

**alnab**

# Cast steel valves gate, globe, and check



**ASME CLASSES 150-1500  
NPS 2-64 (DN 50-1600)  
API 600/API 594/ASME B16.34**

**VELAN**

# VELAN'S PROFILE

## VELAN AT A GLANCE

### History

- Founded in 1950

### Sales

- Over \$450 million

### People

- Over 1,800 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

All major certifications and approvals

- ASME N stamp and NPT for nuclear valves (since 1970)
- ISO 9001 (since 1991)  
Currently certified to ISO 9001:2008
- PED
- GOST (TR and RTN)
- API 6A and API 6D
- TA-Luft
- Quality programs fully compliant with ISO-9001, NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B, surveyed by ASME and audited by NUPIC, Northrop Grumman Newport News, DCMA, utilities, architect/ engineers, and other organizations from around the world

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](http://www.velan.com)



Velan is one of the world's leading manufacturers of industrial steel valves, supplying gate, globe, check, ball, triple-offset butterfly, knife gate, control, and highly engineered severe service valves for critical applications in the chemical, petrochemical, oil and gas, fossil and nuclear power, cogeneration, pulp and paper, mining, marine and cryogenic industries. 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.

Velan concentrates on one business—the design, manufacture and marketing of steel valves in a broad range of types and sizes for high performance service in a wide range of applications. The company's talented people are focused on Velan's core values of quality, reliability, innovation, and integrity and mission to be the world's leading valve brand.

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\* For gate valves larger than NPS 24 (DN 600), wall thickness is based on B16.34 plus additional wall thickness allowance.



# VELAN'S GLOBAL NETWORK

## Head office



Montreal, Canada  
Velan Inc.

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

## Manufacturing Plants

### North America



Montreal, Canada  
Velan Inc., Plant 1



Montreal, Canada  
Velan Inc., Plant 2 and 7



Granby, Canada  
Velan Inc., Plant 4 and 6



Montreal, Canada  
Velan Inc., Plant 5



Williston, VT, USA  
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



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  
VelCAN




Benicia, CA, USA  
VelCAL



Marietta, GA, U.S.A.  
VelEAST



Willich, Germany  
Velan GmbH

 – ASME N-stamp accredited manufacturer

# VELAN CAST STEEL VALVES

## FOR PROCESS AND POWER INDUSTRIES

### LOW FUGITIVE EMISSIONS

Velan's comprehensive line of cast steel gate, globe, and check valves features leading-edge design, engineering, and manufacturing technology. Our valves meet the most stringent national and international standards for fugitive emissions.

Our gate, globe, and check valves are widely used in many industries including:

- **Process industries:** oil, chemical, petrochemical, refining, pulp and paper, pharmaceutical, and food processing.
- **Power industries:** nuclear, fossil fuel, combined cycle, cogeneration, and district heating.

In addition, our valves are used for ship-building, LNG tanker carriers, offshore platforms, water treatment, mining, and more.



*Cast steel valve installation at an oil refinery.*



*Carbon steel gate valve, ASME Class 600 used for boiler feed water installation at a hydrogen plant in Texas.*



*A geothermal power plant valve installation for sour gas service.*



*Gate valves in service for a boiler feed installation.*

# CAST STEEL VALVES MANUFACTURING PROGRAM

## CAST STEEL GATE, GLOBE, AND CHECK VALVES

Valve type	ASME Class	SIZE (NPS/DN)																													
		2	2½	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36	38	40	42	44	46	48	50	54	56	60	64
		50	65	80	100	150	200	250	300	350	400	450	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1350	1400	1500	1600
GATE	150	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	300	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	600	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	900	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GLOBE	150	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	300	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	600	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	900	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CHECK	150	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	300	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	600	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	900	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1500	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

### GASKET MATERIALS

VALVE TYPE	MATERIAL
Gate	Class 150: corrugated steel/graphite except NPS 2-2½ (DN 50-65) spiral wound Class 300-1500: spiral wound stainless steel and graphite
Globe	Spiral wound stainless steel and graphite
Check	Spiral wound stainless steel and graphite

#### NOTE:

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

### OPTIONAL BODY MATERIALS

ASTM SPEC. GRADE	NOMINAL DESIGNATION	MIN. TEMP.		MAX. TEMP.		VELAN CODE
		°F	°C	°F	°C	
A216-WCB	Carbon steel	-20	-29	800	427	02
A217-WC6	1¼Cr-½Mo	-20	-29	1,100 <sup>(1)</sup>	593	05
A217-WC9	2¼Cr-1Mo	-20	-29	1,100 <sup>(1)</sup>	593	06
A217-C5	5Cr-½Mo	-20	-29	1,200 <sup>(1)</sup>	649	04
A217-C12	9Cr-1Mo	-20	-29	1,200 <sup>(1)</sup>	649	09
A352-LCB	Carbon steel	-50	-46	650	343	25
A352-LCC	Carbon steel	-50	-46	700	371	31
A352-LC2	2½Ni	-100	-73	650	343	39
A351-CF8M	18Cr-9Ni-2Mo	-425	-254	1,500 <sup>(1)</sup>	816 <sup>(1)</sup>	13
A351-CF3M	18Cr-9Ni-2Mo	-425	-254	850	454	14

(1) Flanged end ratings terminate at 1,000°F (538°C) for Class 150.



# TOTAL QUALITY AND PROCESS IMPROVEMENT

# VELAN

## ▼ Total Quality Commitment ▼

Velan Total Quality Program

*Our aim is to offer products and services that not only meet but clearly exceed the expectations of our customers.*

*Through training, teamwork, and performance, our employees strive to achieve continuous improvement of all processes.*

*Our goal is total quality and on-time delivery; our method is total commitment.*



A.K. Velan,  
Founder of Velan

Velan's number-one priority is quality. From order entry to design engineering, the entire company is totally committed to offering top quality products and services that not only meet but exceed customer expectations. All Velan valves are designed and manufactured with an emphasis on low emissions, safety, simple maintenance, ease of operation, and, above all, long and reliable service life.

## TOTAL PROCESS IMPROVEMENT

While Velan has always made quality a priority, in 1990 the company adopted a formal Total Quality Management Program, aimed at improving production processes. The company was awarded ISO 9001 status the following year.

Today, Velan's Total Process Improvement Program brings together a group of industry best practices, including Lean Manufacturing and Six-Sigma, with the goal of creating a more balanced and efficient production system.

## CERTIFICATES/APPROVALS

Velan holds all major applicable approvals, including ISO 9001:2008, PED, ASME N/NPT, TÜV, and TA-Luft. Velan's comprehensive quality program is fully compliant with the most stringent industry standards and has been surveyed and audited by leading organizations, regulatory bodies, utilities, and architect/engineers from around the world.



## TOTAL PROCESS IMPROVEMENT PROGRAM

- Total Quality Management Program (TQM) (since 1990)
- Lean manufacturing
- Six-Sigma

## CERTIFICATIONS/APPROVALS

- ISO 9001 (since 1991); Currently certified to ISO 9001:2008
- PED
- ASME N and NPT (since 1970)
- AD2000-Merkblatt HP 0 and A4/TRD 110
- TA-Luft
- Designed and tested to B16.34
- QA program fully compliant with NCA 4000, ASME NQA-1, and 10 CFR 50 Appendix B
- Quality programs surveyed by ASME and audited by NUPIC, Northrop Grumman Newport News, DCMA, utilities, architect/engineers, and other organizations from around the world

# 6 SYSTEMS ENSURE THE FINAL QUALITY GOALS

## 1. DESIGN

All valves are designed to comply with the requirements of ASME B16.34, the ASME code, and special customer requirements, as applicable.

## 2. QUALITY ASSURANCE

Every step from procurement through production, welding, assembly, testing, and packaging is in accordance with written quality programs and procedures. (An ASME Section III manual for code valve production and an ISO 9001 QA manual for all other production.) Velan's five North American plants are certified to ISO 9001 and three plants have ASME N type certificates of authorization. Velan has been fully approved to supply CE marked valves in accordance with the PED (European Pressure Equipment Directive). Orders are reviewed by the Engineering and QA departments and all special customer requirements are incorporated into QCI (Quality Control Instructions) issued for each project. The QA Department also maintains calibration and gauge-control systems, and trains and qualifies skilled welders and NDT inspectors.

## 3. QUALITY CONTROL

The QC Department is responsible for all aspects of quality, from receiving of material to control of machining processes, welding, nondestructive examination, assembly, pressure testing, cleaning, painting, and packaging. When required, a permanent record of all completed quality goals is prepared and sent to customers in the form of a "Valve Data Package."



*TQM innovations at Plant 2 include "snag lists" of any problems encountered in daily engineering and manufacturing processes. The lists are compiled weekly and automatically become the first items on the agenda for TQM team meetings.*

## 4. PRESSURE TESTING

Each valve is pressure tested in accordance with ASME B16.34, API 598, or special customer requirements as applicable. In all plants test status is integrated into production control/inventory management software.



*An operator on a CNC horizontal boring mill monitors his own quality.*

## 5. IMPROVEMENT TEAMS

Continuous improvement teams at point of manufacturing ensure quality at source, process control, higher quality workmanship, and operator ownership.

## 6. QUALIFICATION TESTING

A key to reliability is the performance of functional qualification tests. These tests are performed on all valves to determine reliability and service life. 1,000 cold and 1,000 thermal cycles with 1,000°F (555.6°C) superheated steam and five blowdowns with "0" leakage.



# MASS PRODUCTION OF CAST STEEL VALVES



*Automatic bonnet machine.*



*Fully automated precision machining.*



*Automatic multiple drilling machine.*



*Automatic three-way facing machine.*



## AUTOMATIC PLASMA ARC HARDFACING FOR SEATS AND DISCS



Automatic plasma arc hardfacing equipment of a wedge using a robotic arm.

High-quality deposits of hardfacing materials including cobalt-chrome (CoCr) Alloys such as Stellite®, Stoodly® and Wallex®, as well as other hardfacing materials are assured by the use of state-of-the-art technology regarding controlled pre- and post-heating, automatic plasma arc hardfacing equipment and controlled cooling processes.



Automatic plasma arc hardfacing equipment for seats.

## RELIABILITY THROUGH TESTING

All valves are tested during production for reliability with pressurized air and hydrotested for bubble-free tightness in accordance with API 598 specifications.



Semi-automatic stations for testing NPS 2-12 (DN 50-300) valves to API 598.



Above: Operational test for electric actuators.

Right: TA-Luft qualification test on a NPS 4 (DN 100) Class 600 gate valve with live-loading. The test medium is helium at 1500 psi (100 bar).



# CONTINUOUS CASTING QUALITY IMPROVEMENT

## AND COMPUTERIZED CASTING PROCESS SIMULATION

### Velan's VEL-QCI-955 Program (API 600)

The **Velan VEL-QCI-955 Program** was implemented to set the quality control standards for pressure boundary castings, and to ensure a consistent supply of quality castings to Velan's customers.

1. Radiographic Sample (pattern) Approval Process.
2. Radiographic Monitoring Program.
3. Casting Monitoring Program.

### Sample castings

Before castings are released for production, the Velan Level III NDE inspector evaluates and approves the submitted radiographic films (100% coverage) as per the B16.34 acceptance standard.

### Radiographic monitoring

Random radiographic monitoring requires that castings be taken every six months from each foundry, randomly by size and quantity sets, and radiographed per the B16.34 requirement.

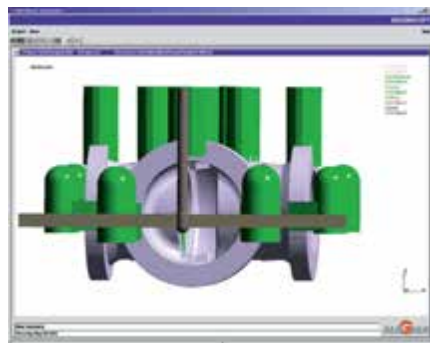


*3-D solid model of casting imported into MAGMASOFT® simulation program.*

If sample castings fail to meet the radiographic requirements of B16.34, Velan's Quality Assurance department will issue a corrective action request to the foundry.

### Casting monitoring

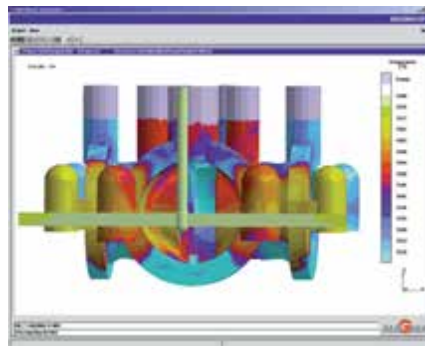
Castings rejected due to defects such as shrinkage, porosity, and inclusions discovered by radiography, hydrostatic tests, or machining are recorded as part of the statistical control of each vendor.



*Rising and gating simulation on a NPS 30 (DN 750) Class 600 gate valve body.*

### 3-D solidification simulation

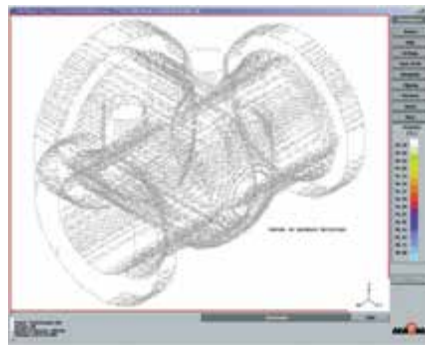
Velan works with foundries that use computer-based casting simulation programs such as MAGMASOFT® to optimize casting design and manufacturing methods before and during the production process.



