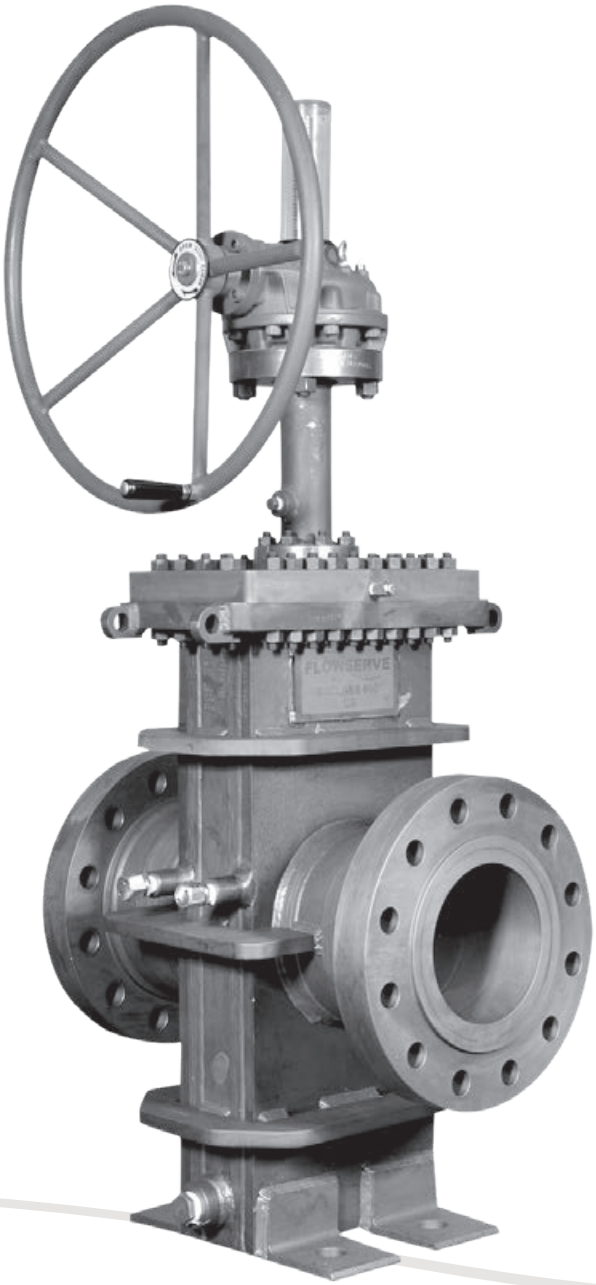
FLOWSERVE

TECHNICAL BULLETIN

Valbart™ TCSGV
Through Conduit Slab Gate Valve

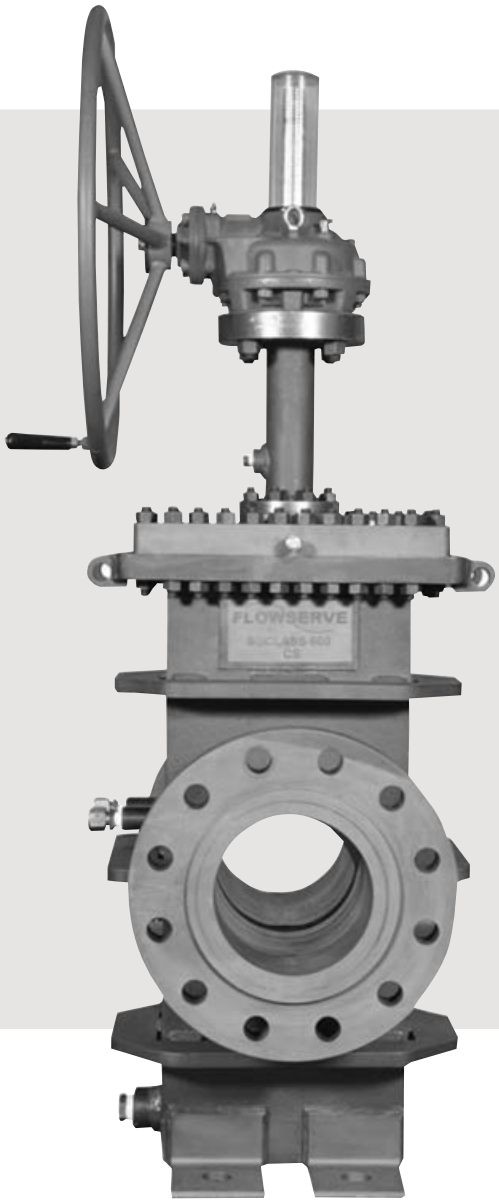


Experience In Motion

Tight shutoff in liquid or gas services

The Valbart TCSGV through conduit slab gate valve is 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), double block and bleed, cavity relief, and other requirements commonly specified in the pipeline industry.

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



Slab gate applications

Valbart TCSGV 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 engineered bore sealing mechanism of the TCSGV valve is the primary metal-to-metal seat and secondary soft seat. This configuration provides reliable soft sealing and uncompromised metal sealing for severe/heavy-duty services involving:

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

Positive sealing mechanism

The spring-energized seat of the TCSGV valve is designed to push against the slab gate for continuous contact and positive sealing, even at low pipeline pressures. The floating slab and seats enable fluid pressure to assist the sealing by compressing the slab tighter into the seat as pipeline pressure increases. See **Figure 1**.

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.

The sealing mechanism of the TCSGV valve 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 simultaneous upstream and downstream sealing
- Bore sealing mechanism by position; no wedging effect required

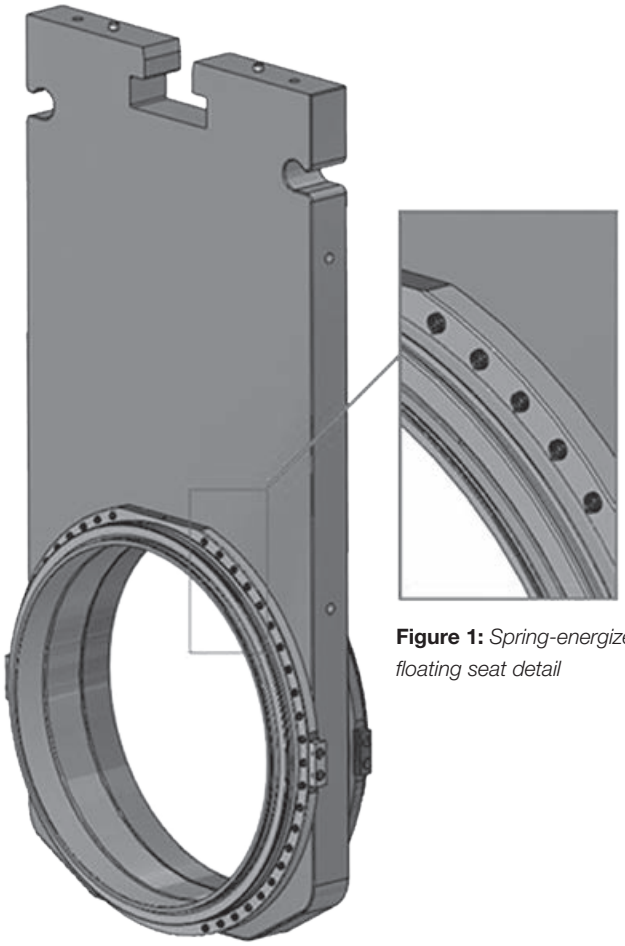


Figure 1: *Spring-energized floating seat detail*

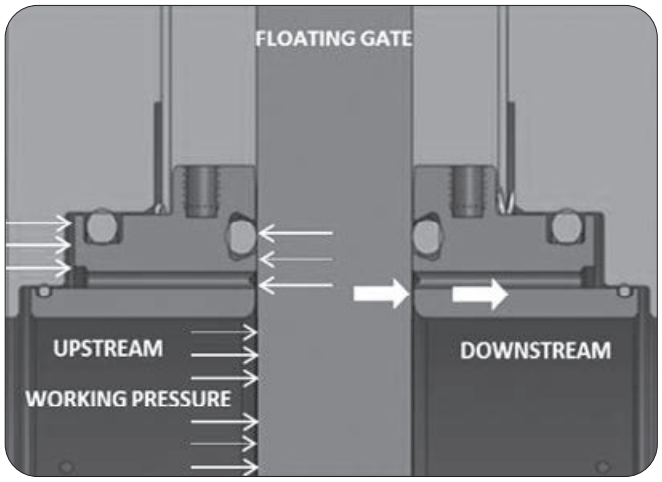


Figure 2: *TCSGV valve sealing*

Sealing application capabilities

Bi-directional, bubble-tight sealing

Valve seats are designed to seal against upstream or downstream pressure sources in either direction with the cavity vented. See **Figure 3.**

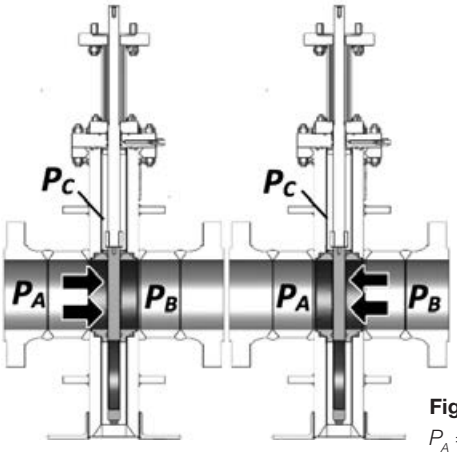


Figure 3: *Bi-directional sealing*
P_A = upstream pressure
P_B = downstream pressure
P_C = cavity pressure

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).

