Memoryseal® SB-150/300/600 resilient-seated ball valves

Data sheet

Velan Memoryseal split-body resilient-seated ball valves are available with a floating or trunnion ball, designed to handle an extensive range of applications.

Standard valves with MPTFE seats and graphite packing can handle steam service up to 150 psig (10.3 bar). Valves with carbon graphite filled PTFE seats are suitable for steam up to 250 psig (17.2 bar).

These rugged, versatile, and high-performance Memoryseal split-body resilient-seated ball valves can meet NACE specifications(3).

Memoryseal NPS 3 (80) split-body full port valve with slide handle.

Features

- Multiple solid cup and cone type PTFE stem seal or graphite packing.
- Two-piece self-aligning packing flange and gland.
- Valve/packing meets ISO and API Fugitive Emissions Standards, and corrosion test requirements.
- Long cycle life.
- Low, uniform torques.
- Pressurized thrust washer prevents galling and provides secondary stem seal.
- ASME Section VIII mid flanges and bolting eliminates weak center section.
- UL approved, SB-150/300 NPS 2–12 (DN 50–300) (optional).
- AGA and CGA approved, SB-150 full port NPS 2–8 (DN 50–200) (optional).
- Locking devices standard on lever operated valves.
- Trunnion-mounted ball on larger valves allows the ball to float in case of fire and shut-off on the secondary metal seat.
- Cavity fillers are available for NPS ½–12 (DN 15–300).
- Valves are fire safe per API 607(2) / ISO 10497.
- Certified SIL 3.

Specifications

Sizes	NPS ½ – 24 (DN 15 – 600)
Pressure rating	ASME Class 150, 300, and 600
End connections	ASME B16.5
Port	Full and regular
Valve design	ASME B16.34, API 608(1)
Face-to-face	ASME B16.10 Flanged long or short pattern

(1) For latest revision compliance contact your local Velan office.

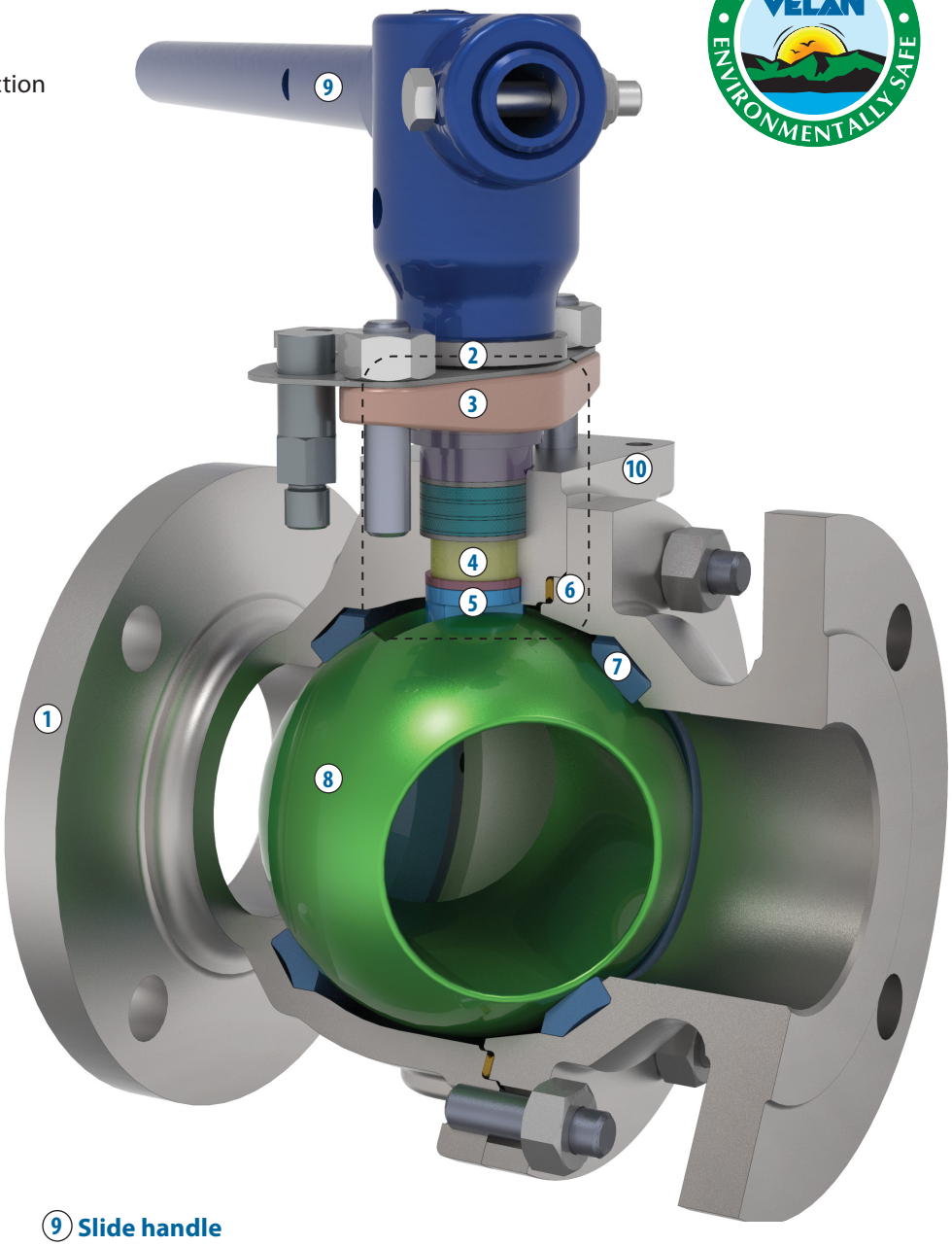
(2) API 607 Rev. 5 / ISO 10497 is optional, requires graphite packing.

(3) To ensure these valves meet NACE specifications, this requirement must be confirmed prior to placing the purchase order.

Applications

- Fluids
- Semi-solids
- Corrosive services
- Steam services
- Chemical
- Oil & gas
- Petrochemical
- Pulp and paper processing

Design features



1 Body
Body with precision machined construction complies to ASME B16.34.

2 Packing chamber
Unique packing chamber design maintains low emissions control for reliable sealing and long lasting high cycle life.

3 Packing flange
Self-aligning packing flange is independent of gland for equal compression of packing rings.

4 Stem guides
Upper and lower bushings prevent side load on packing rings. Eliminates premature wear, therefore enhancing packing life.

5 Stem
Stem shoulder assures blowout-proof protection. A floating stem eliminates thrust washer wear.

6 Gasket
Fully enclosed spiral wound graphite filled 316 gasket for a tight seal.

A secondary metal-to-metal contact area in addition to the primary gasket.

7 Memoryseal® seats
Velan concave-convex flexible, in-tension seats with induced sealing memory.

8 Ball
Contact between the mirror-finished ball and Memoryseal seats with low torque operation.

9 Slide handle
Sliding lock mechanism secures handle in open or closed position. Slide handle can convert to a T-handle by attaching the lever pipe in the center.

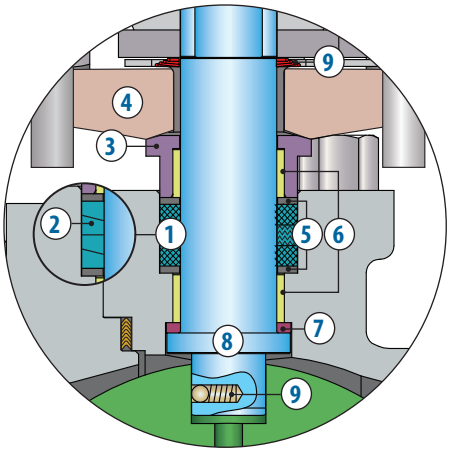
10 Actuator mounting
Four mounting holes are provided on top of the valve body to mount the bracket which can receive an ISO 5211 mounting actuator.

Cavity pressure relief
Memoryseal seats are designed to relieve overpressure in the ball/body cavity. (See page 4)

Anti-static design
Eliminates static electrical buildup between stem, ball and body. (See pages 3 and 8.)

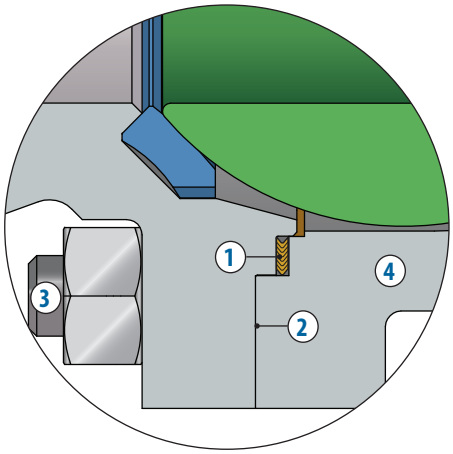
Packing chamber and body seals

Dual qualified to API 641 and ISO-15848-1 fugitive emission requirements[1]



The unique E-20 packing chamber design maintains low emissions control for long lasting high cycle life. Valve packing is 100 ppm Low emission (Low-E).

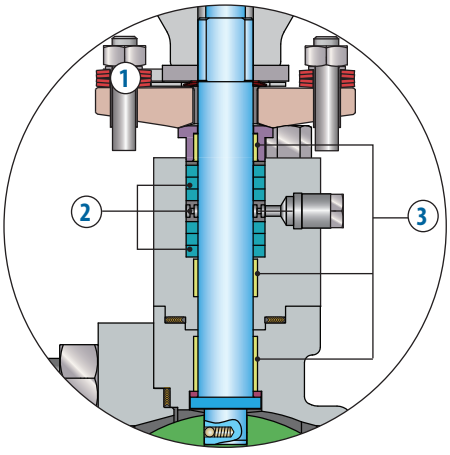
1. Graphite packed valves are dual qualified to API 641 and ISO-15848-1, up to NPS 24 Class 150/300 and NPS 12 Class 600. Packing rings made in braided and die-formed flexible graphite, tested to API 622.
2. PTFE packed valves are dual qualified to API 641 and ISO-15848-1, up to NPS 12 Class 150/300/600. Packing rings made in cup and cone type PTFE.
3. Specially machined gland bushing provides self-alignment to packing flange.
4. Adjustible self-aligning packing flange is independent of gland for equal compression of packing rings.
5. Two packing washers provide anti-extrusion of the PTFE graphite packing for enhanced seal performance.
6. Upper gland bushing sleeve and lower stem bushing prevent side load on packing rings. Eliminates premature wear, enhancing packing life.
7. Pressurized PTFE thrust washer prevents galling and provides secondary stem seal.
8. Floating stem eliminates thrust washer wear and stem shoulder assures blowout-proof safety.
9. Anti-static design
   Ball-to-stem spring device eliminates static electrical buildup between stem, ball, and body for NPS 2–24 (DN 50–600). A separate external coil spring device that grounds stem to body is included in the full size range.



Memoryseal body seal designs incorporate a secondary metal-to-metal contact area in addition to the primary gasket. Both the bolting and mid-flange meet ASME Section VIII standards for a superior seal.

1. Primary gasket is fully enclosed spiral wound graphite filled 316.
2. Secondary metal-to-metal contact
3. ASME Section VIII bolting
4. ASME Section VIII mid-flange

Alternative packing chamber with live-loading, lantern ring and leakoff options



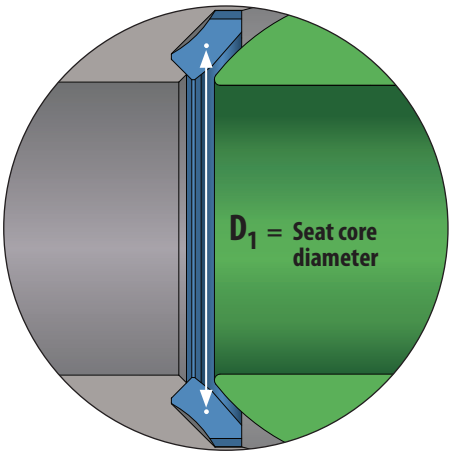
Velan's double packed arrangement uses the E-20 packing style, a double stacked live-loaded packing flange, and lantern ring.