*90% filling simulation on a NPS 30 (DN 750) Class 600 gate valve body.*

Working together with foundries we continue to improve the integrity of castings so we can supply the highest quality products.

An example of the successful cooperation between our Engineering department and the foundry using the MAGMASOFT® simulation for a NPS 30 (DN 750) Class 600 gate body is shown on this page.



*No shrinkage on a NPS 30 (DN 750) Class 600 gate valve body simulation.*

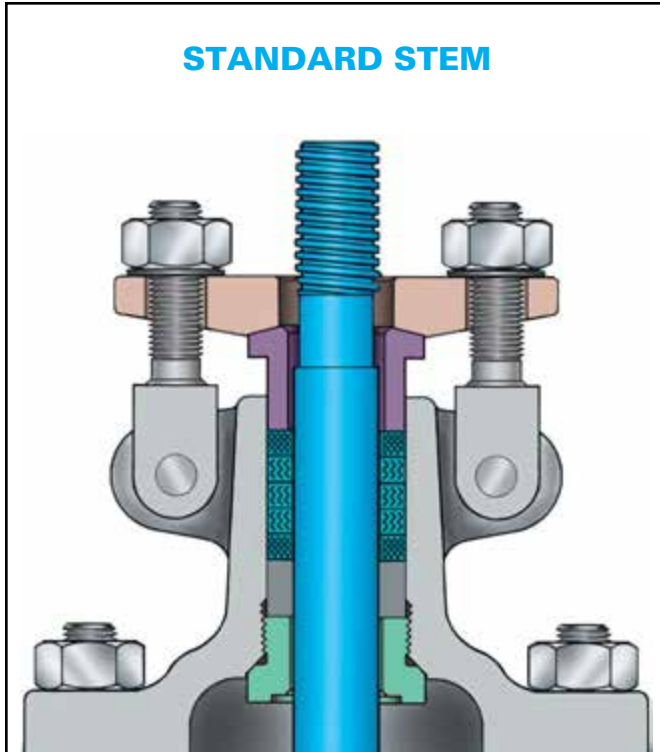
### BENEFITS TO VELAN'S CUSTOMERS AND TO THE FOUNDRIES

- Shorter delivery time.
- Higher quality commercial castings.
- Faster optimization of the methoding system.
- Improved internal integrity of castings at pattern approval.
- Optimized metal flow and solidification pattern.
- Improved prediction of internal defects.
- Reduced scrap.
- Optimized casting design.
- Reduced shrinkage and porosity.
- Reduced NDE (radiographic) upgrading.



# DESIGN OF STEM SEALS

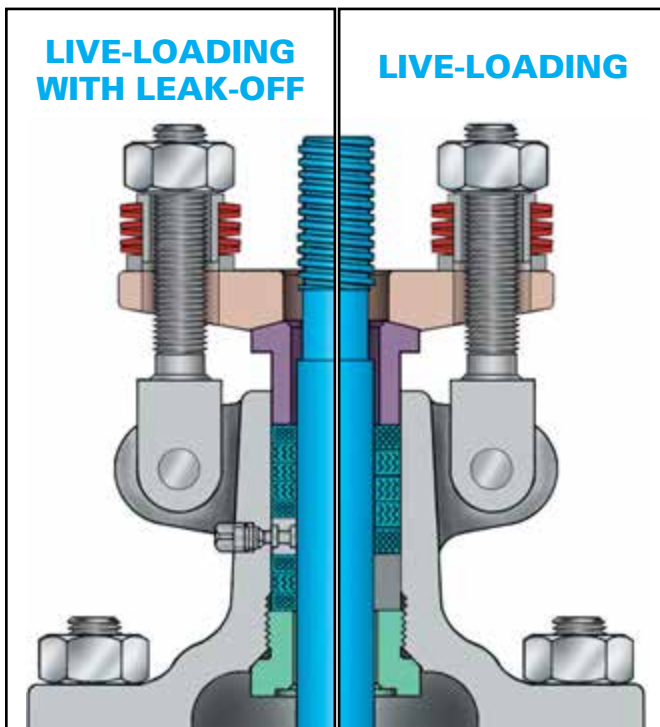
Velan offers standard cast steel bolted bonnet gate and globe valves that are qualification tested for compliance with EPA fugitive emissions regulations as well as ISO 15848 and API 622 standards



The Velan stem seal evolved from these test findings:

- **Ensures leakage of less than 100 ppm** as demonstrated through extensive laboratory testing.
- **Large loads.** Sealing is achieved by consolidation using high density individually die formed (precompressed) packing rings or by cycling and re-torquing. This results in a high compression load and packing forms a mass of low porosity and permeability (4,000 psi for graphite).
- **Small clearances between vital parts.**
- **Precision stem and packing chambers.** Straightness, roundness, and fine finish of the stem and packing chamber wall are essential.
- **Short and narrow packing chambers improve sealing.** Maximum of six rings in a single set chamber.
- **Stem and packing chamber walls.** Close roundness, straightness and superior burnished surface finish of typically 6–8 RMS for the stem and 63 RMS or better for the packing chamber.

## LIVE-LOADING OPTIONS



- **Live-loading.** Two sets of Belleville springs maintain a permanent packing stress of 3,500 – 4,000 psi. Live-loading extends the low emission service life especially in service with large pressure/ temperature transients or frequent cycling.
- **Leak-off.** For critical service, a lantern ring and double packing can be provided with a leak-off connection. The leak-off is provided to allow collection of leakage from the lower packing set.
- **Rings individually compressed in packing chamber** to 3,500 to 4,000 psi for graphite and 2,000 psi PTFE to ensure equal stress distribution and effectiveness of all rings.
- Velan has extensive experience in valve live-loading. The original live-loading concept was developed by Velan in 1972 in a research project for AECL to eliminate leakage in nuclear service. Velan has been supplying live-loaded valves for Nuclear and non-nuclear service for over 40 years.

# 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 test in a valve
<ul style="list-style-type: none"> <li>● Introduced in 2006.</li> <li>● Velan has tested our standard packing set to ISO 15848-1 and re-validated our FE certification.</li> <li>● Uses the “global” test method.</li> <li>● ISO 15848-1 test is carried out with a standard valve and additional bonnet enclosure.</li> </ul>	<ul style="list-style-type: none"> <li>● Introduced in 2006.</li> <li>● Velan has tested our standard packing set to API 622 and re-validated our FE certification.</li> <li>● Uses the “sniffing / flushing” test method (local method).</li> <li>● API 622 test is carried out in a test fixture designed to simulate a valve.</li> </ul>	<ul style="list-style-type: none"> <li>● Introduced in 2011</li> <li>● Intended for fugitive emissions valves</li> <li>● Uses sniffing as a test method</li> <li>● Testing is carried out using assembled valves</li> </ul>

REQUIREMENTS	ISO 15848-1	API 622	API 624
<b>Type test set-up</b>	Valve	Test fixture	Valve
<b>Measurement method</b>	Global (volumetric)	Local (sniffing/flushing)	Local (sniffing)
<b>Units<sup>(1)</sup></b>	mg·s <sup>-1</sup> ·m <sup>-1</sup>	ppmv	ppmv
<b>Test pressure<sup>(2)</sup></b>	Cold working pressure @ ambient or reduced at high temperature	Between zero and 600 psi	ASME B16.34 pressure rating, ambient and at temperature or 600 psi whichever is lower
<b>Test gas</b>	Helium (methane allowed)	Methane	Methane (He allowed)
<b>Thermal cycles</b>	Minimum 2	5	3
<b>Mechanical cycles</b>	Minimum 500	1,510	310
<b>Packing adjustment</b>	One time	One time above 500 ppmv	Not permitted
<b>Qualification class</b>	Class A: Typically bellows seal Class B: Typically PTFE packing Class C: Typically expanded graphite	Not available	Not available
<b>Extension of test validation</b>	50% – 200% stem diameter (similar sealing arrangement)	Not available	NPS 4, 6, & 12 (DN 100, 150, & 300): Class 300 <sup>(3)</sup> NPS 4 (DN 100): Class 1500 <sup>(4)</sup> NPS 4 (DN 100): Class 2500 <sup>(5)</sup>
<b>Production test</b>	ISO 15848-2	Not specified	Not specified

(1) No correlation between mg/second and ppmv.

(2) The test pressure shall be in accordance with the temperature rating for the test valve per ASME B16.34 for the applicable body material and pressure class or 600 psig, whichever is lower.

(3) NPS 4, 6, & 12 (DN 100, 150, and 300): Class 300 qualifies Classes 150–600

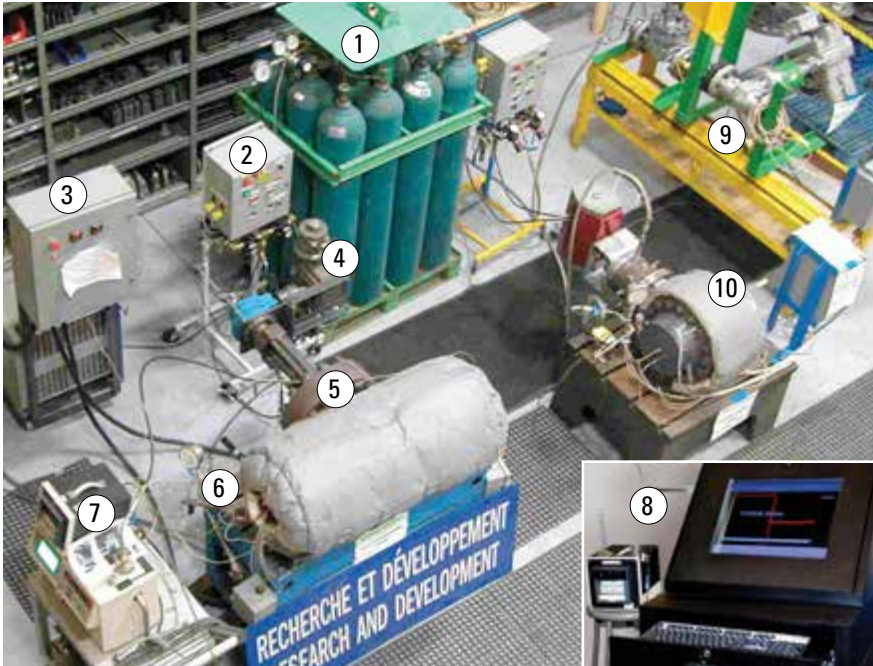
(4) NPS 4 (DN 100): Class 1500 qualifies Classes 900 and 1500

(5) NPS 4 (DN 100): Class 2500 qualifies only Class 2500



# FUGITIVE EMISSION TESTING

## VELAN ISO 15848-1 RESEARCH AND DEVELOPMENT TEST LAB

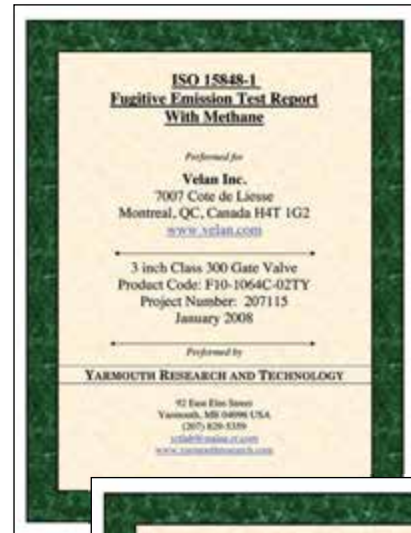


①	Helium source (pressurized cluster bottles)
②	Valve actuator control box
③	Heating system control box
④	Valve actuator
⑤	Qualification valve NPS 8 (DN 200) Class 600 API 600 cast steel gate
⑥	Heating elements
⑦	Mass spectrometer
⑧	Data acquisition system
⑨	Qualification valve NPS 3 (DN 80) Class 600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

## THIRD PARTY FUGITIVE EMISSIONS TESTING OF VELAN VALVES



*A global measurement technique used by ISO 15848-1 provides highest sensitivity to leakage.*



*Local measurement (sniffing) used by API 624 technique pressurizes the valve with gas while checking for leakage with a detector probe.*



# ACCESSORIES

## GEAR, ELECTRIC, AND CYLINDER ACTUATORS

### GEAR ACTUATORS

Gearing is generally applied to valves to make operation easier. The gearing may be, of the spur, bevel, or worm type—any of which may be applied to Velan valves.

The gears and gear brackets may be either cast iron or cast steel and may have cast or cut teeth, depending on the loads and the application. Gearing is too often neglected when valve operation is considered, resulting in unsatisfactory operation that requires expensive changes.



### CYLINDER ACTUATORS

The most commonly used cylinders are actuated by air, but oil and water types are also available if required. In all designs, the valve stem normally serves as a piston rod with the disc fastened directly to it. Tail rods are also supplied as standard equipment to serve as position indicators and for emergency opening. Handwheels and gear heads can be mounted on top of cylinders for operation in an emergency, which may arise due to the loss of operating medium in the cylinder.



