Forged steel valves
gate, globe, and check

ASME CLASSES 150 – 4500
NPS ¼ – 4 (DN 8 – 100)
API 602/ASME B16.34

VELAN

VELAN'S PROFILE

VELAN AT A GLANCE

History
- Founded in 1950

People
- Over 2,000 employees

Product line
A world-leading range of valves across all major industrial applications:
- Cast steel gate, globe, check, and ball valves
- Forged steel gate, globe, check, and ball valves
- Triple-offset butterfly valves
- Knife gate valves
- Severe service valves
- Bellows seal valves
- Steam traps

Quality
Velan holds major applicable approvals:
- ASME N/NPT
- ISO 9001
- ISO 14001
- OHSAS 18001
- PED
- API
- SIL, and
- TA-Luft
- Comprehensive quality programs that are compliant with the most stringent industry standards such as ISO 9001, API Q1, NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B.
- Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, Newport News Shipbuilding, and DCMA.

Headquartered in Montreal, Velan has several international subsidiaries. For general inquiries:

Velan head office:
7007 Côte de Liesse,
Montreal, QC H4T 1G2 Canada

Tel: +1 514 748 7743
Fax: +1 514 748 8635

Check our website for more specific contact information.

www.velan.com

Velan is one of the world's leading manufacturers of cast and forged steel gate, globe, check, ball, triple-offset, knife gate, highly engineered severe service valves, and steam traps offering superior performance across all major industrial applications including: fossil, nuclear, and cogeneration power; oil and gas; refining and petrochemicals; chemicals and pharmaceutical; LNG and cryogenics; marine; HVAC; mining; water and wastewater; pulp and paper; and subsea. The company also supplies actuators and integrated control packages.

Founded in 1950, Velan has earned a reputation for product excellence and innovation by bringing to the market superior products with special emphasis on quality, safety, ease of operation, and long service life. Velan valves have an extremely broad installation base and are approved by major companies worldwide.

TABLE OF CONTENTS

VELAN'S GLOBAL NETWORK

Head office

Montreal, Canada
Velan Inc.

- **17 production facilities**
  - **5 plants in North America**
  - **6 plants in Europe**
  - **6 plants in Asia**
- **5 stocking and distribution centers**
- **Hundreds of distributors worldwide**
- **Over 60 service shops worldwide**

Manufacturing plants

North America

Montreal, Canada
Velan Inc., Plant 1 (N)

Montreal, Canada
Velan Inc., Plant 2 and 7 (N)

Granby, Canada
Velan Inc., Plant 4 and 6

Montreal, Canada
Velan Inc., Plant 5

Williston, VT, U.S.A. (N)
Velan Valve Corp., Plant 3

Europe

Lyon, France
Velan S.A.S.

Mennecy, France
Segault S.A.

Leicester, UK
Velan Valves Ltd.

Lisbon, Portugal
Velan Válvulas Industriais, Lda.

Lucca, Italy
Velan ABV S.p.A., Plant 1

Lucca, Italy
Velan ABV S.p.A., Plant 2

Asia

Ansan City, South Korea
Velan Ltd., Plant 1

Ansan City, South Korea
Velan Ltd., Plant 2

Ansan City, South Korea
Velan Ltd., Plant 3

Taichung, Taiwan
Velan Valvac Mfg. Co., Ltd.

Suzhou, China
Velan Valve (Suzhou) Co., Ltd.

Coimbatore, India
Velan Valves India Pvt. Ltd.

Distribution centers

Granby, Canada
Vel*CAN*

Benicia, CA, U.S.A.
Vel*CAL*

Marietta, GA, U.S.A.
Vel*EAST*

Houston, TX, U.S.A.
Vel*TEX*

Willich, Germany
Velan GmbH

(N) – *ASME N-stamp accredited manufacturer*

MANUFACTURING PROGRAM

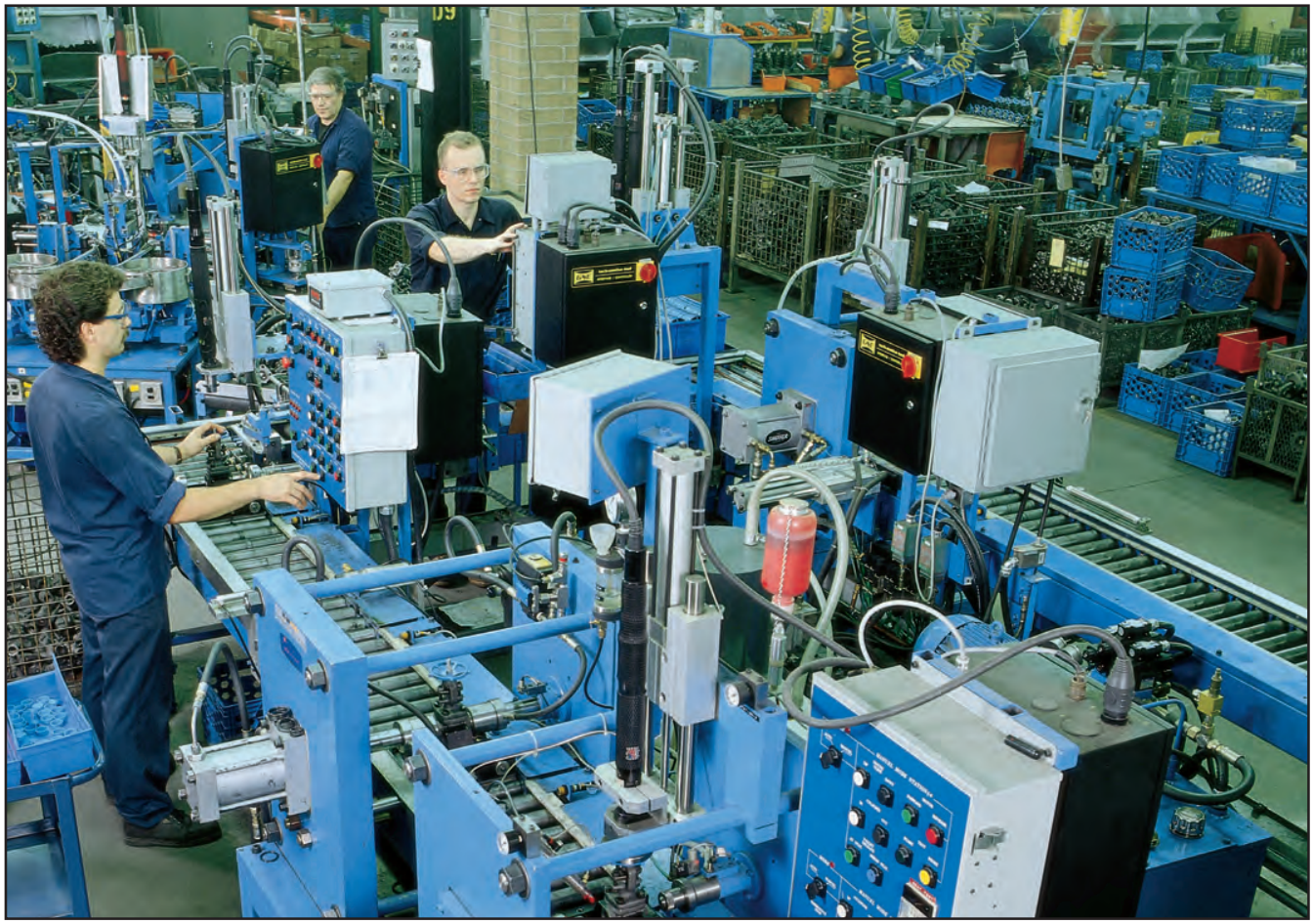
Small forged steel valves in carbon, alloy, and stainless steel
NPS ¼–4 (DN 8–100)

Valve type	Bonnet type	Bonnet joint	Flanged ends	Threaded or socket weld		Butt weld ends	Male / female ends
				Conventional port	Full port		
GATE	OS & Y	Bolted	150, 300, 600, 1500, 2500	800, 1500, 1690	800, 1500	1500, 2500	
	OS & Y	Welded	150, 300, 600, 1500, 2500, 4500	800, 1500, 1690, 2500, 4500	800	1500, 2500	800, 1500
GLOBE		Bolted	150, 300, 600, 1500	800, 1500, 1690		1500	
	OS & Y	Welded	150, 300, 600, 1500	800, 1500, 1690		1500	
		Y-pattern	1500, 2500	1690, 2680, 4500	1690, 2680, 4500		

Valve type	Type	Cover joint	Flanged ends	Threaded or socket weld	Butt weld ends	
				Conventional port		
CHECK	Piston	Bolted	150, 300, 600, 1500	800, 1500	1500	
	Piston	Welded	150, 300, 600, 1500	800, 1500	1500	
	Ball	Bolted	150, 300, 600	800, 1500	1500	
	Swing	Bolted	150, 300, 600	800		
	Swing	Coverless		800		
	Inclined piston	Welded	1500, 2500	1690, 2680, 4500	1690, 2680, 4500	

SEMI-AUTOMATIC ASSEMBLY AND TESTING PLANT

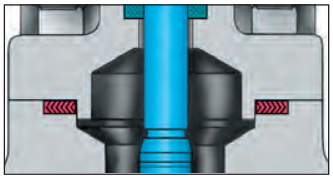
For Class 800 (API 602) gate valves



EXCLUSIVE DESIGN FEATURES

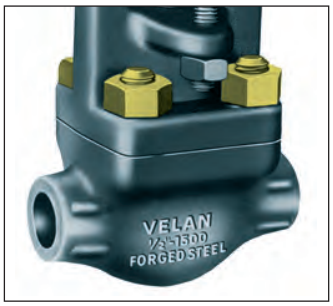
Stronger, leakproof body-bonnet joint fully encased spiral wound gasket

The design of the gasketed joint is critical. Its compression is better controlled in a fully enclosed cavity. Also, the possibility of unwinding of the SS spiral metal is eliminated.



Stronger bolting ensures joint tightness

Simple stress vs. deflection tests conducted on spiral wound gaskets in our laboratory confirmed that the control of leakage is highly dependent on gasket seating stress and that the values shown in the **ASME Section III Code**, namely the seating factor **m** = 3 and the seating stress **y** = 10,000 psi used in calculating bolt sizes, are highly insufficient.



Our bolted joints are calculated to a minimum gasket stress of 16,000 psi which is essential for a leakproof joint.

GASKET OD	ASME m	VELAN m	ASME y	VELAN y
2 – 5.5″	3	7	10,000	16,000 – 28,000

Threaded-in strength welded bonnets (full-penetration welds on special orders only)

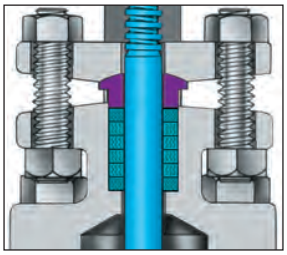
Valves with threaded-in strength welded bonnet offer an additional level of safety against fugitive emissions.

The body-bonnet welds are made on fully automatic MIG Welders. Weld hardness is controlled (including the heat-affected zone) and maintained below 200 HB.

Right: Automatic MIG welder.

Note: *CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite™, and other approved manufacturers.*

Safer and tighter stem seal

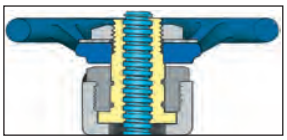


- Stem hardened and ground.
- Two-piece self-aligning gland.
- Each packing ring individually inserted and compressed for better tightness.
- Sturdy full-length threaded corrosion-resistant bolts provide the required high packing stress.
- Live-loading optional.
- Positive backseat: stem bevel against integral backseat.

Two-piece stem drive renewable in-line

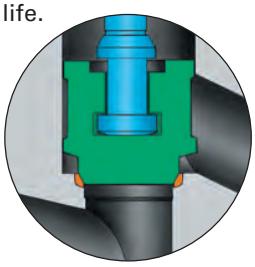
This exclusive and handy feature found only on Velan small forged OS & Y gate valves enables:

- Replacement of stem nut in-line.
- Removal of handwheel without affecting the position of valve (closed or open).
- Better stem nut lubrication control.

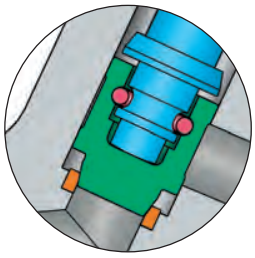


Body-guided disc in globe stop, needle and stop-check valves eliminates side thrust on stem

The top-and-bottom guided disc assures perfect seat and disc alignment in spite of side thrust caused by high velocity flow. This prevents stem from scoring and galling and provides longer disc seal and body life.



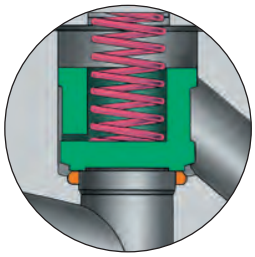
Solid CoCr alloy disc for full CoCr alloy trim



Solid CoCr alloy disc for all y-pattern valves

Body-guided disc in piston-check valves

- Assures perfect alignment of disc and seat even at large flow velocities.
- Flat seating faces for low and medium pressures.

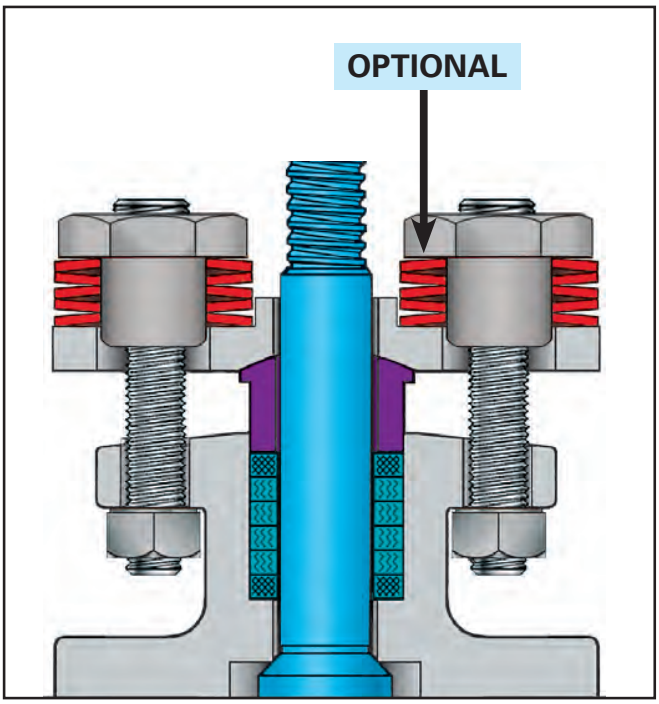


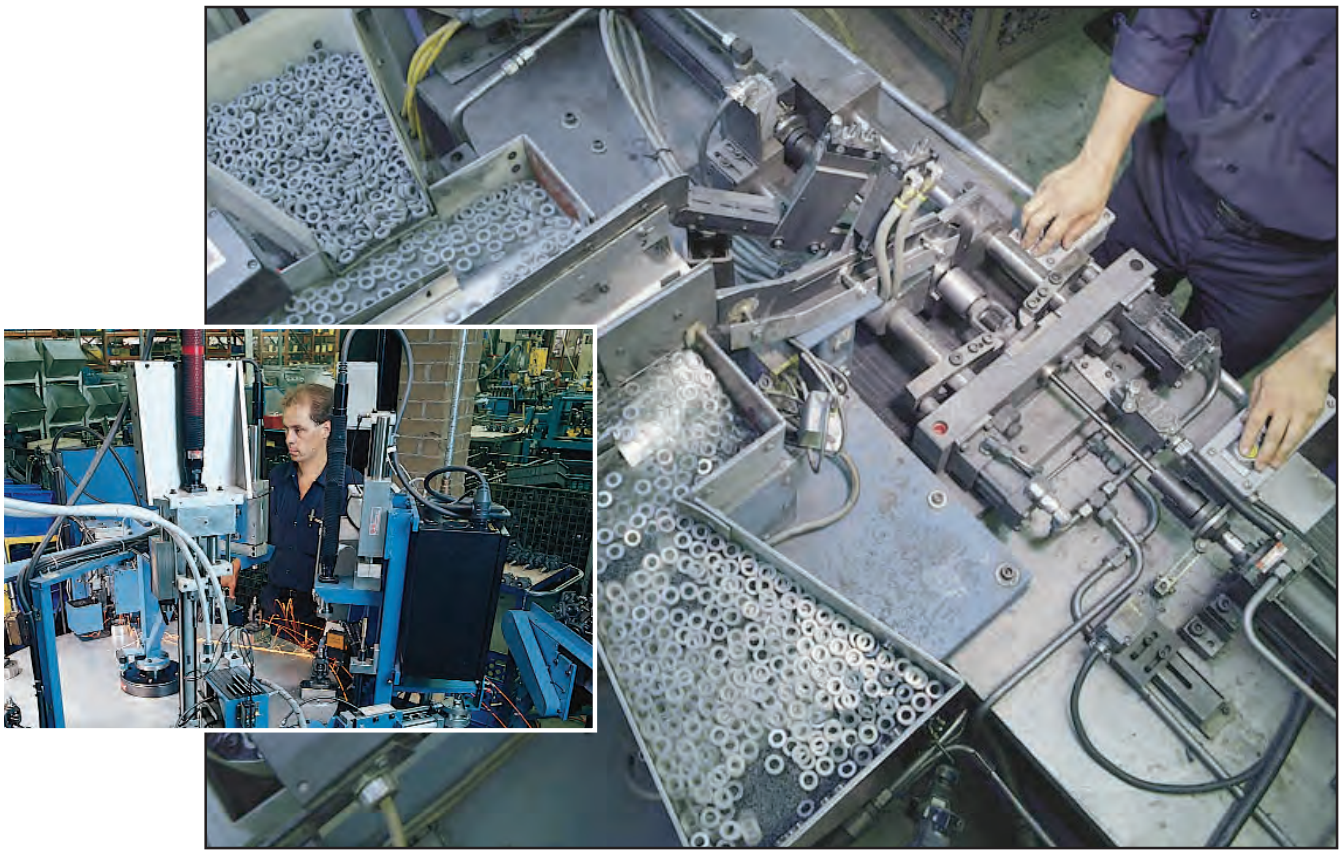
DESIGN OF STEM SEALS FOR LOW EMISSIONS

Test results lead to design of long-life leakproof stem seal

The Velan stem seal evolved from these test findings:

- **Large loads.** Sealing is achieved when compression load is high and packing forms a mass of close fibers of low porosity and permeability (4,000 psi for graphite).
- **Short and narrow packing chambers** improve sealing.
- **Small clearances between vital parts.**
- **Precision stem and packing chambers.** Straightness, roundness and fine finish of stem and packing chamber wall are essential.
- **Short and narrow packing chamber.** Maximum six rings in a single set chamber, and wherever possible, only $^{3}/_{16}$ – $^{1}/_{4}$" (4.76–6.35 mm) wide.
- **Rings precompressed** to 3500–4000 psi for graphite and to 1800–2000 psi for PTFE to ensure equal stress distribution and effectiveness of all rings.
- **Stem and packing chamber walls.** Close roundness, straightness and superior 8–16 RMS or burnished surface finish.
- **Live-loading (optional).** Two sets of Belleville springs maintain a permanent packing stress of 3500–4000 psi.





Photos illustrate packing machine and bonnet assembly machine.

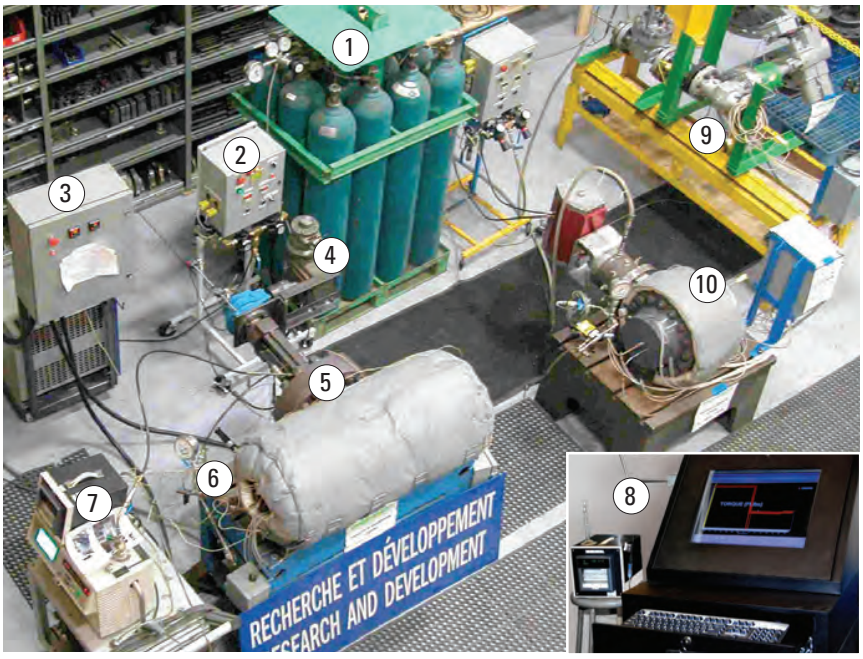
FUGITIVE EMISSION TESTING

Why fugitive emission (FE) testing is so important

- In a typical petroleum plant, 60% of fugitive emissions are from valves. Therefore it is extremely important to reduce valve emissions to the greatest degree possible.
- Four widely recognized standards regarding valve fugitive emissions are ISO 15848-1, ISO 15848-2, API 622, and API 624.
- Velan offers standard cast steel bolted bonnet gate and globe valves qualification tested for compliance with ISO, API and EPA fugitive emission requirements.
- The primary intention of API 622 compares performance of different packing brands.
- Different packing arrangements are available upon request.

ISO 15848-1 type test and ISO 15848-2 production tests	API standard 622 FE test in a test fixture	API Standard 624 FE type test in a valve
• Introduced in 2006. • Velan has tested our standard packing set to ISO 15848-1 and re-validated our FE certification. • Uses the "global" test method. • ISO 15848-1 test is carried out with a standard valve and additional bonnet enclosure.	• Introduced in 2006. • Velan has tested our standard packing set to API 622 and re-validated our FE certification. • Uses the "sniffing / flushing" test method (local method). • API 622 test is carried out in a test fixture designed to simulate a valve.	• Expected release in 2013. • Intended for low fugitive emissions valves. • Uses sniffing as a test method. • Testing is carried out using assembled valves. • Tested valve qualifies a range of sizes and classes.