1. Live-loading packing flange with double stacked Belleville springs maintain the packing load for low maintenance and extended cycle life.
2. Double set of graphite packing rings, lantern ring and leakoff for diverse applications such as vacuum service, leakage monitoring, seal injection and maintenance.
3. Upper gland bushing sleeve and two stem bushings prevent side load on packing rings. Eliminates premature wear, enhancing packing life.

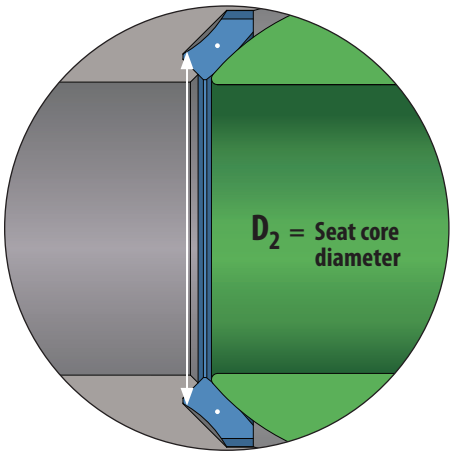
(1) See page 10 for more on qualifications.

Velan Memoryseal® ball valve technology

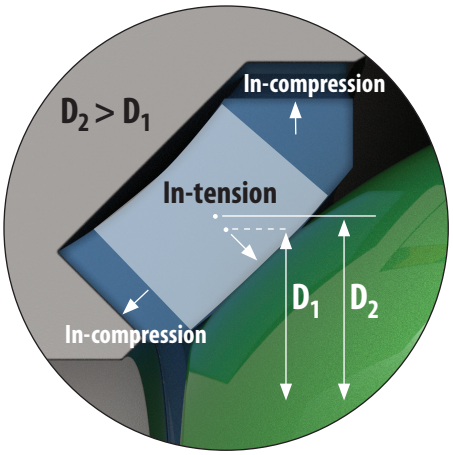
Memoryseal® seat
Before assembly



Memoryseal® seat
After assembly



Memoryseal® seat
Induced sealing memory



Sealing memory

The Velan sealing memory is induced into the seats during the assembly process, when the ball is inserted into the valve body it partially flattens the seat, creating a tensile stress in the center of the seat.

As a result, the seat core increases in diameter from D_1 to D_2 and, like a stretched elastic band, pushes against the ball. This ensures reliable sealing even at vacuum or low pressures.

Seat strength

A seat in-tension is stronger than a seat in compression because the tensile strength of MPTFE in-tension is 3600 psi (25 MPa) versus only 1800 psi (12.5 MPa) for MPTFE in compression. Greater strength means less fatigue, superior sealing ability, and longer cycle life.

The Memoryseal seat is the only successful seat design in-tension rather than compression and will outlast other extreme seat designs.

Lower torques

Velan in-tension seats produce more uniform torque because the seat deflects into the cavity behind it to accommodate slight differences in machining tolerances or the normal expansion of MPTFE as temperature increases. MPTFE expands approximately seven times as much as metal.

Cavity pressure relief

Memoryseal seats are designed to relieve overpressure in the ball/body cavity. This capability is influenced by many variables including fluid characteristics, variations in pressure, seat materials, seat compression, temperature, and thermal cycles.

Positive release of cavity over-pressure to the upstream side is ensured by bypassing the upstream seat through a drilled hole in the ball. This option is preferred in certain services such as liquid chlorine.

When the valve is in the open position, pressure relief is always through the vent in the top of the ball adjacent to the stem connection. For further information on cavity relief contact our Quarter-turn marketing department.

Concave-convex flexible, in-tension seats with induced sealing memory

Benefits of Memoryseal seats include:

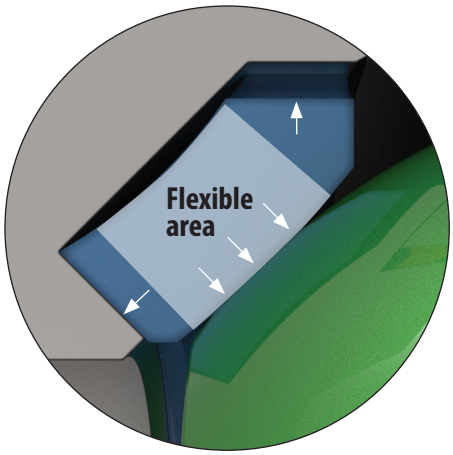
- Greater strength
- Less fatigue
- Positive bi-directional shutoff
- Uniform torque
- Compensate for temperature fluctuations
- Eliminate cold flow effects
- High cycle life

The large flexible area of the Memoryseal seat offers superior sealing.

Greater flexible strength equals greater performance with Memoryseal® seats

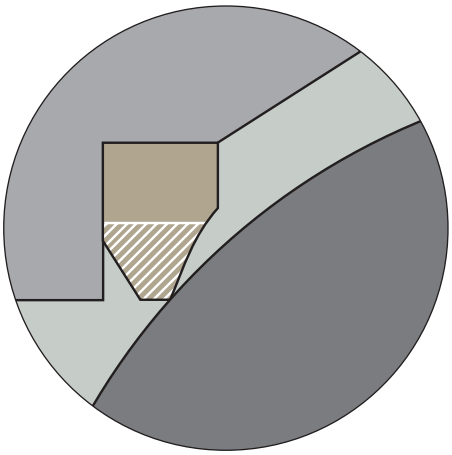
Velan Memoryseal® ball valve technology versus competing designs

Memoryseal® in-tension flexible seat



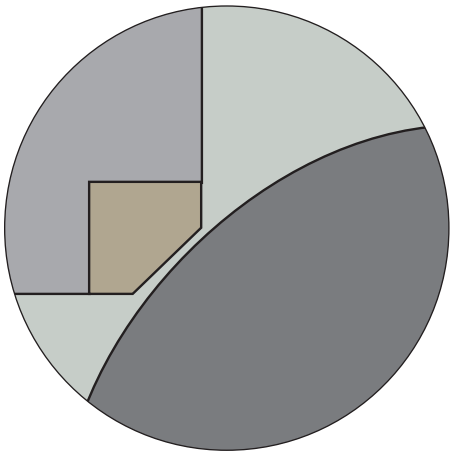
- ☑ Larger seat with smaller seating contact
- ☑ Larger seat with smaller seating contact
- ☑ Seat in-tension, stronger, 3600 psi tensile strength
- ☑ Greater flexible strength = tightness on low-pressure service
- ☑ Greater flexibility = lower torque
- ☑ Greater flexibility = better shock resistance to high DP
- ☑ Greater flexibility = compensation for pressure and temperature fluctuation
- ☑ Greater flexibility = longevity

Competitive Flexible seat



- ☒ Smaller, weaker seat
- ☒ Minimal flexible area, susceptible to fatigue
- ☒ Seat in compression, only 1800 psi tensile strength
- ☒ Can leak in low-pressure service due to fatigue
- ☒ Minimal flexibility; conservative torque
- ☒ Minimal flexibility, weak shock resistance to high DP
- ☒ Moderate compensation for pressure and temperature fluctuation
- ☒ Moderate flexibility = premature wear

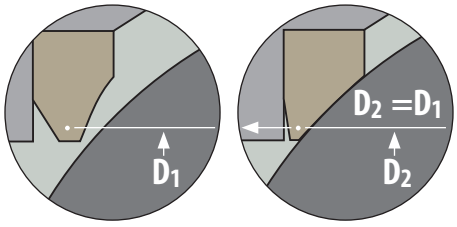
Non-flexible Jam seat



- ☒ Much smaller seat
- ☒ No flexibility, high compres-sion: susceptible to cold flow
- ☒ Seat in compression, only 1800 psi tensile strength
- ☒ Can leak in low-pressure service due to fatigue
- ☒ No flexibility, high compression, susceptible to high torque and severe torque variation
- ☒ No flexibility, no shock resistance to high DP
- ☒ No compensation for pressure and temperature fluctuation
- ☒ No flexibility = short cycle life

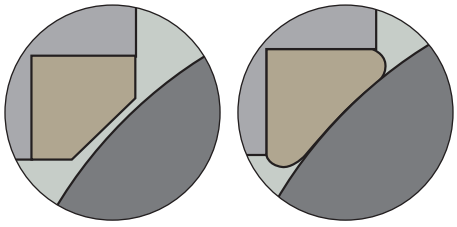
The competing seat design illustrations shown on this page are general in nature and are not intended to show the exact design or performance of any specific manufacturer.

Before assembly **After assembly**



After assembly the seat diameter D_1 does not increase. Seat contact is in compression, not tension.

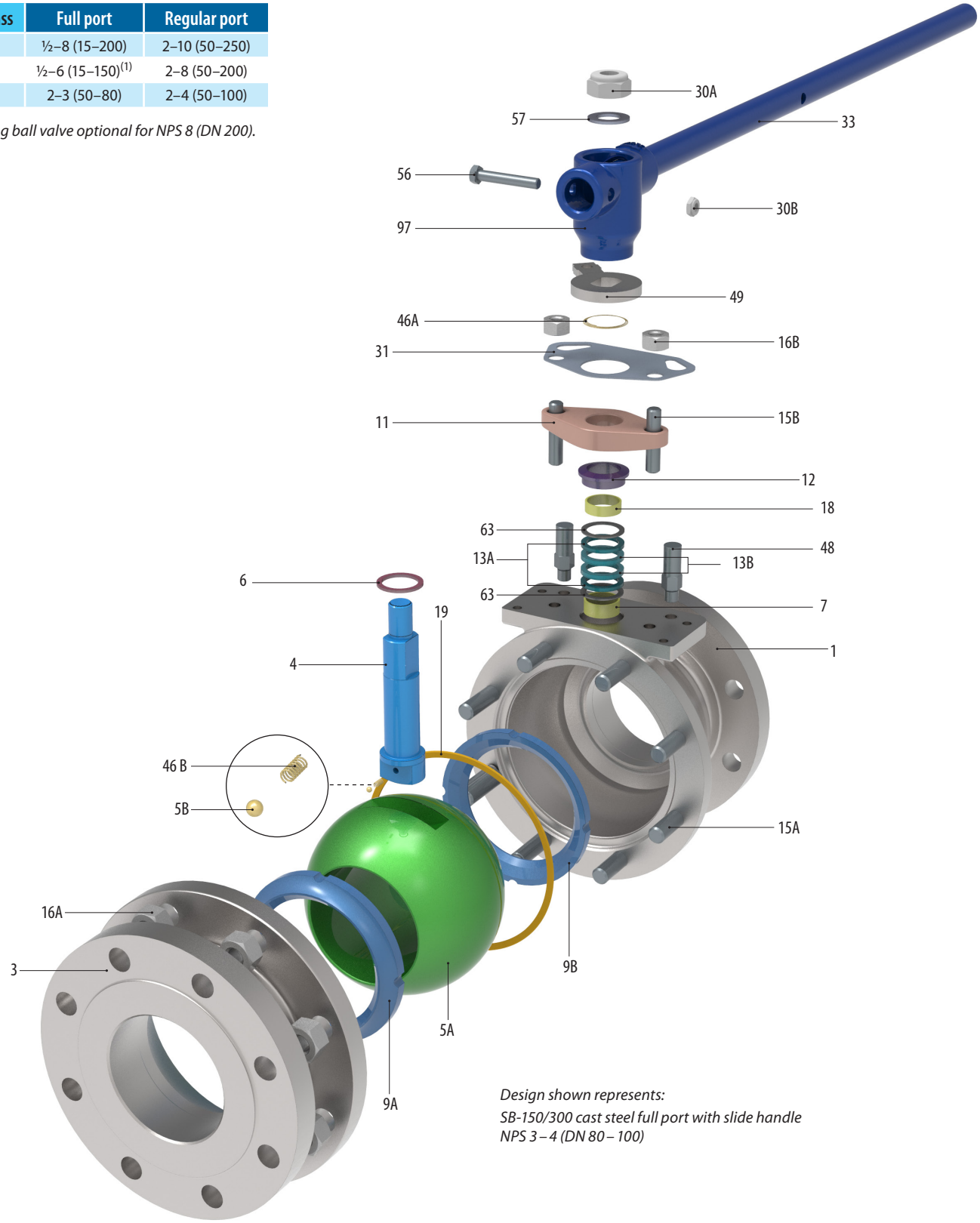
Before assembly **After assembly**



Exploded view: Floating ball

ASME Class	Full port	Regular port
150	½–8 (15–200)	2–10 (50–250)
300	½–6 (15–150)(1)	2–8 (50–200)
600	2–3 (50–80)	2–4 (50–100)

(1) Floating ball valve optional for NPS 8 (DN 200).