Velan cylinders can be furnished with mounting pads for one of the commercial cylinders or valve positioners that provide throttling control. High-pressure cylinders are also available for specific applications.

TYPE	Size	OPTIONAL		STANDARD	
	ASME CLASS	NPS	DN	NPS	DN
GATE	150	6–24	150–600	30–60	750–1500
	300	6–16	150–400	18–36	450–900
	600	4–12	100–300	14–36	350–900
	900	3–6	80–150	8–10	200–250
	1500	3–4	80–100	6–10	150–250
GLOBE	150	6–12	150–300	14–16	350–400
	300	6–12	150–300	14–16	350–400
	600	4–10	100–250	—	—
	900	2–4	50–100	—	—
	1500	2–4	50–100	—	—

### VALVE ACTUATOR SIZING

The Velan philosophy for selecting an actuator is to calculate the required thrust and torque to operate the valve at the required service conditions. A reasonable margin of excess actuator capability over that required is always allowed for in the final actuator selection, but grossly oversized actuators are avoided.

Because of the wide variations in system operating conditions, actuator sizing is based on the following:

### ELECTRIC ACTUATORS

Motorized controls may be applied to valves of almost any size for operation in practically any position or location.

All units, whether installed directly on a valve or on a floor stand, can be manually operated in case of power failure. The units are available for either alternating or direct current.



Motor units supplied by Velan are the high-torque type with windings impregnated to resist both oil and moisture. They are completely weather-proof, explosion-proof (optional), and dust and steam tight. Various sizes and styles are available for different applications, and systems and can be varied to fit special requirements.

ACTUATOR TYPE	LINE PRESSURE	DIFFERENTIAL PRESSURE (CLOSED)	POWER SUPPLY
ELECTRIC	Specified by customer	Specified by customer	Voltage, type, phase, specified by customer
PNEUMATIC	Specified by customer	Specified by customer	Air pressure specified by customer
HYDRAULIC	Specified by customer	Specified by customer	Hydraulic pressure specified by customer
HANDWHEEL/GEAR ACTUATED	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	200 lb. rimpull <sup>(2)</sup> unless otherwise advised by customer

(1) CWP = cold working pressure per ASME B16.34 at 100°F (e.g., Class 150, CWP = 285 psig, 70% of CWP = 200 psig).

(2) Rimpull is defined as the total tangential force acting on the handwheel (e.g., 200 lb rimpull requires 100 lb force per hand). This rimpull figure is given for closing/opening conditions. For running conditions (travel from open to closed or vice versa), the rimpull is considerably less. For details, contact the company.

## OTHER ACCESSORIES

### CHAIN WHEELS

Chain wheels are available for all types of Velan cast steel valves. They may be substituted for a plain handwheel or may be used in addition to the existing handwheel.

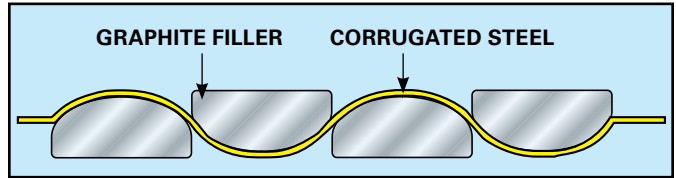
### FLOOR STANDS

Floor stands are available in a number of sizes, and the size to be used depends on the stem size and stem load of the valve.



# BODY-BONNET DESIGN

## BODY-BONNET GASKET DESIGN GATE VALVES WITH OVAL FLANGES



Standard corrugated steel gaskets without graphite as specified in API 600 were found to be an unacceptable choice for low emission service, even under ideal laboratory test conditions, and regardless of the flange finish and gasket load. After testing several alternative gaskets, we selected the best performing gasket in our tests—a corrugated steel gasket with graphite-filled channels.

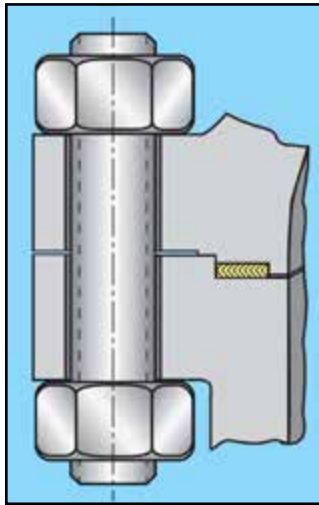
### TYPICAL TEST RESULT

**3,700 cycles with zero ppm for NPS 6 (DN 150)  
Class 150**

### DESIGN FEATURES

- Ensures leakage of no more than 20 ppm as demonstrated through extensive laboratory testing.
- Requires no retorquing after long cycling.
- Effective under wide fluctuations of temperature and pressure.
- Insensitive to flange finish.
- Steel walls of graphite channels provide additional protection from oxidation, corrosion, and blow-out.
- Seal offers the advantage of flexible graphite (0 –14pH, -328°F to +2,000°F).
- Lower bolt torques.
- Modern torquing methods.

## API 600 CAST STEEL VALVES WITH ROUND BODY-BONNET FLANGES



### DESIGN FEATURES

- Full enclosure to allow gasket to retain positive radial support during loading.
- Ensures leakage of no more than 20 ppm as demonstrated through extensive laboratory testing.
- Accurate control of compression through close tolerance of gasket groove and allowance for radial expansion.
- No radial machine marks.
- Close tolerance ( $\pm 0.005"$  or 0.13 mm) for gasket thickness.
- Regular testing of gasket resiliency and inspection at receiving due to sensitivity to inconsistent quality.
- Modern torquing methods.

### FULLY-ENCASED SPIRAL WOUND 316 OR 347 SS/GRAPHITE BODY-BONNET GASKET

<b>Gate</b>	Class 150:	NPS 2–2½ (DN 50–65)
	Class 300–1500:	NPS 2–36 (DN 50–900)
<b>Globe</b>	Class 150–600:	NPS 2–16 (DN 50–400)
<b>Check</b>	Class 150–1500:	NPS 2–36 (DN 50–900)

### TYPICAL TEST RESULT

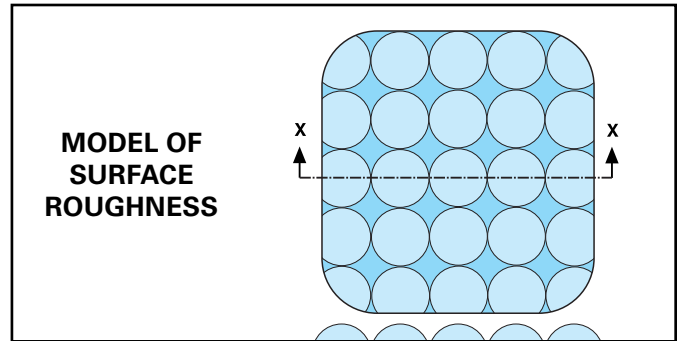
**3,100 cycles with zero ppm for NPS 10 (DN 250)  
Class 300**

# TECHNOLOGY OF SEAT-DISC TIGHTNESS

The initial seat tightness of valves which can be proven by hydro-testing, has little effect on extended long-term tightness.

## SEAT-DISC CONTACT MECHANICS

- When magnified, even a ground, lapped surface appears irregular and rough.
- The rate of leakage is a function of the smoothness and finish of the surfaces.
- The seat-disc (wedge) contacts are on the peaks.
- For absolutely leak-tight joints, the peaks must be deformed with torque until a large portion of mating surfaces is in microscopic contact.
- The compression stress is approximately three times the yield (for 70,000 psi–210,000 psi).
- Sufficient contact pressure generated by the torque is essential. A small increase in contact pressure produces a rapid decrease in leakage.
- The valve seat should be either very narrow or very wide, depending on the valve type.



<b>Globe valves</b>	Conical seat-line contact
<b>Gate and API 594 swing check valves</b>	Large, flat-faced seats

## VELAN API 600 GATE VALVE SEAT TIGHTNESS

### GATE VALVE SEAT TIGHTNESS

- Welded-in CoCr alloy faced seats and a flexible wedge in 13Cr, SS 316, Monel, or hardfaced with CoCr alloy.
- Seating faces ground and lapped to 2 RMS.

Factory acceptance standard for gate valve seat leakage

Size		Velan standard	Multiplier K API 598 – 2009	
NPS	DN		Low pressure test	High pressure test
≤ 2	≤ 50	0	0	0
2½–12	65–300	0	4	2
14 ≥	350 ≥	2	4	2

Allowable leakage = (K) x (NPS)

Bubbles/min. for low-pressure test  
Drops/min. for high-pressure test

## 8 IMPORTANT STEPS IN ASSEMBLY AND TESTING

### MAKE THE DIFFERENCE IN SEAT TIGHTNESS AND PERFORMANCE



**1** Automatic seal welding of CoCr alloy hardfaced seats.

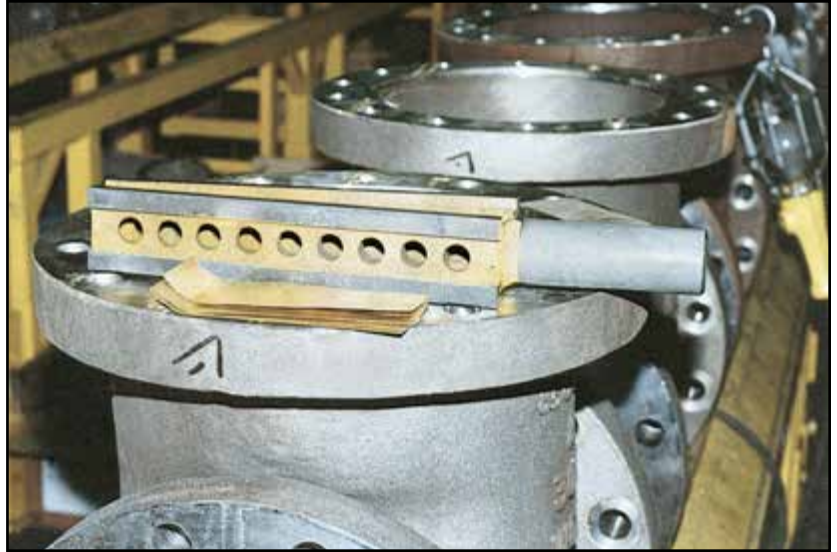


**2** Air-under-water test of the seat's welds.





**3** Relapping of seating faces after seal welding.



**4** Determination of final seat/seat angle with gauge and shims to determine ideal wedge angle (NPS 6–60 (DN 150–1,500)).



**5** Precision grinding of individually fit wedge seating surfaces.



**6** Lapping of wedge seating surfaces.



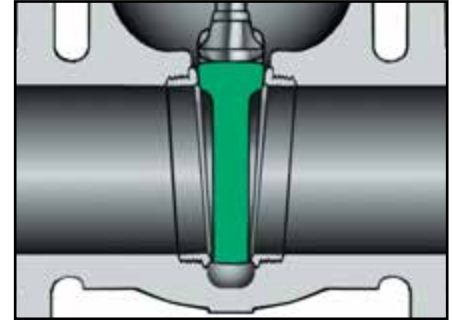
**7** Assigning the ideally fitted wedge, ground and lapped, to its proper valve body.



**8** After assembly, pressure testing of shell, seats, packing, and backseat to API 598.

# VELAN API 600 GATE VALVES

## FLEXIBLE WEDGE VERSUS SOLID WEDGE



### Flexible round wedge pioneered by Velan

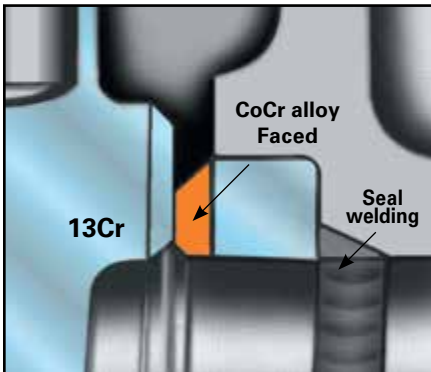
- Universal use for temperatures up to 1,000°F (538°C).
- Flexibility compensates for seat face distortion.
- Compensates for deformation of body due to pipe stresses.
- Long cycle life.
- Ideal for processes with large temperature fluctuations.

- Assures valve tightness on both seats over wide range of pressures.
- Stem-to-wedge connection is inside the seating faces supporting the wedge ears during opening. More robust with less mass.

### Classical solid wedge on competitive designs

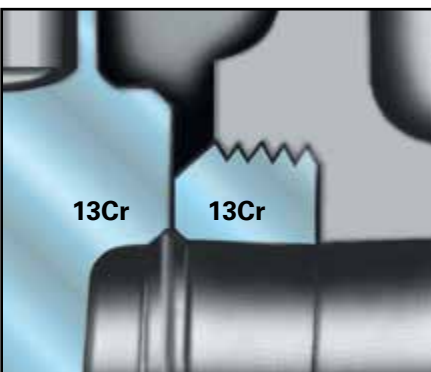
- Wedge may cause severe jamming at temperatures over 200°F (93°C).
- Suitable for small valves NPS ½ –2, (DN 15–50).
- Wedge will stick when valve is closed hot and allowed to cool.
- No compensation for deformation of body due to pressure-temperature or pipe stresses.
- Difficult to make valve tight on both seats due to seat face distortion.

