		Weight			
			RF		WE		RJ								- RF / RJ- [kg] – [lb]		- BW- [kg] – [lb]	
4	100	*3,94*	432	*17,01*	432	*17,01*	435	*17,13*	248	*9,74*	502	*19,76*	697	*27,44*	212,6	*401,2*	155,98	*343,8*
6	150	*5,94*	559	*10,50*	559	*15,88*	562	*11,00*	323	*12,70*	612	*24,09*	871	*34,29*	318	*701*	238,24	*525,2*
8	201	*7,94*	660	*26,00*	660	*26,00*	664	*26,13*	417	*16,42*	758	*29,84*	1071	*42,17*	476	*1049,4*	364,89	*804,4*
10	252	*9,94*	787	*31,00*	787	*31,00*	791	*31,13*	494	*19,43*	923	*36,34*	1287	*50,67*	728	*1604,9*	540,43	*1191,4*
12	303	*11,94*	838	*33,00*	838	*33,00*	841	*33,13*	578	*22,76*	1058	*41,65*	1496	*58,90*	961	*2118,6*	738,44	*1627,9*
14	334	*13,19*	889	*35,00*	889	*35,00*	892	*35,13*	619	*24,37*	1150	*45,28*	1618	*63,70*	1174	*2588,2*	886,99	*1955,4*
16	385	*15,19*	991	*39,00*	991	*39,00*	994	*39,13*	699	*27,50*	1293	*50,91*	1808	*71,18*	1580	*3483,3*	1606,42	*3541,5*
18	436	*17,19*	1092	*43,00*	1092	*43,00*	1095	*43,13*	787	*30,96*	1460	*57,48*	2056	*80,94*	2119	*4671,5*	1658,74	*3656,8*
20	487	*19,19*	1194	*47,00*	1194	*47,00*	1200	*47,25*	867	*34,13*	1601	*63,01*	2171	*78,49*	2627	*5791,5*	2329,83	*5136,3*
24	589	*23,19*	1397	*55,00*	1397	*55,00*	1407	*55,38*	1042	*41,02*	1902	*74,88*	2700	*106,30*	4485,9	*9889,7*	4024,05	*8871,5*
30	735	*28,94*	1651	*65,00*	1651	*65,00*	1664	*65,50*	1295	*50,98*	2325,5	*91,55*	3409,5	*134,23*	6582	*14510,8*	6274,13	*13832*

Dimensions and Weights — Class 1500



NOMINAL VALVE SIZE ["]	NOMINAL BORE PASSAGE [MM] - [IN]		L [MM] - [IN]						H [MM] - [IN]		H1 [MM] - [IN]		H2 [MM] - [IN] -stem fully extended-		Weight			
			RF		WE		RJ								- RF / RJ- [kg] – [lb]		- BW- [kg] – [lb]	
12	287	*11,30*	1130	*44,50*	1130	*44,50*	1146	*45,13*	601	*23,66*	1152	*45,35*	1638	*64,49*	2448	*5396,9*	2203	*4856,7*

Mounting Operators

Flowserve offers Limitorque® actuation for reliable automation of the Flowserve slab gate valve. Limitorque has a long history of providing high-performance, long-lasting actuators for a variety of industries. Matching a Limitorque actuator with the Flowserve slab gate valve results in an automated valve package with single-source engineering, supply and service.

Limitorque offers electric MX actuators (Figure 18),complete with V Series (Figure 19) gear box and controls to meet any valve thrust and customer application requirement. State-of-the-art, non-intrusive control systems allow operators to calibrate and locally control the actuator and valve without removing the actuator cover.

Actuators are available with SIL-capability for meeting enhanced safety integrity requirements. Various digital protocols and network communications can be offered for compatibility with numerous controls systems, including ModBus, DeviceNet and Foundation Fieldbus. Limitorque heavy-duty electric actuators provide the reliability, robustness and features to meet the needs of the oil and gas industry. Different actuators or special applications are available upon request.

Figure 18: Limitorque MX electric actuator

Valve Automation Center

Operator mounting should be performed at a Flowserve Valve Automation Center before shipment. If the operators are to be on-site, the mounting should be carried out before installing the valves in-line, as per Flowserve instructions. Mounting of operators on valves already installed in-line is not recommended; if performed, it should only be done under the supervision of Flowserve personnel.

Figure 19: V Series bevel gearboxes are easily adapted for motorized operation by MX actuators.