Design shown represents:
SB-150/300 cast steel full port with slide handle
NPS 3 – 4 (DN 80 – 100)

Standard materials: Floating ball

PART		Carbon steel	Stainless steel
1	Body	ASTM A216 WCB	ASTM A351 CF8M
3	Body end	ASTM A216 WCB	ASTM A351 CF8M
4	Stem	ASTM A276 Grade 316 Cond. A stainless steel	
5A	Ball	ASTM A276 Grade 316 Cond. A stainless steel	
5B	Grounding ball	ASTM A276 Grade 316 stainless steel	
6	Thrust washer	RPTFE	
7	Stem bushing	RPTFE	
9A, 9B	Seat	MPTFE / PTFE / RPTFE / C-RPTFE	
11	Packing flange	ASTM A216 WCB	ASTM A351 CF8M
12	Gland bushing	ASTM A276 304	
13A	Packing rings (outer)	Braided graphite	
13B	Packing rings (inner)	Die-forme flexible graphite	
15A	Body stud	ASTM A193 Grade B7M	
15B	Gland stud	ASTM A193 Grade B7 or B7M	ASTM A193 Grade B8M CL 2
16A	Body stud nut	ASTM A194 Grade 2HM	ASTM A194 Grade 8M
16B	Gland stud nut	ASTM A194 Grade 2HM	ASTM A194 Grade 8M
18	Gland bushing sleeve	RPTFE	
19	Body seal	Gr. 316L or 347 SS / Graphite (spiral wound)	
30A	Handle nut	Carbon steel plated	
30B	Jam nut	Carbon steel plated	
31	Lock plate	ASTM A240 Gr. 304 stainless steel	
33	Slide handle	ASTM A106 carbon steel Gr. B	
46A, 46B	Spring	ASTM A313 Gr. 302 stainless steel	
48	Stop pin	ASTM A276 Gr. 304 stainless steel	
49	Stop plate	ASTM A351 CF8M	
56	Hexagon head screw	ASTM F593 Gr. 304 stainless steel	
57	Washer	Carbon steel plated	
63	Packing washer	ASTM A240 Gr. 316 stainless steel	
97	Adaptor	ASTM A216 WCB	

Other materials available

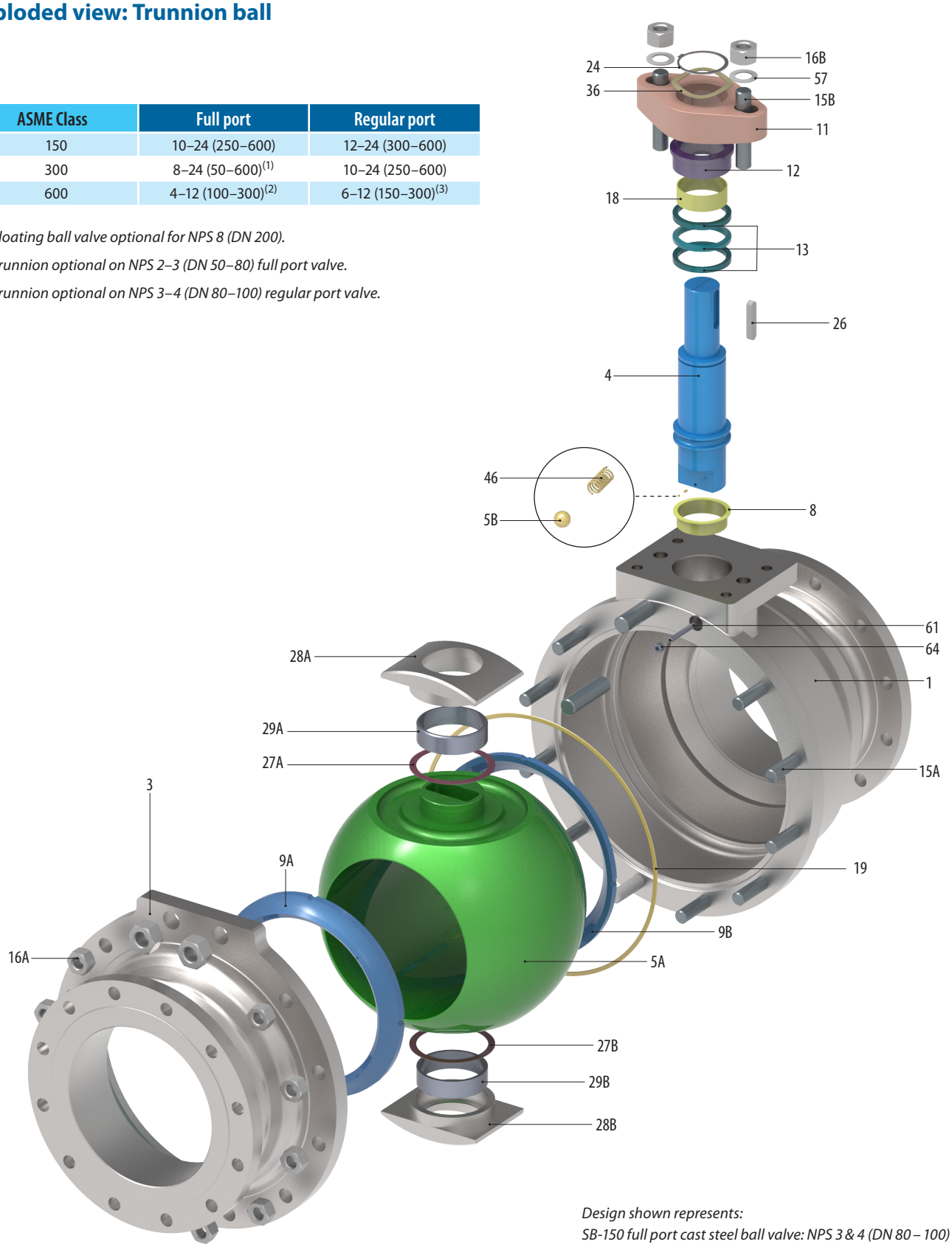
Exploded view: Trunnion ball

ASME Class	Full port	Regular port
150	10–24 (250–600)	12–24 (300–600)
300	8–24 (50–600)(1)	10–24 (250–600)
600	4–12 (100–300)(2)	6–12 (150–300)(3)

(1) Floating ball valve optional for NPS 8 (DN 200).

(2) Trunnion optional on NPS 2–3 (DN 50–80) full port valve.

(3) Trunnion optional on NPS 3–4 (DN 80–100) regular port valve.



Design shown represents:
SB-150 full port cast steel ball valve: NPS 3 & 4 (DN 80 – 100)

Standard materials: Trunnion ball

PART		Carbon steel	Stainless steel
1	Body	ASTM A216 WCB	ASTM A351 CF8M
3	Body end	ASTM A216 WCB	ASTM A351 CF8M
4	Stem	ASTM A276 Gr. 316 SS Cond. A	
5A	Ball	ASTM A351 CF8M	
5B	Grounding ball	ASTM A276 Gr. 316 SS	
8	Thrust bushing	BG-1326 PPS	
9A, 9B	Seat	MPTFE / PTFE / RPTFE / C-RPTFE	
11	Packing flange	ASTM A216 WCB	ASTM A351 CF8M
12	Gland bushing	ASTM A276 Gr. 304 SS	
13	Packing rings	PTFE	
15A	Body stud	ASTM A193 Gr. B7 or B7M	ASTM A193 Gr. B8M Cl. 2
15B	Gland stud	ASTM A193 Gr. B7 or B7M	ASTM A193 Gr. B8M Cl. 2
16A	Body stud nut	ASTM A194 Gr. 2H or 2HM	ASTM A194 Gr. 8M
16B	Gland stud nut	ASTM A194 Gr. 2H or 2HM	ASTM A194 Gr. 8M
18	Gland bushing sleeve	RPTFE	
19	Body seal	Gr. 316L or 347 SS / Graphite (spiral wound)	
24	Retaining ring	ASTM A682 Carbon steel (spring steel)	
26	Key	ASTM A29 Carbon steel SAE 1045	
27A, 27B	Ball washer	RPTFE	
28A, 28B	Trunnion bearing retainer	ASTM A515 GR 60-70	ASTM A240 Gr. 316 SS
29A, 29B	Trunnion bearing	Epoxy / PTFE	
36	Wave washer	ASTM A684 Carbon steel (spring steel)	
46	Spring	ASTM A313 Gr. 302 SS	
57[1]	Flat washer	Carbon steel (plated)	
61	Dowel pin	ASTM A276 Gr. 316 SS	
64	NPT plug	ASTM A182 Gr. F316 SS	

(1) Applicable only with oblong holes in the packing flange

Note: Other materials available

Technical specifications: design and testing

Pressure-temperature rating	Shell: ASME B16.34
	Valve: See seat materials
Shell wall thickness	ASME B16.34
Face-to-face	ASME B16.10 Flanged long or short pattern
Flange dimensions	ASME B16.5
Valve testing	API 598
Fire safe testing	API 607 rev 5 (5)
Valve design	API 608 and ASME B16.34

Note: Other end connections and actuation available upon request.

Testing and quality assurance

All our valves are tested in our factory to guarantee their performance in the field.

- Shell test performed at 150% max. cold working pressure(1).
- Low pressure closure test preformed at 60 to 100 psig(2).
- RT examination of bonnet/body critical areas as defined in ASME B16.34(3).
- ISO 15848-2 Fugitive emissions production test up to 450 psi Helium(4).
- MT/PT of bonnet/body entire surface.(4)
- Functional test of all accessories such as actuator and external switches(4).

Certifications

Velan offers a wide range of certifications of compliance with regulatory requirements:

- PED
- ATEX
- IEC 61508 SIL 3 Capable
- GOST/EAC

Fugitive Emission Qualifications

- API 641 (methane)
- ISO 15848-1 (methane)
- TA Luft (helium)(4)
- Velan's FE qualifications have been surveyed and audited by leading organizations around the world such as Bureau Veritas, Lloyds Register and TA Luft.

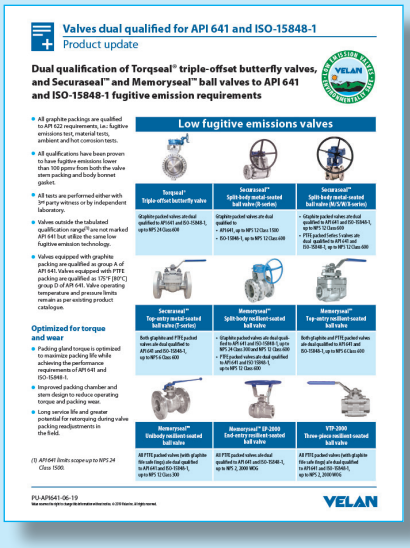
(1) Tests performed as per API 598.