Velan ISO 15848-1 Research and Development test lab



1	Helium source (pressurized cluster bottles)
2	Valve actuator control box
3	Heating system control box
4	Valve actuator
5	Qualification valve NPS 8 (DN 200) Class 600 API 600 cast steel gate
6	Heating elements
7	Mass spectrometer
8	Data acquisition system
9	Qualification valve NPS 3 (DN 80) Class 600 API 600 cast steel gate
10	Qualification valve NPS 10 (DN 250) Class 300 Torqseal®


ISO 15848-1
Fugitive Emission Test Report
With Methane

Performed for
Velan Inc.
7007 Cote de Liesse
Montreal, QC, Canada H4T 1G2
www.velan.com

3 inch Class 300 Gate Valve
Product Code: F10-1064C-02TY
Project Number: 207115
January 2008

Performed by
YARMOUTH RESEARCH AND TECHNOLOGY

92 East Elm Street
Yarmouth, ME 04096 USA
(207) 829-5359

API Standard 622 Test Report
"Type Testing of Process Valve Packing for Fugitive Emissions"
First Edition, August 2006

Performed for
Velan Inc.
7007 Cote de Liesse
Montreal, QC, Canada H4T 1G2
www.velan.com

3/4 inch Class 800 Gate Valve
With OEM Packing

Project Number: 207114F
March 28, 2008

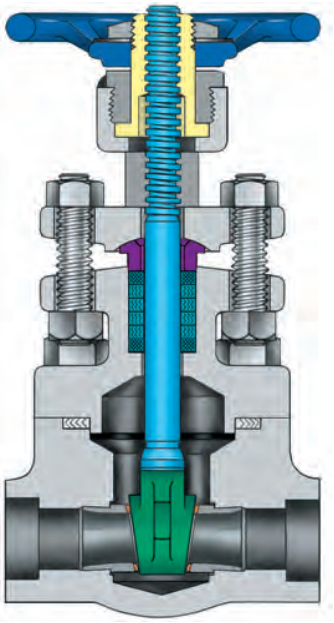
Performed by
YARMOUTH RESEARCH AND TECHNOLOGY

92 East Elm Street
Yarmouth, ME 04096 USA
(207) 829-5359

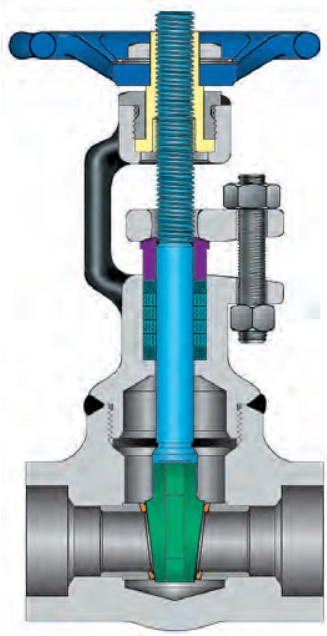
VELAN FORGED STEEL GATE VALVES

THREADED, SOCKET WELD AND FLANGED

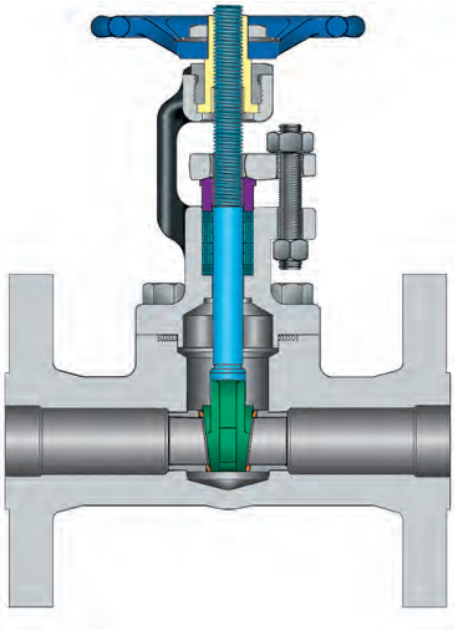
NPS ¼–2 (DN 8–50), ASME CLASS 800 (1975 psi @ 100°F),
ASME CLASS 1500 (3705 psi @ 100°F), FLANGED ASME CLASSES 150, 300, 600, 1500



BOLTED BONNET
2054B – Class 800
3054B – Class 1500



WELDED BONNET
2054W – Class 800
3054W – Class 1500



FLANGED BOLTED BONNET
0054B – Class 150 2054B – Class 600
1054B – Class 300 3054B – Class 1500

DESIGN FEATURES

- A compact but extremely sturdy design for high pressure-temperature service.
- Solid CoCr alloy wedge (optional) ensures low friction and long service life.
- For Class 1500 valves and for steam service, seats are seal-welded to the body.
- Packing rings are precompressed to 4000 psi to provide a high integrity seal.
- For welded bonnet valves, the bonnet is threaded in and torqued to an engineered torque value and the body bonnet joint is strength-welded, offering double protection against leakage. (body/bonnet threads and strength-weld).
- Fully guided wedge reduces wear on seating surfaces.
- Repairable 2-piece stem drive.

OPTIONAL FEATURES (SPECIAL APPLICATIONS)

- A special design is also available with double packing, leak-off connection, live-loading and a packing blowout for easy removal of old packing.
- Bolted bonnet gate valves for alkylation service (HF acid service see page 21).
- Parallel slide gate valves.
- API 603 NPS ½–1½ (DN 15–40), for ASME Classes 150, 300, and 600.

PART	STANDARD MATERIALS
Body	A105
Bonnet	A105
Gasket	Gr. 304 (stainless & graphite)
Packing flange	A105
Seat	Gr. 410 (stainless) HF CoCr alloy
Wedge	CA15 HT or CoCr alloy
Stem	Gr. 410 (stainless)
Stem nut	Gr. 416 (stainless)
Yoke bushing	12L14 steel
Gland	Gr. 416 (stainless)
Packing	Graphite
Gland bolt	Gr. B6
Gland nut	Gr. 2H
Cap screw	Gr. B7
Handwheel	Malleable iron
Handwheel nut	Steel
Handwheel lockwasher	Steel
Name plate	Aluminum

For other materials, trims, and engineering data, see pages 23–35.

VELAN FORGED STEEL GATE VALVES

BOLTED BONNET GATE DIMENSIONS AND WEIGHTS

Size NPS DN	A Port		B End-to-end		C Center-to-top, closed		D Center-to-top, open		H Handwheel		K Socket weld bore	L Socket weld depth	Weight lb kg	
	800	1500	800	1500	800	1500	800	1500	800	1500			800	1500
1/4 8	0.25 6	0.25 6	3.13 80	4.00 102	4.81 122	7.13 181	5.31 135	7.75 197	2.50 64	3.50 89	0.555 14.1	0.38 9.5	3.30 1.5	11.00 5.0
3/8 10	0.25 6	0.35 9	3.13 80	4.00 102	4.81 122	7.13 181	5.31 135	7.75 197	2.50 64	3.50 89	0.690 17.5	0.38 9.5	3.30 1.5	11.00 5.0
1/2 15	0.38 10	0.50 13	3.13 80	4.00 102	4.81 122	7.13 181	5.31 135	7.75 197	2.50 64	3.50 89	0.855 21.7	0.38 9.5	3.30 1.5	11.00 5.0
3/4 20	0.50 13		3.25 83	5.00 127	5.91 150	7.25 184	6.75 171	7.88 200	3.50 89	3.50 89	1.065 27.1	0.50 12.7	5.30 2.4	13.00 5.9
1 25	0.69 18		3.50 89	6.00 152	6.38 162	8.70 221	7.38 188	9.63 244	3.50 89	5.00 127	1.330 33.8	0.50 12.7	6.40 2.9	26.00 11.8
1 1/4 32	1.25 32		5.00 127	7.00 178	7.77 197	9.12 232	9.12 232	10.63 270	4.75 121	6.00 152	1.675 42.5	0.50 12.7	15.00 6.8	34.00 15.4
1 1/2 40	1.25 32		5.00 127	7.00 178	7.77 197	9.12 232	9.12 232	10.63 270	4.75 121	6.00 152	1.915 48.6	0.50 12.7	15.00 6.8	34.00 15.4
2 50	1.50 38		5.25 133	9.00 229	8.70 221	10.56 268	10.40 264	12.30 312	6.00 152	10.00 254	2.406 61.1	0.63 15.9	19.00 8.6	58.00 26.3

FLANGED FACE-TO-FACE

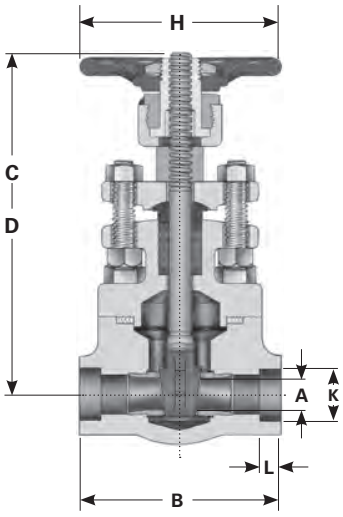
Size NPS DN	Flanged face-to-face				
	150	300	600	1500	2500
1/4 8	4.00 102	5.50 139	6.50 165	8.50 216	–
3/8 10	4.00 102	5.50 139	6.50 165	8.50 216	–
1/2 15	4.25 108	5.50 139	6.50 165	8.50 216	10.38 264
3/4 20	4.62 117	6.00 152	7.50 191	9.00 229	10.75 273
1 25	5.00 127	6.50 165	8.50 216	10.00 254	12.12 308
1 1/4 32	5.50 140	7.00 178	9.00 229	11.00 279	13.75 349
1 1/2 40	6.50 165	7.50 191	9.50 241	12.00 305	15.12 384
2 50	7.00 178	8.50 216	11.50 292	14.50 368	17.75 451

Also see page 17 for bellows seal valves for emission-free service.

BOLTED BONNET GATE FULL PORT DIMENSIONS AND WEIGHTS

Size NPS DN	A Port	B End-to-end		C Center-to-top, closed		D Center-to top, open		H Handwheel		K Socket weld bore	L Socket weld depth	Weight lb kg	
		800	1500	800	1500	800	1500	800	1500			800	1500
1/4 8	0.25 6	–	4.00 102	–	7.10 180	–	7.8 198	–	3.50 89	0.555 14.1	0.38 9.5	–	10 4.5
3/8 10	0.35 9	–	4.00 102	–	7.10 180	–	7.8 198	–	3.50 89	0.690 17.5	0.38 9.5	–	10 4.5
1/2 15	0.50 13	3.25 83	4.00 102	5.90 150	8.7 221	6.63 168	7.88 200	3.50 89	3.50 89	0.855 21.7	0.38 9.5	6.20 2.8	12.00 5.4
3/4 20	0.69 18	3.50 89	6.00 152	6.40 162	9.10 231	7.40 188	9.60 244	4.75 121	4.75 121	1.065 27.1	0.50 12.7	6.60 3.0	24.00 10.9
1 25	0.96 24	5.00 127	7.00 178	7.80 198	9.10 231	9.10 231	10.60 269	6.00 152	6.00 152	1.330 33.8	0.50 12.7	15.00 6.8	32.00 14.5
1 1/4 32	1.25 32	5.00 127	7.00 178	7.80 198	9.10 231	9.10 231	10.60 269	6.00 152	6.00 152	1.675 42.5	0.50 12.7	15.00 6.8	32.00 14.5
1 1/2 40	1.50 38	5.25 133	9.00 229	8.60 218	10.60 269	10.40 264	12.30 312	6.00 152	10.00 254	1.915 48.6	0.50 12.7	20.00 9.1	50.00 22.7
2 50	2.00(1) 51	6.00 152	9.00 229	10.90 277	11.50 292	13.12 333	13.75 349	8.00 203	10.00 254	2.406 61.1	0.63 15.9	24.00 10.9	60.00 27.2

(1) 1.89" (48 mm) Class 1500



WELDED BONNET GATE VALVE DIMENSIONS AND WEIGHTS(2)

Size NPS DN	A Port				B End-to-end				C Center-to-top, closed				D Center-to-top, open				H Handwheel				K Socket weld bore	L Socket weld depth	Weight lb kg			
	800	1500	2500	4500	800	1500	2500	4500	800	1500	2500	4500	800	1500	2500	4500	800	1500	2500	4500			800	1500	2500	4500
1/4 8	0.25 6	0.25 6	–	–	2.88 73	3.50 89	–	–	4.63 117	6.40 163	–	–	5.13 130	7.10 180	–	–	2.50 64	3.50 89	–	–	0.555 14.1	0.38 9.5	2.50 1.1	–	–	–
3/8 10	0.25 6	0.25 6	–	–	2.88 73	3.50 89	–	–	4.63 117	6.40 163	–	–	5.13 130	7.10 180	–	–	2.50 64	3.50 89	–	–	0.690 17.5	0.38 9.5	2.50 1.1	6.50 2.9	–	–
1/2 15	0.38 10	0.35 9	0.50 13	–	2.88 73	3.50 89	5.00 127	–	4.63 117	6.40 163	9.00 229	–	5.13 130	7.10 180	9.80 249	–	2.50 64	3.50 89	6.00 152	–	0.855 21.7	0.38 9.5	2.50 1.1	6.50 2.9	21.00 9.5	–
3/4 20	0.50 13	0.50 13	0.50 13	0.58 15	3.25 83	3.50 89	5.00 127	7.00 178	5.90 150	6.40 163	9.00 229	11.82 300	6.63 168	7.10 180	9.80 249	12.62 321	3.50 89	3.50 89	6.00 152	8.00 203	1.065 27.1	0.50 12.7	4.40 2.0	6.80 3.1	20.00 9.1	62 28
1 25	0.69 18	0.69 18	0.69 18	0.58 15	3.50 89	5.00 127	5.00 127	8.00 203	6.30 160	8.10 206	9.10 231	11.82 300	7.20 182	8.90 226	10.00 254	12.62 321	3.50 89	4.75 121	6.00 152	8.00 203	1.330 33.8	0.50 12.7	5.30 2.4	13.00 5.9	19.00 8.6	66 30
1 1/4 32	1.25 32	1.25 32	0.96 24	0.88 22	5.00 127	5.25 133	10.00 254	11.00 279	7.77 197	9.40 239	11.30 287	16.50 419	9.12 231	10.80 274	12.50 318	17.72 450	4.75 121	6.00 152	8.00 203	12.00 305	1.675 42.5	0.50 12.7	11.00 5.0	20.00 9.1	68.00 30.8	127 58
1 1/2 40	1.25 32	1.25 32	0.96 24	0.88 22	5.00 127	5.25 133	10.00 254	11.00 279	7.77 197	9.40 239	11.30 287	16.50 419	9.12 231	10.80 274	12.50 318	17.72 450	4.75 121	6.00 152	8.00 203	12.00 305	1.915 48.6	0.50 12.7	11.00 5.0	20.00 9.1	68.00 30.8	127 58
2 50	1.50 38	1.50 38	1.50 38	1.20 31	5.25 133	10.00 254	10.00 254	11.00 279	8.50 216	12.40 315	12.40 315	17.00 432	10.40 264	14.10 358	14.15 358	18.6 472	6.00 152	10.00 254	10.00 254	12.00 305	2.406 61.1	0.63 15.9	16.00 7.3	50.00 22.7	77.00 34.9	151 69

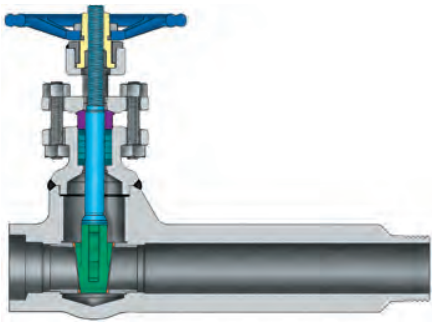
(2) Full bore also available for Classes 800 and 1500

VELAN FORGED STEEL EXTENDED BODY GATE VALVES

CONVENTIONAL PORT, THREADED OR SOCKET WELD FEMALE

NPS ½–2 (DN 15–50), API 602, ASME CLASSES 800, 1500

INTEGRALLY-REINFORCED EXTENDED BODY – 2174W



EXTENDED BODY – 2184W

PART	STANDARD MATERIALS
Body	A105
Bonnet	A105
Packing flange	A105
Seat	Gr. 410 (stainless) HF CoCr alloy
Wedge	CA15 HT or CoCr alloy
Stem	Gr. 410 (stainless)
Stem nut	Gr. 416 (stainless)
Yoke bushing	Steel
Gland	Gr. 416 (stainless)
Packing	Graphite
Gland bolt	Gr. B6 (stainless)
Gland nut	Gr. 2H
Handwheel	Malleable iron
Handwheel nut and lockwasher	Steel
Name plate	Aluminum

For other materials, trims, and engineering data, see pages 23–35.

TWO TYPES

- This valve is available with an extended body or an integrally-reinforced extended body (IREB).
- Extended body gate valves have a welded or NPT connection and are used for tapping of pressure vessels and header lines for vents, drains or takeoff lines and instrumentation.
- Also available: extended body assemblies for vents, drains, and instrument root valves.

AVAILABLE VARIATIONS[2]

FAMILY STANDARD END	MALE EXTENDED END	
	Standard: 2184W, 3184W	IREB: 2174W, 3174W
Thread	Couplet, NPT, or Socket	Couplet, NPT, socket weld (plain), butt weld
Socket weld	Couplet or Socket	

EXTENDED BODY GATE VALVE DIMENSIONS AND WEIGHTS

Size NPS DN	A Port	B End-to-end		C Center-to-top, closed		D Center-to-top, open		H Handwheel		K Socket weld bore	L Socket weld depth	DA Short end-to-center		DB Long end-to center		Weight lb kg	
	800 & 1500	800	1500	800	1500	800	1500	800	1500			800	1500	800	1500	800	1500
½	0.50[1]	5.63	5.75	5.90	6.2	6.6	6.8	3.50	3.50	0.855	0.38	1.63	1.75	4.00	4.00	5.0	7.7
15	13	143	146	150	158	168	173	89	89	21.7	9.5	41	44	102	102	2.3	3.5
¾	0.50	5.63	5.75	5.90	6.2	6.6	6.8	3.50	3.50	1.065	0.50	1.63	1.75	4.00	4.00	5	8.8
20	13	143	146	150	158	168	173	89	89	27.1	12.7	41	44	102	102	2.3	4.0
1	0.69	5.75	7.25	6.4	8.1	7.4	8.9	3.50	4.75	1.33	0.50	1.75	2.50	4.00	4.75	6.1	17.00
25	18	146	184	163	206	188	226	89	121	33.8	12.7	44	64	102	121	2.8	7.7
1¼	1.25	7.00	–	7.6	–	9.2	–	4.75	–	1.675	0.50	2.25	–	4.75	–	13	–
32	32	178		193		234		121		42.5	12.7	57		121		6	
1½	1.25	7.25	7.88	7.6	9.40	9.2	10.8	4.75	6.00	1.915	0.50	2.5	2.63	4.75	5.25	13.00	24.00
40	32	184	200	193	239	234	274	121	152	48.6	12.7	64	67	121	133	6	11
2	1.50	7.88	12.25	8.50	12.40	10.40	14.10	6.00	10.00	2.406	0.63	2.63	5.00	5.25	7.25	19.00	55.00
50	38	200	311	216	315	264	358	152	254	61.1	15.9	67	127	133	184	9	25

IREB GATE VALVE DIMENSIONS AND WEIGHTS

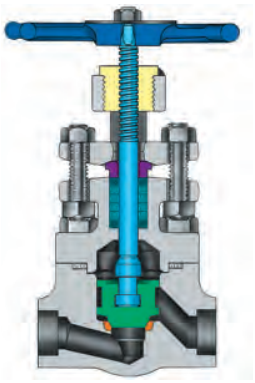
Size NPS DN	A Port	B End-to-end		C Center-to-top, closed		D Center-to-top, open		H Handwheel		K Socket weld bore	L Socket weld depth	DA Short end-to-center		DB Long end-to center		Weight lb kg	
	800 & 1500	800	1500	800	1500	800	1500	800	1500			800	1500	800	1500	800	1500
½	0.50[1]	8.63	8.88	5.90	6.2	6.63	6.8	3.50	3.50	0.855	0.38	1.63	1.75	7.00	7.13	6.6	8.8
15	13	219	226	150	158	168	173	89	89	21.7	9.5	41	44	178	181	3.0	4.0
¾	0.50	8.63	8.88	5.90	6.2	6.63	6.8	3.50	3.50	1.065	0.50	1.63	1.75	7.00	7.13	6.6	10
20	13	219	226	150	158	168	173	89	89	27.1	12.7	41	44	178	181	3.0	4.5
1	0.69	9.38	10.13	6.4	8.1	7.4	8.9	3.50	4.75	1.33	0.50	1.75	2.50	7.63	7.63	7.7	20
25	18	238	257	163	206	188	226	89	121	33.8	12.7	44	64	194	194	3.5	9.1
1¼	1.25	10.50	10.63	7.6	9.4	9.2	10.8	4.75	6.00	1.675	0.50	2.50	2.63	8.00	8.00	15	30
32	32	266	270	193	239	234	274	121	152	42.5	12.7	64	67	203	203	6.8	14
1½	1.25	10.50	10.63	7.6	9.4	9.2	10.8	4.75	6.00	1.915	0.50	2.50	2.63	8.00	8.00	15	30
40	32	266	270	193	239	234	274	121	152	48.6	12.7	64	67	203	203	6.8	14
2	1.50	11.88	14.25	8.50	12.4	10.4	14.1	6.00	10.00	2.406	0.63	2.63	5.00	9.25	9.25	25	66
50	38	302	362	216	315	264	358	152	254	61.1	15.9	67	127	235	235	11.3	30

(1) 0.36" (9 mm) seat for ½" NPT male end only. *(2) Bolted bonnet also available.*

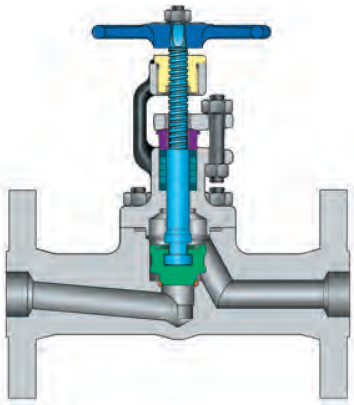
VELAN FORGED STEEL GLOBE VALVES

CONVENTIONAL PORT, THREADED OR SOCKET WELD

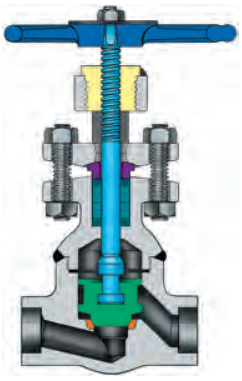
NPS ¼–2 (DN 8–50), ASME CLASS 800 (1975 psi @ 100°F), ASME CLASS 1500 (3705 psi @ 100°F)
FLANGED ASME CLASSES 150, 300, 600, 1500



BOLTED BONNET
2074B – Class 800
3074B – Class 1500



FLANGED BOLTED BONNET
0074B – Class 150 2074B – Class 600
1074B – Class 300 3074B – Class 1500



WELDED BONNET
2074W – Class 800
3074W – Class 1500

PART	STANDARD MATERIALS
Body	A105
Seat (integral)	CoCr alloy
Bonnet	A105
Gasket	Gr. 304 (stainless and graphite)
Packing flange	A 105
Disc	CA15 HT or CoCr alloy
Stem	Gr. 410 (stainless)
Stem nut	Gr. 416 (stainless) or bronze
Gland	Gr. 416 (stainless)
Packing	Graphite
Gland bolt	Gr. B6
Gland nut	Gr. 2H
Cap screw	Gr. B7
Handwheel	Malleable iron
Handwheel lockwasher	Steel
Name plate	Aluminum

Available with live-loading, double packing, and leak-off.
Also see page 17 for bellows seal valves for emission-free service.