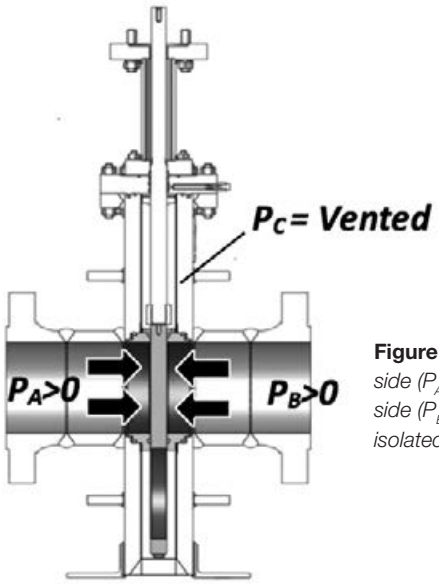


Figure 4: *DBB — upstream side (P_A) and downstream side (P_B) simultaneously isolated with cavity vented*

Double block and bleed (DBB) types A and B (API 6D)

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. See **Figure 4.**

Double isolation and bleed (DIB) types A and B (API 6D)

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. See **Figure 5.**

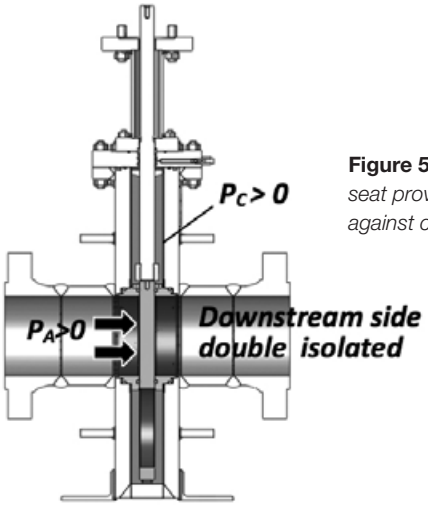


Figure 5: *DIB — Downstream seat provides isolation against cavity pressure.*

Design features

Fabricated body construction with engineered ribs profile

The TCSGV slab gate valve has a robust fabricated design with a high strength to weight ratio. The engineered ribs profile is a result of extensive finite element analysis for optimizing strength over weight and ensures that material is placed where needed. This minimizes body and seat deflection and also ensures solid sealing performance up to the rated pressure of the valve. See **Figure 6.**

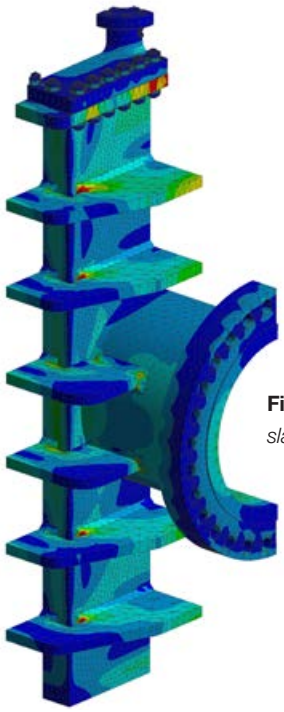


Figure 6: *FEA analysis on slab gate valve body*

Electroless nickel plated (ENP) with low-friction coating

The slab and seat are treated with ENP and low-friction coating to reduce operating forces and torque. Reduced friction also improves wear on seat and slab surfaces.

Self-relieving per API 6D, latest edition

Excess cavity pressure is relieved by the valve seat to the pressurized side, ensuring double isolation at the downstream end. See **Figure 7.**

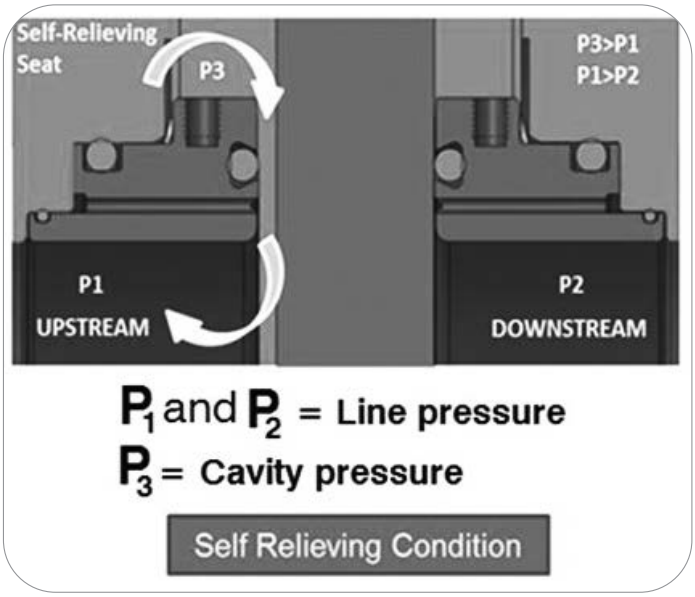


Figure 7: *Self-relieving mechanism*

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

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. See **Figure 8.**

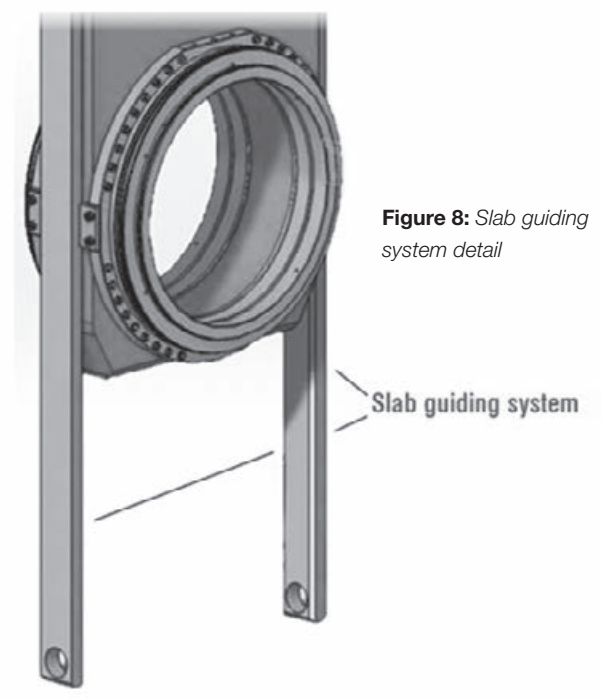


Figure 8: *Slab guiding system detail*

Bore sealing by stem position

No wedging effect and operating thrust, regardless of the temperature range.

No side loads to the stem

The floating seat and gate design ensures low operating thrust. The stem is guided by a low-friction, coated bearing. See **Figure 9.**

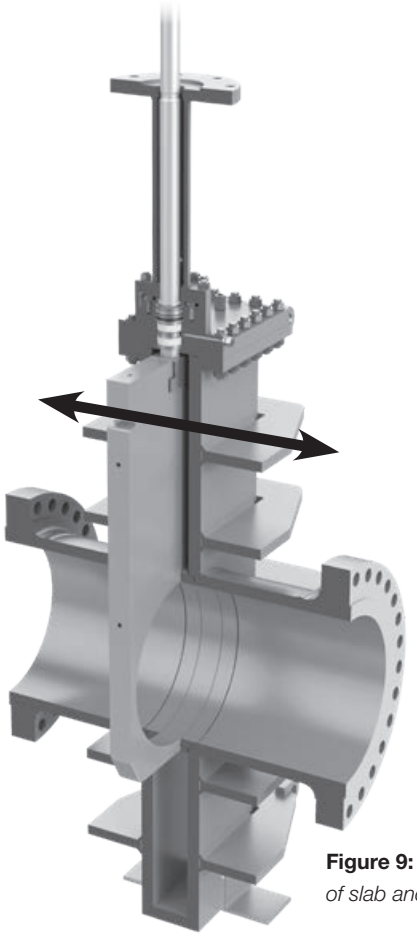


Figure 9: *Floating motion of slab and seats*

Self-cleaning seat

The collection of process fluid debris in the soft seating area is eliminated by the metal seat acting as a scraper. The self-cleaning seat improves uptime and reliability by removing any build-up of debris that may have accumulated on the slab. See **Figure 10.**

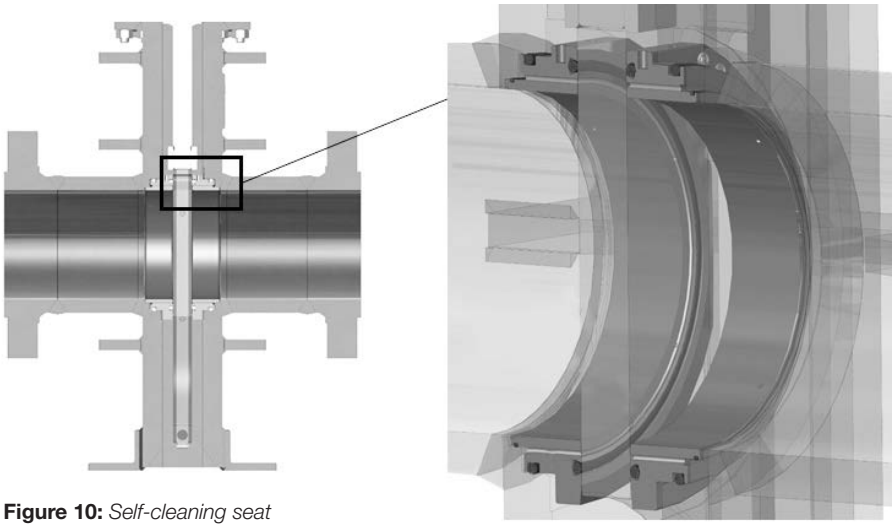


Figure 10: *Self-cleaning seat*

Top-entry design

Simplified maintenance and repair are 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. See **Figure 11.**

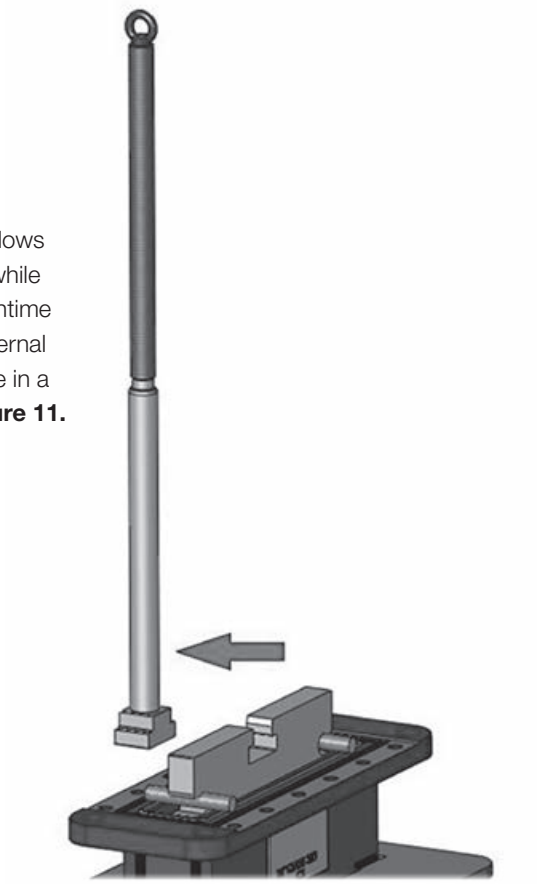


Figure 11: *Top-entry design allows in-line maintenance.*

Blowout-proof stem design

The TCSGV valve's stem design — retained in the bonnet as per API 6D requirements — improves personnel and plant safety. See **Figure 12.**