(2) Test performed with air or nitrogen as per API 598.

(3) Available upon request. Extended RT or any other NDE also available upon request.

(4) Available upon request.

(5) Applicable to carbon steel (ferritic) and stainless steel (austenitic) valves, consult Velan for other valve materials.


Valves dual qualified for API 641 and ISO-15848-1
Product update
Dual qualification of Torqseal® triple-offset butterfly valves, and Securaseal™ and Memoryseal™ ball valves to API 641 and ISO-15848-1 fugitive emission requirements
Low fugitive emissions valves
Optimized for torque and wear
VELAN

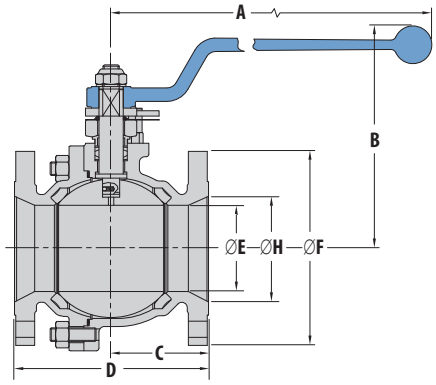
To download the latest information on valves qualified for API 641 and ISO-15848-1 go to velan.com and first log into or create a My Velan member account.

Under the Resources tab at the top of the page, scroll down to Literature, click on the Literature category dropdown menu and select Product updates.

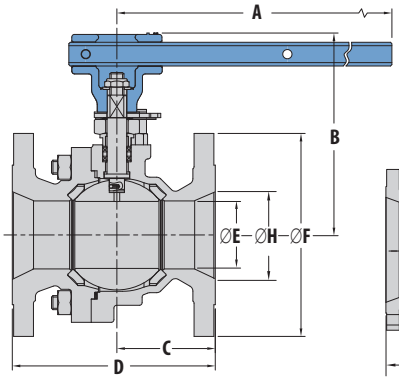
The Document code: PU-API_641-06-19 can be found at this link.

Dimensions, weights, and Cvs for floating ball

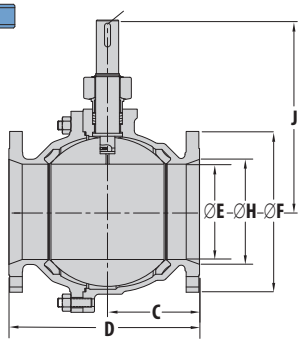
Lever handle



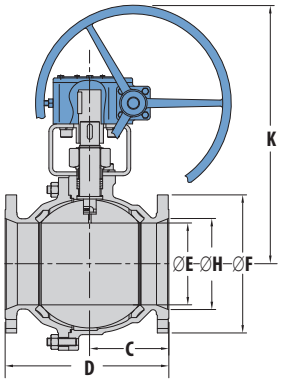
Slide handle



Bare stem



Gear



Size NPS DN	ASME Class 150 regular port										
	A	B	C	D	ØE	ØF	ØH	J	K	lb / kg	C_V
2 50	7.69 195	5.02 128	3.04 77	7 178	1.5 38	6 152	2 51	–	–	19.8 9	130
3 80	10.38 264	5.44 138	4 102	8 203	2 51	7.5 191	3 76	–	–	36 16	250
4 100	20 508	8.77 223	4.36 111	9 229	3 76	9 229	4 102	–	–	71 32	540
6 150	28 711	10.19 259	4.74 120	10.5 267	4 102	11 279	6 152	–	–	129 59	770
8 200	–	–	5.71 145	11.5 292	6 152	13.5 343	8 203	–	20.19 513	284 129	1,900
10 250	–	–	6.37 162	13 330	8 203	16 406	10 254	–	25.12 638	520 236	3,900
12 300	–	–	7 178	14 356	10 254	19 483	12 305	20.84 529	–	820 372	6,700
14 350	–	–	7.5 191	15 381	10 254	21 533	13.25 337	20.84 529	–	1128 512	5,200
16 400	–	–	8 203	16 406	12 305	23.5 597	15.25 387	22.59 574	–	1610 731	8,050
18 450	–	–	17 432	34 864	13.25 337	25 635	17.25 438	24.22 615	–	2198 998	12,500
20 500	–	–	18 457	36 914	15.25 387	27.5 699	19.25 489	24.13 613	–	2171 986	15,500
24 600	–	–	21 533	42 1067	17.25 438	32 813	23.25 591	27.28 693	–	3650 1657	27,000

Size NPS DN	ASME Class 300 regular port										
	A	B	C	D	ØE	ØF	ØH	J	K	lb / kg	C_V
2 50	7.69 195	5.02 128	3.92 100	8.5 216	1.5 38	6.5 165	2 51	–	–	26 12	130
3 80	10.38 264	5.44 138	5.56 141	11.13 283	2 51	8.25 210	3 76	–	–	52 24	250
4 100	20 508	8.77 223	5.99 152	12 305	3 76	10 254	4 102	–	–	102 46	540
6 150	19.88 505	10.31 262	7.94 202	15.88 403	4 102	12.5 318	6 152	–	17.37 441	225 102	770
8 200	–	–	8.25 210	16.5 419	6 152	15 381	8 203	–	24.19 614	389 177	1,900
10 250	–	–	9 229	18 457	8 203	17.5 445	10 254	–	28.88 735	710 322	3,900
12 300	–	–	9.13 232	19.75 502	10 254	20.5 521	12 305	20.84 529	–	960 436	6,700
14 350	–	–	11.25 286	22.5 572	10 254	23 584	13.25 337	20.84 529	–	1096 498	5,200
16 400	–	–	12 305	24 610	12 305	25.5 648	15.25 387	22.59 574	–	1470 667	8,050
18 450	–	–	12 305	26 660	13.25 337	28 711	17.25 438	24.22 615	–	2049 930	12,500
20 500	–	–	14 356	28 711	15.25 387	30.5 775	19.25 489	24.13 613	–	2768 1257	15,500
24 600	–	–	16 406	32 813	17.25 438	36 914	23.25 591	25.92 658	–	4600 2088	27,000

Size NPS DN	ASME Class 600 regular port									
	A	B	C	D	ØE	ØF	ØH	J	lb / kg	C_V
2 50	10.38 264	5.34 136	4.74 120	11.5 292	1.6 41	6.5 165	2 51	–	46 21	130
3 80	11.91 303	7.43 189	7 178	14 356	2 51	8.25 210	3 76	–	87 39	250
4 100	25.88 657	11.12 282	8.5 216	17 432	3 76	10.75 273	4 102	–	186 84	540
6 150	25.88 657	13.71 348	11 279	22 559	4 102	14 356	6 152	–	435 197	770
8 200	–	–	13 330	26 660	6 152	16.5 419	8 203	18.68 474	741 336	1,900
10 250	–	–	12.5 318	31 787	8 203	20 508	10 254	19.26 489	1150 522	3,900
12 300	–	–	14.5 368	33 838	10 254	22 559	12 305	21.15 537	1672 759	6,700

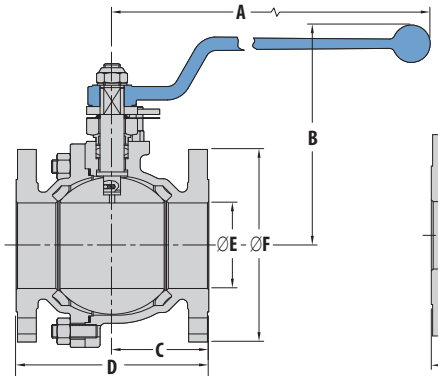
Notes:

For regular port and other sizes and pressure classes, contact your local Velan office.

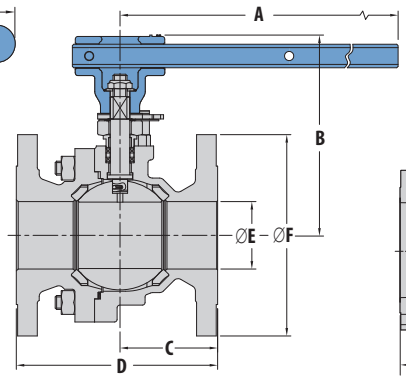
Flow coefficients (Cv).
Kv is the metric equivalent of Cv.
Kv = Cv x 0.864

Dimensions, weights, and Cvs for floating ball

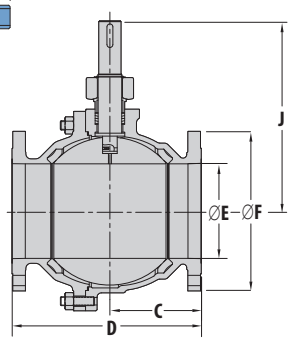
Lever handle



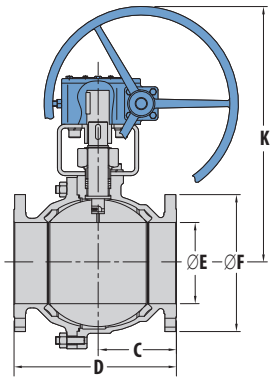
Slide handlle



Bare stem



Gear



Size NPS DN	ASME Class 150 full port									
	A	B	C	D	ØE	ØF	J	K	lb / kg	C_V
½ 15	5.27 134	3.27 83	1.62 41	4.25 108	0.5 13	3.5 89	–	–	5 2	12
¾ 20	5.56 141	3.88 99	1.75 44	4.63 118	0.75 19	3.88 99	–	–	7.2 3	50
1 25	5.56 141	4.14 105	2.05 52	5 127	1 25	4.25 108	–	–	8.4 4	100
1½ 40	7.68 195	5.02 128	2.54 65	6.5 165	1.5 38	5 127	–	–	16.2 7	250
2 50	10.38 264	5.44 138	2.89 73	7 178	2 51	6 152	–	–	24 11	430
2½ 65	11.91 303	6.96 177	3.26 83	7.5 191	2.5 64	7 178	–	–	42 19	720
3 80	20 508	8.77 223	3.77 96	8 203	3 76	7.5 191	–	–	54 25	1,020
4 100	28 711	10.19 259	4.52 115	9 229	4 102	9 229	–	–	91 41	2,000
6 150	–	–	6.25 159	15.5 394	6 152	11 279	–	20.19 513	202 92	5,500
8 200	–	–	8.13 207	18 457	8 203	13.5 343	–	28.88 734	447 203	9,800
10 250	–	–	10.5 267	21 533	10 254	16 406	20.84 529	–	762 346	16,400
12 300	–	–	12 305	24 610	12 305	19 483	22.59 574	–	1034 469	23,800
14 350	–	–	13.5 343	27 686	13.25 337	21 533	24.22 615	–	1370 622	27,500
16 400	–	–	15 381	30 762	15.25 387	23.5 597	24.12 613	–	1852 841	36,000
18 450	–	–	17 432	34 864	17.25 438	25 635	25.92 658	–	2571 1167	46,000
20 500	–	–	18 457	36 914	19.25 489	27.5 699	29.69 754	–	3225 1464	57,000
24 600	–	–	21 533	42 1067	23.25 591	32 813	34.81 884	–	5241 2379	75,000