## SEAL WELDED SEATS VERSUS SCREWED-IN SEATS



### Velan standard ground and lapped seal welded seat rings faced with CoCr alloy

- Pioneered by Velan and considered state-of-the-art technology.
- Welded-in leakproof.
- Weld quality 100% tested.
- CoCr alloy seating faces for long service life.
- Ground and lapped to 2 RMS finish after weld-in.
- Standardized use for steam up to 1,000°F (538°C), oil and gas.
- CoCr alloy face will wear less than the 13Cr wedge, which can easily be repaired or replaced.



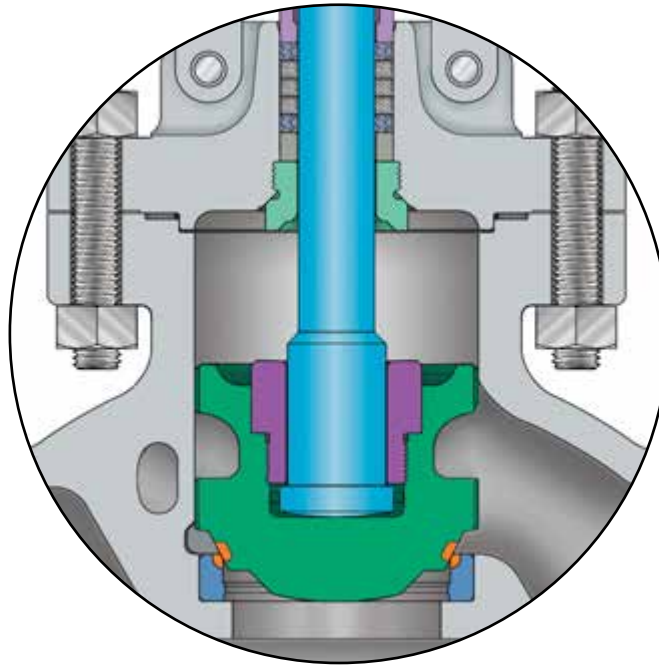
### Competing screwed-in seats in 13Cr

- Can loosen up due to corrosion and cause substantial leakage.
- Replacement is difficult if not impossible.
- Threads can corrode and cause leakage.
- Seat is unsecured from unscrewing.
- Seat can become loose due to temperature fluctuations, corrosion, or vibration, and can leak.
- Not suitable for steam service. Steam and other fluids will wear draw body threads of loose seats beyond repair.
- 13Cr seat suitable only for certain fluids.



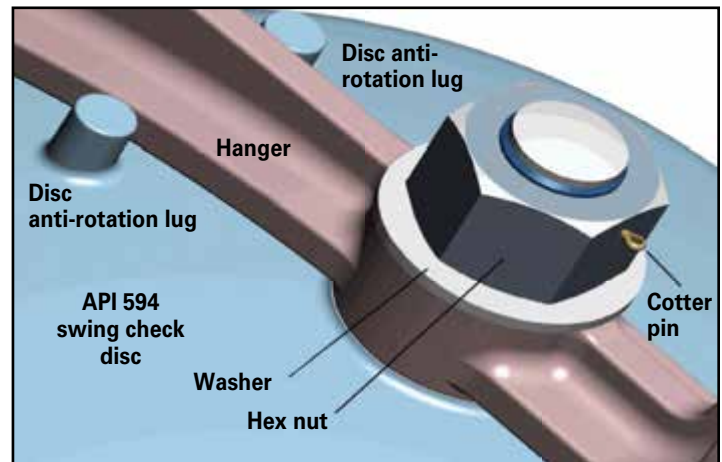
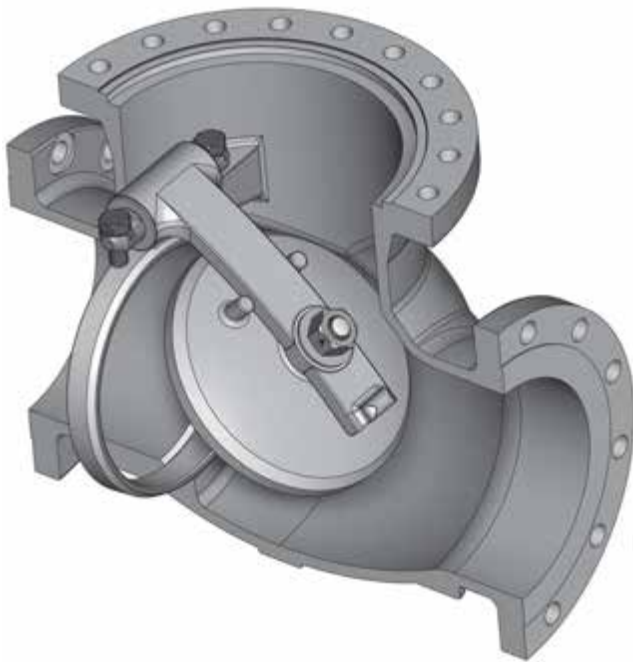
## VELAN GLOBE VALVES CONICAL SEATS

- Line contact seal.
- Contact pressure increased by 1.5 to 5 times with same stems and yokes.



- Seat has good elasticity.
- Low closing torques.
- Ideal for high pressure-temperature.

## VELAN API 594 SWING CHECK VALVES



**API 594 swing check disc assembly detail**

- Cage unit design with no penetration of body prevents:
  - a) Possibility of leakage with gasketed or packed hinge pin.
  - b) Possibility of pin ejection.
- All parts are accessible from the top for easy servicing.
- Welded-in seat faced with CoCr alloy.
- Non-rotating disc.
- Ground and lapped seating surfaces.

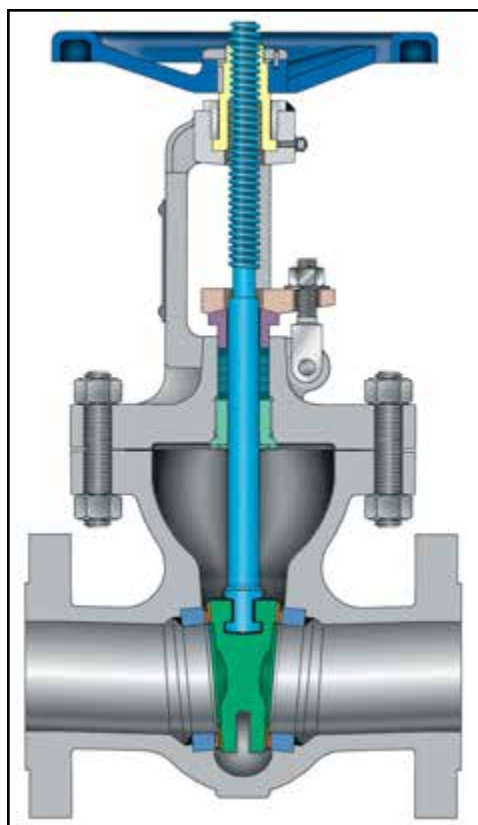
\* CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite, and other approved manufacturers.



# VELAN CAST STEEL API 600 GATE VALVES

## BOLTED BONNET CAST CARBON, STAINLESS OR ALLOY STEEL

NPS 2–64 (DN 50–1600), ASME CLASSES: 150– 1500



ASME CLASS	FIGURE NUMBER
150	0064C
300	1064C
600	2064C
900	7064C
1500	3064C

### STANDARD MATERIALS

PART	MATERIALS			
	WC6	WC9	CF8M	
Body <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Bonnet <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Stem <sup>(1)(3)</sup>	SS 410			SS 630, 600 or SS 316
Wedge <sup>(1)</sup>	CA 15 or 13Cr faced WCB	CA 15 or 13Cr faced WC6	CA 15 or 13Cr faced WC9	CF8M
Seat <sup>(1)(2)</sup>	CoCr alloy faced carbon steel	CoCr alloy faced F11	CoCr alloy faced F22	CoCr alloy faced F316
Packing flange	Carbon steel			Stainless steel
Gland bushing	Carbon steel			Stainless steel
Packing ring <sup>(1)</sup>	Graphite			Graphite
Gland stud	Gr. B or B7 <sup>(4)</sup>			F316, B8M or 630 <sup>(5)</sup>
Gland nut	Gr. 2H			Gr. 8M
Body/bonnet nut	Gr. 2H	Gr. 4		Gr. 8M
Body/bonnet stud	B7	B16		B8M or 630
Back seat <sup>(1)(3)</sup>	SS 410			SS 316
Gasket <sup>(1)</sup>	Class 150: corrugated steel/graphite Class 300–1500: spiral wound stainless steel/graphite			
Key	Carbon steel			
Yoke bushing	Carbon steel			Stainless steel
Bearing	Steel			
Handwheel nut	Malleable iron or steel			
Handwheel <sup>(1)</sup>	Malleable iron or ductile iron			
Grease fitting	Steel			
Groove pin	Carbon steel			Stainless steel
Bushing	Carbon steel			Stainless steel
Washer	Carbon steel			Stainless steel
Name plate	Stainless steel			
Identification tag	Stainless steel			
Rivet	Stainless steel			
Stem nut	A 439 Austenitic ductile iron Gr. D-2C			

(1) Other materials available.

(2) Hardfaced.

(3) Hardened.

(4) For eye bolts Gr. B, for studs B7 is used.

(5) For eye bolts F316, for studs B8M or 630 is used.

### DESIGN FEATURES

- **Universal trim.** 13Cr stem, wedge in CA 15 or 13Cr faced, and CoCr alloy faced seat API Trim 8 suitable for applications up to 850°F (454°C).
- **Seat face** CoCr alloy hardfaced, ground, and lapped to a mirror finish.
- **Flexible wedge** with low center stem-wedge contact, in solid CA15 (13Cr) or hardfaced with 13Cr, SS 316, Monel or CoCr alloy. Wedge is ground and lapped to a mirror finish and tightly guided to prevent dragging and seat damage. A CoCr alloy hardfaced CF8M wedge is also available.
- **Non-rotating stem** with precision Acme threads and burnished finish. Double Acme for faster operation.
- **Body and bonnet joint** accurately machined. Gasket materials on page 5, details on page 15.
- **Body and bonnet** castings are precision machined. One-piece bonnet up to NPS 12 (DN 300) for better alignment and fewer parts.
- **Gland** has two-piece construction for easy alignment.
- **Flanges:**  
ASME Classes 150–300: 1/16" raised face.  
ASME Classes 600–1500: 1/4" raised face.  
Finish 125–250 AARH for all valves.
- **Rotating stem nut** is Austenitic ductile iron Gr. D-2C renewable in line (as shown). Thrust bearings are supplied as follows:  
ASME Classes 150–300:  
NPS 10–12 (DN 250–300), 1 bearing (top),  
NPS 16 (DN 400) and up, two bearings  
ASME Classes 600–1500: NPS 6 (DN 150) and up.



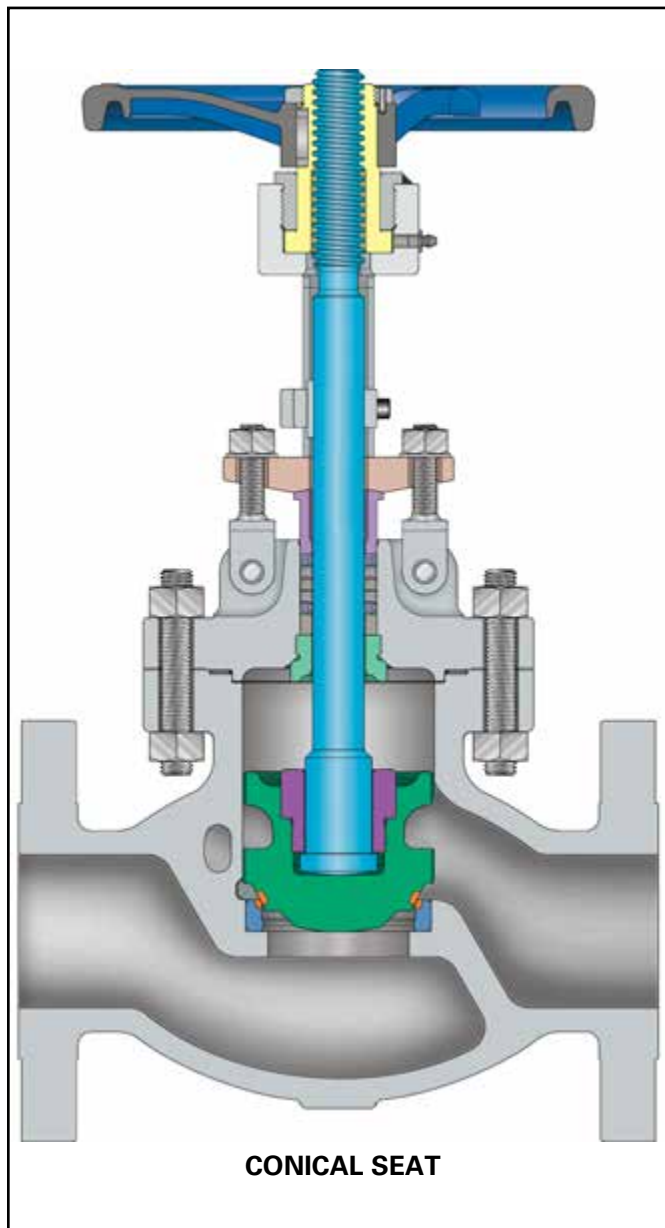


# VELAN CAST STEEL GLOBE & STOP CHECK VALVES

## BOLTED BONNET CAST CARBON, STAINLESS OR ALLOY STEEL

NPS 2–24 (DN 50–600), ASME CLASSES: 150–1500

### NOW THE ONLY GLOBE VALVE WITH NON-ROTATING STEM



All sizes and pressure classes have conical seats.