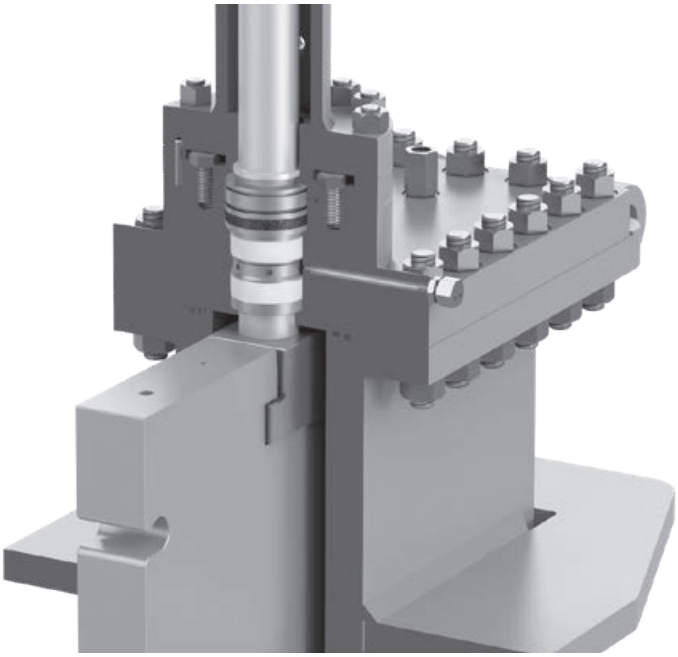


Figure 12: *Blowout-proof stem design*

Sealant injectors

The Valbart TCSGV valve incorporates a seat and stem sealant injector design. These ports enable the injection of sealant to restore the valve's sealing capability. See **Figure 13.**

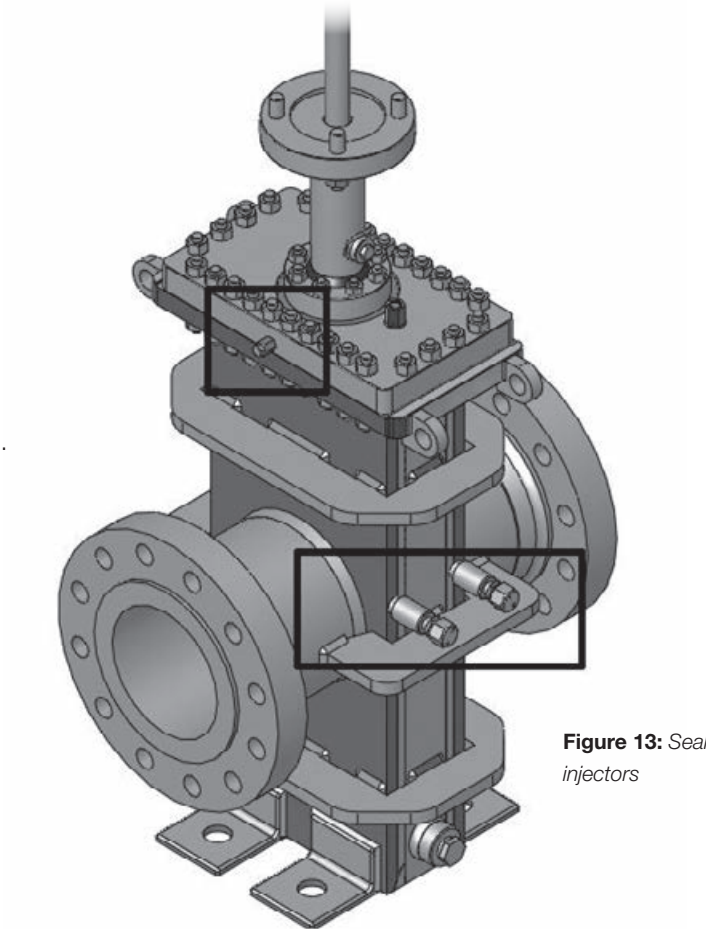


Figure 13: *Sealant injectors*

Seat design

The TCSGV valve's seat design is a solid metal single-piston effect seat, including grease injector holes as a standard feature. **Figure 14** details the seat sealant injector and the sealant pathways.

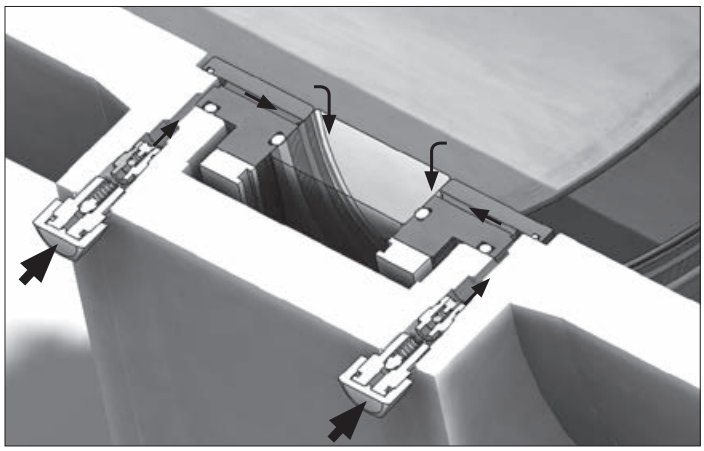


Figure 14: *Seat and seat housing details*

Chevron-style stem seal

PTFE chevron packing provides an effective, low-friction stem seal, for long life under adverse operating conditions. The double packing set design has been emissions tested and certified to ISO 15848-1, while the additional graphite ring provides compliance to API 607/6FA fire safety standards. A sealant injection fitting is provided for emergency sealing if needed. See **Figure 15.**

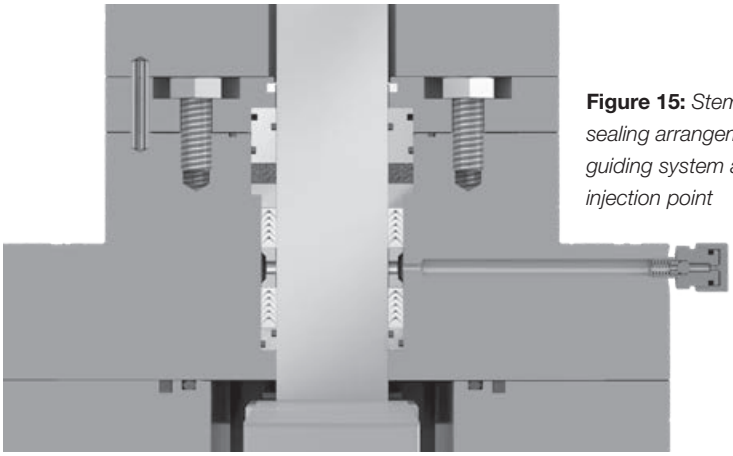
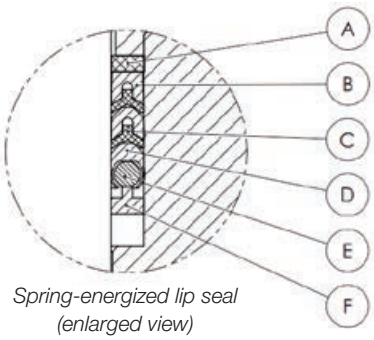


Figure 15: *Stem and body to bonnet sealing arrangement design, stem guiding system and emergency seal injection point*

Flowserve Energized Packing (FEP)

Spring-energized lip seal combined with proven Chevron packing technology makes this the ideal packing to eliminate emissions in critical applications. Qualified to the rigorous requirements of the ISO 15848-1 standard. See **Figure 16.**



Spring-energized lip seal (enlarged view)

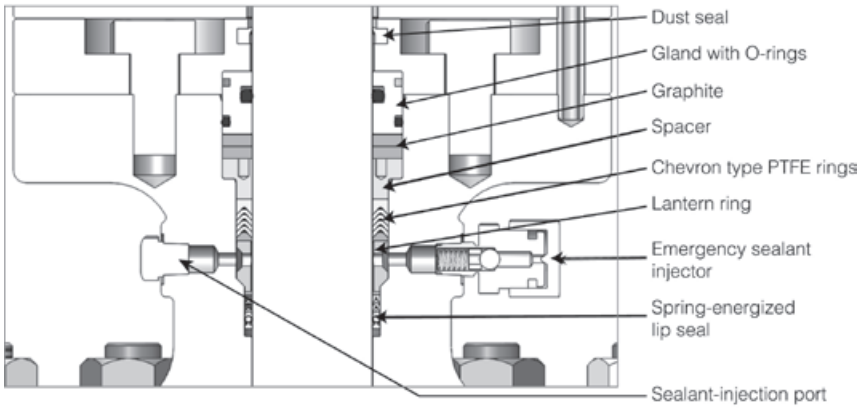


Figure 16: *Stem seal showing Flowserve Energized Packing (FEP) configuration*

FEP packing details		
Item	**Description**	**Material**
A	Backup	PEEK®
B	V-ring	TFM
C	Spacer	RPTFE
D	Jacket	TFM
E	Spring	ELGILOY®
F	Retainer	PEEK

® PEEK is a registered trademark of Victrex plc Corp.
® ELGILOY is a registered trademark of Elgiloy Specialty Metals.