Size NPS DN	ASME 300 full port									
	A	B	C	D	ØE	ØF	J	K	lb / kg	C_V
½ 15	5.27 134	3.27 83	2.06 52	5.5 140	0.5 13	3.75 95	–	–	6.6 3	12
¾ 20	5.56 141	3.88 99	2.55 65	6 152	0.75 19	4.63 118	–	–	10.1 5	50
1 25	5.56 141	4.14 105	2.61 66	6.5 165	1 25	4.88 124	–	–	13 6	100
1½ 40	7.68 195	5.02 128	2.92 74	7.5 191	1.5 38	6.13 156	–	–	24 11	250
2 50	10.38 264	5.44 138	3.83 97	8.5 216	2 51	6.5 165	–	–	34 15	430
2½ 65	20 508	8.37 213	4 102	9.5 241	2.5 64	7.5 191	–	–	60 27	720
3 80	20 508	8.77 223	5.3 135	11.13 283	3 76	8.25 210	–	–	81 37	1,020
4 100	–	–	5.99 152	12 305	4 102	10 254	–	17.37 441	141 64	2,000
6 150	–	–	6.65 169	15.88 403	6 152	12.5 318	–	24.19 614	267 121	5,500
8 200	–	–	8.78 223	19.75 502	8 203	15 381	–	28.88 734	558 253	9,800
10 250	–	–	11.19 284	22.38 568	10 254	17.5 445	20.84 529	–	907 412	16,400
12 300	–	–	12.75 324	25.5 648	12 305	20.5 521	22.59 574	–	1308 594	23,800
14 350	–	–	15 381	30 762	14 356	23 584	24.22 615	–	1826 829	27,500
16 400	–	–	16.5 419	33 838	15.25 387	25.5 648	24.13 613	–	2414 1096	36,000
18 450	–	–	18 457	36 914	17 432	28 711	25.92 658	–	3377 1533	46,000
20 500	–	–	19.5 495	39 991	19 483	30.5 775	29.69 754	–	3970 1802	57,000
24 600	–	–	22.5 572	45 1143	23 584	36 914	34.81 884	–	6743 3061	75,000

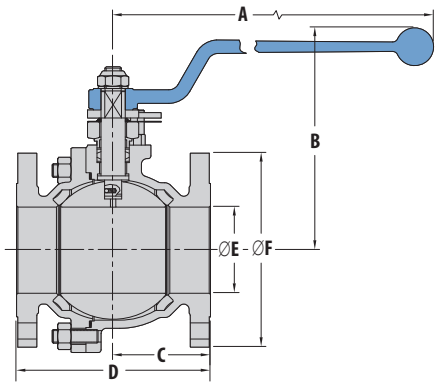
Notes:

For full port and other sizes and pressure classes, contact your local Velan office.

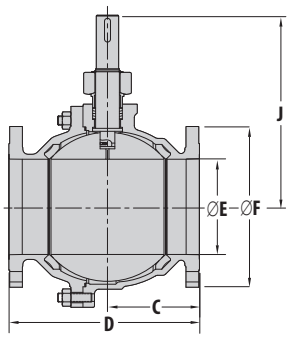
Flow coefficients (Cv).
Kv is the metric equivalent of Cv.
Kv = Cv x 0.864

Dimensions, weights, and Cvs for floating ball

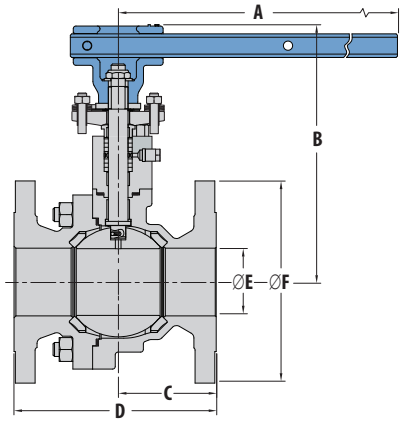
Lever handle



Bare stem



Full port, live-loaded, and double packed



Size NPS DN	ASME Class 600 full port								
	A	B	C	D	ØE	ØF	J	lb / kg	C_V
2 50	11.91 303	7.42 188	5 127	11.5 292	2 51	6.5 165	–	67 30	430
3 80	25.88 657	11.12 282	6.19 157	14 356	3 76	8.25 210	–	146 66	1,020
4 100	25.88 657	13.71 348	7 178	17 432	4 102	10.75 273	–	350 159	2,000
6 150	–	–	9.25 235	22 559	6 152	14 356	18.68 474	626 284	5,500
8 200	–	–	11 279	26 660	8 203	16.5 419	19.26 489	1050 477	9,800
10 250	–	–	14.5 368	31 787	10 254	20 508	21.15 537	1578 716	16,400
12 300	–	–	15.25 387	33 838	12 305	22 559	24.05 611	2160 981	23,800

Size NPS DN	ASME Class 150 full port, live-loaded double packed							
	A	B	C	D	ØE	ØF	lb / kg	C_V
2 50	10.38 264	9.77 248	2.89 73	7 178	2 51	6 152	31 14	430
3 80	20 508	10.89 277	3.77 96	8 203	3 76	7.5 191	62 28	1,020
4 100	28 711	12.19 310	4.52 115	9 229	4 102	9 229	102 46	2,000
6 150	34 864	15.66 398	6.25 159	15.5 394	6 152	11 279	209 95	5,500

Size NPS DN	ASME Class 300 full port, live-loaded double packed							
	A	B	C	D	ØE	ØF	lb / kg	C_V
2 50	10.38 264	9.77 248	3.83 97	8.5 216	2 51	6.5 165	41 19	430
3 80	20 508	10.89 277	5.3 135	11.12 282	3 76	8.25 210	89 40	1,020
4 100	28 711	12.19 310	5.99 152	12 305	4 102	10 254	141 64	2,000
6 150	34 864	15.66 398	6.65 169	15.88 403	6 152	12.5 318	274 124	5,500

Notes:

For full port and other sizes and pressure classes, contact your local Velan office.

Flow coefficients (Cv).
Kv is the metric equivalent of Cv.
Kv = Cv x 0.864

Standard actuation compliant to API 608

API 608 standard compliant configurations for the resilient-seated ball valves types shown below are available with the following actuation and handle options (position "J" in the figure number). Other options are available in non-API 608 configurations.

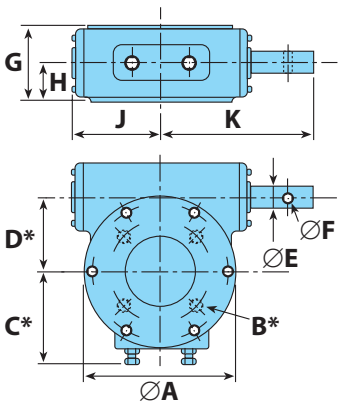
Product	Port	ASME Class	Size NPS	Size DN	Lever handle (W)	Slide[1]/ Oval handle (H)	Gear (G)	Bare stem (B)
SB	Full	150	½	15	• Lever handle	• Oval handle		
			¾	20	• Lever handle	• Oval handle		
			1	25	• Lever handle	• Oval handle		
			1 ½	40	• Lever handle	• Oval handle		
			2	50	• Lever handle			
			2 ½	65	• Lever handle			
			3	80		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			4	100		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			6	150			• Gear G0-3 & Ø12 HD	• Bare stem
			8	200			• Gear G0-4 & Ø20 HD	• Bare stem
		300	½	15	• Lever handle	• Oval handle		
			¾	20	• Lever handle	• Oval handle		
			1	25	• Lever handle	• Oval handle		
			1 ½	40	• Lever handle	• Oval handle		
			2	50	• Lever handle			
			2 ½	65		• Slide handle[1]		
			3	80		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			4	100			• Gear G0-3 & Ø12 HD	• Bare stem
			6	150			• Gear G0-3 & Ø20 HD	• Bare stem
			8	200			• Gear G0-4 & Ø20 HD	• Bare stem
	Regular	150	2	50	• Lever handle			
			3	80	• Lever handle			
			4	100		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			6	150		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			8	200			• Gear G0-3 & Ø12 HD	• Bare stem
			10	250			• Gear G0-4 & Ø20 HD	• Bare stem
		300	2	50	• Lever handle			
			3	80	• Lever handle			
			4	100		• Slide handle[1]	• Gear G0-2 & Ø12 HD	• Bare stem
			6	150			• Gear G0-3 & Ø12 HD	• Bare stem
			8	200			• Gear G0-3 & Ø12 HD	• Bare stem
			10	250			• Gear G0-4 & Ø20 HD	• Bare stem

• Stocking replenishment program • Available with factory lead times

(1) All slide handles convert to a T-handle by removing the screw holding the pipe while using the second hole to attach the pipe to the pipe holder.

Manual gear operators

Velan recommends manual gear actuators on all NPS 8–12 (DN 200–300) valves that are not equipped with air or electric actuators.



Manual gear actuators are also used on NPS 3–6 (DN 80–150) valves where operating space is too small for lever handles. The actuators are fully enclosed and a pointer indicates the position of the ball. Handle extensions, chain sprockets, and right angle drives are available.

Torque ratings

Unit	Ratio	Max. output torque		Max. shaft diameter		Weight		Efficiency
	Basic	lb•in	Nm	in	mm	lb	kg	Basic
G0-2	30:1	4,800	542	1.437	36	22	10	0.25
G0-3	50:1	9,000	1,017	2.250	57	29	13	0.25
G0-4	80:1	21,000	2,373	3.250	83	70	32	0.25

Type	Dimensions – in/mm									
	ØA	B*	C*	D*	ØE	ØF	G	H	I	J
G0-2	6.37 162	4 x ⅜ - 16 UNC 3 ⅞" (98.4 mm)	4.00 102	2.50 64	0.75 19	0.18 4.57	3.50 89	1.50 38	3.18 81	8.00 203
G0-3	7.12 181	4 x ½ - 13 UNC 5" (127 mm)	4.25 108	3.12 79	0.75 19	0.18 4.57	3.75 95	1.50 38	3.50 89	8.00 203
G0-4	10.00 254	4 x ¾ - 10 UNC 6 ½" (165 mm)	5.75 146	4.50 114	1.00 25	0.25 6.35	4.50 114	2.25 57	5.18 132	9.81 249