For information on BELLOWS SEAL VALVES see VEL-BS catalog.

### DESIGN FEATURES:

- **Non-rotating stem** with precision Acme threads and burnished finish. Valve suitable for horizontal installation.
- **Universal trim.**  
13Cr stem, 13Cr faced disc, and CoCr alloy faced seats API Trim 8 suitable for service up to 850°F (454°C).
- **Seat face** CoCr alloy hardfaced, ground, and lapped to a mirror finish. Conical seat machined to 8 RMS.
- **Tapered disc.**  
Body guided disc accurately mates the hardfaced surface of the disc with the surface of the seat, hardfaced with 13Cr, CoCr alloy, SS 316, or Monel, ground and lapped with seat.  
  
Disc in SS 316 hardfaced with CoCr alloy also available.  
  
NPS 2–6 (DN 50–150) valves may have solid CA15 (13Cr) discs.
- **Body and bonnet.**  
Castings are precision machined. One-piece bonnet for better alignment, fewer parts.
- **Stuffing box** finish to 63 RMS or better.
- **Body and bonnet joint** accurately machined. Fully enclosed gasket. Gasket materials on page 5. Details on page 15.
- **Gland** has two-piece construction for easy alignment.
- **Rotating stem nut.**  
Austenitic ductile iron Gr. D-2C, renewable in-line.
- **Torque arm** reduces wear on packing rings and enables better sealing and reduces torque.
- **Impactor handwheels.**  
Globe and stop check valves require higher closing torques than gate valves with the same seat diameter and pressure class. The most economical mechanism for tight shutoff is the impactor handwheel. Two lugs cast under the wheel strike simultaneous blows and give 3–10 times the closing force of standard handwheels. Impactor handwheels are supplied at manufacturer's option unless specified by customer (see page 23).
- **Flanges:**  
ASME Classes 150–300:  $\frac{1}{16}$ " raised face.  
ASME Classes 600–1500:  $\frac{1}{4}$ " raised face.  
Finish 125–250 AARH for all valves.

## STANDARD MATERIALS

PART	MATERIALS			
	WCB	WC6	WC9	CF8M
Body <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Bonnet <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Seat <sup>(1)(2)</sup>	CoCr alloy faced carbon steel	CoCr alloy faced F11	CoCr alloy faced F22	CoCr alloy faced F316
Disc	CA 15 or faced A105	CA 15 or 13Cr faced F11	CA 15 or 13Cr faced F22	CF8M or F316
Disc nut	Carbon steel			SS 304 or 316
Stem <sup>(1)(3)</sup>	SS 410			SS 316 or 630
Backseat <sup>(1)(3)</sup>	SS 410			SS 316
Packing ring <sup>(1)</sup>	Graphite			
Gland stud	Gr. B or B7 <sup>(4)</sup>			F316, B8M or 630 <sup>(5)</sup>
Gland nut	Gr. 2H			Gr. 8M
Packing flange	Carbon steel			SS
Gland bushing	Carbon steel			SS
Bonnet stud	B7	B16		B8M or 630
Bonnet nut	Gr. 2H	Gr. 4		Gr. 8M
Hinge pin	Steel			SS
Gasket <sup>(1)</sup>	Spiral wound stainless steel/graphite			
Torque arm	Carbon steel			
Yoke bushing	Carbon steel			Stainless steel
Stem nut	A 439 Austenitic ductile iron Gr. D-2C			
Handwheel nut	Malleable iron or steel			
Handwheel <sup>(1)</sup>	Malleable iron or Ductile iron			

(1) Other materials available.

(2) Hardfaced.

(3) Hardened.

(4) For eye bolts Gr.B, for studs B7 is used.

(5) For eye bolts F316, for studs B8M or 630 is used.

## DESIGN SPECIFICATIONS

ITEM	APPLICABLE SPECIFICATION
General design	BS 1873
Wall thickness	API 600
Pressure-temperature rating	ASME B16.34
Face-to-face dimensions for butt weld and flanged valves	ASME B16.10
Flange design	ASME B16.5
Butt welding design	ASME B16.25
Materials	ASTM

ASME CLASS	FIGURE NUMBERS		
	GLOBE	STOP CHECK	NEEDLE
150	0074C	0084C	0094C
300	1074C	1084C	1094C
600	2074C	2084C	2094C
900	7074C	7084C	7094C
1500	3074C	3084C	3094C

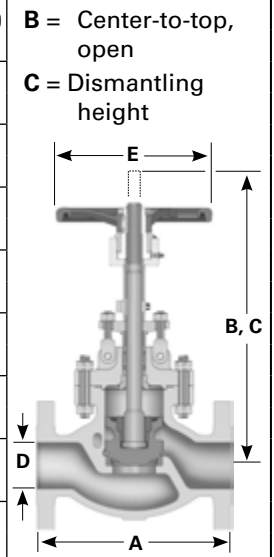
**Forged globe valves**  
**ASME Classes 900–2500 and**  
**Inclined cast globe valves**  
**ASME Classes 900–2500 also available**

## GLOBE VALVE DIMENSIONS

SIZE	ASME CLASS 150					ASME CLASS 300					ASME CLASS 600					ASME CLASS 900					ASME CLASS 1500									
	NPS DN	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E				
2	8.00	16.85	20.88	2.00	8	10.50	16.85	20.88	2.00	8	11.50	17.10	21.13	2.00	10	14.50	19.75	25.00	1.88	18	14.50	19.75	25.00	1.88	18	14.50	19.75	25.00	1.88	18
50	203	428	530	51	203.2	267	428	530	51	203	292	434	537	51	254	368	502	635	48	457	368	502	635	48	457	368	502	635	48	457
2½	8.50	17.10	21.25	2.50	10	11.50	17.10	21.25	2.50	10	13.00	18.67	22.88	2.50	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
65	216	434	540	64	254	292	434	540	64	254	330	474	581	64	254	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	9.50	18.42	22.75	3.00	10	12.50	18.42	22.75	3.00	10	14.00	20.19	24.13	3.00	14	15.00	24.09	30.50	2.88	14 <sup>(2)(3)</sup>	18.50	24.09	30.50	2.75	14 <sup>(2)(3)</sup>	18.50	24.09	30.50	2.75	14 <sup>(2)(3)</sup>
80	241	468	578	76	254	318	468	578	76	254	356	513	613	76	356	381	612	775	73	356	470	612	775	70	356	470	612	775	70	356
4	11.50	20.88	26.18	4.00	14	14.00	20.88	26.18	4.00	14	17.00	23.88	29.25	4.00	24 <sup>(2)(3)</sup>	18.00	27.50	35.38	3.88	18.00	–	–	–	–	–	–	–	–	–	–
100	292	530	665	102	356	356	530	665	102	356	432	607	743	102	610	457	699	899	99	457	–	–	–	–	–	–	–	–	–	–
6	16.00	25.75	32.00	6.00	24	17.50	26.38	32.88	6.00	24 <sup>(2)(3)</sup>	22.00	31.22	37.88	6.00	24 <sup>(2)(3)</sup>	24.00	39.13	45.03	5.75	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
150	406	654	813	152	610	445	670	835	152	610	559	793	962	152	610	610	939	1143	146	610	–	–	–	–	–	–	–	–	–	–
8	19.50	30.73	38.38	8.00	24	22.00	32.00	38.88	8.00	24 <sup>(2)(4)</sup>	26.00	41.75	57.88	8.88	24 <sup>(4)</sup>	29.00	50.13	62.63	7.50	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
200	495	780	975	203	610	559	813	988	203	610	660	1060	1470	200	610	737	1273	1590	191	610	–	–	–	–	–	–	–	–	–	–
10	24.50	39.25	46.75	10.00	24 <sup>(2)(3)</sup>	24.50	42.34	52.18	10.00	24 <sup>(2)(4)</sup>	31.00	47.16	59.00	9.75	24 <sup>(4)</sup>	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
250	622	997	1187	254	610	622	1075	1325	254	610	787	1198	1499	248	610	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–
12	27.50	42.52	53.00	12.00	24 <sup>(2)(4)</sup>	28.00	46.19	62.75	12.00	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
300	699	1080	1346	305	610	711	1173	1594	305	610	–	–	–	–	–	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–
14	31.00	54.21	65.44	13.25	24 <sup>(4)</sup>	33.00	54.21	72.00	13.25	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
350	787	1377	1662	337	610	838	1377	1829	337	610	–	–	–	–	–	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–
16	36.00	59.94	72.63	15.25	24 <sup>(4)</sup>	34.00	59.94	76.00	15.25	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
400	914	1522	1845	387	610	863	1522	1930	387	610	–	–	–	–	–	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–
18	38.50	59.62	75.00	17.50	24 <sup>(4)</sup>	38.50	59.62	75.00	17.50	24 <sup>(2)</sup>	–	–	–	–	–	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
450	978	1514	1905	444	610	978	1514	1905	444	610	–	–	–	–	–	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–
24	51.00	85.00	119.00	21.00	24 <sup>(4)</sup>	55.00	85.00	119.00	21.00	24 <sup>(2)</sup>	–	–	–	–	–	–	–	–	–	24 <sup>(4)</sup>	–	–	–	–	–	–	–	–	–	–
600	1295	2159	3023	533	610	1397	2159	3023	533	610	–	–	–	–	–	–	–	–	–	610	–	–	–	–	–	–	–	–	–	–

(1) Height does not include actuators. (2) Impactor handwheel.

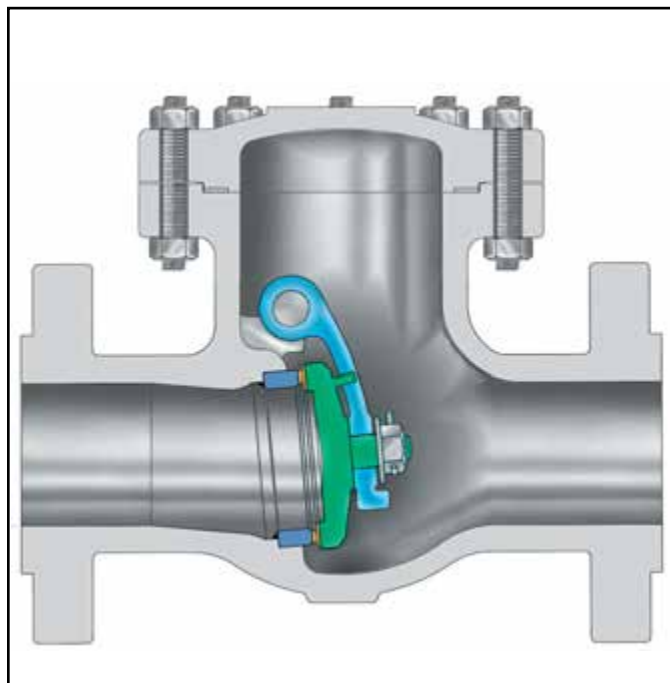
(3) Gear actuator is optional. (4) Gear actuator.



# VELAN CAST STEEL API 594 SWING CHECK VALVES

## CAST CARBON, STAINLESS OR ALLOY STEEL

NPS 2–48 (DN 50–1200), ASME CLASSES: 150–1500



### STANDARD MATERIALS

PART	MATERIALS			
Body <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Seat <sup>(1)(2)</sup>	CoCr alloy faced CS	CoCr alloy faced F11	CoCr alloy faced F22	CoCr alloy faced F316
Hinge pin <sup>(1)(3)</sup>	SS 410			SS 630 or 660
Gasket <sup>(1)</sup>	Spiral wound stainless steel/graphite			
Cover stud	Gr. B7	B16		B8M or 630
Cover nut	Gr. 2H	Gr. 4		Gr. 8M
Cover <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Washer	Commercial			
Disc <sup>(1)</sup>	CA 15 or 13Cr faced WCB	CA 15 or 13Cr faced WC6	CA 15 or 13Cr faced WC9	CF8M
Disc hanger	WCB	WC6	WC9	CF8M
Disc nut	Gr. 2H	Gr. 4		Gr. 8M

(1) Other materials available.

(2) Hardfaced.

(3) Hardened.

See catalog VEL-PS for FORGED STEEL CHECK VALVES  
ASME Classes 900–2500.