Parts list

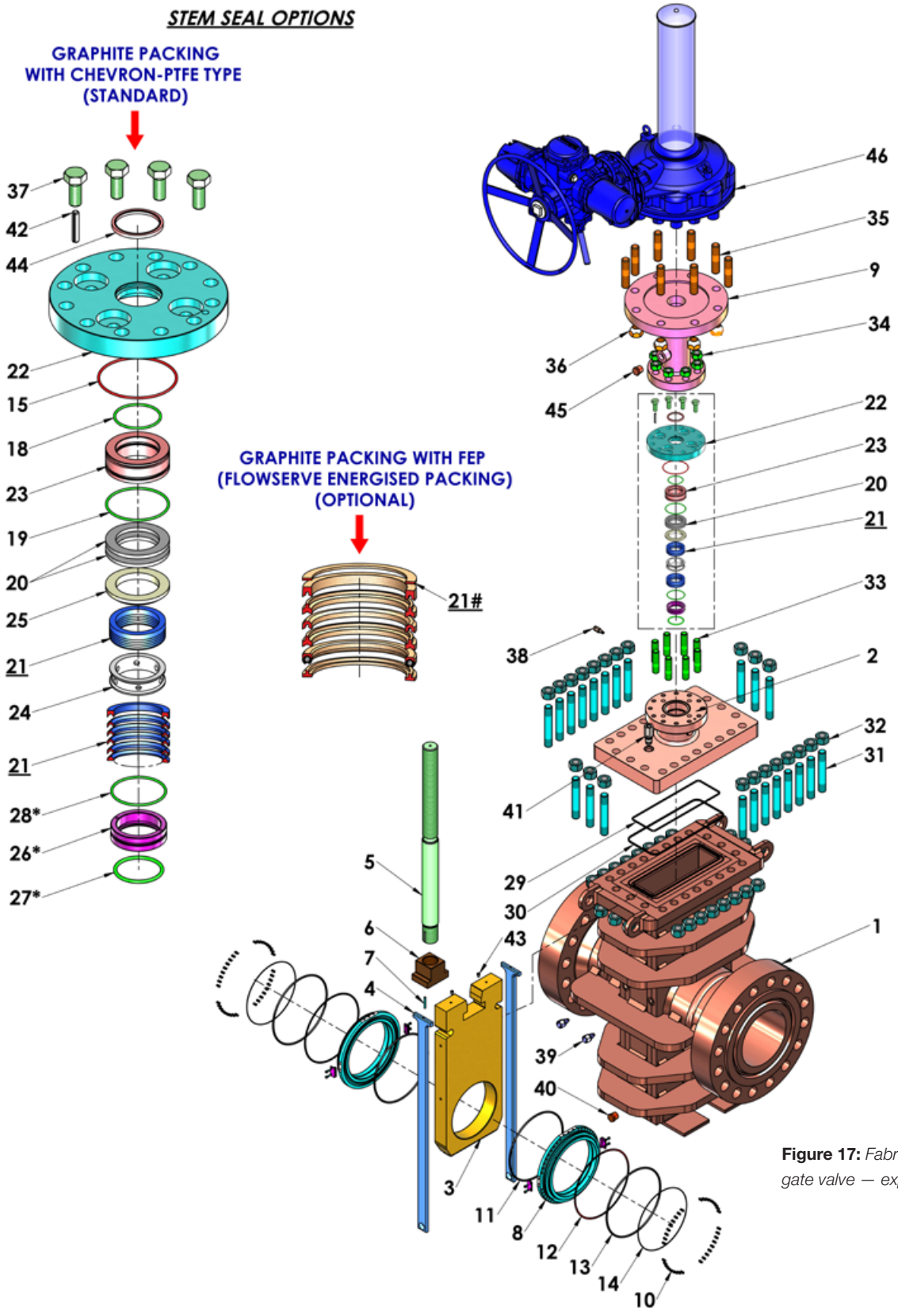


Figure 17: *Fabricated body slab gate valve — exploded view*

Bill of materials – Packing design

N°	COMPONENT	MATERIAL (-29°C to 121°C [-20°F to 250°F])	MATERIAL (-46°C to 121°C [-50°F to 250°F])
1	Body	ASTM A516 Gr. 70 / ASTM A216 Gr. WCB/WCC	ASTM A516 Gr. 70 / ASTM A352 Gr. LCB/LCC
2	Bonnet	ASTM A516 Gr. 70 / ASTM A216 Gr. WCB/WCC	ASTM A516 Gr. 70 / ASTM A352 Gr. LCB/LCC
3	Slab	ASTM A516 Gr. 70 / ASTM A216 Gr. WCB/WCC + ENP + AFT (3)	ASTM A516 Gr. 70 / ASTM A350 Gr. LF2 + ENP + AFT (3)
4	Slab guide	ASTM A516 Gr. 70 + ENP	ASTM A516 Gr. 70 + ENP
5	Stem	ASTM A564 Tp. 630 (17-4) (4) + AFT (3)	ASTM A564 Tp. 630 (17-4) (4) + AFT (3)
6	Stem head	ASTM A564 Tp. 630 (17-4) (4)	ASTM A564 Tp. 630 (17-4) (4)
7	Stem head pin	ASTM A564 Tp. 630 (17-4) / Inconel® 718	ASTM A564 Tp. 630 (17-4) / Inconel 718
8	Seat	ASTM A105N + ENP + AFT (3)	ASTM A350 Gr.LF2 + ENP + AFT (3)
9	Yoke	ASTM A516 Gr. 70 + A106 Gr. B (pipe)	ASTM A516 Gr. 70 + A333 Gr. 6 (pipe)
10	Seat spring	INCONEL X-750	Inconel X-750
11	Seat face O-ring	FKM	FKM / HNBR
12	Seat back-up ring	PEEK (1)	PEEK (1)
13	Seat gasket O-ring	FKM	FKM / HNBR
14	Seat back-up O-ring	FKM	FKM / HNBR
15	Environmental O-ring	FKM	FKM / HNBR
18	Gland inner O-ring	FKM	FKM / HNBR
19	Gland outer O-ring	FKM	FKM / HNBR
20	Stem packing fire-safe	Graphite	Graphite
21/21#	Stem packing	Stem packing PTFE (Chevron) / Flowserve Energized Packing (FEP) #	Stem packing PTFE (Chevron) / Flowserve Energized Packing (FEP) #
22	Packing retainer	ASTM A322 Gr. 4140	ASTM A322 Gr. 4140
23	Gland	SS316	SS316
24	Lantern ring	SS316	SS316
25	Spacer	Tin bronze	Tin bronze
26*	Bearing	SS316	SS316
27*	Bearing inner O-ring	FKM	FKM / HNBR
28*	Bearing outer O-ring	FKM	FKM / HNBR
29	Bonnet gasket	FKM	FKM / HNBR
30	Bonnet fire-safe gasket	Graphite	Graphite
31	Body to bonnet stud	ASTM A193 Gr. B7M	ASTM A320 Gr. L7M
32	Body to bonnet nut	ASTM A194 Gr. 2HM	ASTM A194 Gr. 7M
33	Bonnet to yoke stud	ASTM A193 Gr. B7M	ASTM A320 Gr. L7M
34	Bonnet to yoke nut	ASTM A194 Gr. 2HM	ASTM A194 Gr. 7M
35	Yoke to gear stud	BS 3692 Gr.8.8	ASTM A320 Gr. L7
36	Yoke to gear nut	ASTM A563 Gr. B	ASTM A194 Gr. 7
37	Packing retainer to bonnet bolt	ASTM A193 Gr. B7M	ASTM A320 Gr. L7M
38	Stem injection fitting	SS316L	SS316L
39	Seat injection fitting	SS316L (2)	SS316L (2)
40	Drain fitting	ASTM A105N	ASTM A350 Gr.LF2
41	Bleeder	SS316L	SS316L
42	Spring dowel pin	SS316	SS316
43	Stopper screw	SS316	SS316
44	Dust seal	Polyurethane / Nylon	Polyurethane / Nylon
45	Yoke plug	ASTM A105N	ASTM A350 Gr. LF2
46	Valve operator (gear box + actuator)	Limitorque® — manufacturer standard	Limitorque — manufacturer standard

(1) Only for ASME class 1500 and above
(2) Upstream check valve included
(3) AFT = anti-friction treatment
(4) Optional materials available upon request

 # Applicable for FEP stem seal design
** Not applicable for FEP*

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Specifications

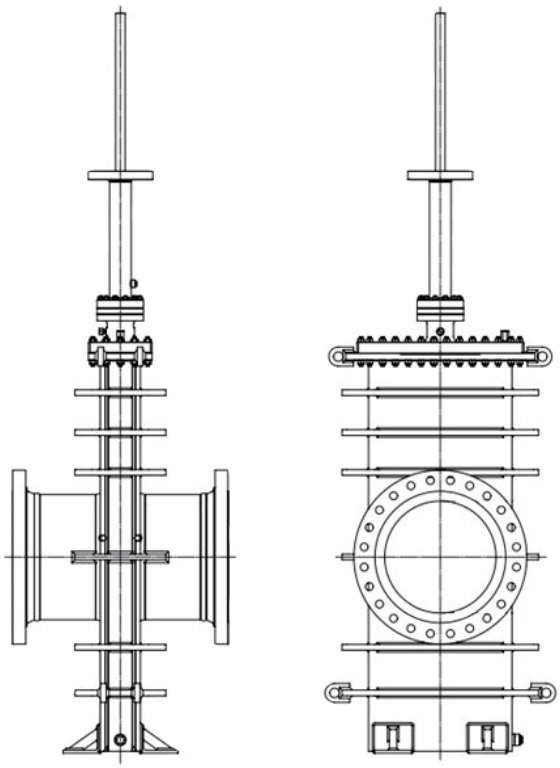


Table 1: *Specification compliance summary*

Size and pressure ratings[1]	NPS 2 to 42; Class 150
	NPS 2 to 42; Class 300
	NPS 2 to 42; Class 600
	NPS 4 to 20; Class 900
	NPS 4 to 12; Class 1500
Flow direction	Bidirectional
End connection	Flanged RF/RJ, butt weld, hub end
Face-to-face dimension[2]	As per API 6D and ASME B16.10
Trim area	Full bore (piggable) and reduced bore to API 6D
Design	API 6D, ASME VIII
Stem seal[3]	PTFE chevron packing with graphite ring/Flowserve energized packing (FEP)
Leakage rates	API 6D, ISO 5208 (Rate A soft seat; Rate D metal seat)
Design temperature range[4]	-29°C to 121°C (-20.2°F to 250°F)
Fire-safe	API 607, API 6FA
Fugitive emissions	ISO 15848

1. Other sizes available upon request
2. Special face-to-face dimensions available upon request
3. Full graphite packing or FEP – Flowserve energized packing available as optional stem seal
4. -46ºC to 121ºC (-50.8ºF to 250ºF) materials available

Configurations and options

Ends

Valve ends can be manufactured to several configurations to comply with customer requests. Flanged RF and RTJ are manufactured to ASME B16.5 to 24 in (MSS SP-44 for 22 in) or ASME B16.47 for sizes above 24 in. 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.

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.

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 10 in. Cl.150, 10 in. Cl.300 and 6 in. Cl.600.