** Mounting holes straddle center line.*

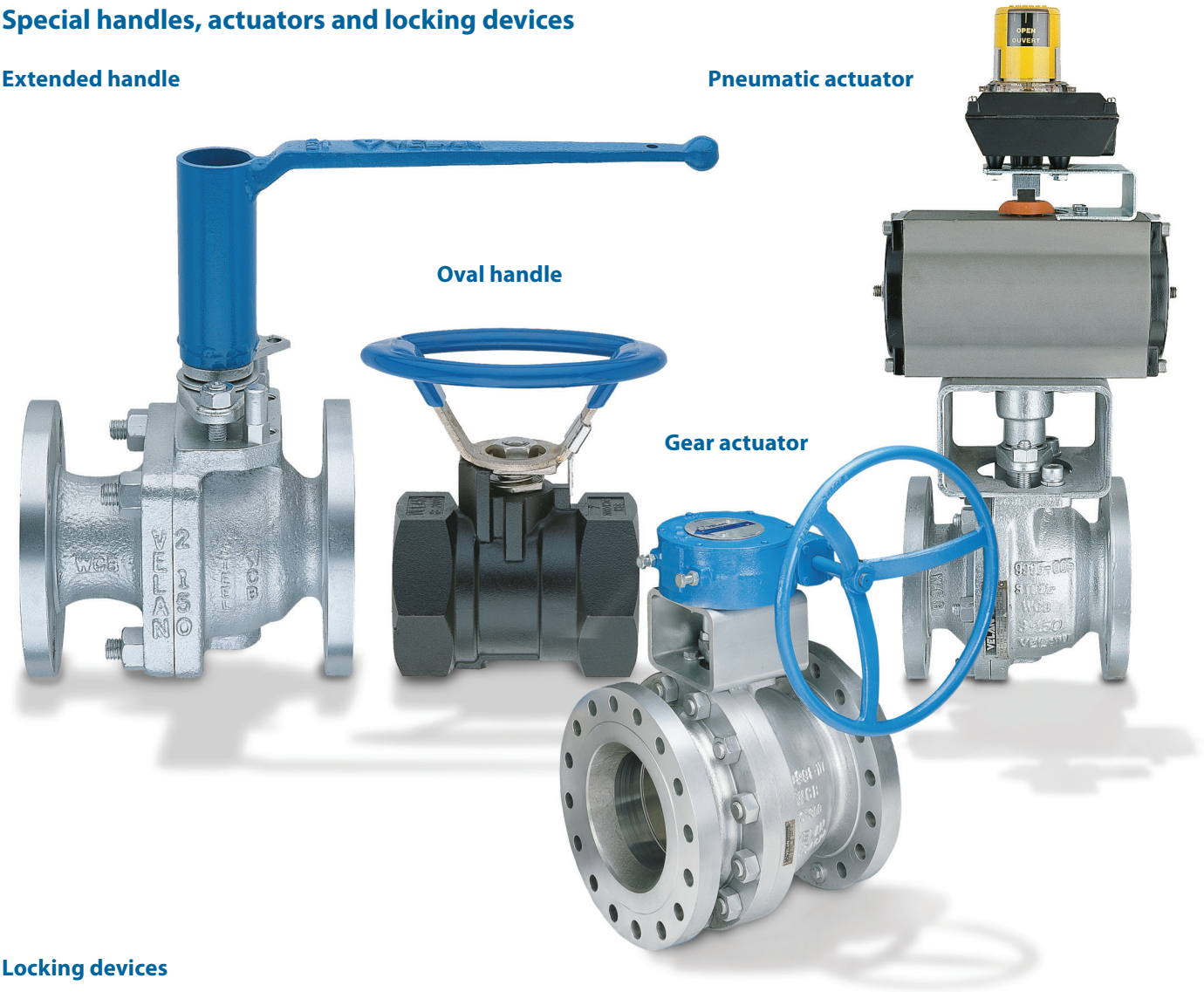
Special handles, actuators and locking devices

Extended handle

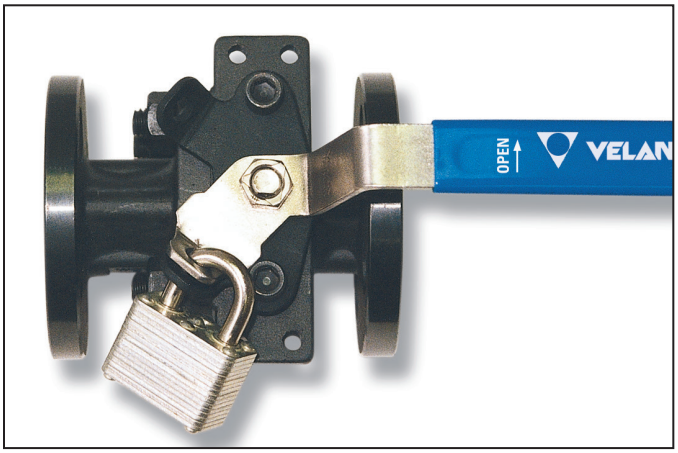
Pneumatic actuator

Oval handle

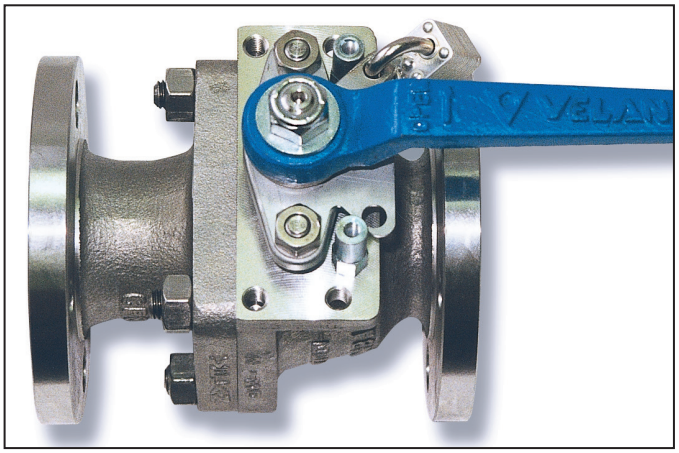
Gear actuator



Locking devices



Standard on:
SB-150/300: NPS ½–1½ (DN 15–40) FP / NPS 2 (DN 50) RP



Standard on:
SB-150: NPS 2–4 (DN 50–100) FP / 3–6 (DN 80–150) RP
SB-300: 2–3 (DN 50–80) FP / 3–4 (DN 80–100) RP
SB-600 2–4 (DN 50–00) FP / 2–6 (DN 50–150) RP

Automated valves and control

Velan ball valves are available in a variety of automation packages and include pneumatic, electric, and hydraulic. Velan also supplies automated packages with integral control actuation.

Automation is done either by Velan at its own facilities located around the world or by authorized automation centers. In either case, automation is done in accordance with strict guidelines of quality assurance, engineering standards, and performance.

Thanks to Velan's flexible automation program, we can offer the best actuation package and accessories to meet the customer's needs, whatever their performance and commercial requirements.

Velan maintains *"Specification for Valve Automation"* and *"Quarter Turn Actuation Standards"* documents. Only those automation centers that adhere to these standards and are approved by Velan audits earn the status of "Authorized Velan Automation Center."

This program ensures our ball valves can be automated by a wide range of actuators and accessories, regardless of whether the actuation is done at Velan or at an authorized automation center.

All automated ball valves from Velan or authorized automation centers have a discrete serial number data sheet on permanent file. This permanent record contains the source of supply and data on all components such as actuators, solenoid valves, limit switches, and positioners. All the test data—such as operational and seat leak tests—are recorded as well.

Automated packages with integral control actuation.

Sizing of actuators

Elements affecting valve torque

The torque requirements of soft seated ball valves depend on many factors.

Valve design and material selection

- **Seat design and material selection**

  Velan seats were developed to ensure maximum flexibility and low torque. The friction force depends on the seat material, and the applicable torque multipliers are shown in the seat material selection table on page 18.

- **Ball: free-floating or trunnion-mounted?**

  A free floating ball is forced against the down-stream seat by the fluid pressure and the resulting torque is a product of the friction force and the seat/ball contact radius. The fluid load is carried by the bearings in a trunnion-mounted ball valve, resulting in a lower torque overall.

- **Stem seal**

  The torque resulting from the stem-packing friction depends on the packing chamber depth, the type of materials, and the size of the stem/packing rings–smaller the valve, the greater the importance of the stem seal factor.

Service conditions

- **Differential pressure**

  The breakaway torque increases substantially with the differential pressure on larger ball valves. On small ball valves, up to NPS 1 (DN 25), where the stem packing friction is higher than the ball/seat torque, the overall torque remains approximately the same.

- **Frequency of operation**

  When a valve remains in the closed position for extended periods of time, the breakaway torque increases due to the resilient material filling the voids in the ball caused by machining and other problems.

- **Fluid influence**

  The torque tends to be lower with oils, but higher with gas or other liquids with solids or slurries. Dirt and solid particles can become embedded in the seats, which greatly increases the torque. Note that torque data on the product pages is the result of laboratory tests with clean water at ambient temperature.

- **Influence of temperature**

  Within the operating temperature range, the torque, in most cases, remains constant–except at low cryogenic levels when the seats become more rigid.

- **Limitation to speed of actuation**

  Resilient materials such as virgin MPTFE or reinforced PTFE (RPTFE) can be damaged by a fast turning ball under pressure. The speed limits for closing or opening the ball valves for sizes:

  - NPS ½–2½ (DN 15–65), 0.5 second
  - NPS 3–6 (DN 80–150), 1 second
  - NPS 8–12 (DN 200–300), 5 seconds

Actuator torque requirement calculations

Important:

1. Published factors are to be used as a guide.
2. The actuator selection has to be based also on economic considerations. A valve that has an important function, or one that is out of reach for service, should have a larger actuator than would normally be selected.

Table 1 **Seat factor "MF" and seat material selection**

Seat material	Application and Limitations					Factor "MF" (1)
	Temp. range °F (°C)	Chemical	Radiation	Valve type	Service application	
PTFE (T) Virgin polytetrafluoroethylene	-100 to 400 (-73 to 204) *See note (2)*	All except: • Molten alkali metals • Liquid or gaseous fluorine • A few fluorochemicals (i.e., CLF_3 and OF_2)	10^4 RAD	SB-150/300	Chemical and cryogenic service.	1.0
RPTFE (G) 15% Glass reinforced	-100 to 450 (-73 to 232)	All except: • Molten alkali metals • Liquid or gaseous fluorine • A few fluorochemicals (i.e., CLF_3 and OF_2)	10^4 RAD	SB-150/300	Used as standard for low and medium pressure service for steam service up to 150 psig (10.3 bar).	1.0
C-RPTFE (C) Carbon graphite reinforced PTFE	-100 to 500 (-73 to 260) *See note (3)*	All except: • Molten alkali metals • Liquid or gaseous fluorine • A few fluorochemicals (i.e., CLF_3 and OF_2) • Fluid media with carbon	10^4 RAD	SB-150/300/600	For high temperature and high pressure service. For steam up to 450 psig (31 bar).	1.0
MPTFE (E) Modified polytetrafluoroethylene	-100 to 450 (-73 to 232)	All except: - Molten alkali metals - Liquid or gaseous fluorine - A few fluorochemicals (i.e., CLF_3 and OF_2)	10^4 RAD	SB-150/300	For low and medium pressure service. Particularly recommended for use on styrene and butadiene.	1.0
UHMW-PE (U) Ultra high molecular weight polyethylene	-60 to 200 (-51 to 93)	At temperatures below 140°F (60°C), the material is unaffected by a large number of solvents. It is attacked by aromatic and halogenated hydrocarbons and strong oxidizing agents (nitric acid, oleum and halogens).	10^7 RAD	SB-150/300/600	Where high chemical resistance and abrasion resistance are required.	1.3

Table 2 **Fluid factor "FF"**

Liquid	Factor "FF" (1)
Clean particle-free, non-lubricating (e.g.: water, alcohol or solvents)	1.0
Clean particle-free, lubricating oil	0.5 to 0.8
Slurry (liquids carrying solids) or heavy corroded and contaminated system	1.3 to 2.0
Gas or saturated steam, clean and wet	1.0
Gas or superheated steam, clean and dry	1.3
Gas, dirty (e.g.: natural gas)	1.2 to 1.5

Table 3 **Frequency of operation factor "OF"**

Liquid	Factor "0F" (1)
Once per day or greater	1.0
Once per week or greater	1.3
Once per month or greater	1.4
Once per four-month or greater	1.5

Notes:

(1) The seat, fluid, and frequency of operation factors should be considered as a guide only and should be adjusted according to experience and judgment. Velan is not responsible directly or indirectly for actuator selection by third parties.

(2) Down to -325°F (-198°C) for cryogenic service with special seats for Class 150/300. For temperatures below -100°F (-73°C), our cryogenic seat must be used the standard seat is not to be used for these lower temperatures.

(3) Down to -325°F (-198°C) for cryogenic service with special seats for Class 600. For temperatures below -100°F (-73°C), our cryogenic seat must be used the standard seat is not to be used for these lower temperatures.

Typical examples for sizing actuators based on actuator torquing equation

To obtain the torque requirements for an actuator:

Step 1
Determine the basic, maximum torque "**TT**" for a particular valve and pressure differential from *Torque tables* on pages 20-21.

Step 2
Determine the seat factor "**MF**", from *Table 1* page 18.
For MPTFE or RPTFE, the factor is 1.0.

Step 3
Determine the fluid factor "**FF**", from *Table 2* page 18.