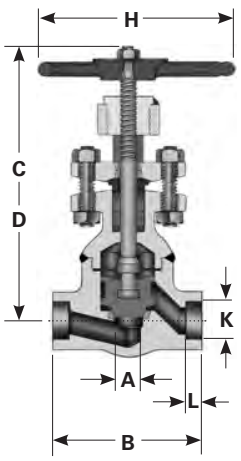
For other materials, trims, and engineering data, see pages 23–35.

BOLTED BONNET GLOBE DIMENSIONS AND WEIGHTS

Size NPS DN	A Port		B End-to-end		C Center-to-top, closed		D Center-to-top, open		H Handwheel		K Socket weld bore	L Socket weld depth	Weight lb kg		Flanged Face-to-face			
	800	1500	800	1500	800	1500	800	1500	800	1500			800	1500	150	300	600	1500
1/4	0.36	0.50	3.13	4.00	4.6	7.69	4.9	8.1	2.5	6	0.555	0.38	3.50	12.00	4.00	6.00	6.50	8.50
8	9.2	13	80	102	117	195	124	206	64	152	14.1	9.5	1.6	5.4	102	152	165	216
3/8	0.36	0.50	3.13	4.00	4.6	7.69	4.9	8.1	2.5	6	0.690	0.38	3.50	12.00	4.00	6.00	6.50	8.50
10	9.2	13	80	102	117	195	124	206	64	152	17.5	9.5	1.6	5.4	102	152	165	216
1/2	0.36	0.50	3.13	4.00	4.6	7.69	4.9	8.1	2.5	6	0.855	0.38	3.50	12.00	4.25	6.00	6.50	8.50
15	9.2	13	80	102	117	195	124	206	64	152	21.7	9.5	1.6	5.4	108	152	165	216
3/4	0.50	0.50	3.25	5.00	6.61	7.8	7.1	8.4	4.0	6	1.065	0.50	5.90	14.00	4.62	7.00	7.50	9.00
20	13	13	83	127	168	198	180	213	102	152	27.1	12.7	2.7	6.4	117	178	190	229
1	0.75	0.75	3.50	6.00	6.70	9.2	7.3	10.0	4.0	8	1.330	0.50	6.70	29.00	5.00	8.00	8.50	10.00
25	19	19	89	152	170	233	185	254	102	203	33.8	12.7	3.0	13.2	127	203	216	254
1 1/4	1.25	1.25	5.00	7.00	8.11	10.1	8.7	11.0	6.0	8	1.675	0.50	18.00	37.00	5.50	8.50	9.00	11.00
32	32	32	127	178	206	257	221	279	152	203	42.5	12.7	8.2	16.8	140	216	229	279
1 1/2	1.25	1.25	5.00	7.00	8.11	10.1	8.7	11.0	6.0	8	1.915	0.50	16.00	37.00	6.50	9.00	9.50	12.00
40	32	32	127	178	206	257	221	279	152	203	48.6	12.7	7.3	16.8	165	229	241	305
2	1.50	1.50	8.00	9.00	10.39	11.0	11.2	12.3	8.0	12	2.406	0.63	30.00	64.00	8.00	10.50	11.50	14.50
50	38	38	203	229	264	279	285	312	203	305	61.1	15.9	13.6	29.0	203	266	292	368

WELDED BONNET GLOBE DIMENSIONS & WEIGHTS

Size NPS DN	A Port		B End-to-end		C Center-to-top, closed		D Center-to-top, Open		H Handwheel		K Socket weld bore	L Socket weld depth	Weight lb kg	
	800	1500	800	1500	800	1500	800	1500	800	1500			800	1500
1/4	0.36	0.50	2.88	3.50	4.57	6.8	4.84	7.3	2.5	6.0	0.555	0.38	2.50	6.00
8	9.2	13	73	89	116	173	123	185	64	152	14.1	9.5	1.14	2.7
3/8	0.36	0.50	2.88	3.50	4.57	6.8	4.84	7.3	2.5	6.0	0.690	0.38	2.50	6.00
10	9.2	13	73	89	116	173	123	185	64	152	17.5	9.5	1.14	2.7
1/2	0.36	0.50	2.88	3.50	4.57	6.8	4.84	7.3	2.5	6.0	0.855	0.38	2.50	7.50
15	9.2	13	73	89	116	173	123	185	64	152	21.7	9.5	1.14	3.4
3/4	0.50	0.50	3.25	3.50	6.60	6.8	6.90	7.3	4.0	6.0	1.065	0.50	4.80	7.50
20	13	13	83	89	168	173	175	185	102	152	27.1	12.7	2.2	3.4
1	0.75	0.75	3.50	5.00	6.70	8.21	7.20	8.84	4.0	6.0	1.330	0.50	5.70	15.00
25	19	19	89	127	170	209	183	225	102	152	33.8	12.7	2.6	6.9
1 1/4	1.25	1.25	5.00	5.25	8.05	10.8	8.93	10.76	6.0	8.0	1.675	0.50	12.00	23.00
32	32	32	127	133	204	274	227	273	152	203	42.5	12.7	5.4	10.4
1 1/2	1.25	1.25	5.00	5.25	8.05	10.8	8.93	10.76	6.0	8.0	1.915	0.50	12.00	23.00
40	32	32	127	133	204	274	227	273	152	203	48.6	12.7	5.4	10.4
2	1.38	1.50	5.25	10.00	9.30	12.8	10.00	14.00	6.0	12.0	2.406	0.63	17.00	57.00
50	35	38	133	254	236	325	254	356	152	305	61.1	15.9	7.7	26

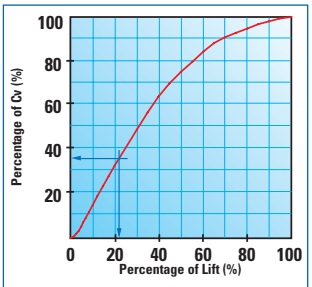


For Y-pattern globe valves, see page 12.

AVAILABLE FEATURES

	Bolted bonnet		Welded bonnet	
Class	800	1500	800	1500
Stop	2074B	3074B	2074W	3074W
Stop check	2084B	3084B	2084W	3084W
Needle	2094B	3094B	2094W	3094W
Flow control	2014B	3014B	2014W	3014W

THROTTLING GLOBE VALVES

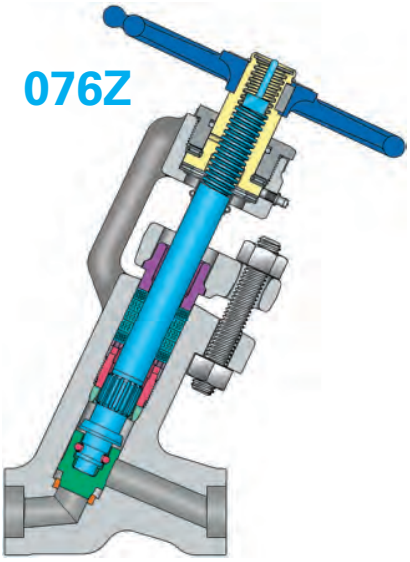


Regular style globe valves are suitable for moderate throttling applications. As a general rule, an adequately sized globe valve (i.e. with pipe velocity between 15 to 25 ft/sec for water and 200 to 300 ft/sec for steam) should not be throttled down below 35% of its maximum full open Cv capacity (approximately 20% of full stroke). Harsh throttling, below 35% of full Cv capacity, will require analysis by applications department to determine suitability under possible cavitation, flashing, noise and vibration.

VELAN FORGED STEEL Y-PATTERN GLOBE VALVES

BONNETLESS, CONVENTIONAL PORT OPENING, THREADED, SOCKET WELD OR BUTT WELD

NPS ½–4 (DN 15–100), ASME CLASSES 1690, 2680, 4500



NON-ROTATING STEM
Patented for quick serviceability, (USA patent number 4356832).

For more information consult Velan's Y-pattern globe valve catalog (CAT-BG) at www.velan.com.

DESIGN FEATURES

- Designed for quick and easy maintenance – one step removal of all working parts including packing.
- All pressure containing parts within one body-bonnet forging – no joints to leak or welds to cut for servicing.
- Non rotating stem allows a non-spinning disc, ensures low torque and prevents torsional damage of the packing.
- Fully enclosed, lubricated stem drive system with needle bearings ensures low operating torque.
- Solid CoCr alloy disc, seat ring and backseat provide excellent long service life even in severe services.
- Backseat bevel on the stem, not on the disc, satisfies both API-600 and API-602 specifications.

FIGURE NUMBERS

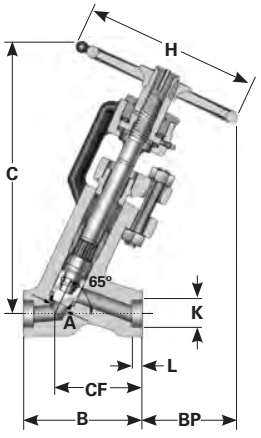
THREADED, SOCKET WELD OR BUTT WELD CONNECTIONS			
CLASS	**STOP VALVE**	**STOP CHECK VALVE**	**NEEDLE VALVE**
1690	8076Z	8086Z	8096Z
2680	9076Z	9086Z	9096Z
4500	5076Z	5086Z	5096Z

PART	STANDARD MATERIALS
Body	A105
Seat (integral)	CoCr alloy
Disc	CoCr alloy
Stem	Gr. 410 (stainless)
Stem nut	A 439 Austenitic ductile iron Gr. D-2C
Backseat	CoCr alloy
Splined bushing	Gr. 630 (stainless)
Packing washer	Gr. 304 (stainless)
Packing	Graphite
Split gland bushing	Gr. CA15 (stainless)
Packing flange	A 105
Gland stud	Gr. B7
Gland nut	Gr. 2H
Yoke bushing	Gr. 1020 steel
Thrust bearing	Steel
Stem protector	Steel
O-ring	Nitrile rubber
Handwheel	Malleable iron
Snap ring	Steel
Name plate	Gr. 304 (stainless)

For other materials, trims, and engineering data, see pages 23–35.

DIMENSIONS, WEIGHTS AND CV

Size NPS DN	A Port		B End-to-end		C Center-to-top		H Handwheel		K Socket weld bore	L Socket weld depth	BP Clearance, open		CF Center-to-end		Weight lb kg		Cv Flow coefficient	
	1690 2680	4500	1690 2680	4500	1690 2680	4500	1690 2680	4500			1690 2680	4500	1690 2680	4500	1690 2680	4500	1690 2680	4500
¼	0.559	0.375	4.88	5.75	9.63	11.75	6.00	6.00	0.555	0.38	3.63	3.25	3.20	4.19	15	27	1.3	1.0
8	14.2	9.5	124	146	146	298	152	152	14.1	9.5	92	83	81	106	7	12.2		
⅜	0.559	0.375	4.88	5.75	9.63	11.75	6.00	6.00	0.690	0.38	3.63	3.25	3.20	4.19	15	27	2.4	1.3
10	14.2	9.5	124	146	245	298	152	152	17.5	9.5	92	83	81	106	7	12.2		
½	0.559	0.375	4.88	5.75	9.63	11.75	6.00	6.00	0.855	0.38	3.63	3.25	3.20	4.19	15	27	2.9	1.5
15	14.2	9.5	124	146	245	298	152	152	21.7	9.5	92	83	81	106	7	12.2		
¾	0.559	0.559	4.88	7.00	9.63	14.78	6.00	10.00	1.065	0.50	3.63	6.00	3.20	3.88	15	56	5.0	5.0
20	14.2	14.2	124	178	245	375	152	254	27.1	12.7	92	152	81	99	7	25		
1	0.833	0.559	5.75	7.00	13.19	14.78	8.00	10.00	1.330	0.50	5.13	6.00	4.19	3.88	33	56	9.8	5.0
25	21.2	14.2	146	178	335	375	203	254	33.8	12.7	130	152	106	99	15	25		
1¼	1.125	0.833	7.25	10.13	16.63	18.88	12.00	12.00	1.675	0.50	7.57	7.00	4.94	6.57	67	94	20	9.8
32	28.6	21.2	184	257	422	480	305	305	42.5	12.7	192	178	125	167	30	43		
1½	1.125	1.125	7.25	12.00	16.63	20.75	12.00	18.00	1.915	0.50	7.57	8.00	4.94	8.00	67	148	20	20
40	26.6	28.6	184	305	422	527	305	457	48.6	12.7	192	203	125	203	30	67		
2	1.688	1.125	10.13	12.00	19.73	20.75	12.00	18.00	2.406	0.63	7.50	8.00	6.57	8.00	110	148	60	26
50	42.9	28.6	257	305	501	527	305	457	61.1	15.9	190	203	167	203	50	67		
2½[1]	1.688	1.50	12.00	12.00	20.69	20.75	16.00[2]	16.00[2]	2.906	0.63	7.25	7.25	8.00	8.00	148[3]	148	60	47
65	42.9	38.1	305	305	526	527	406	406	73.8	15.9	184	184	203	203	67	67		
3[1]	1.688	1.50	12.00	12.00	20.69	20.75	16.00[2]	16.00[2]	(4)	(4)	7.25	7.25	8.00	8.00	148[3]	148	60	47
80	42.9	38.1	305	305	526	527	406	406			184	184	203	203	67	67		
4	1.688	1.50	12.00	12.00	20.69	20.75	16.00[2]	16.00[2]	(4)	(4)	7.25	7.25	8.00	8.00	148	148	60	47
100	42.9	38.1	305	305	526	527	406	406			184	184	203	203	67	67		

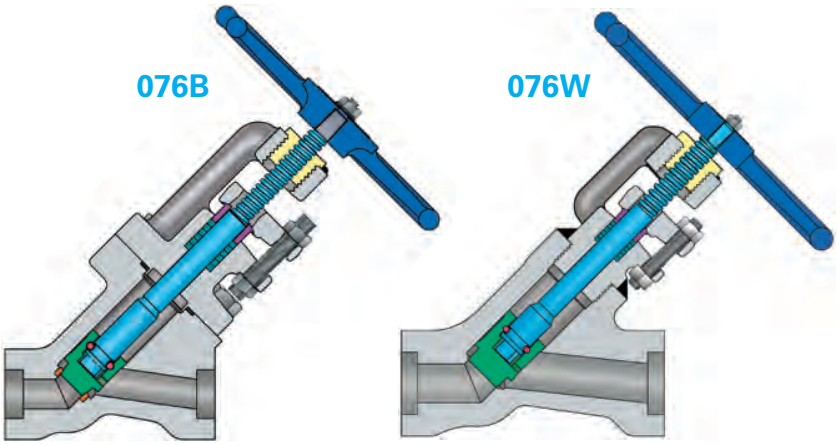


(1) For Classes 1690 and 2680, dimensions are as shown, or same as for NPS 2 (DN 50) valve, depending on end connection.
(2) Impactor handle. (3) For butt weld weight is 110 lbs (50 kg). (4) Butt weld or flanged connection only in these sizes.

VELAN FORGED STEEL 45° INCLINED GLOBE VALVES

CONVENTIONAL PORT OPENING, THREADED, SOCKET WELD OR BUTT WELD

NPS ½–2 (DN 15–50), ASME CLASSES 800, 1690, 2680



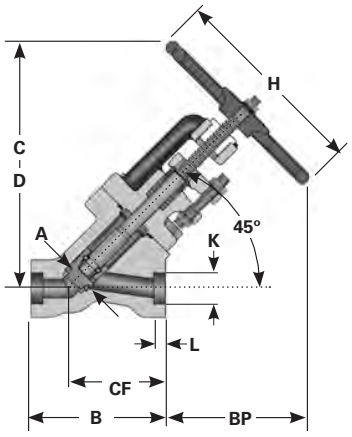
45° BOLTED BONNET **45° WELDED BONNET**

PART	STANDARD MATERIALS
Body	A105
Bonnet	A105
Seat (integral)	CoCr alloy
Disc	CoCr alloy
Stem	Gr. 410 (stainless)
Stem nut	CS CD plated
Gland bushing	Gr. 416 (stainless)
Yoke bushing	AL Brz C64200
Cap Screw	Gr. B7
Gasket	Gr. 304 & Graphite
Packing	Graphite
Packing flange	CS
Gland stud	Gr. B6
Gland nut	Gr. 2H
Handwheel	Malleable iron
Name plate	Aluminum

For other materials, trims, and engineering data, see pages 23–35.

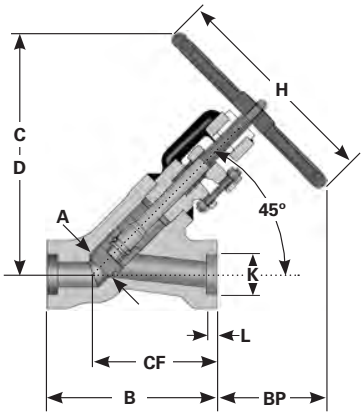
BOLTED BONNET GLOBE 45° INCLINED VALVE DIMENSIONS, WEIGHTS & CV

Size NPS DN	A Port	B End-to-end		C Center-to-top, closed		D Center-to-top, open		H Handwheel		K Socket weld bore	L Socket weld depth	BP Clearance, open		CF Center-to-end		Weight lb kg		Cv Flow coef-ficient
	800 & 1690	800	1690	800	1690	800	1690	800	1690			800	1690	800	1690	800	1690	
½ 15	0.559 14.2	4.00 102	4.88 124	6.76 1.72	8.81 224	7.20 183	9.25 235	4.00 102	6.00 152	0.855 21.7	0.38 9.5	4.22 107	5.50 140	2.88 73	3.50 99	12.00 5.4	15.00 7	3.4
¾ 20	0.559 14.2	4.00 102	4.88 124	6.76 1.72	8.81 224	7.20 183	9.25 235	4.00 102	6.00 152	1.065 27.1	0.50 12.7	4.22 107	5.5 140	2.88 73	3.50 99	12.00 5.4	15.00 7	5.8
1 25	0.833 21.2	4.88 124	5.75 146	7.16 182	10.6 269	7.78 198	11.22 285	4.00 102	8.00 203	1.330 33.8	0.50 12.7	4.17 106	6.75 172	3.50 89	4.19 106	15.00 7	22.00 10	11.3
1¼ 32	1.125 28.6	5.75 146	7.75 197	9.05 230	11.72 298	9.85 250	12.51 318	6.00 152	8.00 203	1.675 42.5	0.50 12.7	5.40 137	6.73 171	4.19 106	6.00 152	33.00 15	36.00 16	26.5
1½ 40	1.125 28.6	5.75 146	7.75 197	9.05 230	11.72 298	9.85 250	12.51 318	6.00 152	8.00 203	1.915 48.6	0.50 12.7	5.40 137	6.73 171	4.19 106	6.00 152	33.00 15	36.00 16	29
2 50	1.50 38.1	7.25 184	10.13 275	11.72 298	14.32 364	12.78 325	15.38 391	8.00 203	12.00 305	2.406 61.1	0.63 15.9	7.00 172	7.58 193	5.50 140	7.38 187	67.00 30	72.00 37	54



WELDED BONNET GLOBE 45° INCLINED VALVE DIMENSIONS, WEIGHTS & CV

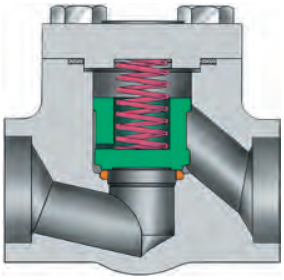
Size NPS DN	A Port	B End-to-end	C Center-to-top, closed	D Center-to-top, open	H Handwheel	K Socket weld bore	L Socket weld depth	BP Clearance, open	CF Center-to-end	Weight lb kg	Cv Flow coefficient
	1690 & 2680	1690 & 2680	1690 & 2680	1690 & 2680	1690 & 2680			1690 & 2680	1690 & 2680	1690 & 2680	
½ 15	0.559 14.2	4.88 124	7.75 197	8.19 208	6.00 152	0.855 21.7	0.38 9.5	4.00 102	3.50 99	9.50 4	3.4
¾ 20	0.559 14.2	4.88 124	7.75 197	8.19 208	6.00 152	1.065 27.1	0.50 12.7	4.00 102	3.50 99	9.50 4	5.8
1 25	0.833 21.2	5.75 146	9.73 247	10.38 264	8.00 203	1.330 33.8	0.50 12.7	5.19 132	4.19 106	18.00 8	11.3
1¼ 32	1.125 28.6	7.75 197	11.37 28	12.22 310	8.00 203	1.675 42.5	0.50 12.7	6.38 162	6.00 152	37.00 17	26.5
1½ 40	1.125 28.6	7.75 197	11.37 28	12.22 310	8.00 203	1.915 48.6	0.50 12.7	6.38 162	6.00 152	37.00 17	29
2 50	1.50 38.1	10.13 275	14.19 360	15.26 388	12.00 305	2.406 61.1	0.63 15.9	7.45 189	7.38 187	55.00 25	54



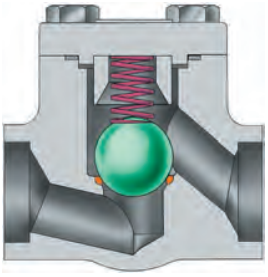
VELAN FORGED STEEL CHECK VALVES

CONVENTIONAL PORT OPENING, PISTON, BALL OR SWING

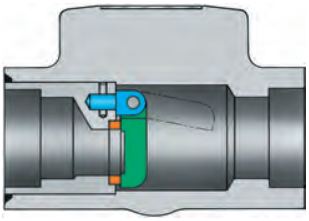
NPS ¼–2 (DN 8–50), ASME CLASSES 800, 1500
THREADED OR SOCKET WELD FLANGED ASME CLASSES 150, 300, 600, 1500



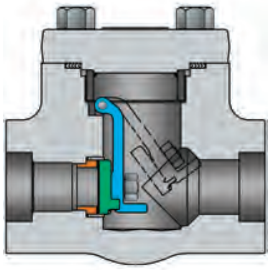
PISTON BOLTED COVER



BALL TYPE BOLTED COVER



COVERLESS SWING CHECK



SWING CHECK BOLTED COVER

SPECIFICATIONS

Type	Bolted cover	Coverless
Piston check	034B	—
Ball check	024B	—
Swing check	114B	114W

For other materials, trims, and engineering data, see pages 23–35.