Valves can be supplied with the following actuation configurations:

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

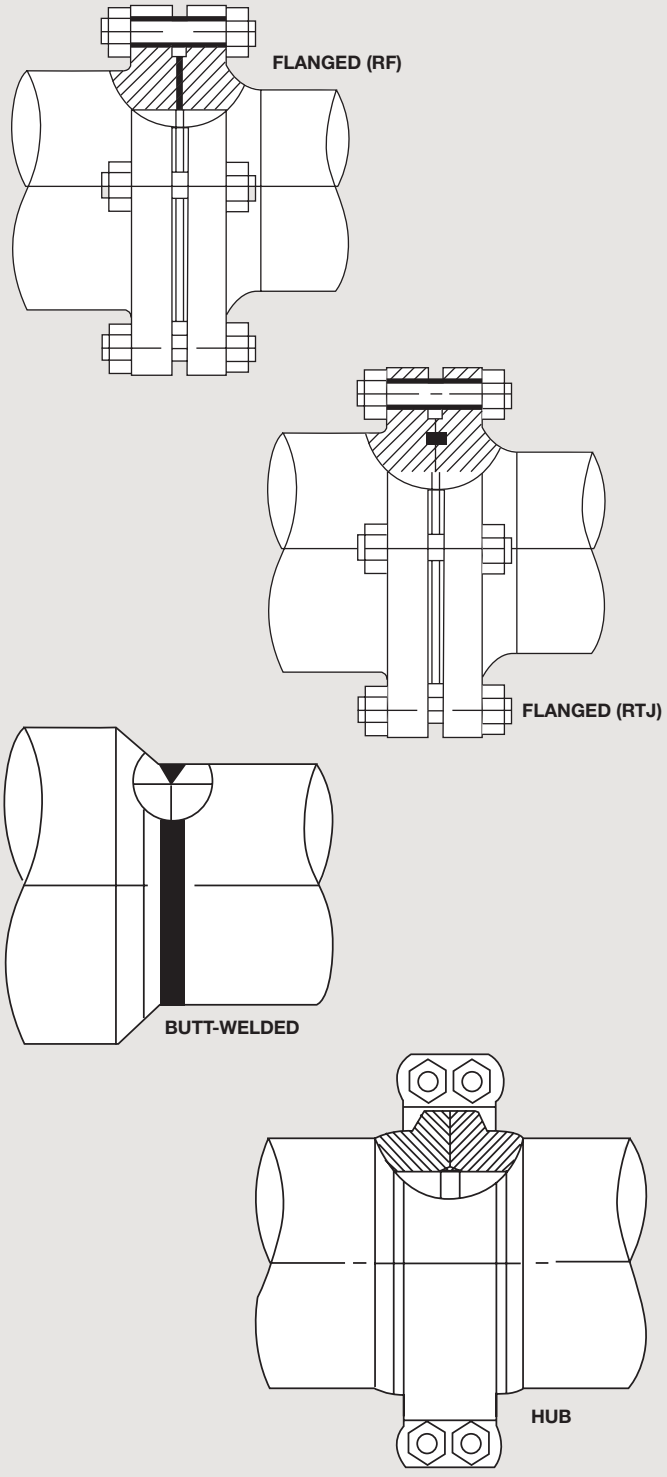


Figure 18: *Applicable end connections*

Engineering data

Valve testing

All 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 and certifications

- API 6D monogram
- Fire-safe – API 607/API 6FA
- Fugitive emissions – BS EN ISO 15848-1

Leakage rates

Table 2: *Leak rate specification compliance*

Standard	Soft Seated	Metal Seated (1)
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.

Typical testing pressures(2)

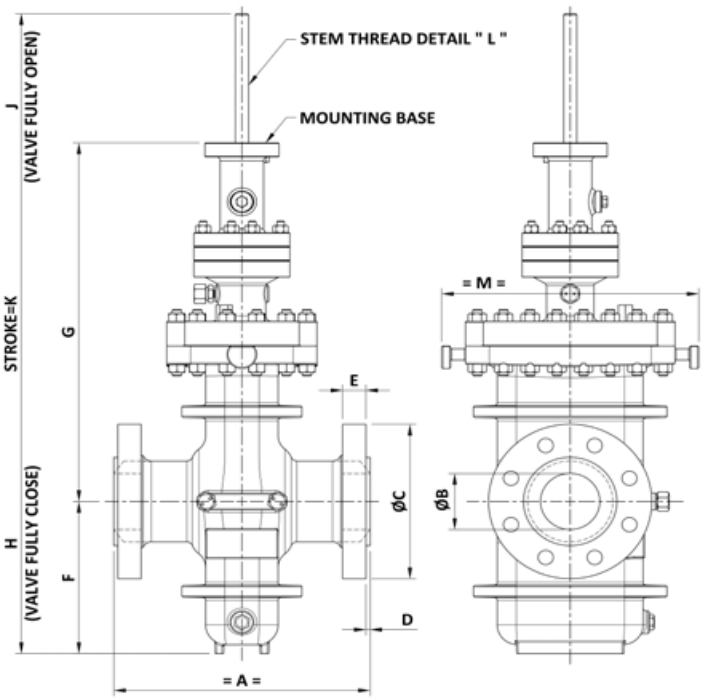
Table 3: *API 6D standard testing pressure values*

ASME Class	Body Hydrotest Pressure		Seat Hydrotest Pressure		Pneumatic Seat Test Pressure(3)	
	bar	psi	bar	psi	bar	psi
150	30	435	22	320	5.5	80
300	78	1,125	57	825		
600	155	2,250	114	1,650		
900	233	3,375	171	2,475		
1500	388	5,620	285	4,125		

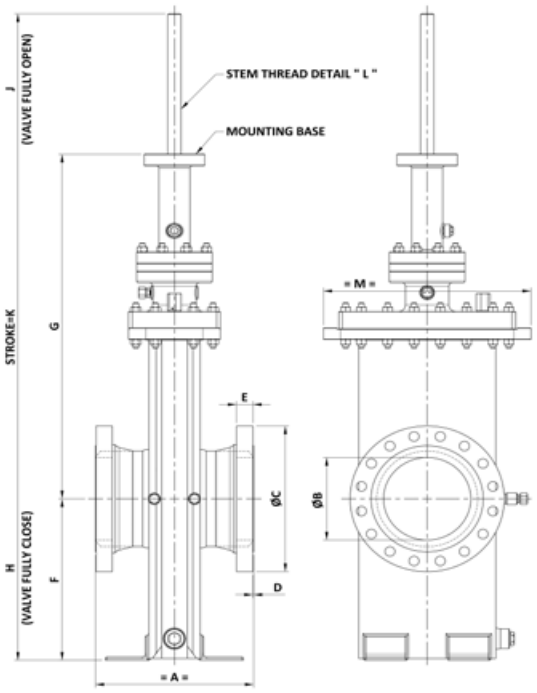
(2) Pressures are for standard carbon steel materials; test pressures may change for different materials.
Conversion factor: 1 bar = 14.5 psi

(3) Pneumatic seat test is optional; test pressures provided as reference.

Dimensions and weights — Class 150



CAST DESIGN (2 to 4 in)