Step 4
Determine the frequency of operation factor "**OF**", from *Table 3* page 18.

Using the data from **Steps 1–4**, the actuator torque equation "**AT**" can now be established:

AT = TT x MF x FF x OF = lbf•in (Nm)

AT = (Step 1) x (Step 2) x (Step 3) x (Step 4) = lbf•in

Example for a split-body flanged in CF8M, full port:

Application:	Water
Service:	Clean water. Differential pressure 100 psid (6.8 bar)
Service temp.:	70°F (21°C)
Cycle time:	Every 6 hours
Valve size:	SB-150, NPS 4 (DN 100)
Seat material:	MPTFE
Actuator:	Pneumatic actuator with spring return, fail closed
Air supply:	90 psig (6.2 bar)

Sizing of torque:

TT = 1005 lbf•in (114 Nm), For ΔP = 100 psid (6.8 bar).

MF = 1 (MPTFE) (*Table 1* page 18)

FF = 1.3 (*Table 2* page 18)

OF = 1 (*Table 3* page 18)

Minimum break torque required

AT = 1005 (114 Nm) x 1 x 1.3 x 1 = 1306 lbf•in (148 Nm)

Selection of actuator:

In the example, 1306 lbf•in (148 Nm) is the minimum required valve break torque or the minimum required actuator output torque.

Since allowances for the fluid type, seat material, and frequency of operation have already been incorporated into the torque calculation, additional safety factors are not required.

However, it is good practice to apply an additional 1.5 multiplier to the break torque when selecting a pneumatic actuator. This will ensure smooth operation and protection from occasional reduction of air pressure.

This is sufficient data when constant torque type actuators such as rack and pinion double acting or electric actuators are used.

However, when scotch-yoke type, spring return–fail closed, or spring return–fail open actuators are used, factor the break torque by 0.70 for run torque and by 0.80 for reseat torque.

Pressure / temperature ratings: SB-150/300/600

Carbon steel: ASTM A216-WCB

Temp. °F °C	Psig Bar							
	Class 150			Class 300				Class 600
	PTFE[1]	RPTFE & MPTFE	C-RPTFE	PTFE[1]	RPTFE	MPTFE	C-RPTFE	C-RPTFE[2]
-20°F -29°C	285 20	285 20	285 20	740 51	740 51	740 51	740 51	1480 102
0°F -18°C	285 20	285 20	285 20	740 51	740 51	740 51	740 51	1480 102
100°F 38°C	285 20	285 20	285 20	740 51	740 51	740 51	740 51	1480 102
150°F 66°C	272 19	272 19	272 19	633 44	649 45	710 49	710 49	1295 89
200°F 93°C	260 18	260 18	260 18	527 36	557 38	680 47	680 47	1110 77
250°F 121°C	245 17	245 17	245 17	420 29	466 32	588 41	588 41	925 6
300°F 149°C	230 16	230 16	230 16	313 22	374 26	470 32	470 32	740 51
350°F 177°C	207 14	215 15	215 15	207 14	283 20	353 24	353 24	555 38
400°F 204°C	100 7	192 13	192 13	100 7	192 13	235 16	235 16	370 26
450°F 232°C	N/A	100 7	100 7	N/A	100 7	100 7	118 8	185 13
500°F 260°C	N/A	N/A	0 0	N/A	N/A	N/A	0 0	0 0

Stainless steel: ASTM A351-CF8M

Temp. °F °C	Psig Bar							
	Class 150			Class 300				Class 600
	PTFE[1]	RPTFE & MPTFE	C-RPTFE	PTFE[1]	RPTFE	MPTFE	C-RPTFE	C-RPTFE[2]
-70°F -57°C	275 19	275 19	275 19	720 50	720 50	720 50	720 50	1440 99
0°F -18°C	275 19	275 19	275 19	720 50	720 50	720 50	720 50	1440 99
100°F 38°C	275 19	275 19	275 19	720 50	720 50	720 50	720 50	1440 99
150°F 66°C	255 18	255 18	255 18	617 43	631 44	670 46	670 46	1260 87
200°F 93°C	235 16	235 16	235 16	513 35	543 37	620 43	620 43	1080 75
250°F 121°C	225 16	225 16	225 16	410 28	454 31	532 37	532 37	900 62
300°F 149°C	215 15	215 15	215 15	307 21	366 25	426 29	426 29	720 50
350°F 177°C	203 14	205 14	205 14	203 14	277 19	319 22	319 22	540 37
400°F 204°C	100 7	189 13	189 13	100 7	189 13	213 15	213 15	360 25
450°F 232°C	N/A	100 7	100 7	N/A	100 7	100 7	107 7	180 12
500°F 260°C	N/A	N/A	0 0	N/A	N/A	N/A	0 0	0 0

(1) Valves with PTFE packing are limited to 400°F (204°C).

(2) Maximum 450°F (232°C) for valves with trunnion balls.

Notes:

During the valve selection, please take note that Memoryseal ball valves can be used at the minimum cold temperatures indicated above, except for severe service applications where the media going through the valve is very cold, below -20° F, and the ambient temperature is much warmer and humid. In such extreme applications ice will build up around the valve, especially around the packing area making the valve inoperable.

Pressure rating intermediate to tabulated values are determined by linear interpolation between temperatures.

Torque tables: lb·in

Seats: MPTFE, PTFE, RPTFE for SB-150/300 or C-RPTFE for SB-600
Packing: PTFE standard temperature range between -20°F and 400°F
Net torque values for clean fluids: lb·in

SB-150/300 Regular port – lb·in

Size NPS	Maximum Differential Pressure - psi								
	0	100	200	300	400	500	600	700	740
2	145	150	160	175	205	225	245	270	300
3	180	190	240	330	430	520	650	700	800
4	700	720	900	990	1150	1300	1450	1600	1750
6	920	1005	1410	2070	2490	2775	2970	3240	3350
8	3300	3450	4695	5220	6000	6695	7425	7705	7900
10	5870	6150	7250	10050	12300	14100	15325	15850	16700
12	9480	11240	13100	14420	16075	17220	18720	20700	23000
14	11500	11500	12000	13000	14000	15000	16000	17000	18000
16	15000	15000	16000	17000	20000	21500	22500	23000	23500
18	27500	27500	30000	34000	37500	40000	43000	46000	49000
20	31000	31000	37000	45000	50000	53000	60000	65000	68000
24	38000	38000	44000	50000	56000	61000	68000	75000	78000

SB-150/300 Full port – lb·in

Size NPS	Maximum Differential Pressure - psi								
	0	100	200	300	400	500	600	700	740
½	25	27	29	31	32	35	38	40	42
¾	45	48	51	55	60	68	74	82	88
1	70	75	80	85	95	110	120	135	145
1½	145	150	160	175	205	225	245	270	300
2	180	190	240	330	430	520	650	700	800
2½	440	585	720	825	920	1020	1155	1320	1390
3	700	720	900	990	1150	1300	1450	1600	1750
4	920	1005	1410	2070	2490	2775	2970	3240	3350
6	3300	3450	4695	5220	6000	6695	7425	7705	7900
8	5870	6150	7250	10050	12300	14100	15325	15850	16700
10	9480	11240	13100	14420	16075	17220	18720	20700	23000
12	15000	15000	16000	17000	20000	21500	22500	23000	23500
14	27500	27500	30000	34000	37500	40000	43000	46000	49000
16	31000	31000	37000	45000	50000	53000	60000	65000	68000
18	38000	38000	44000	50000	56000	61000	68000	75000	78000
20	45000	45000	60000	70000	80000	82000	90000	100000	110000
24	55000	60000	90000	130000	145000	150000	165000	175000	195000

SB-600 Regular port – lb·in

Size NPS	Maximum Differential Pressure - psi							
	0	200	400	600	800	1000	1200	1480
2	275	275	275	316	397	479	561	675
3	410	410	450	491	532	620	674	750
4	1400	1400	1400	1520	1760	2000	2167	2400
6	3100	3100	3100	3480	4240	5000	5417	6000
8	10000	10000	10000	11200	13600	16883	17667	20000
10	14000	14000	14000	23000	29000	35000	41250	50000
12	24000	24000	24000	38571	48286	58000	69250	85000

SB-600 Full port – lb·in

Size NPS	Maximum Differential Pressure - psi							
	0	200	400	600	800	1000	1200	1480
2	410	410	450	491	532	620	674	750
3	1400	1400	1400	1520	1760	2000	2167	2400
4	3100	3100	3100	3480	4240	5000	5417	6000
6	10000	10000	10000	11200	13600	16883	17667	20000
8	14000	14000	14000	23000	29000	35000	41250	50000
10	24000	24000	24000	38571	48286	58000	69250	85000
12	33300	33300	39875	57120	74360	91600	108850	132990

Torque tables: Nm

Seats: MPTFE, PTFE, RPTFE for SB-150/300 or C-RPTFE for SB-600
Packing: PTFE standard temperature range between -29°C and 204°C
Net torque values for clean fluids: Nm

SB-150/300 Regular port – Nm

Size DN	Maximum Differential Pressure - bar								
	0	6.9	13.8	20.7	27.6	34.5	41.4	48.3	51
50	16	17	18	20	23	25	28	31	34
80	20	21	27	37	49	59	73	79	90
100	79	81	102	112	130	147	164	181	198
150	104	114	159	234	281	314	336	366	379
200	373	390	531	590	678	757	839	871	893
250	663	695	819	1136	1390	1593	1732	1791	1887
300	1300	1300	1356	1469	1582	1695	1808	1921	2034
350	1300	1300	1356	1469	1582	1695	1808	1921	2034
400	1695	1695	1808	1921	2260	2430	2543	2599	2656
450	3108	3108	3390	3842	4238	4520	4859	5198	5537
500	3503	3503	4181	5085	5650	5989	6780	7345	7684
600	4294	4294	4972	5650	6328	6893	7684	8475	8814

SB-150/300 Full port – Nm

Size DN	Maximum Differential Pressure - bar								
	0	6.9	13.8	20.7	27.6	34.5	41.4	48.3	51
15	3	3	3	4	4	4	4	5	5
20	5	5	6	6	7	8	8	9	10
25	8	8	9	10	11	12	14	15	16
40	16	17	18	20	23	25	28	31	34
50	20	21	27	37	49	59	73	79	90
65	50	66	81	93	104	115	131	149	157
80	79	81	102	112	130	147	164	181	198
100	104	114	159	234	281	314	336	366	379
150	373	390	531	590	678	757	839	871	893
200	663	695	819	1136	1390	1593	1732	1791	1887
250	1071	1270	1480	1629	1816	1946	2115	2339	2599
300	1695	1695	1808	1921	2260	2430	2543	2599	2656
350	3108	3108	3390	3842	4238	4520	4859	5198	5537
400	3503	3503	4181	5085	5650	5989	6780	7345	7684
450	4294	4294	4972	5650	6328	6893	7684	8475	8814
500	5085	5085	6780	7910	9040	9266	10170	11300	12430
600	6215	6780	10170	14690	16385	16950	18645	19775	22035

SB-600 Regular port – Nm

Size DN	Maximum Differential Pressure - bar							
	0	13.8	27.6	41.4	55.2	69	82.8	102.1
50	275	275	275	316	397	479	561	675
80	410	410	450	491	532	620	674	750
100	1400	1400	1400	1520	1760	2000	2167	2400
150	3100	3100	3100	3480	4240	5000	5417	6000
200	10000	10000	10000	11200	13600	16883	17667	20000
250	14000	14000	14000	23000	29000	35000	41250	50000
300	24000	24000	24000	38571	48286	58000	69250	85000

SB-600 Full port – Nm

Size DN	Maximum Differential Pressure - bar							
	0	13.8	27.6	41.4	55.2	69	82.8	102.1
50	46	46	51	50	60	70	76	85
80	158	158	158	172	199	226	245	271
100	350	350	350	393	479	565	612	678
150	1130	1130	1130	1266	1537	1908	1996	2260
200	1582	1582	1582	2599	3277	3955	4661	5650
250	2712	2712	2712	4359	5456	6554	7825	9605
300	3763	3763	4506	6455	8403	10351	12300	15028

Note:
Values in Nm have been calculated by multiplying lb•in values by 0.113.