### DESIGN FEATURES

- Body and cover.**  
Precision machined castings.  
**Exclusive:** Disc shaft does not penetrate body.
- Body and cover joint.**  
Accurately machined, fully-enclosed gasket (gasket materials on page 5).
- Disc.**  
Robust one-piece construction to withstand the severe shock of check valve service. Hardfaced with 13Cr, CoCr alloy, SS 316, or Monel, ground and lapped to a mirror finish. Sizes NPS 2–6 (DN 50–150) may have solid CA 15 (13Cr) disc. SS 316 disc with CoCr alloy facing also available.
- Disc assembly.**  
Non-rotating disc is fastened securely to disc hanger with a lock nut and cotter pin. Disc hanger is supported on a sturdy disc carrier hinge pin of excellent bearing qualities. All parts are accessible from top for easy servicing.
- Flanges:**  
ASME Classes 150–300: 1/16" raised face.  
ASME Classes 600–1500: 1/4" raised face.  
Finish 125–250 AARH for all valves.



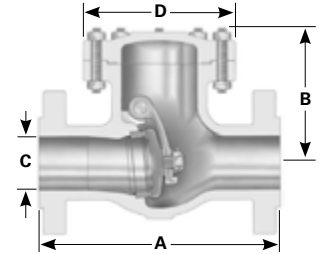
## DESIGN SPECIFICATIONS

ITEM	APPLICABLE SPECIFICATION
Wall thickness and general valve design	API 594
Pressure-temperature rating	ASME B16.34
Face-to-face dimensions for butt weld and flanged valves	ASME B16.10
Flange design	ASME B16.5
Butt welding design	ASME B16.25
Materials	ASTM

CLASS	FIGURE NUMBER	CLASS	FIGURE NUMBER
150	0114C	900	7114C
300	1114C	1500	3114C
600	2114C		

See page 30 and 31 for valve weights and CVs.

Other sizes on application.

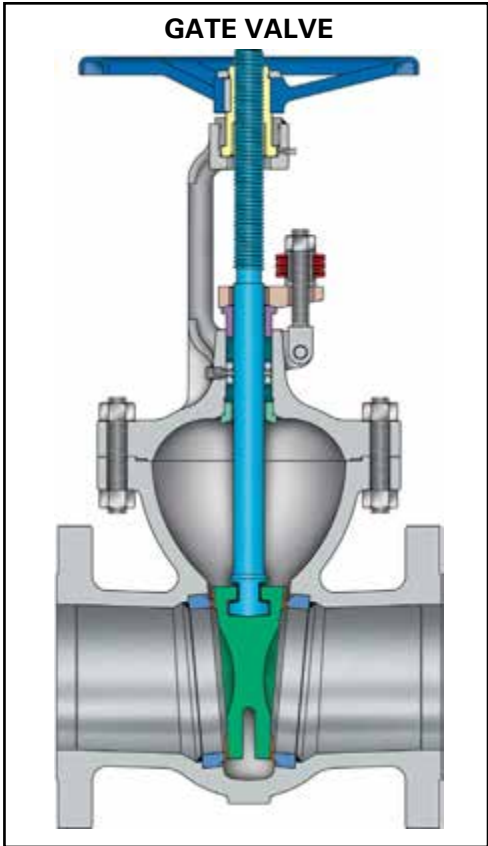


## CHECK VALVE DIMENSIONS

SIZE NPS DN	ASME CLASS 150				ASME CLASS 300				ASME CLASS 600				ASME CLASS 900				ASME CLASS 1500			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
2	8.00	5.75	2.00	6.75	10.50	6.00	2.00	6.75	11.50	6.25	2.00	6.75	14.50	9.50	1.88	8.63	14.50	9.50	1.88	8.63
50	203	146	51	171	267	152	51	171	292	159	51	171	368	241	48	219	368	241	48	219
2½	8.50	6.25	2.50	6.75	11.50	6.25	2.50	6.75	13.00	6.50	2.50	7.50	16.50	10.00	2.25	9.25	16.50	10.00	2.25	9.25
65	216	159	64	171	292	159	64	171	330	165	64	191	419	254	57	235	419	254	57	235
3	9.50	7.75	3.00	8.50	12.50	7.75	3.00	8.50	14.00	8.75	3.00	9.75	15.00	10.50	2.88	10.50	18.50	11.50	2.75	10.50
80	241	197	76	216	318	197	76	216	356	222	76	248	381	267	73	267	470	292	70	267
4	11.50	8.75	4.00	10.25	14.00	8.75	4.00	10.25	17.00	9.25	4.00	12.00	18.00	11.75	3.88	12.25	21.50	12.00	3.63	12.25
100	292	222	102	260	356	222	102	260	432	235	102	305	457	299	99	311	546	305	92	311
6	14.00	10.75	6.00	12.50	17.50	10.75	6.00	12.50	22.00	11.50	6.00	15.75	24.00	15.00	5.75	15.25	27.75	16.50	5.38	16.00
150	356	273	152	318	445	273	152	318	559	292	152	400	610	381	146	387	705	419	137	406
8	19.50	12.75	8.00	15.75	21.00	12.75	8.00	15.75	26.00	13.50	7.88	15.75	29.00	19.25	7.50	18.38	32.75	21.00	7.00	20.75
200	495	324	203	400	533	324	203	400	660	343	200	400	737	489	191	467	832	533	178	527
10	24.50	15.50	10.00	18.50	24.50	16.25	10.00	18.50	31.00	16.75	9.75	19.50	33.00	21.98	9.38	22.25	39.00	23.93	8.75	22.75
250	622	394	254	470	622	413	254	470	787	425	248	495	838	558	238	565	991	608	222	578
12	27.50	17.00	12.00	20.50	28.00	17.00	12.00	20.50	33.00	18.50	11.75	22.50	-	-	-	-	-	-	-	-
300	699	432	305	521	711	432	305	521	838	470	298	572	-	-	-	-	-	-	-	-
14	31.00	19.63	13.25	23.00	33.00	19.63	13.25	23.00	35.00	20.93	12.88	26.25	-	-	-	-	-	-	-	-
350	787	499	337	584	838	499	337	584	889	532	327	667	-	-	-	-	-	-	-	-
16	34.00	22.00	15.25	26.50	34.00	22.50	15.25	26.50	39.00	23.38	14.75	28.25	-	-	-	-	-	-	-	-
400	864	559	387	673	864	572	387	673	991	594	375	718	-	-	-	-	-	-	-	-
18	38.50	25.00	17.13	28.50	38.50	25.00	17.13	28.50	43.00	28.67	16.50	31.50	-	-	-	-	-	-	-	-
450	978	635	435	724	978	635	435	724	1092	728	419	800	-	-	-	-	-	-	-	-
20	38.50	26.50	19.00	31.50	40.00	26.50	19.00	31.50	47.00	27.12	18.25	35.25	52.00	34.95	17.50	37.25	-	-	-	-
500	978	673	483	800	1016	673	483	800	1194	689	464	895	1320	887	444	946	-	-	-	-
24	51.00	31.25	23.25	37.00	53.00	31.25	23.25	37.00	55.00	35.69	22.00	40.25	-	-	-	-	-	-	-	-
600	1295	794	591	940	1346	794	591	940	1397	907	559	1022	-	-	-	-	-	-	-	-
26	51.00	32.63	25.00	37.25	-	-	-	-	57.00	38.49	23.75	44.00	-	-	-	-	-	-	-	-
650	1295	829	635	946	-	-	-	-	1448	980	603	1118	-	-	-	-	-	-	-	-
28	57.00	36.55	27.00	42.00	59.00	36.55	27.00	42.00	-	-	-	-	-	-	-	-	-	-	-	-
700	1448	928	686	1067	1499	928	686	1067	-	-	-	-	-	-	-	-	-	-	-	-
30	60.00	36.89	29.25	44.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
750	1524	937	743	1130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	64.00	40.30	30.75	47.25	-	-	-	-	-	-	-	-	70.00	47.56	25.25	50.00	-	-	-	-
800	1626	1026	781	1200	-	-	-	-	-	-	-	-	1778	1280	641	1270	-	-	-	-
34	-	-	-	-	64.00	42.38	32.75	48.75	-	-	-	-	-	-	-	-	-	-	-	-
850	-	-	-	-	1626	1076	832	1238	-	-	-	-	-	-	-	-	-	-	-	-
36	77.00	41.78	35.25	53.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
900	1956	1061	895	1346	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	80.00	47.01	36.63	53.00	-	-	-	-	-	-	-	-	81.50	50.38	30.00	57.00	-	-	-	-
950	2032	1194	930	1346	-	-	-	-	-	-	-	-	2070	1280	762	1448	-	-	-	-
42	78.00	49.72	37.88	63.50	78.00	53.22	37.88	63.50	-	-	-	-	-	-	-	-	-	-	-	-
1050	1981	1263	962	1613	1981	1352	962	1613	-	-	-	-	-	-	-	-	-	-	-	-
48	94.00	55.00	46.00	61.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1200	2388	1397	1168	1549	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# VELAN SPECIAL SERVICES

## LIVE-LOADED VALVES



### CAST STEEL GATE, NPS 2–64 (DN 50–1600) CAST STEEL GLOBE, NPS 2–24 (DN 50–600)

ASME CLASSES: 150–1500 WITH SINGLE OR DOUBLE PACKING,  
LEAK-OFF AND LIVE-LOADING

#### DESIGN FEATURES

- Safer and tighter stem seal.
- Short and narrow packing chamber improves sealing effectiveness.
- Long-life leakproof packing chamber with double packing and leak-off or single set packing.

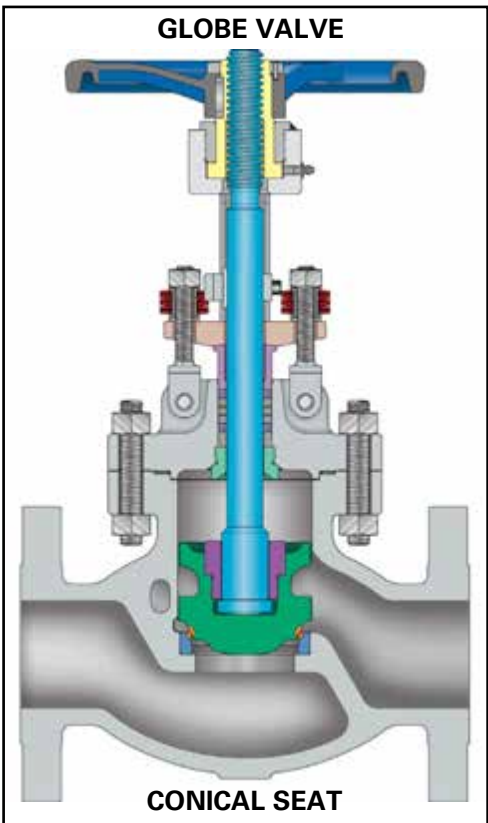
##### Double packing

Two sets of graphite packing rings compressed to 4000 psi. A lantern ring and leak-off provide option for removal of leakage, if any, from lower packing set.

##### Single set packing

Three or four graphite rings between braided rings, 90-95 lbs./cu. ft. density.

- Live-loading.  
Two sets of Belleville springs keep stem tight for long periods of time reducing frequency of maintenance.
- Two-piece stem drive is renewable in-line.
- Stronger leakproof body-bonnet joint.
- Class 150 corrugated graphite-filled steel gasket.
- Classes 300–1500 have round bonnet and fully encased spiral wound gasket
- Welded-in seats hardfaced with CoCr alloy.
- Flexible one-piece wedge, hardfaced with CoCr alloy or 13Cr (solid 13Cr up to NPS 8 (DN 200)).
- 13Cr hardened stem with mirror-like, burnished finish for longer packing life.



For dimensions on gate valves see page 21.

For other globe valve design features see page 22.

For dimensions on globe valves see page 23.

For BELLOWS SEAL GATE AND GLOBE VALVES  
NPS ½–12 (DN 15–300) see catalog VEL-BS.

Note: For gate valves larger than NPS 24 (DN 600), wall thickness is based on B16.34 plus additional wall thickness allowance.

# VELAN SPECIAL SERVICES



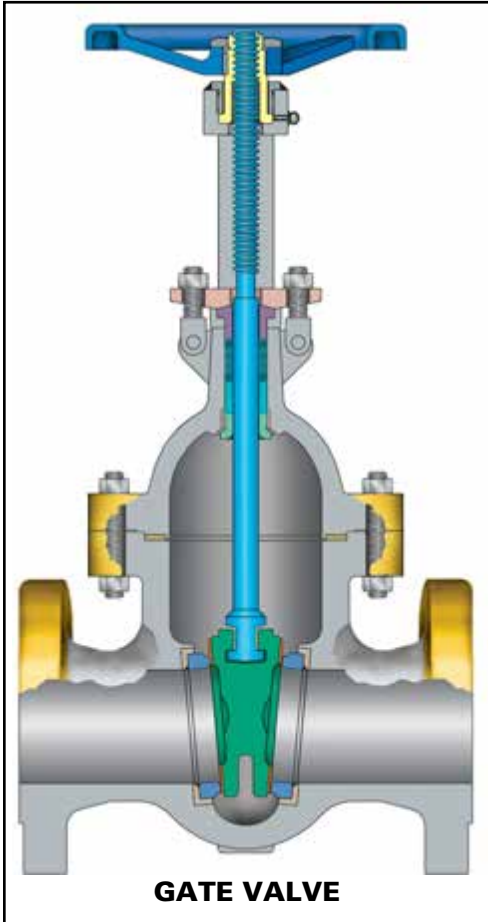
## HYDROFLUORIC (HF) ACID PROCESSING VALVES

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.