PART	STANDARD MATERIALS
Body	A105
Cover	A105
Seat, integral	CoCr alloy
Disc(4)	CA15HT or CoCr alloy(6)
Ball(1)	Gr. 440C
Spring(5)	Gr. 302
Cap screw(3)	Gr. B7
Gasket(3)	Gr. 304 (stainless and graphite)
Swing holder(2)	CA15HT
Swing pin(2)	Gr. 410

(1) Ball type only (2) Swing type only (3) Bolted bonnet only
(4) Piston or swing type only (5) Piston or ball type only
(6) Bolted bonnet swing check disc CoCr alloy Gr. 6 only.

BOLTED COVER PISTON, BALL, AND SWING CHECK DIMENSIONS AND WEIGHTS

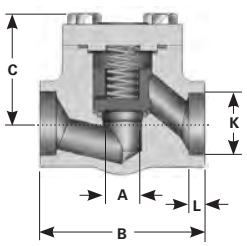
Size	A Port				B End-to-end				C Center-to-top, bolts				K Socket weld	L Socket weld	Weight lb/kg				Flanged Face-to-face			
NPS DN	Piston & ball		Swing check		Piston & ball		Swing check		Piston & ball		Swing check		Piston, ball & swing check		Piston and ball		Swing check(3)		Piston, ball & swing check			
	800	1500	800	1500	800	1500	800	1500	800	1500	800	1500	Bore	Depth	800	1500	800	1500	150(2)	300	600	1500
¼ 8	0.36 9.2	0.50 12.7	–	–	3.13 80	4.00 102	–	–	1.90 48	2.70 68	–	–	0.555 14.1	0.38 9.5	2.5 1.2	6.6 3.0	–	–	4.00 102	–	–	–
⅜ 10	0.36 9.2	0.50 12.7	–	–	3.13 80	4.00 102	–	–	1.90 48	2.70 68	–	–	0.690 17.5	0.38 9.5	2.5 1.2	6.6 3.0	–	–	4.00 102	–	–	–
½ 15	0.36 9.2	0.50 12.7	0.50 12.7	0.50 12.7	3.13 80	4.00 102	3.50 89	6.00 152	1.90 48	2.70 68	2.50 64	3.70 94	0.855 21.7	0.38 9.5	2.5 1.2	6.6 3.0	4.6 2.1	4.4 2.0	4.25 108	6.00 152	6.50 165	8.50 216
¾ 20	0.50 12.7	0.50 12.7	0.50 12.7	0.50 12.7	3.25 83	5.00 127	3.50 89	6.00 152	2.30 58	2.90 74	2.50 64	3.70 94	1.065 27.1	0.50 12.7	3.9 1.8	6.6 3.0	4.6 2.1	6.6 3.0	4.62 117	7.00 178	7.50 191	9.00 229
1 25	0.75 19.1	0.75 19.1	0.75 19.1	0.75 19.1	3.50 89	6.00 152	5.00 127	6.00 152	2.60 66	3.50 89	3.50 89	3.70 94	1.330 33.8	0.50 12.7	4.8 2.2	17 8	12 5.4	12 5.4	5.00 127	8.50 216	8.50 216	10.00 254
1¼ 32	1.25 31.8	1.25 31.8	1.25 31.8	1.25 31.8	5.00 127	7.00 178	5.25 133	7.00 178	3.70 94	4.20 107	3.40 86	3.70 94	1.675 42.5	0.50 12.7	13 5.9	26 12	15 7	19 9	5.50 140	9.00 229	9.00 229	11.00 279
1½ 40	1.25 31.8	1.25 31.8	1.25 31.8	1.25 31.8	5.00 127	7.00 178	5.25 133	7.00 178	3.70 94	4.20 107	3.40 86	4.20 107	1.915 48.6	0.50 12.7	11 5.0	26 12	15 7	19 9	6.50 165	9.50 241	9.50 241	12.00 305
2 50	1.50 38.1	1.50 38.1	1.50 38.1	1.50 38.1	8.00 203	9.00 229	6.00 152	9.00 229	4.80 122	5.40 137	4.30 109	5.20 132	2.406 61.1	0.63 15.9	22 10.0	41 19	21 10	26 12	8.00 203	10.50 267	11.50 292	14.50 368

CLASS 800 1975 psi @ 100°F
CLASS 1500 3705 psi @ 100°F

(1) For swing check valves Classes 300, 600 and 1500 face-to-face dimensions are the same as for piston and ball check valves, for Class 150 swing check valves contact the factory.

(2) Standard face-to-face for welded flange only.

(3) Welded cover also available.



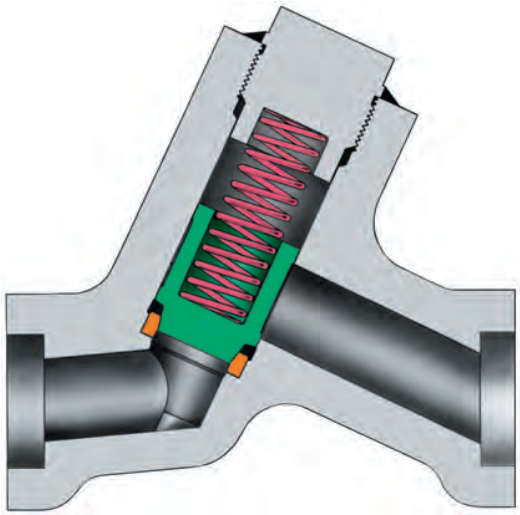
COVERLESS SWING CHECK DIMENSIONS AND WEIGHTS (CLASS 800)

Size NPS/DN	A Port	B End-to-end	C Center-to-top, body	K Socket weld bore	L Socket weld	Weight lb/kg
¼ 8	0.50 13	3.25 83	1.65 42	0.555 14.1	0.38 9.5	3.5 1.6
⅜ 10	0.50 13	3.25 83	1.65 42	0.690 17.5	0.38 9.5	3.5 1.6
½ 15	0.50 13	3.25 83	1.65 42	0.855 21.7	0.38 9.5	3.5 1.6
¾ 20	0.50 13	3.25 83	1.65 42	1.065 27.1	0.50 12.7	3.5 1.6
1 25	0.75 19	3.50 89	1.70 43	1.330 33.8	0.50 12.7	3.0 1.4
1¼ 32	1.25 32	5.00 127	2.56 65	1.675 42.5	0.50 12.7	11.0 5.0
1½ 40	1.25 32	5.00 127	2.56 65	1.915 48.6	0.50 12.7	11.0 5.0
2 50	1.50 38	5.25 133	2.56 65	2.406 61.1	0.63 15.9	10 4.5

VELAN FORGED STEEL INCLINED PISTON CHECK VALVES

FOR HORIZONTAL AND VERTICAL LINES

NPS ¼–4 (DN 8–100), THREADED, SOCKET WELD OR BUTT WELD
ASME CLASSES 1690, 2680, 4500



PART	STANDARD MATERIALS			
Body	A105	A182 Gr. F22	A182 Gr. F316	A 182 Gr. F91
Cover	A105	A182 Gr. F22	A182 Gr. F316	A 182 Gr. F91
Disc	CoCr alloy			
Seat, integral	CoCr alloy			
Spring (1)	Gr. 302 (stainless)	Inconel X750	Gr. 302 (stainless)	Inconel X750

For other materials, trims, and engineering data, see pages 23–35.

DESIGN FEATURES

- Solid CoCr alloy disc, fully guided for fast and full seating, even without spring.
- High Cv.
- Self-draining waterways.

CLASS	1690	2680	4500
Figure number	8036W	9036W	5036W

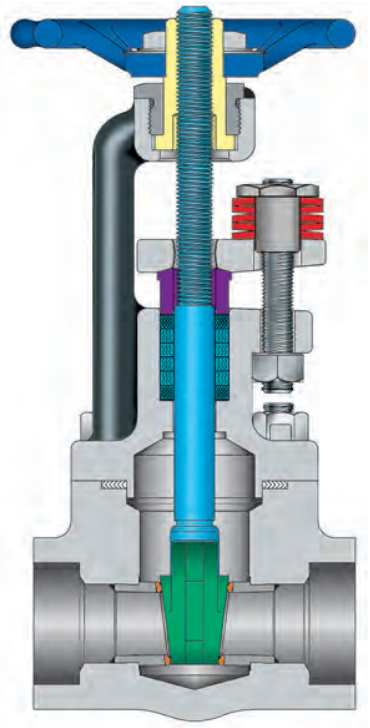
DIMENSIONS, WEIGHTS AND CV

Size NPS DN	Port opening		End-to-end		Center-to-top		Socket weld bore	Socket weld depth	Approximate weight lb/kg		C_V Flow coefficient	
	1690 & 2680	4500	1690 & 2680	4500	1690 & 2680	4500			1690 & 2680	4500	1690 & 2680	4500
¼ 8	0.559 14.2	–	4.88 124	–	3.61 92	–	0.555 14.1	0.38 9.5	6.5 3.0	–	1.0	–
⅜ 10	0.559 14.2	0.375 9.5	4.88 124	5.75 146	3.61 92	4.26 108	0.690 17.5	0.38 9.5	6.3 2.9	5 2.3	1.8	1.5
½ 15	0.559 14.2	0.559 14.2	4.88 124	7.00 178	3.61 92	5.5 140	0.855 21.7	0.38 9.5	6.1 3	25 11	2.1	2.1
¾ 20	0.559 14.2	0.559 14.2	4.88 124	7.00 178	3.61 92	5.5 140	1.065 27.1	0.50 12.7	5.7 2.6	25 11	4.3	4.3
1 25	0.833 21.2	0.559 14.2	5.75 146	7.00 178	4.75 121	5.5 140	1.330 33.8	0.50 12.7	10 4.5	25 11	8.4	4.3
1¼ 32	1.125 28.6	–	7.25 184	–	5.88 150	–	1.675 42.5	0.50 12.7	18.5 8.4	–	17	–
1½ 40	1.125 28.6	1.125 28.6	7.25 184	10.13 257	5.88 150	6.88 175	1.915 48.6	0.50 12.7	18.5 8.4	42 19	19	18
2 50	1.688 42.9	1.50 38.1	10.13 257	12.00 305	7.19 183	8.44 214	2.406 61.1	0.63 15.9	36 16.3	87 40	45	36
2½(1) 65	1.688 42.9	1.50 38.1	12.00 305	12.00 305	8.06 205	8.44 214	2.906 73.8	0.63 15.9	94 43	110(3) 50	45	36
3(1) 80	1.688 42.9	1.50 38.1	12.00 305	12.00 305	8.06 205	8.44 214	(2)	(2)	94 43	110(3) 50	45	36
4 100	1.688 42.9	1.50 38.1	12.00 305	12.00 305	8.06 205	8.44 214	(2)	(2)	94 43	110 50	45	36

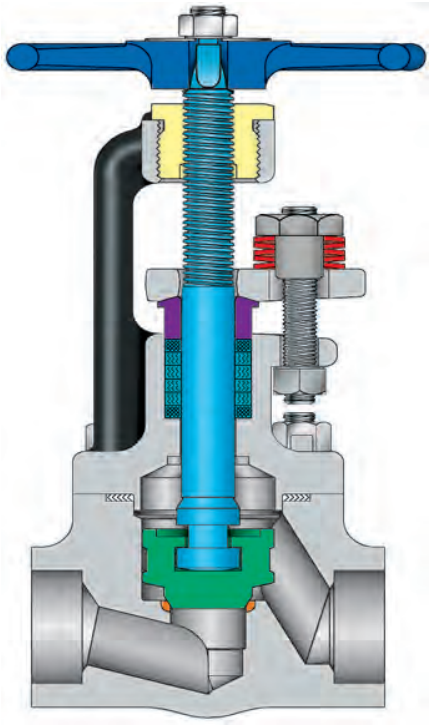
(1) For Classes 1690 and 2680, dimensions are as shown, or same as for NPS 2 (DN 50) valve, depending on end connection.
(2) Butt weld or flanged connection only in these sizes.
(3) For butt weld weight is 87 lbs. (40 kg).

VELAN SPECIAL SERVICES

VALVES FOR NUCLEAR POWER PLANTS



GATE VALVE



GLOBE VALVE

FORGED CARBON, ALLOY AND STAINLESS STEEL GATE GLOBE, AND CHECK VALVES FOR NUCLEAR POWER

NPS ¼–2 (DN 8–50) ASME CLASSES 150–1500

DESIGN FEATURES

- Sturdy bonnet arms.
- Suitable for electric actuation.
- More repacking space.

Gate valves

- Seal welded seats.
- CoCr alloy or cobalt free wedge and seats.

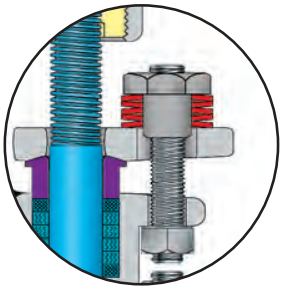
Globe valves

- CoCr alloy or cobalt free seats and discs.
- Stop, stop-check, needle, flow control
- Y-Pattern models for ASME Classes 1500 and 2500

OPTIONS

- Double packing with leak-off.
- Live-loading for nuclear and other critical services.
- Packing blowout fitting.

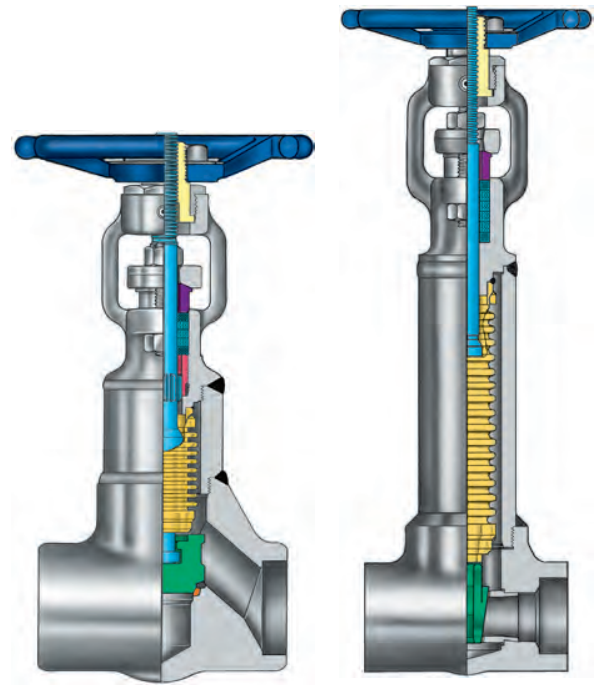
Live-loading option



for gate and globe valves

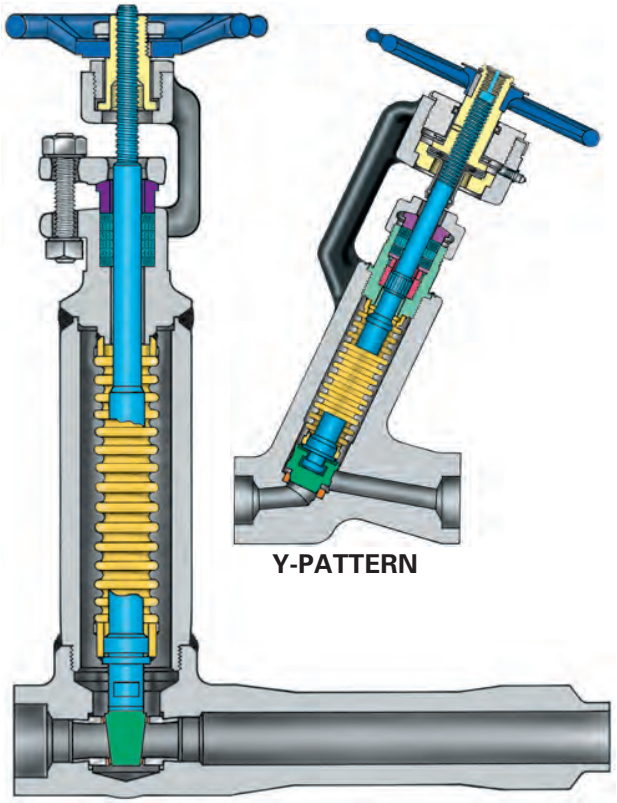
VELAN SPECIAL SERVICES

BELLOWS SEAL COMPACT FORGED STEEL 0 LEAKAGE VALVES



GLOBE VALVE

GATE VALVE



Y-PATTERN

DRAIN VALVE

FOR HIGH PRESSURE, NUCLEAR, AND OTHER CRITICAL SERVICE

GATE VALVES - API 602, CLASSES 800 – 1500, FLANGED ASME CLASSES 150 – 1500

GLOBE VALVES - ASME CLASSES 150 – 600

EXTENDED BODY (DRAIN) VALVES - API 602, CLASSES: 800 – 1500

Y-PATTERN VALVES - ASME CLASSES: 1500 – 2500

A valve with a bellows to seal off the stem enclosure is an ideal choice whenever leakage to the atmosphere is intolerable due to toxicity, chemical corrosion, radioactivity, other health or ecological reasons. In addition, seal welding the body-bonnet seal makes the valve hermetically sealed. The bellows is welded to the stem and to the bottom of the bonnet. Velan has been a leader in bellows seal valves since pioneering the technology in the 1950s.

DESIGN FEATURES

- **No torsion of bellows.** Proper stem guiding of the non-rotating stem prevents torsion of bellows and ensures long cycle life on all valves.
- **Long cycle life bellows.** Designed for and successfully tested in highpressure/temperature applications.
- **The lift** is 50% in extension and 50% in compression.
- **Bellows available in SS 321, Inconel or Hastelloy.**
- **Two secondary stem seals:** a) backseat (stem bevel) protects from line pressure when open and b) stem packing.

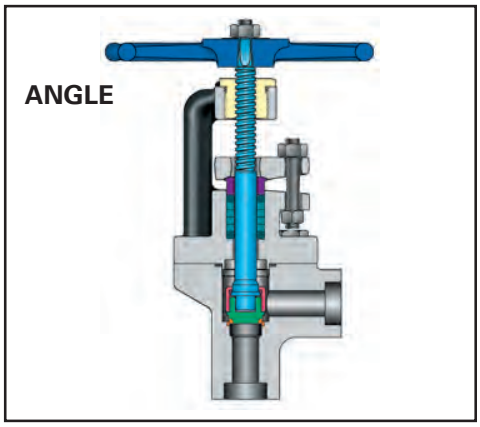
CYCLE LIFE

- Axial movement of the bellows is limited to a maximum of 20 to 25% of the free length, depending on pressure-temperature and desired life cycle.
  Velan bellows are designed for:
  - 10,000 cycles for NPS ½–2 (DN 15–50) globe valves,
  - 5,000 cycles for bonnetless globe valves
  - 3,000 cycles for NPS ½–2 (DN 15–50) gate valves.

For more information, see our Bellows seal valve catalog (VEL-BS) at www.velan.com

VELAN SPECIAL SERVICES

BOILER PLANT SERVICE BLOWOFF VALVES



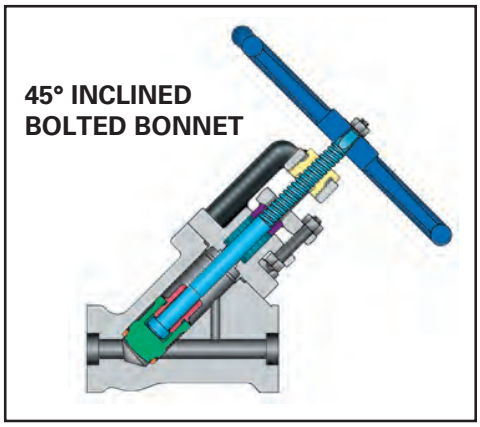
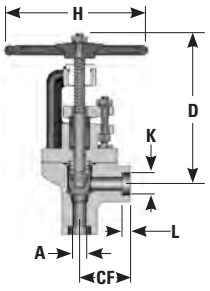
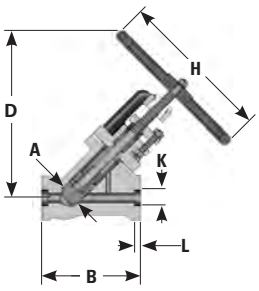


FIGURE NUMBERS

CLASS	ANGLE	45° INCLINED
600	2215B	2216B
1500	3215B	3216B





NPS ½–2 (DN 15–50) FLANGED OR WELDED ENDS

ASME CLASSES 150–1500

Velan boiler blowoff valves meet all applicable specifications of the ASME boiler code, U.S. military standards (listed on qualified product list), U.S. Coast Guard, American Bureau of Shipping and Lloyd's.