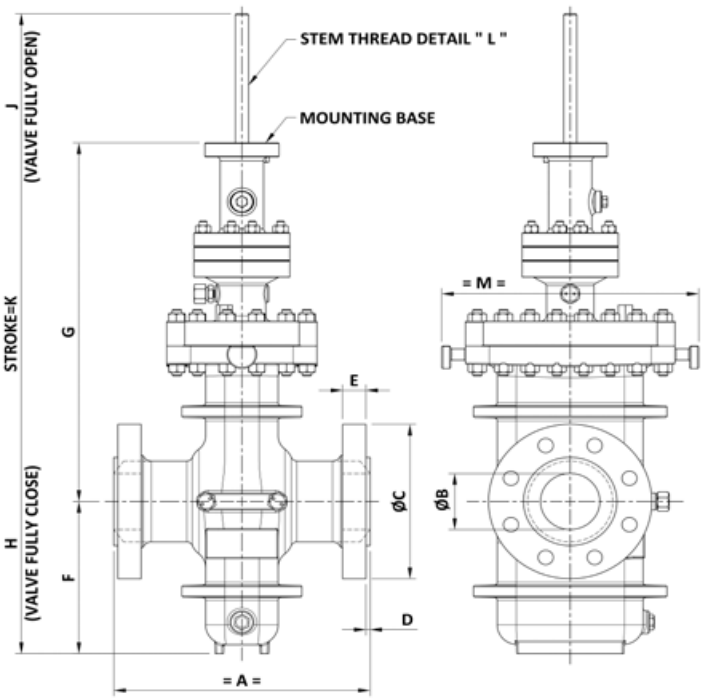
FABRICATED DESIGN

Size	Units	A			ØB	ØC	D	E	F	G	H	J	K	L	M	Units	Weight		Mounting Base
		RF	WE	RJ													RF/RJ	WE	
2	mm	178.00	216.00	191.00	49.00	150.00	2.00	17.50	175.00	446.00	702.50	779.00	76.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	332.00	kg	82.00	70.00	FA10
	in	7.00	8.50	7.50	1.93	5.91	0.08	0.69	6.89	17.56	27.66	30.67	3.01		13.07	lb	180.78	154.32	
3	mm	203.00	283.00	216.00	74.00	190.00	2.00	22.30	226.00	529.00	844.00	945.50	101.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	379.00	kg	105.00	90.00	FA10
	in	8.00	11.13	8.50	2.91	7.48	0.08	0.88	8.90	20.83	33.23	37.22	4.00		14.92	lb	231.49	198.42	
4	mm	229.00	305.00	241.00	100.00	230.00	2.00	22.30	264.00	639.00	998.20	1,133.00	134.80	7/8 - 1/6 in PITCH - 1/3 in LEAD-ACME - 2G - LH (6 TPI - 2 STARTS)	420.00	kg	146.00	125.00	FA10
	in	9.00	12.00	9.50	3.94	9.06	0.08	0.88	10.39	25.16	39.30	44.61	5.31		16.54	lb	321.90	275.58	
6	mm	267.00	403.00	279.00	150.00	280.00	2.00	23.90	334.00	747.00	1,198.80	1,378.00	179.20	1.1/8 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	477.00	kg	208.00	231.00	FA10
	in	10.50	15.88	11.00	5.91	11.02	0.08	0.94	13.15	29.41	47.20	54.25	7.06		18.78	lb	458.56	509.27	
8	mm	292.00	419.00	305.00	201.00	345.00	2.00	27.00	423.50	885.00	1,441.90	1,675.00	233.10	1.1/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	523.00	kg	280.00	314.00	FA10
	in	11.50	16.50	12.00	7.91	13.58	0.08	1.06	16.67	34.84	56.77	65.94	9.18		20.59	lb	617.29	692.25	
10	mm	330.00	457.00	343.00	252.00	405.00	2.00	28.60	493.50	1,053.00	1,702.60	1,986.50	283.90	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	714.00	kg	503.00	450.00	FA14
	in	13.00	18.00	13.50	9.92	15.94	0.08	1.13	19.43	41.46	67.03	78.21	11.18		28.11	lb	1,108.80	992.08	
12	mm	356.00	502.00	368.00	303.00	485.00	2.00	30.20	578.00	1,190.00	1,934.30	2,272.00	337.70	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	763.00	kg	645.00	579.00	FA14
	in	14.00	19.75	14.50	11.93	19.09	0.08	1.19	22.76	46.85	76.15	89.45	13.30		30.04	lb	1,422.00	1,276.47	
14	mm	381.00	572.00	394.00	334.00	535.00	2.00	33.40	623.00	1,260.00	2,042.70	2,411.00	368.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	817.00	kg	732.40	656.00	FA14
	in	15.00	22.50	15.50	13.15	21.06	0.08	1.31	24.53	49.61	80.42	94.92	14.50		32.17	lb	1,614.70	1,446.23	
16	mm	406.00	610.00	419.00	385.00	595.00	2.00	35.00	698.50	1,356.00	2,179.20	2,601.50	422.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	878.00	kg	915.60	819.00	FA14
	in	16.00	24.00	16.50	15.16	23.43	0.08	1.38	27.50	53.39	85.80	102.42	16.63		34.57	lb	2,018.60	1,805.58	
18	mm	432.00	660.00	445.00	436.00	635.00	2.00	38.10	782.00	1,538.00	2,458.20	2,934.50	476.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	941.00	kg	1,107.00	991.00	FA14
	in	17.00	26.00	17.50	17.17	25.00	0.08	1.50	30.79	60.55	96.78	115.53	18.75		37.05	lb	2,440.50	2,184.78	
20	mm	457.00	711.00	470.00	487.00	700.00	2.00	41.30	862.00	1,668.00	2,670.20	3,200.50	530.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	990.00	kg	1,394.00	1,248.00	FA14
	in	18.00	28.00	18.50	19.17	27.56	0.08	1.63	33.94	65.67	105.13	126.00	20.88		38.98	lb	3,073.20	2,751.37	
24	mm	508.00	813.00	521.00	589.00	815.00	2.00	46.10	1,032.00	1,914.50	3,106.20	3,744.50	638.30	1.3/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 PTI - 2 STARTS)	1,180.00	kg	2,128.00	1,904.00	FA16
	in	20.00	32.00	20.50	23.19	32.09	0.08	1.81	40.63	75.37	122.29	147.42	25.13		46.46	lb	4,691.40	4,197.60	
30	mm	660.00	914.00	(1)	735.00	985.00	2.00	73.10	1,295.00	2,427.00	3,915.20	4,715.50	800.30	2.0 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	1,476.00	kg	3,920.00	3,510.00	FA16
	in	26.00	36.00	(1)	28.94	38.78	0.08	2.88	50.98	95.55	154.14	185.65	31.51		58.11	lb	8,642.10	7,738.22	
36	mm	813.00	1,016.00	(1)	874.00	1,170.00	2.00	88.90	1,541.00	2,892.00	4,724.70	5,670.00	945.30	2.7/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,886.00	kg	6,500.00	6,110.00	FA30
	in	32.00	40.00	(1)	34.41	46.06	0.08	3.50	60.67	113.86	186.01	223.23	37.22		74.25	lb	14,330.00	13,470.23	
42	mm	1,626.00	1,626.00	(1)	1,020.00	1,345.00	2.00	95.30	1,780.00	3,264.00	5,285.00	6,395.00	1,110.00	3.1/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,936.00	kg	(1)	(1)	FA35
	in	64.00	64.00	(1)	40.16	52.95	0.08	3.75	70.08	128.50	208.07	251.77	43.70		76.22	lb	(1)	(1)	

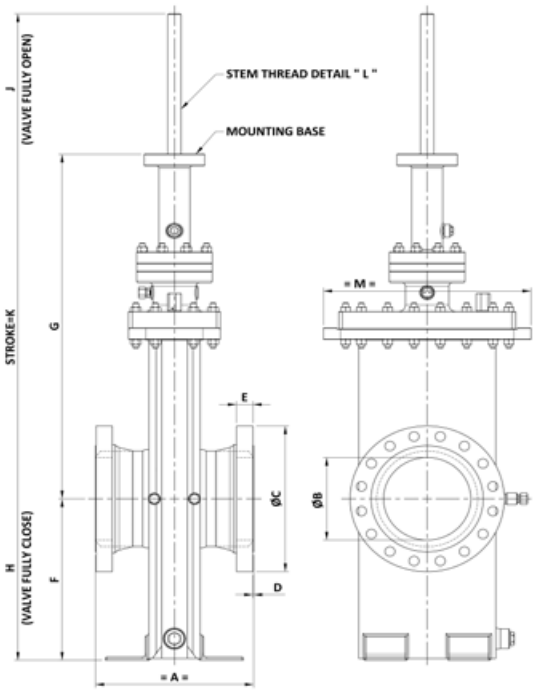
(1) Please consult the factory.

(2) For Acme threads 2 7/8, 3 1/8, 3 3/8 and 3 5/8, stem can be provided with 2.5 TPI as an option on customer request.

Dimensions and weights — Class 300



CAST DESIGN (2 to 4 in)

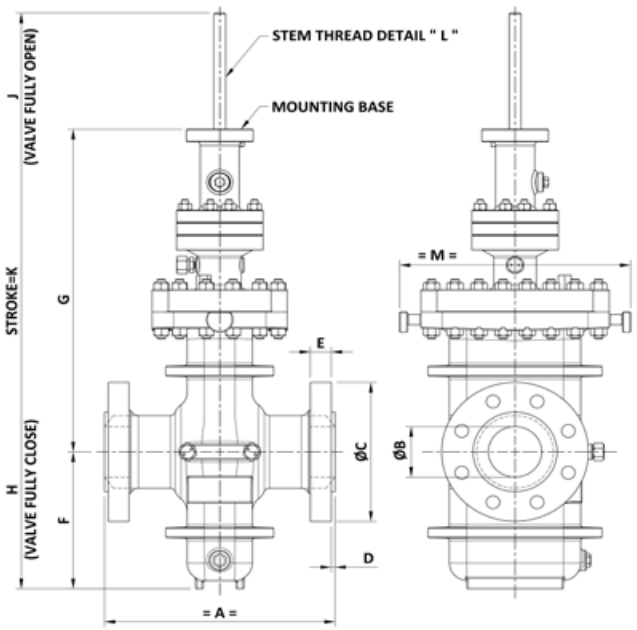


FABRICATED DESIGN

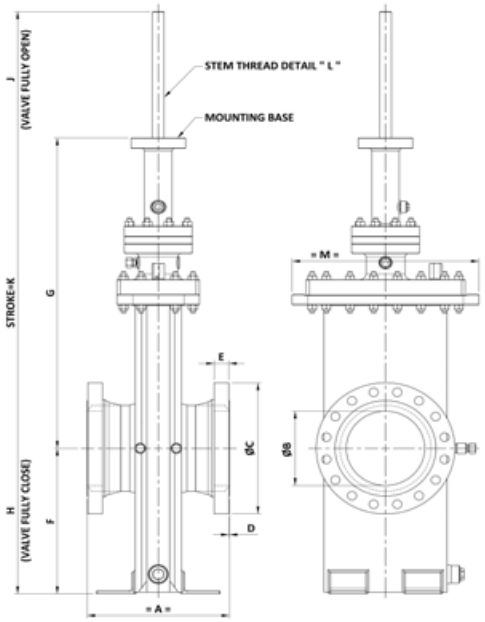
Size	Units	A			ØB	ØC	D	E	F	G	H	J	K	L	M	Units	Weight		Mounting Base
		RF	WE	RJ													RF/RJ	WE	
2	mm	216.00	216.00	232.00	49.00	165.00	2.00	20.70	174.00	441.00	702.50	779.00	76.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	354.00	kg	89.00	74.00	FA10
	in	8.50	8.50	9.13	1.93	6.50	0.08	0.81	6.85	17.36	27.66	30.67	3.01		13.94	lb	196.20	163.14	
3	mm	283.00	283.00	298.00	74.00	210.00	2.00	27.00	226.00	529.00	844.00	945.50	101.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	385.00	kg	126.00	106.00	FA10
	in	11.13	11.13	11.75	2.91	8.27	0.08	1.06	8.90	20.83	33.23	37.22	4.00		15.16	lb	277.80	233.69	
4	mm	305.00	305.00	321.00	100.00	255.00	2.00	30.20	269.00	639.00	1,003.20	1,138.00	134.80	7/8 - 1/6 in PITCH - 1/3 in LEAD-ACME - 2G - LH (6 TPI - 2 STARTS)	433.00	kg	184.00	154.00	FA10
	in	12.00	12.00	12.63	3.94	10.04	0.08	1.19	10.59	25.16	39.50	44.80	5.31		17.05	lb	405.70	339.51	
6	mm	403.00	403.00	419.00	150.00	320.00	2.00	35.00	345.00	741.00	1,203.80	1,383.00	179.20	1.1/8 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	473.00	kg	246.00	187.00	FA10
	in	15.88	15.88	16.50	5.91	12.60	0.08	1.38	13.58	29.17	47.39	54.45	7.06		18.62	lb	542.30	412.26	
8	mm	419.00	419.00	435.00	201.00	380.00	2.00	39.70	423.50	868.50	1,409.00	1,642.00	233.10	1.1/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	526.00	kg	377.00	327.00	FA14
	in	16.50	16.50	17.13	7.91	14.96	0.08	1.56	16.67	34.19	55.47	64.65	9.18		20.71	lb	831.10	720.91	
10	mm	457.00	457.00	473.00	252.00	445.00	2.00	46.10	493.50	1,053.00	1,702.10	1,986.00	283.90	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	714.00	kg	574.00	470.00	FA14
	in	18.00	18.00	18.63	9.92	17.52	0.08	1.81	19.43	41.46	67.01	78.19	11.18		28.11	lb	1,265.50	1,036.17	
12	mm	502.00	502.00	518.00	303.00	520.00	2.00	50.30	578.00	1,190.00	1,933.30	2,271.00	337.70	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	763.00	kg	767.00	660.00	FA14
	in	19.75	19.75	20.38	11.93	20.47	0.08	1.98	22.76	46.85	76.11	89.41	13.30		30.04	lb	1,690.90	1,455.05	
14	mm	762.00	762.00	778.00	334.00	585.00	2.00	52.40	623.00	1,253.00	2,055.70	2,424.00	368.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	759.00	kg	1,002.80	822.00	FA14
	in	30.00	30.00	30.63	13.15	23.03	0.08	2.06	24.53	49.33	80.93	95.43	14.50		29.88	lb	2,210.70	1,812.20	
16	mm	838.00	838.00	854.00	385.00	650.00	2.00	55.60	702.50	1,399.00	2,245.70	2,668.00	422.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	888.00	kg	1,115.00	960.00	FA16
	in	33.00	33.00	33.63	15.16	25.59	0.08	2.19	27.66	55.08	88.41	105.04	16.63		34.96	lb	2,458.20	2,116.44	
18	mm	914.00	914.00	930.00	436.00	710.00	2.00	58.80	781.50	1,558.00	2,499.70	2,976.00	476.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	1,026.00	kg	1,648.20	1,350.00	FA25
	in	36.00	36.00	63.63	17.17	27.95	0.08	2.31	30.77	61.34	98.41	117.17	18.75		40.39	lb	3,633.70	2,976.24	
20	mm	991.00	991.00	1,010.00	487.00	775.00	2.00	62.00	867.00	1,673.00	2,711.20	3,241.50	530.30	1.3/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 PTI - 2 STARTS)	1,057.00	kg	2,216.90	1,816.00	FA25
	in	39.00	39.00	39.75	19.17	30.51	0.08	2.44	34.13	65.87	106.74	127.62	20.88		41.61	lb	4,887.40	4,003.59	
24	mm	1,143.00	1,143.00	1,165.00	589.00	915.00	2.00	68.30	1,032.00	2,031.00	3,256.70	3,895.00	638.30	2.0 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	1,180.00	kg	3,134.00	2,566.00	FA30
	in	45.00	45.00	45.88	23.19	36.02	0.08	2.69	40.63	76.96	128.22	153.35	25.13		46.46	lb	6,909.30	5,657.05	
30	mm	1,397.00	1,397.00	1,422.00	735.00	1,090.00	2.00	90.50	1,295.00	2,474.00	4,038.00	4,838.00	800.30	2.1/4 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	1,430.00	kg	5,263.00	4,526.00	FA35
	in	55.00	55.00	56.00	28.94	42.91	0.08	3.56	50.98	97.40	158.98	190.47	31.51		56.30	lb	11,602.90	9,978.11	
36	mm	1,727.00	1,727.00	1,756.00	874.00	1,270.00	2.00	103.20	1,541.00	2,892.00	4,723.70	5,669.00	945.30	3.1/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,776.00	kg	8,500.00	7,310.00	FA40
	in	68.00	68.00	69.13	34.41	50.00	0.08	4.06	60.67	113.86	185.97	223.19	37.22		69.92	lb	18,739.30	16,115.77	
42	mm	2,134.00	2,134.00	(1)	1,020.00	1,290.00	2.00	117.50	(1)	(1)	(1)	(1)	(1)	(1)	(1)	kg	(1)	(1)	(1)
	in	84.00	84.00	(1)	40.16	50.79	0.08	4.63	(1)	(1)	(1)	(1)	(1)		(1)	lb	(1)	(1)	