### HF ACID GATE, GLOBE AND CHECK VALVES CARBON STEEL AND MONEL, NPS 2–36 (DN 50–900)

PRESSURE CLASSES 150–300

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 60 years. Velan offers a comprehensive line of Phillips-approved and UOP-listed HF acid gate, globe, and check valves with several benefits.



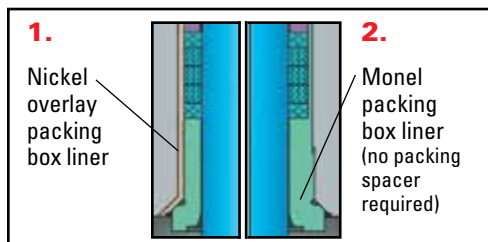
GATE VALVE

### DESIGN FEATURES

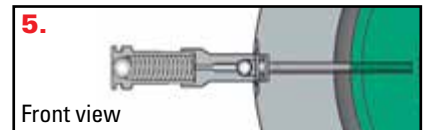
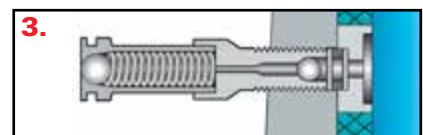
- **Nickel plated overlay on backseat in stem hole** to combat severe alkylation conditions.
- **HF acid detecting paint** to ensure valve integrity.
- **Stem** made from solid age hardened K-Monel 500 for increased strength and corrosion resistance.
- **Casting design** X ray "RT" quality castings as per B16.34 acceptance standards. Velan is one of the first valve manufacturers to have the MAGMASOFT® computer casting simulation program to ensure high quality levels.
- **Bonnet joint** accurately machined for better service life.
- **Seal welded seats in Monel.** Monel seats are welded-in to ensure zero leakage behind and around the seat and then ground and lapped after welding using state-of-the-art technology to prevent in-service corrosion.
- **Body/bonnet wall thickness** to API 600.
- **Velan's low-fugitive emissions guarantee.** Based on extensive laboratory testing and field experience.

### OPTIONAL DESIGN FEATURES

1. **Nickel overlay packing box liner.**
2. **Packing box in Monel** to combat severe alkylation conditions in this critical area.



3. **Grease injector and lantern ring:** where grease injection is a requirement (UOP only).
4. **PTFE seat insert:** resists abrasion and corrosion.
5. **PTFE seat seal grease injection:** when required (UOP only).

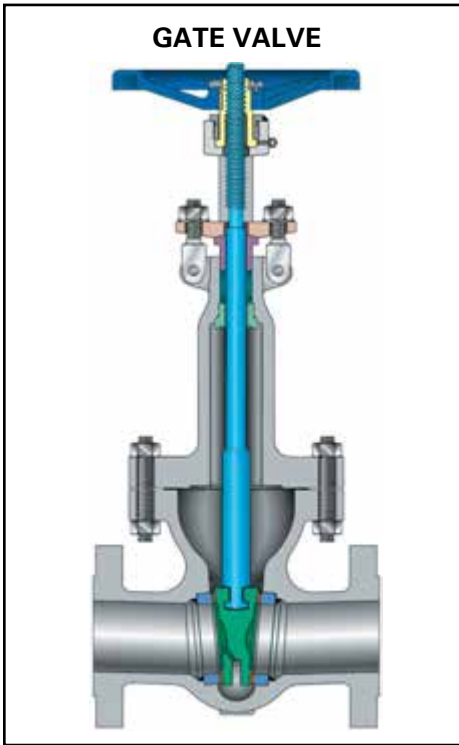


For more information on  
VELAN HF ACID GATE, GLOBE  
AND CHECK VALVES  
see flyer FLY-HFA.

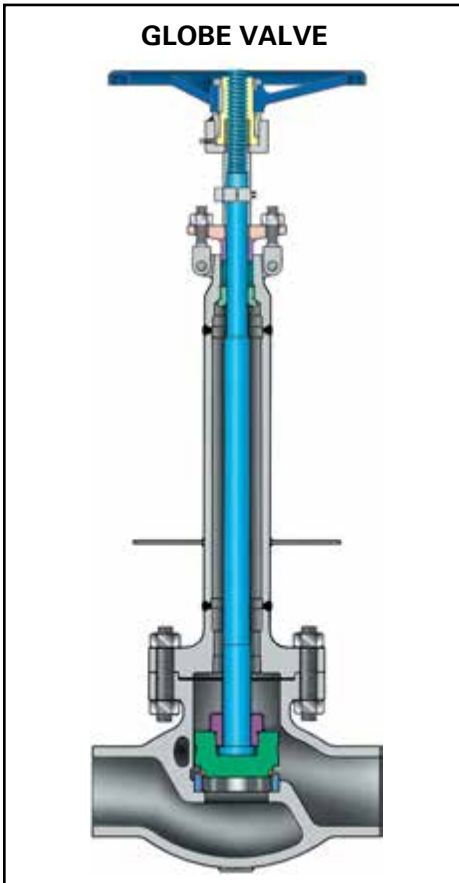


# VELAN SPECIAL SERVICES

## CAST STEEL CRYOGENIC VALVES



GATE VALVE



GLOBE VALVE

### CAST CRYOGENIC GATE, GLOBE, AND CHECK VALVES AUSTENITIC STAINLESS STEEL, NPS 2–30 (DN 50–750)

PRESSURE CLASSES 150–1500

The production, transport, and storage of liquefied gases such as oxygen, nitrogen, argon, natural gas, hydrogen, or helium (down to  $-425^{\circ}\text{F}$  /  $-253.9^{\circ}\text{C}$ ) presents several technical problems. Velan specially-adapted extended bonnet cast valves offer safe and efficient service.

#### MATERIALS

- **Body and bonnet:** Austenitic stainless steel castings used for bodies and bonnets offer excellent impact strength, minimal heat loss, and protection against corrosion.
- **Stem:** Austenitic stainless steel. To reduce galling, stems are also offered in A479 grade XM-19 with high toughness 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.
- **Stem nut/yoke bushing:** Austenitic ductile iron Gr. D-2C.
- **Packing:** PTFE or graphite packing protected from freezing by a column of insulating gas.
- **Seating faces:** CoCr alloy is used to prevent seizing and galling. When extremely tight shutoff is required, globe and check valves are supplied with Neoflon, PTFE, or other soft inserts.
- **Bolting:** Strain-hardened Austenitic stainless steel.
- **Lubrication of stem nut:** Exxon Nebula Lubriplate No. 930-AA or Shell Darina EPI or equivalent.

#### DESIGN FEATURES

- **Extended bonnets** with sufficient gas column length, usually specified by customer, are supplied for all valves to keep the stem packing at sufficient distance away from the cold fluid to remain functional.
- **Flexible wedges** with CoCr alloy seating faces for cryogenic service.
- **Neoflon inserts** are available for globe, piston, and API 594 swing check discs.
- **Cleaning:** All cryogenic valves are thoroughly degreased and cleaned and pipe ends are sealed to prevent contamination.

For more details on CRYOGENIC GATE, GLOBE, AND CHECK VALVES see VEL-CRYO catalog.

#### TABLE OF LIQUEFIED GASES

Type	Boiling point		Liquid density lb / ft. <sup>3</sup>	Type	Boiling point		Liquid density lb / ft. <sup>3</sup>
	°C	°F			°C	°F	
Natural gas (LNG)	-168	-270	26	Air	-194.4	-318	57.87
Methane (CH <sub>4</sub> )	-161.5	-258	26.20	Nitrogen (N <sub>2</sub> )	-195.8	-320	50.45
Oxygen (O <sub>2</sub> )	-182.9	-296	71.20	Hydrogen (H <sub>2</sub> )	-252.7	-423	4.43
Argon (Ar)	-185.9	-303	87.40	Helium (He)	-268.9	-452	7.82
Carbon dioxide (CO <sub>2</sub> )	-78.5	-109	50.60	Absolute zero	-273.16	-460	–

# VELAN SPECIAL SERVICES

## BLOCK AND BLEED GATE VALVES FOR CHEMICAL AND PETROCHEMICAL INDUSTRIES



Valve shown above has a special "Pipeline" bonnet. Standard bonnets with regular yoke also available.



### CAST STEEL API 600\* BLOCK AND BLEED GATE VALVES ASME CLASS 150, NPS 2–60 (DN 50–1500) ASME CLASS 300, NPS 2–36 (DN 50–900)

FLANGED OR BUTT WELD ENDS

#### DESIGN FEATURES

- **Positive shutoff** with visual or remote proof of seat tightness.
- **No product contamination** due to absolute tightness.
- **Dual seating.** Elastomer-to-metal seat plus metal-to-metal secondary seal.
- **Fire safe.** The metal-to-metal seat ensures tightness if the secondary elastomer seat is damaged during the fire.
- **PTFE seat insert** resists corrosive media, has high abrasion resistance, and operates up to +400°F (204°C).
- **Seat hardfaced** with SS 410 and seal welded.

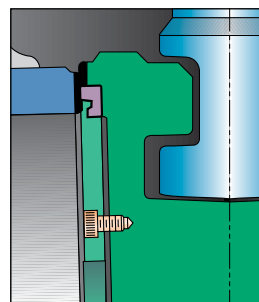
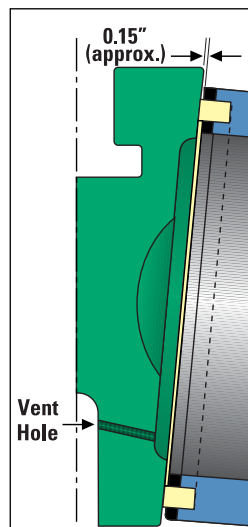
#### EASY IN-LINE VALVE RESEATING

Seats are hardfaced with SS 410 and welded-in for lifetime service. A worn soft seat insert can easily be replaced after removal of the wedge from the body. Shut off flow and relieve pressure before replacing the seat insert.

#### SEAT/WEDGE DESIGN

**STYLE A**  
NPS 2–12  
(DN 50–300)

**STYLE B\***  
NPS 14–60  
(DN 350–1500)



\*NPS 14–24  
(DN 350–600)  
may be  
STYLE A or B at  
manufacturer's  
option

#### SPECIFICATIONS FOR SEAT INSERT MATERIALS

TYPE	MAXIMUM OPERATING TEMP.	NOT RECOMMENDED
PTFE	-100 to +400°F -73 to +204°C	Fluorinated hydrocarbons
Buna-N	-20 to +200°F -29 to +93°C	Halogenated hydrocarbons, nitrobenzene, aniline, hydraulic fluids, skydrol, cellulube, pydrazil, acetone
Viton	-20 to +400°F -29 to +240°C	Acetone, anines, anhydrous ammonia, hot hydrofluoric acid, ester, ethers

#### CAVITY OVER-PRESSURIZATION PROTECTION

Block and bleed valves are capable of trapping fluid in the cavity between the seats when in the closed position. If subjected to an increase in temperature, an excessive build up of pressure can occur, which may result in a pressure boundary failure. It is the responsibility of the user to assure that measures are taken to prevent the pressure from exceeding the rating of the valve.

Cavity over-pressurization protection is not provided by Velan, unless specified. Velan can provide alternative solutions to safeguard against cavity over-pressurization. Please contact us to determine the correct solution for your use.

\* For gate valves larger than NPS 24 (DN 600), wall thickness is based on B16.34 plus additional wall thickness allowance.