Flanged or welded ends	Class 600*	Class 1500	Class 2500
Basic steam rating	535 psi @ 850°F	1340 psi @ 850°F	2230 psi @ 850°F
Max. boiler pressure	935 psi	2455 psi	3206 psi
Maximum non-shock	1480 psi @ 100°F	3705 psi @ 100°F	6170 psi @ 100°F

** Use for Classes 300 and 400 boilers.*

APPLICATIONS

- Power and utility boilers
- Cogeneration systems
- Chemical recovery boilers
- Wood-fired boilers
- Solid waste fuel-firing systems
- Circulating fluidized bed (CFB) boilers
- Industrial waste recovery and incineration plants

TYPICAL SERVICE

- Blowoff
- Acid cleaning
- Steam sampling
- Water/steam shut-off
- Gauge shut-off
- Main stop drains
- Chemical feed
- Vents
- Feedwater

Many installations use a tandem combination of two valves. he valve closer to the boiler should be wide open first and then the second valve opened slowly. At the end of the blowoff period, a reverse procedure should be used.

DESIGN FEATURES

These special blowoff valves are available in bolted bonnet angle and streamlined flow 45° inclined designs for Class 600 and 1500 primary service and in bonnetless angle and inclined designs for Class 2500.

- CoCr alloy seats and fully-guided CoCr alloy discs resist the excessive corrosion and erosion effects aggravated by grid and boiler scale particles and high temperature changes.

***NOTE:** See page 12 for Y-pattern globe valves or for more information consult Velan's Y-pattern globe valve catalog (CAT-BG) at www.velan.com.*

45° INCLINED VALVE DIMENSIONS

SIZE NPS DN	A Port	CF End-to-end weld end	CF Face-to-face flanged		D Center-to-top, open	H Handwheel diameter	K Socket weld bore	L Socket weld depth
	600 & 1500	600 & 1500	600	1500	600 & 1500	600 & 1500	600 & 1500	600 & 1500
1 25	1.50 38.1	8.00 203	12.00 305	12.00 305	15.20 386	12.00 305	1.330 33.8	0.50 12.7
1½ 40	1.50 38.1	8.00 203	12.00 305	12.00 305	15.20 386	12.00 305	1.915 48.6	0.50 12.7
2 50	1.50 38.1	8.00 203	12.00 305	14.50 368	15.20 386	12.00 305	2.406 61.1	0.63 15.9

ANGLE VALVE DIMENSIONS

SIZE NPS DN	A Port	CF Center-to-end weld end	CF Center-to-face flanged		D Center-to-top, open	H Handwheel diameter	K Socket weld bore	L Socket weld depth
	600 & 1500	600 & 1500	600	1500	600 & 1500	600 & 1500	600 & 1500	600 & 1500
½ 15	0.453 11.5	2.00 51	3.25 83	4.25 108	7.48 190	6.00 152	0.855 21.7	0.38 9.5
¾ 20	0.625 15.9	2.50 64	3.75 95	4.50 114	7.48 190	6.00 152	1.065 27.1	0.50 12.7
1 25	1 25.4	3.00 76	4.25 108	5.00 127	9.50 241	8.00 203	1.330 33.8	0.50 12.7
1¼ 32	1.448 36.8	3.50 89	4.50 114	5.50 140	10.56 268	12.00 305	1.675 42.5	0.50 12.7
1½ 40	1.448 36.8	3.50 89	4.75 121	6.00 152	10.56 268	12.00 305	1.915 48.6	0.50 12.7
2 50	1.750 44.5	4.50 114	5.75 146	7.25 184	11.06 281	12.00 305	2.406 61.1	0.63 15.9

VELAN SPECIAL SERVICES

CONTINUOUS BLOWDOWN AND BOILER PLANT SERVICE VALVES

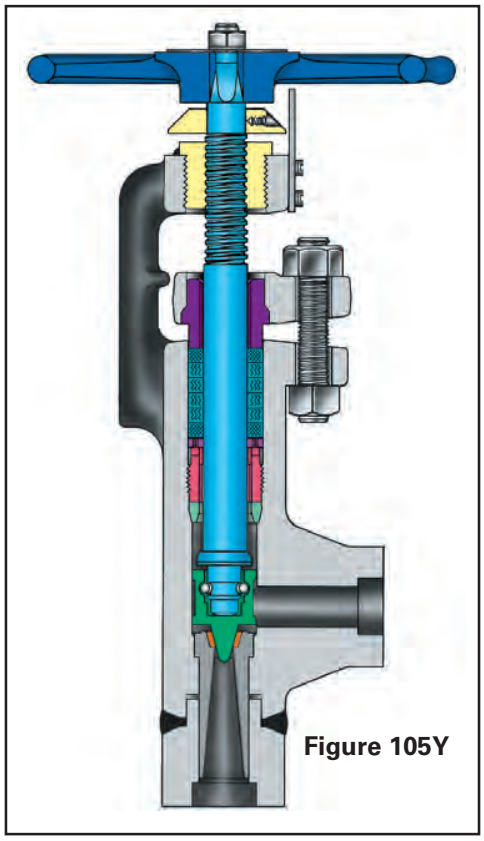


Figure 105Y

NPS ½–2 (DN 15–50) FORGED ANGLE

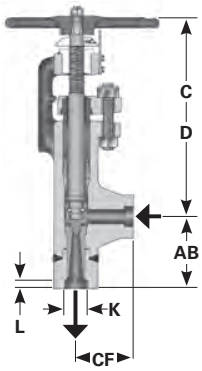
ASME CLASSES 600, 1500, 2500

This valve is designed for continuous blowdown but can also be used for sampling and boiler feed pump bypass relief where high pressure drop causes erosion and cavitation which can destroy conventional globe valves. It incorporates a hardfaced CoCr alloy disc and seat and a venturi diffuser from stainless steel type 316. Orifice range: 1/8 to 1 1/8" (3.18 to 28.58 mm), depending on the capacity required.

OTHER VELAN FORGED VALVES FOR BOILERS PLANT SERVICE

- **Gate and globe, NPS ¼–2 (DN 8–50)**
  Bolted and welded bonnet, ASME Classes 800–1500
  –see Pressure seal and bolted bonnet catalog
- **Gate and globe, NPS 2½–24 (DN 65–600)**
  Bolted or pressure seal, ASME Classes 600–4500
- **Swing, piston and tilting disc check valves, NPS ½–24 (DN 15–600)**
  Bolted or pressure seal, ASME Classes 600–4500
- **Y-Pattern bonnetless globe valves, NPS ¼–4 (DN 8–100)**, ASME Classes 1690–4500
- **Y-Pattern piston check, NPS ¼–4 (DN 8–100)**
  ASME Classes 600–4500

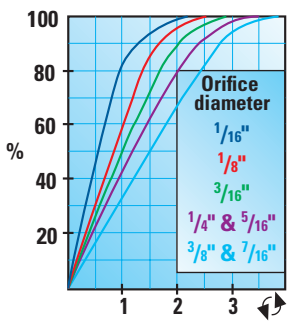
For more details about other Velan forged valves for boilers plant service see our other product catalogs on velan.com



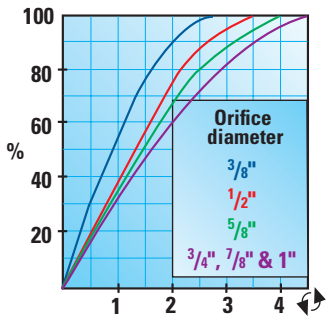
Size NPS DN	AB Center-to-bottom SW	AB Center-to-bottom NPT & BW	CF Center-to-end	C Center-to-top, closed	D Center-to-top, open	K Socket weld bore	L Socket weld depth	Weight lb kg
½ 15	2.25 57	–	3.19 81	11.9 302	12.6 320	0.855 21.7	0.38 9.5	10
¾ 20	3.12 79	3.62 92	3.19 81	11.9 302	12.6 320	1.065 27.1	0.50 12.7	13
1 25	3.92 100	4.42 112	3.19 81	11.9 302	12.6 320	1.330 33.8	0.50 12.7	13
1½ 40	4.95 126		3.00 76	15.6 396	16.5 419	1.675 42.5	0.50 12.7	13
2 50	6.50 165		5.00 127	17.1 434	18.50 470	2.406 61.1	0.63 15.9	13

WIDE OPEN CAPACITIES (%) VS HANDWHEEL TURNS (↻)

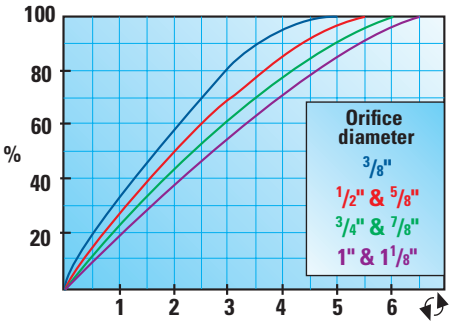
NPS 1/2 – 1 valve



NPS 1 1/2 valve

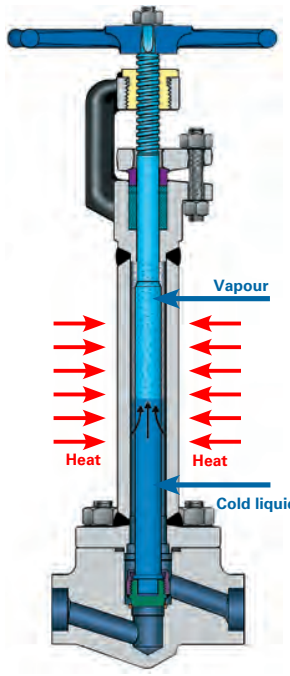


NPS 2 valve

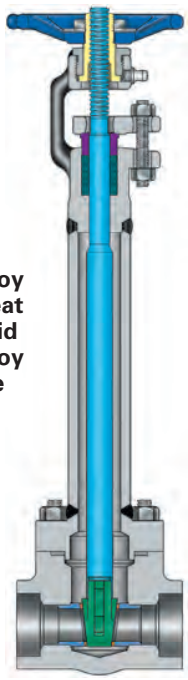


VELAN SPECIAL SERVICES

FORGED CRYOGENIC VALVES



GLOBE VALVE



With CoCr alloy faced seat and solid CoCr alloy wedge

GATE VALVE

NOTE: For more information, see our cryogenic valves catalog (VEL-CRYO) at www.velan.com.

FORGED AUSTENITIC STEEL GATE, GLOBE, AND CHECK VALVES NPS ½–2 (DN 15–50)

ASME CLASSES 150–1500

The production, transport and storage of liquified gases such as Oxygen, Nitrogen, Argon, Natural Gas, Hydrogen or Helium down to -425°F (-254°C) presents several technical problems. Velan specially adapted extended bonnet forged valves offer safe and efficient service.

DESIGN FEATURES

- **Extended bonnets** with sufficient gas column length, usually specified by customer, are supplied for all valves to keep stem packing at sufficient distance away from the cold fluid to remain functional.
- **Solid CoCr alloy** wedges on NPS ½–2 (DN 15–50) valves operate with no galling in cryogenic service.
- **PCTFE and dualseal disc inserts (optional)** for globe and check valves check discs.
- **Cleaning:** All cryogenic valves are thoroughly degreased and cleaned and pipe ends are sealed to prevent contamination.

MATERIALS

- **Body and bonnet:** Austenitic stainless steel forgings used for bodies and bonnets offer excellent impact strength, minimal heat loss and protection against corrosion.
- **Stem:** To reduce galling, stems are made from advanced Nitronic 50 (grade XM-19 A479) with high tensile even at extreme low temperatures, excellent low friction and galling-free movement at points of stem contact.
- **Wetted parts:** All austenitic stainless steel and CoCr alloy.
- **Yoke bushings:** Bronze.
- **Packing:** PTFE or other plastic packing protected from freezing by a column of insulating gas.
- **Seating faces:** CoCr alloy is used to prevent seizing and galling. When extremely tight shut-off is required, globe and check valves may be supplied with PCTFE, PTFE or other soft inserts.
- **Bolting:** Strain-hardened austenitic stainless steel.
- **Lubrication of yoke bushing nut (yoke nut):** Exxon, Nebula EPI; Shell, Darina EPI; and Lubriplate, No. 930-AA or 930-AAA.

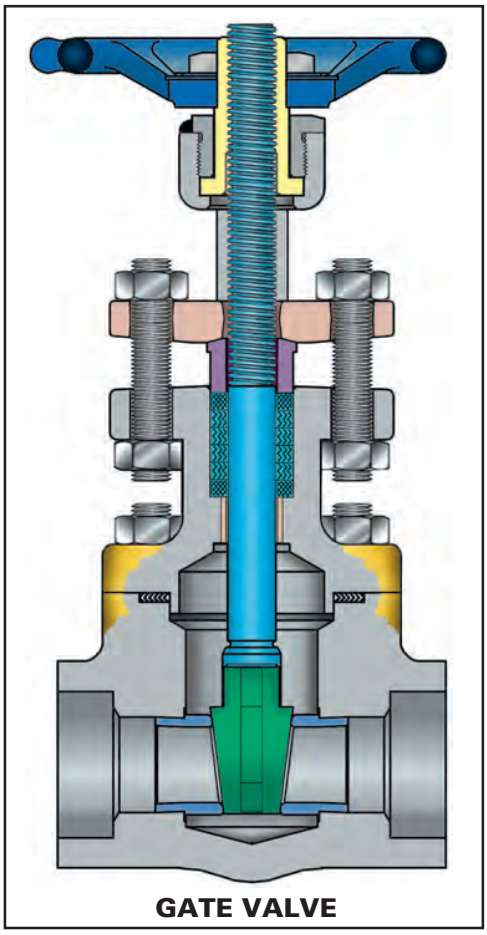
TABLE OF LIQUIFIED GASES

Type	Boiling point		Liquid density lb/ft³
	°C	°F	
Natural gas (LNG)	-168.0	-270	26.00
Methane (CH_4)	-161.5	-258	26.20
Oxygen (0_2)	-182.9	-296	71.20
Argon (A)	-185.9	-303	87.40
Helium (He)	-268.9	-452	7.82
Carbon Dioxide (CO_2)	-78.5	-109	50.60
Air	-194.4	-318	57.87
Nitrogen (N_2)	-195.8	-320	50.45
Hydrogen (H_2)	-252.7	-423	4.43
Absolute zero	**-273.16**	**-460**	—

VELAN SPECIAL SERVICES

HYDROFLUORIC (HF) ACID PROCESSING VALVES

Hydrofluoric acid is one of the strongest and most corrosive acids. Industries using HF acid in their manufacturing process have placed an increasing emphasis on safety in using this product.



GATE VALVE

HF ACID GATE, GLOBE AND CHECK VALVES

NPS ½–2 (DN 15–50), ASME CLASSES 150–800

Fugitive emissions are a critical factor in the performance of any HF Acid valve and at Velan, we have been committed to reducing emissions beyond the industry standards, and providing the highest quality products to our customers for over 50 years. Velan offers a comprehensive line of Phillips and UOP approved API 602 gate, globe and check HF acid valves with several benefits.

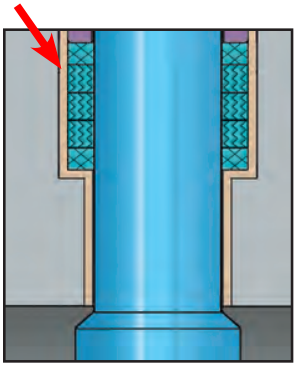
DESIGN FEATURES:

- **Stem drive:** Two-piece allows for replacement of yoke bushing in-line, removal of handwheel without affecting position of valves (closed or opened).
- **Rising stem:** Makes for easy visibility for open-close indications.
- **Gland:** Two piece gland bushing/packing flange is self-aligning to prevent stem damage for cocked gland.
- **Stem made from hardened Monel K500** for strength and durability.
- **Nickel overlay in stem hole for carbon steel valves** to combat severe alkylation conditions.
- **HF acid detecting paint** to ensure valve sealing integrity.
- **Bonnet**: Large extended type bonnet grade.
- **Bonnet joint:** Encapsulated gasket design.
- **Body:** High quality Monel or A105 normalized body with API 602 wall thickness for maximum service.
- **Wedge** solid Monel.
- **Seat rings:** Made of solid Monel 400.

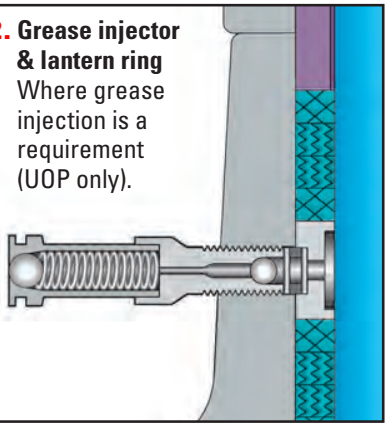
NOTE: *For more information go to www.velan.com to download a copy of Velan's HF acid gate, globe and check valves flyer (FLY-HFA).*

OPTIONAL DESIGN FEATURES

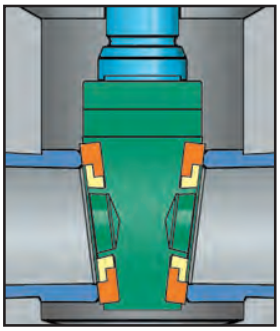
1. Nickel overlay packing box liner



2. Grease injector & lantern ring
Where grease injection is a requirement (UOP only).



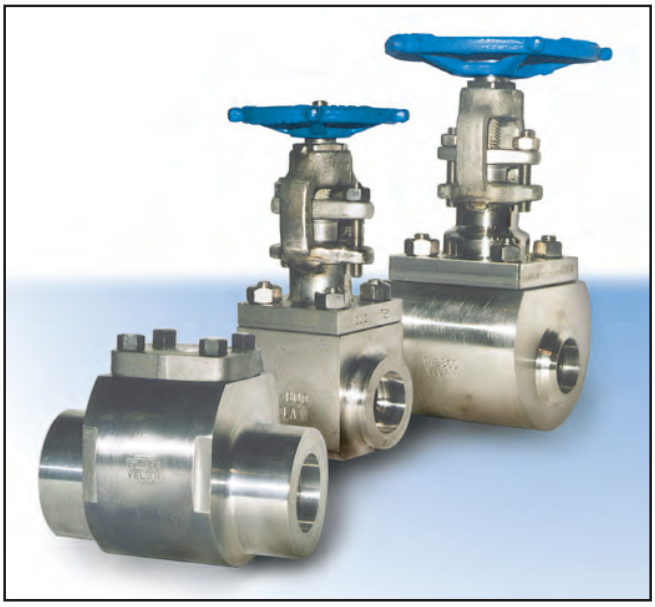
3. CTFE seat insert
Resists abrasion and corrosion



VELAN SPECIAL SERVICES

CUSTOM DESIGN FABRICATED VALVES

Take advantage of increased flexibility with Velan custom-design fabricated valves



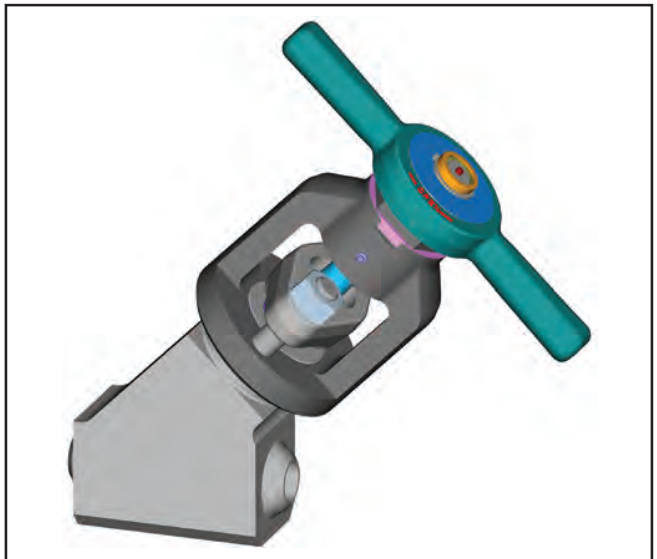


Illustration of a Velan custom design forged globe valve.

***NOTE:** Contact Velan Sales Dept. for more information.*

FABRICATED GATE, GLOBE, CHECK VALVES

NPS ½–2 (DN 8–50), ASME CLASSES 150–2680

As a leading manufacturer of API 602 forged gate, globe and check valves, Velan maintains one of the largest and most comprehensive inventories available from any manufacturer. Despite tens of thousands of ready-to-ship valves located around the world, requirements inevitably come up for non-standard items, and Velan has the perfect solution: fabricated valves.

Built from forged bar stock materials, Velan fabricated gate, globe and check valves offer the advantage of short lead times for non-stock items in exotic alloys.

Velan can readily provide fabricated valves in a wide variety of designs. Furthermore, our Engineering Department has the expertise to custom-design a valve to best handle your critical requirements. Backed up by advanced software tools, including finite element analysis, computational fluid dynamics and 3D solid modeling, Velan has a long history of designing and manufacturing superior quality valves that outperform the most demanding performance requirements.

FABRICATED DESIGN RANGE

- Gate
- Extended body gate
- Globe
- 45° inclined globe
- Critical services
- Y-pattern bonnetless globe
- Piston bolted cover check
- Ball type bolted cover check
- Coverless swing check

MATERIALS:

- Alloy 20
- Duplex
- F51
- F314L
- F347
- F9
- F91
- F44
- Hastelloy
- Incoloy
- Inconel
- Super duplex

Many other approved materials are also available.