(1) Please consult the factory.
(2) For 36 in 300, stem can be provided with 2/5 pitch and 4/5 lead on customer request.
(3) For Acme threads 2 7/8, 3 1/8, 3 3/8 and 3 5/8, stem can be provided with 2.5 TPI as an option on customer request.

Dimensions and weights — Class 600



CAST DESIGN (2 to 4 in)

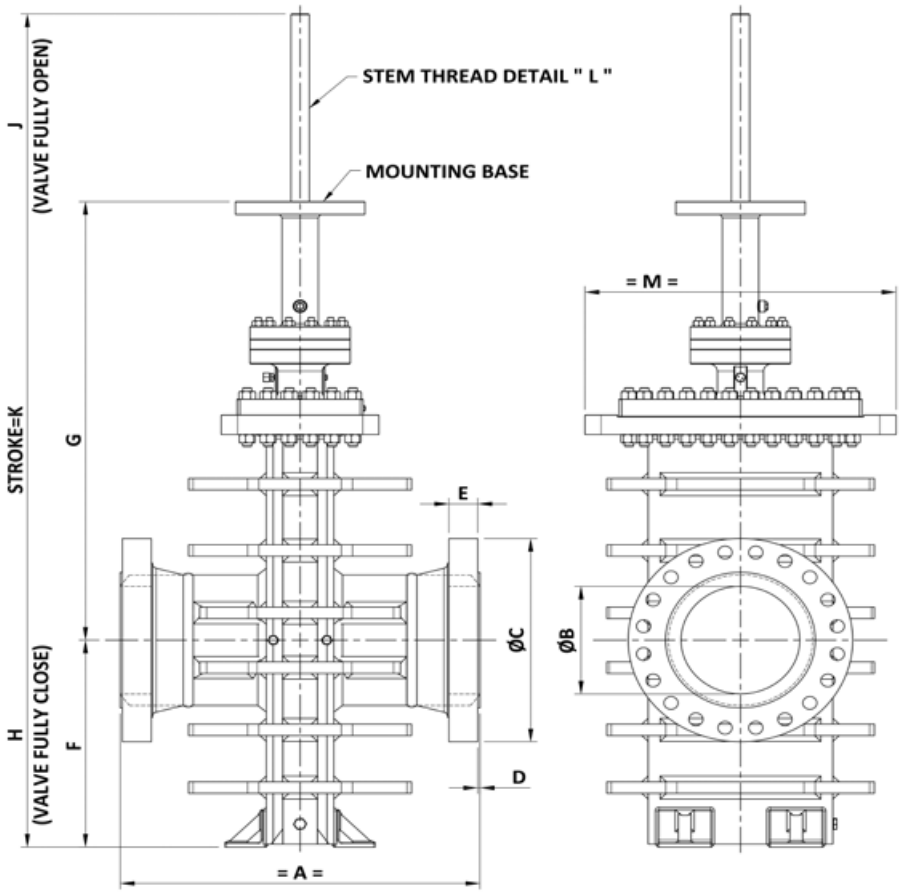


FABRICATED DESIGN

Size	Units	A			ØB	ØC	D	E	F	G	H	J	K	L	M	Units	Weight		Mounting Base
		RF	WE	RJ													RF/RJ	WE	
2	mm	292.00	292.00	295.00	49.00	165.00	7.00	25.40	174.00	441.00	702.50	779.00	76.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	354.00	kg	93.00	71.00	FA10
	in	11.50	11.50	11.63	1.93	6.50	0.28	1.00	6.85	17.36	27.66	30.67	3.01		13.94	lb	205.00	156.53	
3	mm	356.00	356.00	359.00	74.00	210.00	7.00	31.80	226.00	529.00	844.00	945.50	101.50	3/4 - 1/8 in PITCH - 1/4 in LEAD - ACME - 2G - LH (8 TPI - 2 STARTS)	385.00	kg	133.00	102.00	FA10
	in	14.00	14.00	14.13	2.91	8.27	0.28	1.25	8.90	20.83	33.23	37.22	4.00		15.16	lb	293.20	224.87	
4	mm	432.00	432.00	435.00	100.00	275.00	7.00	38.10	271.00	639.00	1,006.20	1,141.00	134.80	7/8 - 1/6 in PITCH - 1/3 in LEAD-ACME - 2G - LH (6 TPI - 2 STARTS)	435.00	kg	220.00	169.00	FA10
	in	17.00	17.00	17.13	3.94	10.83	0.28	1.50	10.67	25.16	39.61	44.92	5.31		17.13	lb	184.00	372.58	
6	mm	559.00	559.00	562.00	150.00	355.00	7.00	47.70	358.00	747.00	1,220.80	1,400.00	179.20	1.1/8 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	473.00	kg	345.00	286.00	FA14
	in	22.00	22.00	22.13	5.91	13.98	0.28	1.88	14.09	29.41	48.06	55.12	7.06		18.62	lb	760.60	630.52	
8	mm	660.00	660.00	664.00	201.00	420.00	7.00	55.60	417.00	885.00	1,417.90	1,651.00	233.10	1.1/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 TPI - 2 STARTS)	526.00	kg	475.00	413.00	FA14
	in	26.00	26.00	26.13	7.91	16.54	0.28	2.19	16.42	34.84	55.82	65.00	9.18		20.71	lb	1,047.20	910.51	
10	mm	787.00	787.00	791.00	252.00	510.00	7.00	64.50	493.50	1,053.00	1,710.60	1,994.50	283.90	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	714.00	kg	768.00	615.00	FA14
	in	31.00	31.00	31.13	9.92	20.08	0.28	2.54	19.43	41.46	67.35	78.52	11.18		28.11	lb	1,693.10	1,355.84	
12	mm	838.00	838.00	841.00	303.00	560.00	7.00	67.70	578.00	1,190.00	1,933.30	2,271.00	337.70	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	763.00	kg	1,018.90	816.00	FA16
	in	33.00	33.00	33.13	11.93	22.05	0.28	2.67	22.76	46.85	76.11	89.41	13.30		30.04	lb	2,246.20	1,798.97	
14	mm	889.00	889.00	892.00	334.00	605.00	7.00	69.90	623.00	1,269.00	2,055.70	2,424.00	368.30	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	845.00	kg	1,213.70	984.00	FA25
	in	35.00	35.00	35.13	13.15	23.82	0.28	2.75	24.53	49.96	80.93	95.43	14.50		33.27	lb	2,675.80	2,169.35	
16	mm	991.00	991.00	994.00	385.00	685.00	7.00	78.20	702.50	1,442.00	2,332.70	2,755.00	422.30	1.3/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 PTI - 2 STARTS)	925.00	kg	1,327.20	1,342.00	FA30
	in	39.00	39.00	39.13	15.16	26.97	0.28	3.08	27.66	56.77	91.84	108.46	16.63		36.42	lb	2,926.00	2,958.60	
18	mm	1,092.00	1,092.00	1,095.00	436.00	745.00	7.00	84.60	786.50	1,622.00	2,659.70	3,136.00	476.30	2.0 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	981.00	kg	2,337.90	1,844.00	FA30
	in	43.00	43.00	43.13	17.17	29.33	0.28	3.33	30.96	63.86	104.71	123.46	18.75		38.62	lb	5,154.10	4,065.32	
20	mm	1,194.00	1,194.00	1,200.00	487.00	815.00	7.00	88.90	867.00	1,747.50	2,849.70	3,380.00	530.30	2.1/4 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	1,102.00	kg	2,888.00	2,311.00	FA35
	in	47.00	47.00	47.25	19.17	32.09	0.28	3.50	34.13	68.80	112.19	133.07	20.88		43.39	lb	6,367.00	5,094.88	
24	mm	1,397.00	1,397.00	1,407.00	589.00	940.00	7.00	101.60	1,052.00	2,052.00	3,402.20	4,040.50	638.30	2.3/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,262.00	kg	4,570.00	3,791.00	FA35
	in	55.00	55.00	55.38	23.19	37.01	0.28	4.00	41.42	80.79	133.94	159.07	25.13		49.69	lb	10,075.10	8,357.71	
26	mm	1,448.00	1,448.00	1,461.00	633.00	1,015.00	7.00	108.00	1,130.00	2,203.00	3,589.00	4,276.00	687.00	2.5/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,325.00	kg	5,412.00	4,460.00	FA35
	in	57.00	57.00	57.50	24.92	39.96	0.28	4.25	44.49	86.73	141.30	168.35	27.05		52.17	lb	11,931.40	9,832.61	
30	mm	1,651.00	1,651.00	1,664.00	735.00	1,130.00	7.00	114.30	1,295.00	2,507.50	4,080.70	4,881.00	800.30	3.1/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,510.00	kg	8,670.80	6,938.00	FA40
	in	65.00	65.00	65.50	28.94	44.49	0.28	4.50	50.98	98.72	160.66	192.17	31.51		59.45	lb	19,115.90	15,295.65	
36	mm	2,083.00	2,083.00	2,099.00	874.00	1,315.00	7.00	123.90	1,541.00	2,892.00	4,724.70	5,670.00	945.30	3.5/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,776.00	kg	13,500.00	11,340.00	F48
	in	82.00	82.00	82.63	34.41	51.77	0.28	4.88	60.67	113.86	186.01	223.23	37.22		69.92	lb	29,762.40	25,000.39	
42	mm	2,489.00	2,489.00	(1)	1,020.00	1,405.00	7.00	168.30	(1)	(1)	(1)	(1)	(1)	(1)	(1)	kg	(1)	(1)	(1)
	in	98.00	98.00	(1)	40.16	55.31	0.28	6.63	(1)	(1)	(1)	(1)	(1)		(1)	lb	(1)	(1)	