Valve maximum allowable stem torque (MAST) values

SB-150 Full port – lb·in / Nm

Size NPS/DN	SS316 stem		Carbon steel body		Stainless steel body		
	MAST (lb•in)	MAST (Nm)	Trim SSE1	Trim SSE3	Trim SSE1	Trim SSE2	Trim SSE4
½ 15	174	20	F03-01402-SSE1-W	F03-01402-SSE3-W	F03-01413-SSE1-W	F03-01413-SSE2-W	F03-01413-SSE4-W
¾ 20	273	31	F04-01402-SSE1-W	F04-01402-SSE3-W	F04-01413-SSE1-W	F04-01413-SSE2-W	F04-01413-SSE4-W
1 25	273	31	F05-01402-SSE1-W	F05-01402-SSE3-W	F05-01413-SSE1-W	F05-01413-SSE2-W	F05-01413-SSE4-W
1½ 40	828	94	F07-01402-SSE1-W	F07-01402-SSE3-W	F07-01413-SSE1-W	F07-01413-SSE2-W	F07-01413-SSE4-W
2 50	1490	168	F08-01402-SSE1-W	F08-01402-SSE3-W	F08-01413-SSE1-W	F08-01413-SSE2-W	F08-01413-SSE4-W
2½ 65	1953	221	F09-01402-SSE1-W	F09-01402-SSE3-W	F09-01413-SSE1-W	F09-01413-SSE2-W	F09-01413-SSE4-W
3 80	1953	221	F10-01402-SSE1-H	F10-01402-SSE3-H	F10-01413-SSE1-H	F10-01413-SSE2-H	F10-01413-SSE4-H
4 100	4177	472	F12-01402-SSE1-H	F12-01402-SSE3-H	F12-01413-SSE1-H	F12-01413-SSE2-H	F12-01413-SSE4-H
6 150	9793	1106	F14-01402-SSE1-G	F14-01402-SSE3-G	F14-01413-SSE1-G	F14-01413-SSE2-G	F14-01413-SSE4-G
8 200	20216	2284	F15-01402-SSE1-G	F15-01402-SSE3-G	F15-01413-SSE1-G	F15-01413-SSE2-G	F15-01413-SSE4-G

Notes:

Valve Maximum Allowable Stem Torque (MAST) values calculated at 100°F.

For more details on the valve figure number(s), please refer to page 26.

Valves for commercial use only. Values applicable to isolation (on-off) service only.

For more specific technical information, please contact quotes@velan.com

The maximum allowable stem torque levels for RSBV ball valves shown above are provided for informational purposes only, and may vary depending upon the specific application of the valve.

In order to achieve the maximum allowable stem torque levels, user must comply with all relevant instructions of use and maintenance requirements as set out in Velan's Maintenance Manual (IOM).

Velan shall not be liable for any damages resulting directly or indirectly from the user's non-compliance with the aforementioned torque levels, except to the extent that the automation of the valves has been performed by Velan at its own facilities.

Valve maximum allowable stem torque (MAST) values

SB-300 Full port – lb·in / Nm

Size NPS/DN	SS316 stem		Carbon steel body		Stainless steel body		
	MAST (lb•in)	MAST (Nm)	Trim SSE1	Trim SSE3	Trim SSE1	Trim SSE2	Trim SSE4
½ 15	174	20	F03-11402-SSE1-W	F03-11402-SSE3-W	F03-11413-SSE1-W	F03-11413-SSE2-W	F03-11413-SSE4-W
¾ 20	273	31	F04-11402-SSE1-W	F04-11402-SSE3-W	F04-11413-SSE1-W	F04-11413-SSE2-W	F04-11413-SSE4-W
1 25	273	31	F05-11402-SSE1-W	F05-11402-SSE3-W	F05-11413-SSE1-W	F05-11413-SSE2-W	F05-11413-SSE4-W
1½ 40	828	94	F07-11402-SSE1-W	F07-11402-SSE3-W	F07-11413-SSE1-W	F07-11413-SSE2-W	F07-11413-SSE4-W
2 50	1490	168	F08-11402-SSE1-W	F08-11402-SSE3-W	F08-11413-SSE1-W	F08-11413-SSE2-W	F08-11413-SSE4-W
2½ 65	1953	221	F09-11402-SSE1-H	F09-11402-SSE3-H	F09-11413-SSE1-H	F09-11413-SSE2-H	F09-11413-SSE4-H
3 80	1953	221	F10-11402-SSE1-H	F10-11402-SSE3-H	F10-11413-SSE1-H	F10-11413-SSE2-H	F10-11413-SSE4-H
4 100	4177	472	F12-11402-SSE1-G	F12-11402-SSE3-G	F12-11413-SSE1-G	F12-11413-SSE2-G	F12-11413-SSE4-G
6 150	9793	1106	F14-11402-SSE1-G	F14-11402-SSE3-G	F14-11413-SSE1-G	F14-11413-SSE2-G	F14-11413-SSE4-G
8 200	20216	2284	F15-11402-SSEZ-G	F15-11402-SSE3-G	F15-11413-SSE1-G	F15-11413-SSE2-G	F15-11413-SSE4-G

Notes:

Valve Maximum Allowable Stem Torque (MAST) values calculated at 100°F.

For more details on the valve figure number(s), please refer to page 26.

Valves for commercial use only. Values applicable to isolation (on-off) service only.

For more specific technical information, please contact quotes@velan.com

The maximum allowable stem torque levels for RSBV ball valves shown above are provided for informational purposes only, and may vary depending upon the specific application of the valve.

In order to achieve the maximum allowable stem torque levels, user must comply with all relevant instructions of use and maintenance requirements as set out in Velan's Maintenance Manual (IOM).

Velan shall not be liable for any damages resulting directly or indirectly from the user's non-compliance with the aforementioned torque levels, except to the extent that the automation of the valves has been performed by Velan at its own facilities.

How to order Memoryseal™ SB-150/300/600 resilient-seated ball valves

Type of connection	Size of connection		Model number/ Class		Port	Type	Body			Trim (ball, stem)		Seat	Standard compliance		Actuation
A	B			C	D	E	F			G		H	I		J
F	0	8	—	0	1	4	0	2	—	S	S	E	1	—	W

Example: NPS 2 (DN 50) flanged, split-body, Class 150, full port valve in carbon steel with stainless steel trim, and MPTFE seats, graphite packing and NACE, exposed body bolting with lever handle.

A TYPE OF CONNECTION

F	Flanged B16.5 (B16.47 series A)	**R**	Flanged ring joint

B SIZE OF CONNECTION

Sizes shown in NPS (DN)

03	½ (15)	**08**	2 (50)	**14**	6 (150)	**19**	14 (350)	**23**	22 (550)
04	¾ (20)	**09**	2½ (65)	**15**	8 (200)	**20**	16 (400)	**24**	24 (600)
05	1 (25)	**10**	3 (80)	**16**	10 (250)	**21**	18 (450)		
07	1½ (40)	**12**	4 (100)	**18**	12 (300)	**22**	20 (500)		

C MODEL NUMBER / CLASS(1)

0	150	**1**	300	**2**	600

D PORT

0	Regular port	**1**	Full port

E TYPE

4	Split-body

F BODY MATERIAL

02	WCB	**13**	CF8M	**25**	LCB
03	WC1	**14**	CF3M	**26**	LCB
04	C5	**19**	Monel (M35-1)	**31**	LCC
05	WC6	**20**	Inconel 625	**32**	4A, CD3MN
06	WC9	**21**	Hastelloy C	**35**	CK3MCuN
09	C12	**22**	Titanium Gr. 5	**38**	LC1
12	CF3	**23**	Alloy 20 (CN7M)	**39**	LC2

Consult Velan for other materials.

G TRIM MATERIAL (ball/stem)

Code	Ball	Stem	Code	Ball	Stem
AY	Alloy 20	Alloy 20	**SN**	316 Cr. plated	Nitronic 50
HC	Hastelloy C	Hastelloy C	**SP**	316 Cr. plated	316
PR	316 Cr. plated	630	**SR**	316	630
SB	304	304	**SS**	316	316

H SEAT MATERIAL

C	Graphite-reinforced PTFE	**T**	PTFE
E	MPTFE	**U**	UHMWPE
G	Glass-reinforced PTFE		

I STANDARD COMPLIANCE

Standard configurations for Split-body (SB-150/300) ball valves are available in the following configuration options:	SB-150/300			
	1	**2**	**3**	**4**
API 608[2]	✔	✔	✔	✔
API 641/ISO 15848-1, dual qualified 100 ppm Low-E[3]	✔	✔	✔	✔
API 607, Fire safe[4]	✔	✔		
NACE, exposed body bolting[5]	✔		✔[6]	
Non-NACE[5]		✔		✔

For all other resilient-seated ball valves, please use the following options[7]

A	PTFE packing, not fire safe, no special requirements	**H**	Cryogenic
C	Chlorine	**J**	Vacuum
F	Cavity filler	**T**	Bonnet, double packing
G	Oxygen, with and without extended bonnet	**Z**	Graphite packing, fire-tested to API 607, no special requirements

J ACTUATION(2)

A	Air or hydraulic actuator	**H**	Oval or slide handle[8]
B	Bare stem	**M**	Motor actuator
G	Gear actuator	**W**	Lever

(1) Actual valve pressure temperature ratings depend on choice of materials, consult catalog/data sheet for details.

(2) Not all actuation options are available in an API 608 compliant configuration (Refer to page 14 for Standard actuation compliant to API 608). In the event the customer prefers a non-compliant actuation option, they should select A or Z (position "I" in figure number).

(3) Refer to fugitive emissions product update document (PU-API641) for qualified size/class range.

(4) Fire-tested to API 607 Rev 5 or later. Fire safe applicable to B16.34 ferritic and austenitic materials. E.g. position "F" body materials: 02, 03, 04, 05, 06, 09, 11, 12, 13, 14, 15, 18, 24, 25, 26, 27, 28, 29, 31, 34, 36, 38, 39, 47. Consult Velan for other materials.

(5) Velan valves for NACE service (as indicated by figure number and/or description) comply with the metallurgical requirements of the current NACE MR0103/ISO 17495 and NACE MR0175/ISO 15156 standards. This compliance is applicable to internal components in contact with the process fluid, as well as Body (body/bonnet and body/body-end) bolting.

NOTE: Material selection is dependent on the actual environment and it is therefore the equipment end user's responsibility to ensure that the selected materials are suitable for the intended service. In this respect, we also refer to NACE MR0103/ISO 17495 for definitions of exposed bolting (bolting that is exposed directly to the sour environment or otherwise denied direct atmospheric exposure) and non-exposed bolting (bolting that is not exposed directly to the sour environment and is directly exposed to the atmosphere at all times). Please contact Velan for any questions regarding the application of our products for NACE service.

(6) CAUTION: Not fire safe safe. Typically suitable for chemical applications with non-flammable fluids only where controlled material metallurgy of pressure retaining components and wetted parts in accordance with NACE MR0103/ISO 17495 or NACE MR0175/ISO 15156 standards is preferred.

(7) Consult Velan for ordering instructions.

(8) All slide handles convert to a T-handle by removing the screw holding the pipe while using the second hole to attach the pipe to the pipe holder.

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