CONNECTIONS:

- Butt weld
- Flanged
- NPT
- Socket weld

ENGINEERING DATA

SPECIFICATION OF FORGED VALVE MATERIALS

BODY AND BONNET, PACKING FLANGE, WEDGE-DISC-SEAT

TABLE 1

DESCRIPTION		CARBON STEEL		ALLOY STEEL					STAINLESS STEEL		
ASTM DESIGNATION		A105[2]	A350 Gr. LF2[2]	1¼ Cr ½ Mo	2¼ Cr-1 Mo	5% Cr	9% Cr	9% Cr	316		321
				A182 Gr. F11	A182 Gr. F22 Cl.3	A182 Gr. F5	A182 Gr. F9	A182 Gr. F91	A182 Gr. F316	A182 Gr. F316L	A182 Gr. F321
COMPOSITION %	Carbon	0.35 max.	0.35 max.	0.10-0.20	0.05-0.15 max.	0.15 max.	0.15 max.	0.08-0.12	0.08 max.[3]	0.035 max.	0.08 max.
	Manganese	0.60-1.05	0.60-1.35 max.	0.30-0.80	0.30-0.60	0.30-0.60	0.30-0.60	0.30-0.60	2.00 max.	2.00 max.	2.00 max.
	Phosphorus	0.035 max.	0.035 max.	0.040 max.	0.040 max.	0.030 max.	0.030 max.	0.020 max.	0.045 max.	0.045 max.	0.045 max.
	Sulphur	0.040 max.	0.040 max.	0.040 max.	0.040 max.	0.030 max.	0.030 max.	0.010 max.	0.030 max.	0.03 max.	0.03 max.
	Silicon	0.10-0.35 max.	0.15-0.30	0.50-1.00	0.50 max.	0.50 max.	0.50-1.00	0.20-0.50	1.00 max.	1.00 max.	1.00 max.
	Nickel	—	—	—	—	0.50 max.	—	0.4 max.	10.0-14.0	10.0-15.0	9.0-12.0
	Chromium	—	—	1.00-1.50	2.00-2.50	4.0-6.0	8.0-10.0	8.0-9.50	16.0-18.0	16.0-18.0	17.0 min.
	Molybdenum	—	—	0.44-0.65	0.87-1.13	0.44-0.65	0.90-1.10	0.85-1.05	2.0-3.0	2.0-3.0	(4)
	Special Tests	—	impact-50°F	—	—	—	—	—	—	—	—
Heat Treatment		Normalized	QT or NT[5]	NT[5]	NT[5]	NT[5]	NT[5]	NT[5]	Sol. annealed	Sol. annealed	—
Tensile psi min.		70,000	70,000	70,000	75,000	70,000	85,000	85,000	75,000	70,000	75,000
Yield psi min.		36,000	36,000	40,000	45,000	40,000	55,000	60,000	30,000	25,000	30,000
Elong. % Min.		22	22	20	20	20	20	20	30	30	30
R. Area % Min.		30	30	30	30	35	40	40	50	50	50
Hardness* HB[1]		187 max.	197 max.	143-207	156-207	143-217	179-217	248 max.	—	—	—

(1) All forgings are softer than 237 HB = 22 HRC.
(2) A105, A 350 Gr. LF2 Standard at Velan, 0.25 C max.
(3) Material code 13: 0.030 max.
(4) Titanium: min. 5 x C, max. 6 x C.
(5) QT: Quenched and tempered
NT: Normalized and tempered

TABLE 2

ASTM DESIGNATION		BAR STOCK								CAST		
		CR 13		STAINLESS STEELS			MONEL		HASTELLOY	MONEL	CoCr ALLOY Grade 6	AUSTENITIC DUCTILE
		A479 410[6]	A582 416[6]	A479 316 ST. HARD.	A479 316	A564 630	B164 MONEL	AMS 4676D K-MONEL	B574 N 10276	A494 M-25S	AMS 5387 A	A 439 D-2C
COMPOSITION %	Carbon	0.15	0.15	0.08	0.08	0.07	0.3	0.25	0.010	0.25	0.9-1.4	2.90
	Manganese	1.00	1.25	2.00	2.00	1.00	2.0	1.50	1.0	1.50	1.0	1.80-2.40
	Phosphorus	0.040	0.06	0.045	0.045	0.040	–	0.02	0.04	0.03	0.04	0.08
	Sulphur	0.030	0.15 min.	0.030	0.030	0.030	0.024	0.010	0.03	0.03	0.04	–
	Silicon	1.00	1.00	1.00	1.00	1.00	0.5	1.00	0.08	3.5-4.5	1.5	1.00-3.00
	Nickel	–	–	10.00-14.00	10.00-14.00	3.00-5.00	63.0	63.00-70.00	Balance	Balance	3.0	21.00-24.00
	Chromium	11.50-13.50	12.00-14.00	16.00-18.00	16.00-18.00	15.00-17.50	–	–	14.5-16.5	–	27.0-31.0	0.50
	Molybdenum	–	–	2.00-3.00	2.00-3.00	–	–	–	15.0-17.0	–	1.5	–
	Copper	–	–	–	–	3.00-5.00	28.0-34.0	Balance	–	27.0-33.0	–	–
	Aluminum	–	–	–	–	–	–	–	–	–	–	–
	Cobalt	–	–	–	–	–	–	–	–	–	Balance	–
	Tungsten	–	–	–	–	–	–	–	–	–	3.5-5.5	–
	Iron	–	–	–	–	–	–	–	–	3.50 Max.	3.0	–
Special Condition		Temper	Hard	Level 2	–	–	Hot worked	Hot Fin.	–	Age Hard.	–	–
Heat Treat.		Class 2	Hard Temper	Sol. annealed	Sol. annealed	H 1100	–	–	–	–	–	–
Tensile psi min.		110,000	–	95,000	75,000	140,000	80,000	140,000	100,000	–	130,000	58,000
Yield psi min.		85,000	–	75,000	30,000	115,000	40,000	100,000	41,000	–	–	28,000
Elong. % min.		15	–	25	30	14	30	20	40	–	1	20
R. Area % min.		45	–	40	40	45	–	–	–	–	–	–
Hardness HB		269 max.	293-352	–	–	302 min.	–	326 min.	–	300 min.	344 min.	121-171

(6) Cr 13 available in soft form. Less than 237 HB.
Non-Cobalt hard facing alloy available.

***Note:** CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite™, and other approved manufacturers.*

ENGINEERING DATA

STEM PACKING

TYPE OF PACKING	TYPE OF SERVICE	SERVICE TEMPERATURE[1]
Die-formed graphite sandwiched between braided graphite, or an all braided graphite set	Steam, air, water, oils, liquified petroleum	Up to 1150°F (621°C)
PTFE V-rings	All acids, alkali, solvents, gases, except fluorine	-120 to 500°F (-84 to 260°C)
Braided PTFE	Hydrogen, peroxide, oleum, acids, alkali	-100 to 400°F (-73 to 204°C)

BODY-BONNET GASKETS

TYPE OF GASKET	TYPE OF VALVE	SERVICE TEMPERATURE[1]
Spiral wound Gr. 304 (stainless) + Graphite	Forged valves	Up to 1150°F (621°C)
Spiral wound Gr. 304 (stainless) + PTFE	Forged valves for chemical industry	Up to 500°F (260°C)
Spiral wound Monel + PTFE	Forged valves for chemical industry	Up to 500°F (260°C)

(1) Temperatures up to 1400°F (760°C) are available when specified.

TRIM MATERIALS

TRIM (CODE)	WEDGE/DISC SEATING SURFACE	SEAT SURFACE	STEM
13% Cr (TY)	CA15	CoCr alloy	410
Full CoCr alloy (TS)	CoCr alloy	CoCr alloy	410
316 (MY)	CF8M or 316	CoCr alloy	316
316 full CoCr alloy (MS)	CoCr alloy	CoCr alloy	316
Monel (XY)	Monel	CoCr alloy	Monel
Monel (XX)	Monel	Monel	Monel
Hastelloy (HC)	Hastelloy C	CoCr alloy	Hastelloy C
(SX)	CF8M	CF8M	316

HF (HYDROFLUORIC ACID) VALVES

PART	RECOMMENDED TRIMS FOR HF ACID SERVICE
Stem	Monel K
Wedge and disc	Monel or monel with PTFE, with additional side clearance to prevent buildup.
Seats	Monel
Gasket	Monel and PTFE
Packing	PTFE V-rings
Studs	A 193-B7M
Nuts	A 194-2HM

CHLORINE VALVES

PART	RECOMMENDED TRIMS FOR CHLORINE SERVICE
Stem	Monel K
Wedge and disc	Monel or Monel with PTFE
Seats	Monel
Gasket	Monel and PTFE
Packing	PTFE V-rings
Bolts	A 193-B7

Note: *Special cleaning procedure and packing available.*

SOUR SERVICE VALVES

Valves shown in this catalog are available with materials in compliance with **NACE MR0103** and **NACE MR0175**. The requirement for NACE compliant materials must be specified by the purchaser at time of inquiry and/or order. Please refer to the How-To-Order section at the end of this catalog for a listing of available NACE compliant trims. Please note that it is the equipment user's responsibility to select materials suitable for the intended service or to ensure that a material will be satisfactory in the intended environment.

API 602 FORGED STEEL, CLASS 800

SERVICE TEMPERATURE		A105[1] A350 GR. LF2[1] A216 GR. WCB[1]		A350 GR. LF3[2] A352 GR. LC2[2] A352 GR. LC3[2]		A182 Gr. F11 Cl.2[3] A217 Gr. WC6[4]		A182 Gr. F22 Cl.[3] A217 Gr. WC9[4]		A182 Gr. F5 A182 Gr. F5a A217 Gr. C5	
°F	°C	psig	MPa	psig	MPa	psig	MPa	psig	MPa	psig	MPa
-20 to 100	-29 to 38	1975	13.62	2000	13.79	2000	13.79	2000	13.79	2000	13.79
200	94	1800	12.41	2000	13.79	2000	13.79	2000	13.79	1985	13.69
300	149	1750	12.07	1940	13.38	1925	13.28	1940	13.38	1910	13.17
400	205	1690	11.65	1880	12.96	1850	12.76	1880	12.97	1880	12.96
500	260	1595	11.00	1775	12.24	1775	12.24	1775	12.24	1775	12.24
600	316	1460	10.07	1615	11.14	1615	11.14	1615	11.14	1615	11.14
650	344	1430	9.86	1570	10.82	1570	10.82	1570	10.82	1570	10.82
700	371	1420	9.79	–	–	1515	10.45	1515	10.45	1515	10.45
750	399	1345	9.27	–	–	1420	9.79	1420	9.79	1410	9.72
800	427	1100	7.58	–	–	1355	9.34	1355	9.34	1355	9.21
850	455	715	4.93	–	–	1300	8.96	1300	8.96	1290	8.90
900	482	460	3.17	–	–	1200	8.27	1200	8.27	985	6.79
950	510	275	1.90	–	–	850	5.86	1005	6.93	735	5.07
1000	538	140	0.96	–	–	575	3.97	695	4.79	530	3.66
1050	566	–	–	–	–	385	2.66	465	3.21	385	2.66
1100	594	–	–	–	–	255	1.76	295	2.03	265	1.83
1150	621	–	–	–	–	165	1.14	180	1.24	165	1.14
1200	649	–	–	–	–	100	0.69	110	0.76	95	0.66

SERVICE TEMPERATURE		A182 Gr. F9 A217 Gr. C12		A182 Gr. F316[6] A351 Gr. CF3M[5] A351 Gr. CF8M	
°F	°C	psig	MPa	psig	MPa
-20 to 100	-29 to 38	2000	13.79	1920	13.24
200	94	2000	13.79	1655	11.41
300	149	1940	13.38	1495	10.31
400	205	1880	12.96	1370	9.45
500	260	1775	12.24	1275	8.79
600	316	1615	11.14	1205	8.31
650	344	1570	10.82	1185	8.17
700	371	1515	10.45	1160	8.00
750	399	1420	9.79	1140	7.86
800	427	1355	9.34	1125	7.76
850	455	1300	8.96	1115	7.69
900	482	1200	8.27	1105	7.62
950	510	1005	6.93	1030	7.10
1000	538	675	4.66	935	6.45
1050	566	460	3.17	915	6.31
1100	594	300	2.07	815	5.62
1150	621	200	1.38	630	4.34
1200	649	140	0.97	495	3.41
1250	677	–	–	390	2.69
1300	705	–	–	310	2.14
1350	732	–	–	255	1.76
1400	760	–	–	200	1.38
1450	788	–	–	155	1.07
1500	816	–	–	110	0.76

NOTE: *All other small forged steel valves NPS ¼–2 (DN 8–50) have pressure-temperature ratings to B16.34.*

(1) Permissible but not recommended for prolonged use above about 800°F (425°C).

(2) Not to be used over 650°F (345°C).

(3) Permissible but not recommended for prolonged use above about 1100°F (595°C).

(4) Not to be used over 1100°F (595°C).

(5) Not to be used over 850°F (455°C).

(6) At temperatures over 1000°F (538°C) use only when the carbon content is 0.04% or higher (material code 10).

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED CARBON STEEL A105[1] — US customary

Standard Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2225	3350	5575	9275	16675	2975	6275	9925
	Seat	325	825	1650	2450	4100	6800	12225	2175	4600	7300
°F		Standard Class							Intermediate Standard Class		
-20 to 100		285	740	1480	2220	3705	6170	11110	1975	4175	6615
200		260	680	1360	2035	3395	5655	10185	1810	3825	6065
300		230	655	1310	1965	3270	5450	9815	1745	3685	5845
400		200	635	1265	1900	3170	5280	9505	1690	3570	5660
500		170	605	1205	1810	3015	5025	9040	1610	3395	5385
600		140	570	1135	1705	2840	4730	8515	1515	3200	5070
650		125	550	1100	1650	2745	4575	8240	1465	3095	4905
700		110	530	1060	1590	2665	4425	7960	1415	3000	4745
750		95	505	1015	1520	2535	4230	7610	1350	2855	4535
800		80	410	825	1235	2055	3430	6170	1100	2315	3675
850		65	320	640	955	1595	2655	4785	850	1795	2845
900		50	230	460	690	1150	1915	3455	615	1295	2055
950		35	135	275	410	685	1145	2055	365	770	1225
1000		20	85	170	255	430	715	1285	225	485	765

Special Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Special Class							Intermediate Special Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		285	740	1480	2220	3700	6170	11105	1975	4170	6615
400		280	735	1465	2200	3665	6105	10995	1955	4130	6545
500		280	735	1465	2200	3665	6105	10995	1955	4130	6545
600		280	735	1465	2200	3665	6105	10995	1955	4130	6545
650		275	715	1430	2145	3575	5960	10730	1905	4030	6390
700		265	690	1380	2075	3455	5760	10365	1845	3895	6175
750		245	635	1270	1905	3170	5285	9515	1695	3570	5665
800		195	515	1030	1545	2570	4285	7715	1375	2895	4595
850		155	400	795	1195	1995	3320	0	1060	2245	3560
900		110	285	575	860	1435	2395	4305	765	1615	2565
950		65	170	345	515	855	1430	2570	460	965	1535
1000		40	105	215	320	535	895	1605	285	605	960

Limited Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Limited Class							Intermediate Limited Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		285	740	1480	2220	3700	6170	11105	1975	4170	6615
400		280	735	1465	2200	3665	6105	10995	1955	4130	6545
500		280	735	1465	2200	3665	6105	10995	1955	4130	6545
600		280	735	1465	2200	3665	6105	10995	1955	4130	6545
650		275	715	1430	2145	3575	5960	10730	1905	4030	6390
700		265	690	1380	2075	3455	5760	10365	1845	3895	6175
750		245	635	1270	1905	3170	5285	9515	1695	3570	5665
800		195	515	1030	1545	2570	4285	7715	1375	2895	4595
850		155	400	795	1195	1995	3320	5980	1060	2245	3560
900		110	285	575	860	1435	2395	4305	765	1615	2565
950		65	170	350	520	875	1485	2745	465	990	1595
1000		40	105	220	335	570	1000	1990	295	650	1085

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 1000°F maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 1000°F.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 900°F. Consult the factory.

(1) Permissible but not recommended for prolonged usage above 800°F.

FORGED CARBON STEEL A105[1] — metric

Standard Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	154	230	383	639	1149	205	432	685
	Seat	22	57	113	169	281	469	843	150	317	502
°C		Standard Class							Intermediate Standard Class		
–29 to 38		19.6	51.1	102.1	153.2	255.3	425.5	765.9	136.2	287.6	456.1
50		19.2	50.1	100.2	150.4	250.6	417.7	751.9	133.7	282.3	447.8
100		17.7	46.6	93.2	139.8	233.0	388.3	699.0	124.3	262.5	416.3
150		15.8	45.1	90.2	135.2	225.4	375.6	676.1	120.2	253.9	402.6
200		13.8	43.8	87.6	131.4	219.0	365.0	657.0	116.8	246.7	391.3
250		12.1	41.9	83.9	125.8	209.7	349.5	629.1	111.8	236.3	374.7
300		10.2	39.8	79.6	119.5	199.1	331.8	597.3	106.2	224.3	355.7
325		9.3	38.7	77.4	116.1	193.6	322.6	580.7	103.2	218.1	345.8
350		8.4	37.6	75.1	112.7	187.8	313.0	563.5	100.2	211.6	335.5
375		7.4	36.4	72.7	109.1	181.8	303.1	545.5	97.0	204.8	324.9
400		6.5	34.7	69.4	104.2	173.6	289.3	520.8	92.6	195.6	310.1
425		5.5	28.8	57.5	86.3	143.8	239.7	431.5	76.7	162.0	257.0
450		4.6	23.0	46.0	69.0	115.0	191.7	345.1	61.3	129.6	205.5
475		3.7	17.4	34.9	52.3	87.2	145.3	261.5	46.5	98.2	155.8
500		2.8	11.8	23.5	35.3	58.8	97.9	176.3	31.4	66.2	105.0
538		1.4	5.9	11.8	17.7	29.5	49.2	88.6	15.7	33.2	52.7

Special Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Special Class							Intermediate Special Class		
–29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
50		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
100		19.8	51.6	103.3	154.9	258.2	430.3	774.5	137.7	290.9	461.3
150		19.6	51.0	102.1	153.1	255.2	425.3	765.5	136.1	287.5	455.9
200		19.4	50.6	101.1	151.7	252.9	421.4	758.6	134.8	284.9	451.7
250		19.4	50.5	101.1	151.6	252.6	421.1	757.9	134.8	284.6	451.4
300		19.4	50.5	101.1	151.6	252.6	421.1	757.9	134.8	284.6	451.4
325		19.2	50.1	100.2	150.3	250.6	417.6	751.7	133.6	282.3	447.7
350		18.7	48.9	97.8	146.7	244.6	407.6	733.7	130.4	275.6	436.9
375		18.1	47.1	94.2	141.3	235.5	392.5	706.5	125.6	265.3	420.8
400		16.6	43.4	86.8	130.2	217.0	361.7	651.0	115.7	244.5	387.7
425		13.8	36.0	71.9	107.9	179.8	299.6	539.3	95.9	202.6	321.2
450		11.0	28.8	57.5	86.3	143.8	239.6	431.4	76.7	162.0	256.9
475		8.4	21.8	43.6	65.4	109.0	181.6	326.9	58.1	122.8	194.7
500		5.6	14.7	29.4	44.1	73.5	122.4	220.4	39.2	82.8	131.2
538		2.8	7.4	14.8	22.2	36.9	61.6	110.8	19.7	41.6	66.0

Limited Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Limited Class							Intermediate Limited Class		
–29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
50		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
100		19.8	51.6	103.3	154.9	258.2	430.3	774.5	137.7	290.9	461.3
150		19.6	51.0	102.1	153.1	255.2	425.3	765.5	136.1	287.5	455.9
200		19.4	50.6	101.1	151.7	252.9	421.4	758.6	134.8	284.9	451.7
250		19.4	50.5	101.1	151.6	252.6	421.1	757.9	134.8	284.6	451.4
300		19.4	50.5	101.1	151.6	252.6	421.1	757.9	134.8	284.6	451.4
325		19.2	50.1	100.2	150.3	250.6	417.6	751.7	133.6	282.3	447.7
350		18.7	48.9	97.8	146.7	244.6	407.6	733.7	130.4	275.6	436.9
375		18.1	47.1	94.2	141.3	235.5	392.5	706.5	125.6	265.3	420.8
400		16.6	43.4	86.8	130.2	217.0	361.7	651.0	115.7	244.5	387.7
425		13.8	36.0	71.9	107.9	179.8	299.6	539.3	95.9	202.6	321.2
450		11.0	28.8	57.5	86.3	143.8	239.6	431.4	76.7	162.0	256.9
475		8.4	21.8	43.6	65.4	109.0	181.6	326.9	58.1	122.8	194.7
500		5.6	14.7	29.6	44.5	74.6	125.4	230.3	39.5	84.2	134.6
538		2.8	7.5	15.2	23.1	39.4	69.0	137.3	20.4	44.8	74.6

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 538°C maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 538°C.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 475°C. Consult the factory.

(1) Permissible but not recommended for prolonged usage above 425°C.

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED CHROME-MOLY STEEL A182 Gr. F22 Cl.3[(1)] — US customary

Standard Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Standard Class							Intermediate Standard Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		260	750	1500	2250	3750	6250	11250	2000	4225	6700
300		230	730	1455	2185	3640	6070	10925	1940	4100	6505
400		200	705	1410	2115	3530	5880	10585	1880	3975	6305
500		170	665	1330	1995	3325	5540	9965	1775	3745	5940
600		140	605	1210	1815	3025	5040	9070	1615	3410	5405
650		125	590	1175	1765	2940	4905	8825	1570	3315	5260
700		110	570	1135	1705	2840	4730	8515	1515	3200	5070
750		95	530	1065	1595	2660	4430	7970	1420	2995	4750
800		80	510	1015	1525	2540	4230	7610	1355	2860	4535
850		65	485	975	1460	2435	4060	7305	1300	2745	4350
900		50	450	900	1350	2245	3745	6740	1200	2530	4015
950		35	385	755	1160	1930	3220	5795	1025	2175	3450
1000		20	265	535	800	1335	2230	4010	710	1505	2390
1050		20	175	350	525	875	1455	2625	465	985	1560
1100		20	110	220	330	550	915	1645	295	620	980
1150		20	70	135	205	345	570	1030	180	390	610
1200		15	40	80	125	205	345	615	110	230	370

Special Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Special Class							Intermediate Special Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		285	740	1480	2220	3695	6160	11090	1975	4165	6605
400		280	730	1455	2185	3640	6065	10915	1940	4100	6500
500		280	725	1450	2175	3620	6035	10865	1935	4080	6470
600		275	720	1440	2165	3605	6010	10815	1925	4060	6445
650		275	715	1430	2145	3580	5965	10735	1905	4035	6395
700		270	705	1415	2120	3535	5895	10605	1885	3985	6320
750		270	705	1415	2120	3535	5895	10605	1885	3985	6320
800		270	705	1415	2120	3535	5895	10605	1885	3985	6320
850		260	680	1355	2030	3385	5645	10160	1805	3815	6050
900		230	600	1200	1800	3000	5000	9000	1600	3380	5360
950		180	470	945	1415	2360	3930	7070	1260	2660	4215
1000		130	335	670	1005	1670	2785	5015	895	1880	2985
1050		85	220	435	655	1095	1820	3280	580	1235	1950
1100		55	135	275	410	685	1145	2055	365	770	1225
1150		35	85	170	255	430	715	1285	225	485	765
1200		20	50	105	155	255	430	770	140	285	460

Limited Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Limited Class							Intermediate Limited Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		285	740	1480	2220	3695	6160	11090	1975	4165	6605
400		280	730	1455	2185	3640	6065	10915	1940	4100	6500
500		280	725	1450	2175	3620	6035	10865	1935	4080	6470
600		275	720	1440	2165	3605	6010	10815	1925	4060	6445
650		275	715	1430	2145	3580	5965	10735	1905	4035	6395
700		270	705	1415	2120	3535	5895	10605	1885	3985	6320
750		270	705	1415	2120	3535	5895	10605	1885	3985	6320
800		270	705	1415	2120	3535	5895	10605	1885	3985	6320
850		260	680	1355	2030	3385	5645	10160	1805	3815	6050
900		230	600	1200	1800	3000	5000	9000	1600	3380	5360
950		180	470	955	1435	2410	4075	7555	1275	2725	4385
1000		130	340	690	1045	1785	3120	6215	925	2025	3370
1050		85	225	445	680	1170	2040	4065	600	1330	2205
1100		55	135	280	425	730	1280	2545	380	830	1385
1150		35	85	175	265	460	800	1590	235	525	865
1200		20	50	110	160	275	480	955	145	305	520

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 1000°F maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 1000°F.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 900°F. Consult the factory.