(1) Please consult the factory.
(2) For 30 and 36 in 600, stem can be provided with 2/5 pitch and 4/5 lead on customer request.
(3) For Acme threads 2 7/8, 3 1/8, 3 3/8 and 3 5/8, stem can be provided with 2.5 TPI as an option on customer request.

Dimensions and weights — Class 900



Size	Units	A			ØB	ØC	D	E	F	G	H	J	K	L	M	Units	Weight		Mounting Base
		RF	WE	RJ													RF/RJ	WE	
10	mm	838.00	838.00	841.00	252.00	545.00	7.00	69.90	503.50	1,085.00	1,739.60	2,023.50	283.90	1.1/2 - 1/6 in PITCH - 1/3 in LEAD - ACME - 2G - LH (6 TPI - 2 STARTS)	733.00	kg	1,160.00	974.40	FA25
	in	33.00	33.00	33.13	9.92	21.46	0.28	2.75	19.82	42.72	68.49	79.67	11.18		28.86	lb	2,557.36	2,148.18	
12	mm	965.00	965.00	968.00	303.00	610.00	7.00	79.40	578.00	1,190.00	1,934.30	2,272.00	337.70	1.3/4 - 1/5 in PITCH - 2/5 in LEAD - ACME - 2G - LH (5 PTI - 2 STARTS)	763.00	kg	1,400.00	1,176.00	FA30
	in	38.00	38.00	38.13	11.93	24.02	0.28	3.13	22.76	46.85	76.15	89.45	13.30		30.04	lb	3,086.50	2,592.63	
16	mm	1,130.00	1,130.00	1,140.00	373.00	705.00	7.00	88.90	702.50	1,442.00	2,332.70	2,755.00	422.30	2.1/4 - 1/4 in PITCH - 1/2 in LEAD - ACME - 2G - LH (4 TPI - 2 STARTS)	925.00	kg	2,340.00	1,965.60	FA35
	in	44.50	44.50	44.88	14.69	27.76	0.28	3.50	27.66	56.77	91.84	108.46	16.63		36.42	lb	5,158.80	4,333.40	
20	mm	1,321.00	1,321.00	1,334.00	471.00	855.00	7.00	108.00	867.00	1,789.50	2,890.70	3,421.00	530.30	2.5/8 - 1/3 in PITCH - 2/ 3in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,102.00	kg	4,600.00	3,864.00	FA35
	in	52.00	52.00	52.50	18.54	33.66	0.28	4.25	34.13	70.45	113.81	134.69	20.88		43.39	lb	10,141.30	8,518.65	
24	mm	1,549.00	1,549.00	1,568.00	570.00	1,040.00	7.00	139.70	(1)	(1)	(1)	(1)	(1)	(1)	(1)	kg	(1)	(1)	(1)
	in	61.00	61.00	61.75	22.44	40.94	0.28	5.50	(1)	(1)	(1)	(1)	(1)		(1)	lb	(1)	(1)	
30	mm	1,880(1)	(1)	(1)	712.00	1,230.00	7.00	149.30	1,315.00	2,585.50	4,180.20	4,980.50	800.30	3.5/8 - 1/3 in PITCH - 2/3 in LEAD - ACME - 2G - LH (3 TPI - 2 STARTS)	1,550.00	kg	14,000.00	11,760.00	F48
	in	74.00(1)	(1)	(1)	28.03	48.43	0.28	5.88	51.77	101.79	164.57	196.08	31.51		61.02	lb	30,864.70	25,926.33	

(1) Please consult the factory.

(2) For Acme threads 2 7/8, 3 1/8, 3 3/8 and 3 5/8, stem can be provided with 2.5 TPI as an option on customer request.

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, complete with V Series 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. See **Figures 19** and **20**.

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 19: *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 20: *V Series bevel gearboxes are easily adapted for motorized operation by MX actuators.*

Topworks data

Valve Size NPS	Class	ASME Working Pressure	Stem Data			Block and Bleed Thrust	Block and Bleed Torque	Mounting Base	Stroke		Turns to Open Valve
			ACME[1]	Threads per Inch	Starts						
		psig	[in]			lbf	ft lb		mm	in	# of turns
2	150	285	0.75	8	2	639	5	FA10	76.50	3.01	12
2	300	740	0.75	8	2	1,553	11	FA10	76.50	3.01	12
2	600	1,480	0.75	8	2	3,044	22	FA10	76.50	3.01	12
3	150	285	0.75	8	2	948	7	FA10	101.50	4.00	16
3	300	740	0.75	8	2	2,303	17	FA10	101.50	4.00	16
3	600	1,480	0.75	8	2	4,513	33	FA10	101.50	4.00	16
4	150	285	0.875	6	2	1,479	13	FA10	134.80	5.31	16
4	300	740	0.875	6	2	3,632	33	FA10	134.80	5.31	16
4	600	1,480	0.875	6	2	7,141	64	FA10	134.80	5.31	16
6	150	285	1.125	5	2	2,407	27	FA10	179.20	7.06	18
6	300	740	1.125	5	2	5,956	67	FA10	179.20	7.06	18
6	600	1,480	1.125	5	2	11,744	132	FA14	179.20	7.06	18
8	150	285	1.25	5	2	4,029	48	FA10	233.10	9.18	23
8	300	740	1.25	5	2	9,459	113	FA14	233.10	9.18	23
8	600	1,480	1.25	5	2	18,703	223	FA14	233.10	9.18	23
10	150	285	1.5	6	2	5,780	72	FA14	283.90	11.18	34
10	300	740	1.5	6	2	13,617	170	FA14	283.90	11.18	34
10	600	1,480	1.5	6	2	27,282	340	FA14	283.90	11.18	34
10	900	2,220	1.5	6	2	40,308	503	FA25	283.90	11.18	34
12	150	285	1.5	6	2	7,929	99	FA14	337.70	13.30	40
12	300	740	1.5	6	2	18,879	235	FA14	337.70	13.30	40
12	600	1,480	1.5	6	2	37,048	462	FA16	337.70	13.30	40
12	900	2,220	1.75	5	2	55,799	820	FA30	337.70	13.30	33
14	150	285	1.5	6	2	9,313	116	FA14	368.30	14.50	44
14	300	740	1.5	6	2	21,995	274	FA14	368.30	14.50	44
14	600	1,480	1.5	6	2	43,563	543	FA25	368.30	14.50	44
16	150	285	1.5	6	2	12,036	150	FA14	422.30	16.63	50
16	300	740	1.5	6	2	28,453	355	FA16	422.30	16.63	50
16	600	1,480	1.75	5	2	56,717	833	FA30	422.30	16.63	42
16	900	2,220	2.25	4	2	87,212	1,632	FA35	422.30	16.63	33
18	150	285	1.5	6	2	15,113	189	FA14	476.30	18.75	56
18	300	740	1.5	6	2	35,792	446	FA25	476.30	18.75	56
18	600	1,480	2	4	2	72,623	1,258	FA30	476.30	18.75	38
20	150	285	1.5	6	2	18,536	231	FA14	530.30	20.88	63
20	300	740	1.75	5	2	44,105	648	FA25	530.30	20.88	52
20	600	1,480	2.25	4	2	89,314	1,671	FA35	530.30	20.88	42
20	900	2,220	2.625	3	2	126,155	2,884	FA35	530.30	20.88	31

(1) For Acme threads 2.875 to 3.625 in, stem can be provided with 2.5 TPI as an option on customer request.

Valve Size NPS	Class	ASME Working Pressure	Stem Data			Block and Bleed Thrust	Block and Bleed Torque	Mounting Base	Stroke		Turns to Open Valve
			ACME[1]	Threads per Inch	Starts						
		psig	[in]			lbf	ft lb		mm	in	# of turns
24	150	285	1.75	5	2	26,536	390	FA16	638.30	25.13	63
24	300	740	2	4	2	63,917	1,107	FA30	638.30	25.13	50
24	600	1,480	2.375	3	2	103,542	2,223	FA35	638.30	25.13	38
24	900	2,220	3.125	3	2	192,374	4,933	FA40	638.30	25.13	38
26	600	1,480	2.625	3	2	144,000	3,292	FA35	687.00	27.05	41
30	150	285	2	4	2	41,685	722	FA16	800.30	31.51	63
30	300	740	2.25	4	2	99,367	1,859	FA35	800.30	31.51	63
30	600	1,480	3.125	3	2	198,530	5,090	FA40	800.30	31.51	47
30	900	2,220	3.625	3	2	279,427	7,943	F48	800.30	31.51	47
36	150	285	2.875	3	2	58,194	1,411	FA30	945.30	37.22	56
36	300	740	3.125	3	2	138,559	3,553	FA40	945.30	37.22	56
36	600	1,480	3.625	3	2	273,448	7,773	F48	945.30	37.22	56
36	900	2,220	4.375	2	2	413,478	15,184	F60	945.30	37.22	37
42	150	285	3.125	3	2	85,804	2,424	FA35	1,110.00	43.70	66
42	300	740	3.375	3	2	237,585	7,094	F40	1,110.00	43.70	66
42	600	1,480	4.375	2	2	378,168	15,269	F60	1,110.00	43.70	44

(1) For Acme threads 2.875 to 3.625 in, stem can be provided with 2.5 TPI as an option on customer request.

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