Topworks Data

NOMINAL VALVE SIZE ["]	Rating	ASME Working pressure	Stem data			Block and Bleed thrust [N]	Block and bleed torque [Nm] (1)	Input torque at the handwheel [N]	Max allowable stem thrust [N]	Stroke		Stem drive nut turn to operate
			ACME size [in]	Thread /Inch	Number of starts					[mm]	[in]	
4	150	20	7/8”	6	2	7523,4	18,2	7,58	88145,52	134,8	5,3	16
4	300	51,7	7/8”	6	2	18020,1	43,6	18,17	88145,52	134,8	5,3	16
4	600	103,4	7/8”	6	2	34084,63	82,47	34,46	88145,52	134,8	5,3	16
6	150	20	1.1/8”	5	2	12470,9	37,41	15,59	143916,6	179,2	7,1	18
6	300	51,7	1.1/8”	5	2	30349,6	91,5	37,94	143916,6	179,2	7,1	18
6	600	103,4	1.1/8”	5	2	59468,3	178,4	57,4	143916,6	179,2	7,1	18
8	150	20	1.1/4”	5	2	20055,87	63,41	22,02	212290,4	233,13	9,2	23
8	300	51,7	1.1/4”	5	2	49496,52	156,5	50,5	213290,4	233,13	9,2	23
8	600	103,4	1.1/4”	5	2	97494,2	308,2	93,4	213290,4	233,13	9,2	23
10	150	20	1.3/4”	4	2	29128,3	112,76	36,38	457322,89	283,9	11,2	23
10	300	51,7	1.3/4”	4	2	72196,83	302,9	46,6	457322,89	283,9	11,2	23
10	600	103,4	1.3/4”	4	2	142383,44	597,3	157,2	457322,89	283,9	11,2	23
12	150	20	1.3/4”	4	2	40396,2	169,5	54,67	457322,89	337,7	13,3	27
12	300	51,7	1.3/4”	4	2	100522,82	421,7	127,8	457322,89	337,7	13,3	27
12	600	103,4	1.3/4”	4	2	198528,3	832,9	160,17	457322,89	337,7	13,3	27
14	150	20	2”	4	2	47214,13	213,43	64,19	526696,7	368,3	14,5	29
14	300	51,7	2”	4	2	118174	534,2	57,44	526696,7	368,3	14,5	29
14	600	103,4	2”	4	2	233903	1057,3	69,56	526696,7	368,3	14,5	29
16	150	20	1.1/2”	4	2	61803,6	239,3	77,18	305312,7	422,3	16,6	34
16	300	51,7	2	3	2	156706,7	716,4	265,3	297986,03	422,3	16,6	25
16	600	103,4	2.1/4”	3	2	312545,4	1714,5	163,94	680135,1	422,3	16,6	25
18	150	20	1.3/4”	4	2	77427,3	324,8	180,5	403252,2	476,3	18,8	38
18	300	51,7	1.3/4”	4	2	194828,2	817,4	69,87	403252,2	476,3	18,8	38
18	600	103,4	2.1/2”	3	2	793309,7	2245,7	124,8	793309,7	476,3	18,8	29
20	150	20	1.3/4”	4	2	95447,7	400,4	61,5	435286,5	530,3	20,9	42
20	300	51,7	2	4	2	240450,4	1086,9	209,3	550909,5	530,3	20,9	42
20	600	103,4	2.3/4”	3	2	477620,9	2930,6	113,7	979394,6	530,3	20,9	32
24	150	20	1.3/4	4	2	137369,5	576,3	61,9	435286,5	638,3	25,1	51
24	300	51,7	2.1/2	3	2	346362,9	2015,9	112	735634,2	638,3	25,1	38
24	600	103,4	3.1/2”	2	2	690932,3	5797,4	224,7	1410328,3	638,3	25,1	26
30	150	20	2	4	2	214723,3	970,6	63,9	526696,7	800,3	31,5	63
30	300	51,7	3	2	2	543031,2	4204,4	168,7	1333064,9	800,3	31,5	32
30	600	103,4	4	2	2	1077826,6	9744,6	377,7	2203637,9	800,3	31,5	32

(1) *Operating torque with Flowserve Limitorque factory selected standard gear.*
General: Operating handwheel torque are in compliance with API 6D maximum allowed operating force.

Notes:

Notes:

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