(1) Permissible but not recommended for prolonged usage above 1100°F.

FORGED CHROME-MOLY STEEL A182 Gr. F22 Cl.3[1] — metric

Standard Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Standard Class							Intermediate Standard Class		
–29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
50		19.5	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
100		17.7	51.5	103.0	154.6	257.6	429.4	773.0	137.4	290.3	460.4
150		15.8	50.3	100.3	150.6	250.8	418.2	752.8	133.8	282.7	448.3
200		13.8	48.6	97.2	145.8	243.4	405.4	729.8	129.7	274.1	434.6
250		12.1	46.3	92.7	139.0	231.8	386.2	694.8	123.5	260.9	413.8
300		10.2	42.9	85.7	128.6	214.4	357.1	642.6	114.2	241.3	382.7
325		9.3	41.4	82.6	124.0	206.6	344.3	619.6	110.2	232.7	369.0
350		8.4	40.3	80.4	120.7	201.1	335.3	603.3	107.3	226.6	359.3
375		7.4	38.9	77.6	116.5	194.1	323.2	581.8	103.4	218.5	346.5
400		6.5	36.5	73.3	109.8	183.1	304.9	548.5	97.5	206.0	326.7
425		5.5	35.2	70.0	105.1	175.1	291.6	524.7	93.3	197.1	312.5
450		4.6	33.7	67.7	101.4	169.0	281.8	507.0	90.1	190.4	301.9
475		3.7	31.7	63.4	95.1	158.2	263.9	474.8	84.4	178.3	282.8
500		2.8	28.2	56.5	84.7	140.9	235.0	423.0	75.2	158.9	251.9
538		1.4	18.4	36.9	55.3	92.2	153.7	276.6	49.2	103.9	164.7
550		1.4	15.6	31.3	46.9	78.2	130.3	234.5	41.7	88.1	139.7
575		1.4	10.5	21.1	31.6	52.6	87.7	157.9	28.1	59.3	94.0
600		1.4	6.9	13.8	20.7	34.4	57.4	103.3	18.4	38.8	61.5
625		1.4	4.5	8.9	13.4	22.3	37.2	66.9	11.9	25.1	39.8
650		1.4	2.8	5.7	8.5	14.2	23.6	42.6	7.6	16.0	25.4

Special Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Special Class							Intermediate Special Class		
–29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
50		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
100		19.8	51.6	103.2	154.9	258.1	430.2	774.3	137.7	290.8	461.1
150		19.5	51.0	101.9	152.9	254.8	424.6	764.3	135.9	287.0	455.2
200		19.3	50.2	100.4	150.7	251.1	418.5	753.4	133.9	282.9	448.7
250		19.2	50.0	100.0	149.9	249.9	416.5	749.7	133.3	281.6	446.5
300		19.1	49.8	99.6	149.3	248.9	414.8	746.7	132.7	280.4	444.7
325		19.0	49.6	99.2	148.8	248.0	413.3	743.9	132.2	279.4	443.0
350		18.9	49.2	98.4	147.6	246.0	410.0	738.1	131.2	277.2	439.6
375		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
400		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
425		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
450		18.1	47.3	94.4	141.4	235.8	393.1	707.6	125.8	265.7	421.4
475		16.4	42.8	85.5	128.2	213.7	356.3	641.3	114.0	240.8	381.9
500		13.7	35.6	71.5	107.1	178.6	297.5	535.4	95.2	201.1	318.9
538		8.8	23.0	46.1	69.1	115.2	192.1	345.7	61.5	129.8	205.9
550		7.5	19.5	39.1	58.6	97.7	162.8	293.1	52.1	110.1	174.6
575		5.0	13.2	26.3	39.5	65.8	109.7	197.4	35.1	74.1	117.6
600		3.3	8.6	17.2	25.8	43.0	71.7	129.1	23.0	48.5	76.9
625		2.1	5.6	11.2	16.7	27.9	46.5	83.7	14.9	31.4	49.8
650		1.4	3.5	7.1	10.6	17.7	29.5	53.2	9.5	20.0	31.7

Limited Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Limited Class							Intermediate Limited Class		
–29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
50		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
100		19.8	51.6	103.2	154.9	258.1	430.2	774.3	137.7	290.8	461.1
150		19.5	51.0	101.9	152.9	254.8	424.6	764.3	135.9	287.0	455.2
200		19.3	50.2	100.4	150.7	251.1	418.5	753.4	133.9	282.9	448.7
250		19.2	50.0	100.0	149.9	249.9	416.5	749.7	133.3	281.6	446.5
300		19.1	49.8	99.6	149.3	248.9	414.8	746.7	132.7	280.4	444.7
325		19.0	49.6	99.2	148.8	248.0	413.3	743.9	132.2	279.4	443.0
350		18.9	49.2	98.4	147.6	246.0	410.0	738.1	131.2	277.2	439.6
375		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
400		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
425		18.7	48.8	97.5	146.3	243.8	406.3	731.3	130.0	274.6	435.5
450		18.1	47.3	94.4	141.4	235.8	393.1	707.6	125.8	265.7	421.4
475		16.4	42.8	85.5	128.2	213.7	356.3	641.3	114.0	240.8	381.9
500		13.7	35.7	71.9	108.0	181.2	304.8	559.4	95.9	204.4	327.3
538		8.8	23.3	47.3	71.9	123.1	215.2	428.3	63.7	139.9	232.6
550		7.5	19.8	40.1	61.0	104.4	182.3	363.1	53.9	118.7	197.3
575		5.0	13.4	27.0	41.1	70.3	122.9	244.6	36.3	79.9	132.9
600		3.3	8.7	17.7	26.8	46.0	80.3	159.9	23.8	52.3	86.9
625		2.1	5.7	11.5	17.4	29.8	52.1	103.7	15.4	33.9	56.3
650		1.4	3.5	7.3	11.0	18.9	33.0	65.9	9.8	21.6	35.8

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 538°C maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 538°C.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 475°C. Consult the factory.

(1) Permissible but not recommended for prolonged usage above 595°C.

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED STAINLESS STEEL A182 Gr. F316[(1)] — US customary

Standard Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	425	1100	2175	3250	5400	9000	16200	2900	6100	9650
	Seat	325	800	1600	2400	3975	6600	11900	2125	4475	7075
°F		Standard Class							Intermediate Standard Class		
-20 to 100		275	720	1440	2160	3600	6000	10800	1920	4055	6430
200		235	620	1240	1860	3095	5160	9290	1655	3485	5530
300		215	560	1120	1680	2795	4660	8390	1495	3150	4995
400		195	515	1025	1540	2570	4280	7705	1370	2895	4590
500		170	480	955	1435	2390	3980	7165	1275	2690	4265
600		140	450	900	1355	2255	3760	6770	1205	2540	4030
650		125	440	885	1325	2210	3680	6625	1180	2490	3945
700		110	435	870	1305	2170	3620	6515	1160	2445	3880
750		95	425	855	1280	2135	3560	6410	1140	2405	3815
800		80	420	845	1265	2110	3520	6335	1125	2380	3775
850		65	420	835	1255	2090	3480	6265	1115	2355	3730
900		50	415	830	1245	2075	3460	6230	1105	2340	3710
950		35	385	775	1160	1930	3220	5795	1030	2175	3450
1000		20	365	725	1090	1820	3030	5450	970	2050	3250
1050		20	360	720	1080	1800	3000	5400	960	2030	3215
1100		20	305	610	915	1525	2545	4575	815	1720	2730
1150		20	235	475	710	1185	1970	3550	630	1335	2110
1200		20	185	370	555	925	1545	2775	495	1045	1655
1250		20	145	295	440	735	1230	2210	390	830	1320
1300		20	115	235	350	585	970	1750	310	660	1040
1350		20	95	190	290	480	800	1440	255	540	860
1400		20	75	150	225	380	630	1130	200	430	675
1450		20	60	115	175	290	485	875	155	325	520
1500		15	40	85	125	205	345	620	110	230	370

Special Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Special Class							Intermediate Special Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		265	690	1380	2075	3455	5760	10365	1845	3895	6175
300		240	625	1250	1870	3120	5200	9360	1665	3515	5575
400		220	575	1145	1720	2865	4775	8600	1530	3230	5120
500		205	535	1065	1600	2665	4440	7995	1420	3005	4760
600		195	505	1005	1510	2520	4195	7555	1340	2840	4495
650		190	495	985	1480	2465	4105	7395	1315	2775	4400
700		185	485	970	1455	2425	4040	7270	1295	2730	4330
750		185	475	955	1430	2385	3975	7150	1270	2685	4260
800		180	470	945	1415	2355	3930	7070	1260	2655	4215
850		180	465	930	1400	2330	3885	6990	1245	2625	4165
900		180	465	925	1390	2315	3860	6950	1235	2610	4140
950		175	460	915	1375	2290	3815	6870	1220	2580	4090
1000		160	420	840	1260	2105	3505	6310	1120	2370	3755
1050		160	420	840	1260	2105	3505	6310	1120	2370	3755
1100		145	380	765	1145	1905	3180	5720	1020	2145	3410
1150		115	295	590	885	1480	2465	4435	785	1665	2640
1200		90	230	465	695	1155	1930	3470	620	1300	2070
1250		70	185	370	555	920	1535	2765	495	1035	1645
1300		55	145	290	435	730	1215	2185	385	820	1300
1350		45	120	240	360	600	1000	1800	320	675	1070
1400		35	95	190	285	470	785	1415	255	530	840
1450		30	75	145	220	365	605	1095	195	410	650
1500		20	50	105	155	260	430	770	140	295	460

Limited Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Limited Class							Intermediate Limited Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		265	690	1380	2075	3455	5760	10365	1845	3895	6175
300		240	625	1250	1870	3120	5200	9360	1665	3515	5575
400		220	575	1145	1720	2865	4775	8600	1530	3230	5120
500		205	535	1065	1600	2665	4440	7995	1420	3005	4760
600		195	505	1005	1510	2520	4195	7555	1340	2840	4495
650		190	495	985	1480	2465	4105	7395	1315	2775	4400
700		185	485	970	1455	2425	4040	7270	1295	2730	4330
750		185	475	955	1430	2385	3975	7150	1270	2685	4260
800		180	470	945	1415	2355	3930	7070	1260	2655	4215
850		180	465	930	1400	2330	3885	6990	1245	2625	4165
900		180	465	925	1390	2315	3860	6950	1235	2610	4140
950		175	460	915	1375	2290	3815	6870	1220	2580	4090
1000		160	420	840	1260	2105	3505	6310	1120	2370	3755
1050		160	420	840	1260	2105	3505	6310	1120	2370	3755
1100		145	380	770	1160	1945	3300	6115	1030	2200	3545
1150		115	300	605	920	1580	2760	5495	815	1795	2985
1200		90	235	475	725	1235	2160	4300	640	1400	2340
1250		70	185	380	575	985	1720	3425	515	1115	1860
1300		55	145	300	450	780	1360	2705	400	885	1470
1350		45	120	245	375	640	1120	2230	330	730	1210
1400		35	95	195	295	500	880	1755	265	570	950
1450		30	75	150	230	390	680	1355	200	440	735
1500		20	50	110	160	280	480	955	145	320	520

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 1000°F maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 1000°F.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 1000°F. Consult the factory.

(1) At temperatures over 1000°F use only when the carbon content is 0.04% or higher (material code 10).

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED STAINLESS STEEL A182 Gr. F316[1] — metric

Standard Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	29	75	149	224	373	621	1117	199	420	666
	Seat	21	55	110	164	274	456	820	146	308	488
°C		Standard Class							Intermediate Standard Class		
−29 to 38		19.0	49.6	99.3	148.9	248.2	413.7	744.6	132.4	279.6	443.5
50		18.4	48.1	96.2	144.3	240.6	400.9	721.7	128.3	271.0	429.8
100		16.2	42.2	84.4	126.6	211.0	351.6	632.9	112.5	237.7	376.9
150		14.8	38.5	77.0	115.5	192.5	320.8	577.4	102.6	216.8	343.9
200		13.7	35.7	71.3	107.0	178.3	297.2	534.9	95.1	200.9	318.6
250		12.1	33.4	66.8	100.1	166.9	278.1	500.6	89.0	188.0	298.1
300		10.2	31.6	63.2	94.9	158.1	263.5	474.3	84.3	178.1	282.5
325		9.3	30.9	61.8	92.7	154.4	257.4	463.3	82.4	174.0	275.9
350		8.4	30.3	60.7	91.0	151.6	252.7	454.9	80.9	170.8	270.9
375		7.4	29.9	59.8	89.6	149.4	249.0	448.2	79.7	168.3	266.9
400		6.5	29.4	58.9	88.3	147.2	245.3	441.6	78.5	165.8	263.0
425		5.5	29.1	58.3	87.4	145.7	242.9	437.1	77.7	164.2	260.3
450		4.6	28.8	57.7	86.5	144.2	240.4	432.7	76.9	162.5	257.7
475		3.7	28.7	57.3	86.0	143.4	238.9	430.1	76.5	161.5	256.1
500		2.8	28.2	56.5	84.7	140.9	235.0	423.0	75.2	158.9	251.9
538		1.4	25.2	50.0	75.2	125.5	208.9	375.8	66.8	141.1	223.8
550		1.4	25.0	49.8	74.8	124.9	208.0	374.2	66.5	140.5	222.9
575		1.4	24.0	47.9	71.8	119.7	199.5	359.1	63.8	134.9	213.9
600		1.4	19.9	39.8	59.7	99.5	165.9	298.6	53.1	112.1	177.8
625		1.4	15.8	31.6	47.4	79.1	131.8	237.2	42.2	89.1	141.3
650		1.4	12.7	25.3	38.0	63.3	105.5	189.9	33.8	71.3	113.1
675		1.4	10.3	20.6	31.0	51.6	86.0	154.8	27.5	58.1	92.2
700		1.4	8.4	16.8	25.1	41.9	69.8	125.7	22.3	47.2	74.9
725		1.4	7.0	14.0	21.0	34.9	58.2	104.8	18.6	39.4	62.4
750		1.4	5.9	11.7	17.6	29.3	48.9	87.9	15.6	33.0	52.3
775		1.4	4.6	9.0	13.7	22.8	38.0	68.4	12.2	25.7	40.7
800		1.2	3.5	7.0	10.5	17.4	29.2	52.6	9.4	19.8	31.3
816		1.0	2.8	5.9	8.6	14.1	23.8	42.7	7.6	16.0	25.4

Special Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Special Class							Intermediate Special Class		
−29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
50		19.5	50.8	101.6	152.5	254.1	423.5	762.3	135.5	286.3	454.0
100		18.1	47.1	94.2	141.3	235.5	392.4	706.4	125.6	265.3	420.7
150		16.5	43.0	85.9	128.9	214.8	358.0	644.4	114.6	242.0	383.8
200		15.3	39.8	79.6	119.4	199.0	331.7	597.0	106.1	224.2	355.5
250		14.3	37.3	74.5	111.8	186.3	310.4	558.8	99.3	209.9	332.8
300		13.5	35.3	70.6	105.9	176.4	294.1	529.3	94.1	198.8	315.2
325		13.2	34.5	68.9	103.4	172.3	287.2	517.0	91.9	194.2	307.9
350		13.0	33.8	67.7	101.5	169.2	282.1	507.7	90.3	190.7	302.4
375		12.8	33.3	66.7	100.0	166.7	277.9	500.2	88.9	187.9	297.9
400		12.6	32.9	65.7	98.6	164.3	273.8	492.9	87.6	185.1	293.5
425		12.5	32.5	65.1	97.6	162.6	271.1	487.9	86.7	183.2	290.6
450		12.3	32.2	64.4	96.6	161.0	268.3	482.9	85.8	181.4	287.6
475		12.3	32.0	64.0	96.0	160.0	266.6	480.0	85.3	180.3	285.9
500		12.2	31.7	63.4	95.1	158.6	264.3	475.7	84.6	178.7	283.3
538		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.4	163.4	259.1
550		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.4	163.4	259.1
575		10.9	28.6	57.1	85.7	143.0	238.3	428.8	76.2	161.0	255.4
600		9.5	24.9	49.8	74.6	124.4	207.3	373.2	66.3	140.2	222.3
625		7.6	19.8	39.5	59.3	98.8	164.7	296.5	52.7	111.4	176.6
650		6.1	15.8	31.7	47.5	79.1	131.9	237.4	42.2	89.2	141.4
675		4.9	12.9	25.8	38.7	64.5	107.5	193.5	34.4	72.7	115.2
700		4.4	11.4	22.8	34.3	57.1	95.2	171.3	30.5	64.3	102.0
725		3.7	9.5	19.1	28.6	47.7	79.5	143.0	25.4	53.7	85.2
750		2.8	7.4	14.8	22.1	36.7	61.2	110.3	19.6	41.4	65.7
775		2.2	5.8	11.4	17.2	28.5	47.6	85.6	15.2	32.1	51.0
800		1.8	4.4	8.8	13.2	22.0	36.6	65.6	11.7	24.6	39.1
816		1.4	3.4	7.2	10.7	17.9	29.6	53.1	9.4	19.9	31.6

Limited Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Limited Class							Intermediate Limited Class		
−29 to 38		19.8	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	462.0
50		19.5	50.8	101.6	152.5	254.1	423.5	762.3	135.5	286.3	454.0
100		18.1	47.1	94.2	141.3	235.5	392.4	706.4	125.6	265.3	420.7
150		16.5	43.0	85.9	128.9	214.8	358.0	644.4	114.6	242.0	383.8
200		15.3	39.8	79.6	119.4	199.0	331.7	597.0	106.1	224.2	355.5
250		14.3	37.3	74.5	111.8	186.3	310.4	558.8	99.3	209.9	332.8
300		13.5	35.3	70.6	105.9	176.4	294.1	529.3	94.1	198.8	315.2
325		13.2	34.5	68.9	103.4	172.3	287.2	517.0	91.9	194.2	307.9
350		13.0	33.8	67.7	101.5	169.2	282.1	507.7	90.3	190.7	302.4
375		12.8	33.3	66.7	100.0	166.7	277.9	500.2	88.9	187.9	297.9
400		12.6	32.9	65.7	98.6	164.3	273.8	492.9	87.6	185.1	293.5
425		12.5	32.5	65.1	97.6	162.6	271.1	487.9	86.7	183.2	290.6
450		12.3	32.2	64.4	96.6	161.0	268.3	482.9	85.8	181.4	287.6
475		12.3	32.0	64.0	96.0	160.0	266.6	480.0	85.3	180.3	285.9
500		12.2	31.7	63.4	95.1	158.6	264.3	475.7	84.6	178.7	283.3
538		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.4	163.4	259.1
550		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.4	163.4	259.1
575		10.9	28.6	57.3	86.1	144.0	241.2	438.2	76.5	162.3	258.7
600		9.5	25.1	50.4	76.0	128.2	218.2	410.1	67.4	145.1	234.9
625		7.6	20.1	40.5	61.7	105.6	184.5	367.3	54.6	120.1	199.5
650		6.1	16.0	32.5	49.4	84.5	147.7	294.1	43.7	96.2	159.7
675		4.9	13.1	26.5	40.3	68.9	120.4	239.7	35.6	78.4	130.1
700		4.4	11.5	23.4	35.7	61.0	106.6	212.2	31.6	69.3	115.2
725		3.7	9.6	19.6	29.7	51.0	89.0	177.2	26.3	57.9	96.3
750		2.8	7.5	15.2	23.0	39.2	68.5	136.7	20.3	44.6	74.2
775		2.2	5.9	11.7	17.9	30.5	53.3	106.1	15.7	34.6	57.6
800		1.8	4.5	9.0	13.7	23.5	41.0	81.3	12.1	26.5	44.2
816		1.4	3.4	7.4	11.1	19.1	33.2	65.8	9.7	21.5	35.7

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 538°C maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 538°C.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 550°C. Consult the factory.

(1) At temperatures over 538°C use only when the carbon content is 0.04% or higher (material code 10).

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED CHROME-MOLY STEEL A182 Gr. F91 — US customary

Standard Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Standard Class							Intermediate Standard Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		260	750	1500	2250	3750	6250	11250	2000	4225	6700
300		230	730	1455	2185	3640	6070	10925	1940	4100	6505
400		200	705	1410	2115	3530	5880	10585	1880	3975	6305
500		170	665	1330	1995	3325	5540	9965	1775	3745	5940
600		140	605	1210	1815	3025	5040	9070	1615	3410	5405
650		125	590	1175	1765	2940	4905	8825	1570	3315	5260
700		110	570	1135	1705	2840	4730	8515	1515	3200	5070
750		95	530	1065	1595	2660	4430	7970	1420	2995	4750
800		80	510	1015	1525	2540	4230	7610	1355	2860	4535
850		65	485	975	1460	2435	4060	7305	1300	2745	4350
900		50	450	900	1350	2245	3745	6740	1200	2530	4015
950		35	385	775	1160	1930	3220	5795	1030	2175	3450
1000		20	365	725	1090	1820	3030	5450	970	2050	3250
1050		20	360	720	1080	1800	3000	5400	960	2030	3215
1100		20	300	605	905	1510	2515	4525	805	1700	2695
1150		20	225	445	670	1115	1855	3345	595	1255	1990
1200		20	145	290	430	720	1200	2160	385	810	1285

Special Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Special Class							Intermediate Special Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		290	750	1500	2250	3750	6250	11250	2000	4225	6700
400		290	750	1500	2250	3750	6250	11250	2000	4225	6700
500		290	750	1500	2250	3750	6250	11250	2000	4225	6700
600		290	750	1500	2250	3750	6250	11250	2000	4225	6700
650		290	750	1500	2250	3750	6250	11250	2000	4225	6700
700		280	735	1465	2200	3665	6110	10995	1955	4130	6550
750		280	730	1460	2185	3645	6070	10930	1945	4105	6505
800		275	720	1440	2160	3600	6000	10800	1920	4055	6430
850		260	680	1355	2030	3385	5645	10160	1805	3815	6050
900		230	600	1200	1800	3000	5000	9000	1600	3380	5360
950		180	470	945	1415	2360	3930	7070	1260	2660	4215
1000		160	420	840	1260	2105	3505	6310	1120	2370	3755
1050		160	420	840	1260	2105	3505	6310	1120	2370	3755
1100		145	375	755	1130	1885	3145	5655	1005	2125	3370
1150		105	280	555	835	1395	2320	4180	740	1570	2485
1200		70	180	360	540	900	1500	2700	480	1015	1610

Limited Class

Working Pressure by Classes, psig

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	450	1125	2250	3375	5625	9375	16875	3000	6350	10050
	Seat	325	825	1650	2475	4125	6875	12375	2200	4650	7375
°F		Limited Class							Intermediate Limited Class		
-20 to 100		290	750	1500	2250	3750	6250	11250	2000	4225	6700
200		290	750	1500	2250	3750	6250	11250	2000	4225	6700
300		290	750	1500	2250	3750	6250	11250	2000	4225	6700
400		290	750	1500	2250	3750	6250	11250	2000	4225	6700
500		290	750	1500	2250	3750	6250	11250	2000	4225	6700
600		290	750	1500	2250	3750	6250	11250	2000	4225	6700
650		290	750	1500	2250	3750	6250	11250	2000	4225	6700
700		280	735	1465	2200	3665	6110	10995	1955	4130	6550
750		280	730	1460	2185	3645	6070	10930	1945	4105	6505
800		275	720	1440	2160	3600	6000	10800	1920	4055	6430
850		260	680	1355	2030	3385	5645	10160	1805	3815	6050
900		230	600	1200	1800	3000	5000	9000	1600	3380	5360
950		180	470	955	1435	2410	4075	7555	1275	2725	4385
1000		160	425	860	1310	2250	3925	7820	1160	2555	4240
1050		160	425	860	1310	2250	3925	7820	1160	2555	4240
1100		145	380	775	1175	2015	3520	7005	1040	2290	3805
1150		105	285	570	870	1490	2600	5180	765	1695	2805
1200		70	180	370	560	960	1680	3345	495	1095	1820

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 1000°F maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 1000°F.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 900°F. Consult the factory.

ENGINEERING DATA ASME B16.34 PRESSURE TEMPERATURE RATINGS

FORGED CHROME-MOLY STEEL A182 Gr. F91 — metric

Standard Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Standard Class							Intermediate Standard Class		
–29 to 38		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
50		19.5	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
100		17.7	51.5	103.0	154.6	257.6	429.4	773.0	137.4	290.2	460.3
150		15.8	50.3	100.3	150.6	250.8	418.2	752.8	133.8	282.6	448.3
200		13.8	48.6	97.2	145.8	243.4	405.4	729.8	129.6	274.2	434.6
250		12.1	46.3	92.7	139.0	231.8	386.2	694.8	123.6	261.1	414.0
300		10.2	42.9	85.7	128.6	214.4	357.1	642.6	114.3	241.5	382.8
325		9.3	41.4	82.6	124.0	206.6	344.3	619.6	110.2	232.8	369.1
350		8.4	40.3	80.4	120.7	201.1	335.3	603.3	107.3	226.6	359.4
375		7.4	38.9	77.6	116.5	194.1	323.2	581.8	103.5	218.6	346.5
400		6.5	36.5	73.3	109.8	183.1	304.9	548.5	97.6	206.2	326.8
425		5.5	35.2	70.0	105.1	175.1	291.6	524.7	93.4	197.2	312.6
450		4.6	33.7	67.7	101.4	169.0	281.8	507.0	90.2	190.4	302.1
475		3.7	31.7	63.4	95.1	158.2	263.9	474.8	84.5	178.3	282.9
500		2.8	28.2	56.5	84.7	140.9	235.0	423.0	75.3	158.8	251.9
538		1.4	25.2	50.0	75.2	125.5	208.9	375.8	66.8	141.3	223.9
550		1.40	25.0	49.8	74.8	124.9	208.0	374.2	66.5	140.7	223.0
575		1.40	24.0	47.9	71.8	119.7	199.5	359.1	63.8	134.9	213.9
600		1.40	19.5	39.0	58.5	97.5	162.5	292.5	52.0	109.8	174.2
625		1.40	14.6	29.2	43.8	73.0	121.7	219.1	38.9	82.3	130.5
650		1.40	9.9	19.9	29.8	49.6	82.7	148.9	26.5	55.9	88.7

Special Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Special Class							Intermediate Special Class		
–29 to 38		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
50		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
100		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
150		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
200		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
250		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
300		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
325		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
350		19.8	51.5	102.8	154.3	257.1	428.6	771.4	137.1	289.7	459.5
375		19.3	50.6	101.0	151.5	252.5	420.9	757.4	134.7	284.5	451.2
400		19.3	50.3	100.6	150.6	251.2	418.3	753.2	133.9	282.9	448.4
425		19.0	49.6	99.3	148.9	248.2	413.7	744.6	132.4	279.6	443.5
450		18.1	47.3	94.4	141.4	235.8	393.1	707.6	125.7	265.7	421.4
475		16.4	42.8	85.5	128.2	213.7	356.3	641.3	114.0	240.8	381.9
500		13.7	35.6	71.5	107.1	178.6	297.5	535.4	95.2	201.2	318.9
538		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.2	163.5	259.1
550		11.0	29.0	57.9	86.9	145.1	241.7	435.1	77.2	163.5	259.1
575		10.9	28.6	57.1	85.7	143.0	238.3	428.8	76.2	161.1	255.4
600		9.3	24.4	48.7	73.1	121.9	203.1	365.6	65.0	137.3	217.7
625		7.0	18.3	36.5	54.8	91.3	152.1	273.8	48.7	102.9	163.1
650		4.8	12.4	24.8	37.2	62.1	103.4	186.2	33.1	69.9	110.9

Limited Class

Working Pressure by Classes, bar

CLASS		150	300	600	900	1500	2500	4500	800	1690	2680
Test	Shell	30	78	156	233	388	647	1164	207	437	693
	Seat	22	57	114	171	285	474	854	152	321	509
°C		Limited Class							Intermediate Limited Class		
–29 to 38		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
50		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
100		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
150		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
200		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
250		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
300		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
325		20.0	51.7	103.4	155.1	258.6	430.9	775.7	137.9	291.3	461.9
350		19.8	51.5	102.8	154.3	257.1	428.6	771.4	137.1	289.7	459.5
375		19.3	50.6	101.0	151.5	252.5	420.9	757.4	134.7	284.5	451.2
400		19.3	50.3	100.6	150.6	251.2	418.3	753.2	133.9	282.9	448.4
425		19.0	49.6	99.3	148.9	248.2	413.7	744.6	132.4	279.6	443.5
450		18.1	47.3	94.4	141.4	235.8	393.1	707.6	125.7	265.7	421.4
475		16.4	42.8	85.5	128.2	213.7	356.3	641.3	114.0	240.8	381.9
500		13.7	35.7	71.9	108.0	181.2	304.8	559.4	95.9	204.5	327.3
538		11.1	29.4	59.4	90.4	155.1	270.7	539.1	79.9	176.3	292.7
550		11.1	29.4	59.4	90.4	155.1	270.7	539.1	79.9	176.3	292.7
575		11.0	29.0	58.6	89.1	152.8	266.9	531.3	78.9	173.7	288.5
600		9.3	24.7	50.0	76.0	130.3	227.5	453.0	67.3	148.0	245.9
625		7.0	18.5	37.5	57.0	97.6	170.4	339.2	50.4	110.9	184.3
650		4.8	12.6	25.5	38.7	66.4	115.8	230.7	34.3	75.4	125.3

Selection Rules :

A) Flanged-end valves may be rated 150, 300, 600, 900, 1500, and 2500 Standard Class only, 538°C maximum.

B) Butt weld valves may be designated as Standard Class and Special Class, or Limited Class NPS 2½ (DN 65) and smaller.

C) Socket weld valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class.

D) Threaded-end or combination threaded-end valves are limited to NPS 2½ (DN 65) and smaller and may be designated as Standard Class, Special Class, or Limited Class, up to 2500 Class. The ratings terminate at 538°C.

E) Special Class: Requires additional inspection per ASME B16.34, para. 2.1.3.

F) Do not interpolate Limited Class above 475°C. Consult the factory.

ENGINEERING DATA

Cv FLOW COEFFICIENT TABLES

SIZE		Bolted bonnet, welded bonnet gate and bellows seal gate Standard port				Bolted bonnet and welded bonnet gate Full Port		Y-pattern bonnetless globe		Bolted bonnet globe 45° incl.	Welded bonnet globe 45° incl.
NPS	DN	150-800	1500-1690(1)	2500(2)	4500(2)	800	1500-1690(1)	1690-2680	4500	800-1690	1690-2680
¼	8	2.6	2.6	–	–	2.6	2.6	1.3	1.0	–	–
3/8	10	2.6	5	–	–	5	5	2.4	1.3	–	–
½	15	7	14(3)	14	–	14	14	2.9	1.5	3.4	8
¾	20	14	14	14	25	30	30	5.0	5.0	5.8	9
1	25	30	30	30	25	58	58	9.8	6.0	11.3	14
¼	32	100	100	58	48	100	100	20	9.8	26.5	28
1½	40	100	100	58	48	160	160	20	20	29	29
2(5)	50	–	–	–	–	–	–	34	–	–	–
2	50	160	160	160	92	280	250	60	26	54	54
2½	65	–	–	–	–	–	–	60	47	54	–
3	80	–	–	–	–	–	–	60	47	54	–
4	100	–	–	–	–	–	–	60	47	–	–

SIZE		Bolted bonnet, welded bonnet globe vertical and angle(4)		Bolted bonnet and welded bonnet bellows seal globe	Y-pattern bellows seal globe	Bolted bonnet angle globe (boiler blowoff)	Bolted bonnet 45° incl. globe (boiler blowoff)	Swing check	Piston check (vertical)		Piston check (inclined)	
NPS	DN	150-800	1500-1690(1)	150-800	1500-2500	600-1500	600-1500	150-800	150-800	900-1500	1690-2680	4500
¼	8	1.5	1.5	–	–	–	–	–	1.8	2	1.0	–
3/8	10	2.2	2.5	–	–	–	–	–	1.8	2	1.8	1.5
½	15	2.2	3	2.5	5	3	–	9	2	3	2.1	2.1
¾	20	4	4	3.5	6	6	–	10	3	4	4.3	4.3
1	25	6	6	4.5	7	16	18	22	6	6	8.4	4.3
1¼	32	14	14	8.3	15	29	50	32	14	14	17	–
1½	40	14	14	8.3	17	29	50	55	14	14	24	18
2(5)	50	–	–	–	–	–	–	–	–	–	26	–
2	50	33	33	17	19	54	62	82	25	25	45	36
2½	65	–	–	–	–	–	–	–	–	–	45	36
3	80	–	–	–	–	–	–	–	–	–	45	36
4	100	–	–	–	–	–	–	–	–	–	45	36

(1) Bolted bonnet only

(2) Welded bonnet only

(3) 14 Cv for bolted bonnet & 7 Cv for welded bonnet

(4) Bolted bonnet Class 1690 only (horseshoe)

(5) With seat 1.25" and end-to-end 7.25"

NOTE: *Metric Equivalent of Cv is Kv: Kv = Cv x 0.85*

HOW TO ORDER

Type of connection	Size of connection			Pressure rating	Valve type		Body/bonnet style			Body material		Trim material	
A	B			C	D		E			F		G	
F	0	8	—	2	0	7	4	B	—	1	3	M	S

Example: is a NPS 2 (DN 50) 600 Class stainless steel bolted bonnet globe valve with MS trim.

A TYPE OF CONNECTION

B	Butt weld	**S**	Thread NPT
C	Combination (socket weld/threaded)	**U**	Undrilled flanges
F	Flanged B16.5 (B16.47 series A)	**W**	Socket weld
R	Flanged ring joint	**X**	Butt weld (intermediate class)

B SIZE OF CONNECTION

Customers have the choice of specifying valve size as part of the valve figure number (**B**) using the numbers below, or indicating valve size separately. Sizes shown in NPS (DN)

EXAMPLES:
F**08**-2054B-13MS (valve size is part of figure number)
2F-2054B-13MS (valve size is shown separately)

01	¼ (8)	**04**	¾ (20)	**07**	1½ (40)	**10**	3 (80)
02	⅜ (10)	**05**	1 (25)	**08**	2 (50)	**11**	3½ (90)
03	½ (15)	**06**	1¼ (32)	**09**	2½ (65)	**12**	4 (100)

C PRESSURE RATING

0	150	**4**	2500	**8**	1690
1	300	**5**	4500	**9**	2680
2	600 or 800 API 602	**6**	400		
3	1500	**7**	900		

D VALVE TYPE

01	Flow control	**11**	Swing check
02	Ball check	**14**	Parallel slide
03	Piston check	**15**	Instrument
05	Conventional port gate	**17**	IREB gate
06	Full port gate	**18**	Extended body gate
07	Stop globe	**21**	Boiler blowoff
08	Stop check	**22**	Pressure relief
09	Needle	**23**	Double disc gate
10	Continuous blowdown	**34**	Tilting disc check valve

E BODY/BONNET STYLE

4	Vertical	**B**	Bolted bonnet (forged)
5	Angle	**D**	Diaphragm
6	Inclined y-pattern	**E**	Extended bonnet (cryogenic)
7	Inclined y-pattern bonnetless 45°	**R**	Forged bolted bonnet bellows seal
8	Elbow down	**S**	Y-pattern bellows seal (non-rotating stem)
		T	All welded bellows seal
		W	Welded bonnet
		Y	Bonnetless (rotating stem)
		Z	Bonnetless (non-rotating stem)

Note: *Velan valves for* ***NACE*** *service (as indicated by figure number and/or description) comply with the metallurgical requirements of the current NACE MR0103 and MR0175 / ISO 15156. Material selection is dependent on the actual environment and it is therefore the equipment End User's responsibility to ensure that the materials are suitable for the intended service. Please contact Velan for any questions regarding the application of our products for NACE service.*

F BODY MATERIAL

02	A105	**15**	S/S F347	**25**	LCB
04	CHR. MOLY F5	**16**	S/S F304H	**26**	LF2
05	CHR, MOLY F11	**18**	S/S F321	**27**	LF3/LC3
06	CHR, MOLY F22	**19**	Monel M35	**31**	LCC
09	CHR, MOLY F9	**20**	Inconel 625(1)	**32**	S/S F51
10	S/S F316H(2)(4)	**21**	Hastelloy C(1)	**34**	F91
11	S/S F304	**22**	Titanium Gr. 5	**35**	S/S F44 (254SMO)
12	S/S F304L	**23**	Alloy 20 (CN7M)	**36**	S/S F321H
13	S/S F316(3)(4)	**24**	LF1	**37**	Incoloy 825(1)
14	S/S F316L(4)				

(1) Must specify grade
(2) Material Code "10" (F316H) has a minimum carbon content of 0.04% must be used when temperatures are above 1000°F (538°C).
(3) Material Code "13" (F316) is not suitable for temperatures above 1000°F (538°C).
(4) Material Codes "10" (F316H), "13" (F316), and "14" (F316L) are dual certified. If dual certification is required, F316 should be procured with a note that the valves should be dual certified with F316L. If this is specified on the order, then the MTR will state that the F316 valve will meet the chemical and mechanical properties of Dual Certified F316L.

G TRIM (standard trims)

Code		Wedge/disc surface(1)	Seat surface(1)	Stem	Bellows(2) *(if applicable)*	API Number
MS	Standard	CoCr alloy(3)	CoCr alloy(3)	316/316L	321	
MY	Standard	CF8M or 316	CoCr alloy(3)	316/316L	321	12
TS	Standard	CoCr alloy(3)	CoCr alloy(3)	13 CR (410)	321	5
TY	Standard	13 CR (410 or CA15)	CoCr alloy(3)	13 CR (410)	321	8
NA	Nace Service(5)	13 CR (410 or CA15) HRC 22 max.	CoCr alloy(3)	13 CR 410 HRC 22 max.		8(5)
NB	Nace Service(5)	CF8M or 316	CoCr alloy(3)	316/316L	321	12(5)
NC	Nace Service(5)	Monel	CoCr alloy(3)	Monel	Hastelloy C	11(5)
NE	Nace Service(5)	CoCr alloy(3)	CoCr alloy(3)	13 CR 410 HRC 22 max.	Inconel 625	5(5)
NF	Nace Service(5)	CoCr alloy(3)	CoCr alloy(3)	Same as body		
AS		CoCr alloy(3)	CoCr alloy(3)	321	321	
CS		Alloy 20	CoCr alloy(3)	Alloy 20		
HC		Hastelloy C	CoCr alloy(3)	Hastelloy C	Hastelloy C	
HM		HF-acid trim	HF-acid trim	HF-acid trim		
MC		CF8M or 316 with CTFE insert(4)	CoCr alloy(3)	316		
PA		NOREM	NOREM	630	Inconel 625	
US		CoCr alloy(3)	CoCr alloy(3)	S/S 616HT		
UY		13 CR (410 or CA15)	CoCr alloy(3)	S/S 616HT		
XX		Monel	Monel	Monel		9
XY		Monel	CoCr alloy(3)	Monel		11

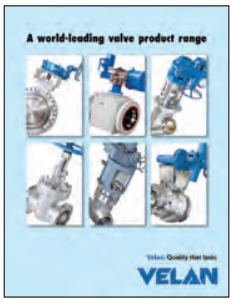
(1) Base material is either the same as the body or solid trim at manufacturer's option.
(2) Bellows material shown as standard, Inconel can be used in lieu of 321 and Hastelloy C in lieu of Inconel, where design and/or pressure class applicable.
(3) CoCr alloy (Grade 6 or 21) based on material or application at manufacturer's option.
(4) Inserts may be in seat or wedge at manufacturer's option.
(5) NACE service valves are supplied with all materials conforming to NACE MR0175. (Including bolting with max. hardness of RC22).

Note: *CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite™, and other approved manufacturers.*

Consult Velan's website at **www.velan.com**, for diagnostic troubleshooting and available trim materials.

The most comprehensive line of industrial forged and cast steel gate, globe, check, ball, butterfly, and knife gate valves and steam traps.

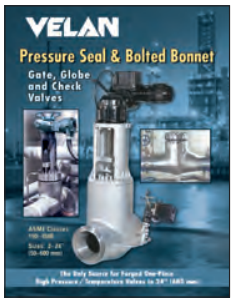
ASME pressure classes 150–4500 in carbon, alloy, and stainless steel



BRO-FLB

SAS-FLB

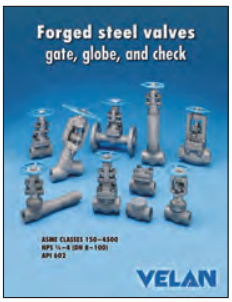
ABV-FLB



VEL-PS

CAT-CSV

CAT-CSSV



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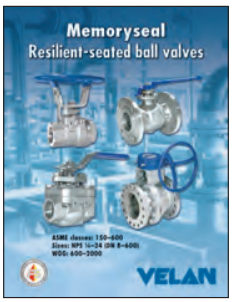

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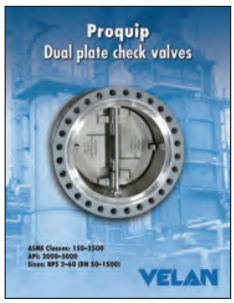

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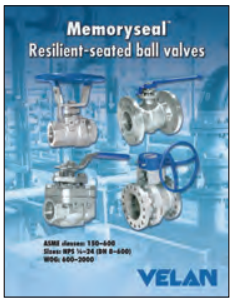

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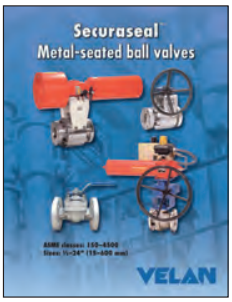

VEL-MS

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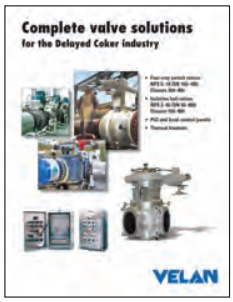

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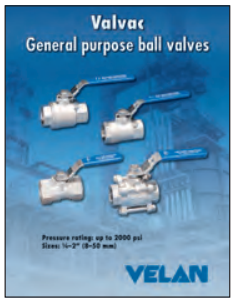

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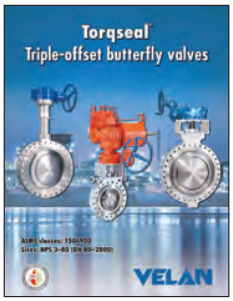

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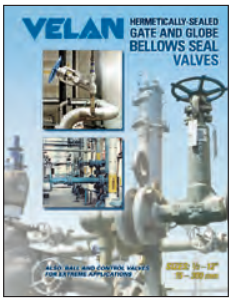

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