# BYPASSES

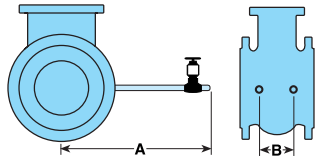
AVAILABLE FOR ALL VELAN CAST STEEL VALVES IN ACCORDANCE WITH MSS-SP45 - SERIES A

**API 600 GLOBE** (Note: Dimensions are in inches)

SIZE		CLASS 150			CLASS 300				CLASS 600				
NPS	DN	Bypass	A	Elbow	B	Bypass	A	Elbow	B	Bypass	A	Elbow	B
3	80	1/2	13.00	1/2	6.38	1/2	11.50	1/2	6.13	1/2	13.00	1/2	8.25
4	100	1/2	13.00	1/2	7.50	1/2	16.50	1/2	7.00	1/2	15.00	1/2	9.50
6	150	3/4	11.13	3/4	11.00	3/4	14.75	3/4	11.00	3/4	13.00	3/4	11.00
8	200	3/4	11.50	3/4	14.00	3/4	13.00	3/4	14.00	3/4	13.00	3/4	11.25
10	250	1	18.00	1	14.88	1	18	1	15.00	—	—	—	—
12	300	1	18.00	1	19.00	1	18	1	18.00	—	—	—	—
14	350	1	18.00	1	19.50	1	18	1	19.50	—	—	—	—
16	400	1	18.00	1	24.00	1	18	1	24.00	—	—	—	—

**API 600 GATE** (Note: Dimensions are in inches)

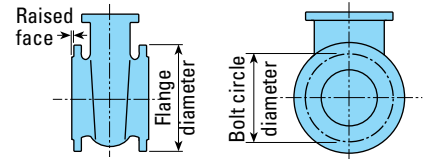
SIZE		CLASS 150			CLASS 300				CLASS 600				
NPS	DN	Bypass	A	Elbow	B	Bypass	A	Elbow	B	Bypass	A	Elbow	B
3	80	1/2	10.50	1/2	4.75	1/2	12.25	1/2	6.25	1/2	12.31	1/2	6.25
4	100	1/2	13.00	1/2	5.63	1/2	13.00	1/2	6.50	1/2	14.00	1/2	6.50
6	150	3/4	14.00	3/4	6.13	3/4	14.00	3/4	9.00	3/4	15.00	3/4	9.00
8	200	3/4	17.00	3/4	6.81	3/4	17.00	3/4	10.00	3/4	17.38	3/4	10.00
10	250	1	18.00	1	7.69	1	18.00	1	11.00	1	18.50	1	11.00
12	300	1	18.00	1	8.13	1	18.00	1	12.50	1	18.50	1	12.50
14	350	1	23.00	1	9.00	1	18.50	1	16.00	1	18.50	1	19.13
16	400	1	24.00	1	10.00	1	18.50	1	15.50	1	20.50	1	20.00
18	450	1	26.63	1	12.00	1	19.50	1	14.00	1	20.50	1	24.00
20	500	1	26.63	1	12.00	1	19.50	1	16.00	1	20.50	1	24.00
24	600	1	28.75	1	12.25	1	22.50	1	18.25	1	22.50	1	32.00
30	750	1	33.63	1	14.00	1	26.00	1	24.00	1	27.00	1	36.00
34	850	—	—	—	—	—	—	—	—	—	28.00	1	42.38
36	900	1	34.00	1	15.25	1	28.00	1	50.00	1	30.00	1	35.00
38	950	—	—	—	—	—	—	—	—	—	31.00	1	47.38
40	1000	—	—	—	—	—	32.00	—	45.00	—	32.00	1	50.50
42	1050	—	—	—	—	—	32.00	—	45.00	—	—	—	—
44	1100	—	—	—	—	—	—	—	—	—	35.00	—	50.00
50	1250	—	—	—	—	—	—	—	—	—	39.00	—	61.75
60	1500	1	44.00	1	24.00	—	—	—	—	—	—	—	—



# FLANGES, WEIGHTS, AND Cv FLOW COEFFICIENTS

**API 600 CAST STEEL VALVES**  
**CLASS 150**  
**DRILLED AND FACED AS FOLLOWS**  
**ASME B 16.5 and B16.47<sup>(1)</sup>**

(Note: Dimensions are in inches and weights in pounds)



ASME CLASS	DIMENSIONS IN INCHES							WEIGHT IN LBS.						CV FLOW COEFFICIENTS		
	SIZE		FLANGE DIAM.	BOLT CIRCLE DIAM.	HOLE DIAM.	QTY. HOLES	DIAM. BOLTS	GATE		GLOBE		SWING		GATE	GLOBE	CHECK
	NPS	DN					BW	FL	BW	FL	BW	FL				
150 1/16 RAISED FACE	2	50	6.00	4.75	0.75	4	3/8	42	48	48	55	31	40	260	35	95
	2 1/2	65	7.00	5.50	0.75	4	3/8	50	59	54	58	35	44	420	60	150
	3	80	7.50	6.00	0.75	4	3/8	67	78	82	102	59	78	625	92	220
	4	100	9.00	7.50	0.75	8	3/8	97	117	120	152	98	121	1150	180	410
	6	150	11.00	9.50	0.88	8	3/4	180	198	240	280	179	212	2650	430	950
	8	200	13.50	11.75	0.88	8	3/4	278	319	405	435	314	360	4850	810	1750
	10	250	16.00	14.25	1.00	12	7/8	456	515	500	550	513	586	7750	1400	2800
	12	300	19.00	17.00	1.00	12	7/8	646	738	1050	1200	602	823	11,500	1950	4100
	14	350	21.00	18.75	1.13	12	1	875	954	1700	1850	765	960	14,000	2500	6200
	16	400	23.50	21.25	1.13	16	1	1120	1200	2300	2500	1120	1300	19,000	3400	8400
	18	450	25.00	22.75	1.25	16	1 1/8	1485	1570	2640	2850	1450	1660	24,000	4500	11,000
	20	500	27.50	25.00	1.25	20	1 1/8	1825	1910	—	—	1700	2050	31,000	—	13,500
	24	600	32.00	29.50	1.38	20	1 1/4	2870	2960	7035	7403	2900	3300	45,000	6580	20,000
	26 <sup>(1)</sup>	650	34.25	31.75	1.38	24	1 1/4	3600	3700	—	—	3600	4000	53,000	—	23,500
	28 <sup>(1)</sup>	700	36.50	34.00	1.38	28	1 1/4	4400	4500	—	—	4300	5000	62,000	—	28,000
	30 <sup>(1)</sup>	750	38.75	36.00	1.37	28	1 1/4	4705	4750	—	—	6300	7000	73,000	—	33,000
	32 <sup>(1)</sup>	800	41.75	38.50	1.63	28	1 1/2	5800	6000	—	—	6000	6600	81,000	—	36,245
	34 <sup>(1)</sup>	850	43.75	40.50	1.63	32	1 1/2	—	6000	—	—	—	—	92,500	—	—
	36 <sup>(1)</sup>	900	46.00	42.75	1.63	32	1 1/2	6500	6850	—	—	8500	9500	108,000	—	48,000
	38 <sup>(1)</sup>	950	48.75	45.25	1.63	32	1 1/2	8857	9674	—	—	—	—	115,000	—	—
	40 <sup>(1)</sup>	1000	50.75	47.25	1.63	36	1 1/2	8400	9000	—	—	—	—	130,000	—	—
	42 <sup>(1)</sup>	1050	53.00	49.50	1.63	36	1 1/2	10,000	11,000	—	—	—	—	142,000	—	—
	46 <sup>(1)</sup>	1150	57.25	53.75	1.63	40	1 1/2	14,000	15,719	—	—	—	—	171,000	—	—
	48 <sup>(1)</sup>	1200	59.50	56.00	1.63	44	1 1/2	14,000	15,000	—	—	—	—	190,000	—	—
50 <sup>(1)</sup>	1250	56.81	54.56	1.25	44	1 1/8	—	8775	—	—	—	—	198,000	—	—	
54 <sup>(1)</sup>	1350	66.25	62.75	1.88	44	1 3/4	21,000	23,000	—	—	—	—	238,000	—	—	
56 <sup>(1)</sup>	1400	68.75	65.00	1.88	48	1 3/4	—	20,000	—	—	—	—	260,000	—	—	
60 <sup>(1)</sup>	1500	73.00	69.25	1.88	52	1 3/4	22,600	26,600	—	—	—	—	300,000	—	—	
64 <sup>(1)</sup>	1600	—	—	—	—	—	—	29,043	—	—	—	—	340,000	—	—	

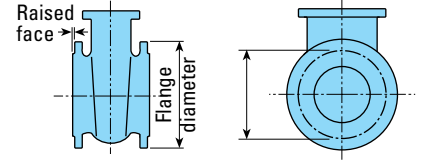
(1) NPS 26 (DN 650) and up: ASME B16.47 Series A (MSS-SP-44). For Series B (API 605) contact the factory.



# FLANGES, WEIGHTS, AND Cv FLOW COEFFICIENTS

## API 600 CAST STEEL VALVES CLASS 300, 600, 900, AND 1500 DRILLED AND FACED AS FOLLOWS ASME B 16.5 and B16.47<sup>(1)</sup>

(Note: Dimensions are in inches and weights in pounds)



ASME CLASS	DIMENSIONS IN INCHES							WEIGHT IN LBS.						CV FLOW COEFFICIENTS		
	SIZE		FLANGE DIAM.	BOLT CIRCLE DIAM.	HOLE DIAM.	QTY. HOLES	DIAM. BOLTS	GATE		GLOBE		SWING		GATE	GLOBE	CHECK
	NPS	DN						BW	FL	BW	FL	BW	FL			
300 1/16 RAISED FACE	2	50	6.50	5.00	0.75	8	3/8	46	60	45	60	37	45	260	35	95
	2 1/2	65	7.50	5.88	0.88	8	3/4	55	76	63	72	49	57	420	60	150
	3	80	8.25	6.62	0.88	8	3/4	90	115	88	114	70	96	625	92	220
	4	100	10.00	7.88	0.88	8	3/4	136	166	130	171	110	150	1150	180	410
	6	150	12.50	10.63	0.88	12	3/4	245	314	261	337	204	265	2650	430	950
	8	200	15.00	13.00	1.00	12	3/4	415	506	447	565	360	455	4850	810	1750
	10	250	17.50	15.25	1.13	16	1	646	762	1000	1150	582	650	7750	1325	2800
	12	300	20.50	17.75	1.25	16	1 1/8	900	1100	1300	1550	825	945	11,500	1950	4100
	14	350	23.00	20.25	1.25	20	1 1/8	1392	1720	1800	2100	1200	1350	14,000	2500	6200
	16	400	25.50	22.50	1.38	20	1 1/4	1870	2220	2300	2700	1500	1800	19,000	3400	8400
	18	450	28.00	24.75	1.38	24	1 1/4	2405	2960	2640	3200	2000	2400	23,500	4500	11,000
	20	500	30.50	27.00	1.38	24	1 1/2	3260	3700	—	—	2600	3000	30,000	—	13,500
	24	600	36.00	32.00	1.63	24	1 1/2	4250	5100	7109	7995	3000	4050	44,000	6580	20,000
	26 <sup>(1)</sup>	650	38.25	34.50	1.75	28	1 1/2	5000	5500	—	—	—	—	53,000	—	—
	28 <sup>(1)</sup>	700	40.75	37.00	1.75	28	1 1/2	7000	7500	—	—	5000	6000	62,000	—	28,000
	30 <sup>(1)</sup>	750	43.00	39.25	1.88	28	1 1/2	8550	9000	—	—	—	—	73,000	—	—
	32 <sup>(1)</sup>	800	45.25	41.50	2.00	28	1 1/2	8200	8800	—	—	—	—	81,000	—	—
34 <sup>(1)</sup>	850	—	—	—	—	—	—	—	—	—	—	8350	10,100	—	—	41,330
36 <sup>(1)</sup>	900	50.00	46.00	2.13	32	2	13,500	15,500	—	—	—	—	108,000	—	—	
40 <sup>(1)</sup>	1000	48.75	45.50	1.75	32	1 1/2	14,500	16,200	—	—	—	—	129,500	—	—	
42 <sup>(1)</sup>	1050	50.75	47.00	1.75	32	1 1/2	14,500	17,000	—	—	—	—	129,500	—	—	
600 1/4 RAISED FACE	2	50	6.50	5.00	0.75	8	3/8	60	72	60	72	48	52	260	35	95
	2 1/2	65	7.50	5.88	0.88	8	3/4	89	102	89	100	59	87	420	60	150
	3	80	8.25	6.63	0.88	8	3/4	130	157	130	150	96	130	625	92	220
	4	100	10.75	8.50	1.00	8	3/4	224	275	213	285	167	225	1150	180	410
	6	150	14.00	11.50	1.13	12	1	394	540	415	515	332	476	2650	430	950
	8	200	16.50	13.75	1.25	12	1 1/8	726	884	1050	1220	525	715	4850	800	1750
	10	250	20.00	17.00	1.38	16	1 1/8	1125	1405	1550	1830	1000	1250	7750	1250	2800
	12	300	22.00	19.25	1.38	20	1 1/4	1490	1812	—	—	1500	1750	11,500	—	4100
	14	350	23.75	20.75	1.50	20	1 1/2	2200	2500	—	—	1750	2050	13,000	—	5900
	16	400	27.00	23.75	1.63	20	1 1/2	3000	3700	—	—	2400	3100	18,000	—	7800
	18	450	29.25	25.75	1.75	20	1 1/2	4000	4800	—	—	3200	4000	22,000	—	9900
	20	500	32.00	28.50	1.75	24	1 1/2	5600	6800	—	—	4500	6100	27,000	—	12,000
	24	600	37.00	33.00	2.00	24	1 1/2	8000	9800	—	—	6400	7600	40,000	—	18,000
	26	650	—	—	—	—	—	6835	8154	—	—	7600	8930	38,000	—	21,150
	30 <sup>(1)</sup>	750	44.50	40.25	2.13	28	2	12,000	14,000	—	—	—	—	52,000	—	—
	34 <sup>(1)</sup>	850	49.00	44.50	2.38	28	2 1/4	—	19,000	—	—	—	—	82,500	—	—
	36 <sup>(1)</sup>	900	51.75	47.00	2.63	28	2 1/2	17,000	19,500	—	—	—	—	72,000	—	—
38 <sup>(1)</sup>	950	50.00	45.75	2.38	28	2 1/4	—	26,700	—	—	—	—	103,000	—	—	
40 <sup>(1)</sup>	1000	52.00	45.75	2.38	32	2 1/4	—	33,200	—	—	—	—	115,000	—	—	
44 <sup>(1)</sup>	1100	52.25	52.50	2.63	32	2 1/2	—	42,800	—	—	—	—	144,000	—	—	
50 <sup>(1)</sup>	1250	65.75	60.00	3.13	28	3	—	59,100	—	—	—	—	190,000	—	—	
900 1/4 RAISED FACE	2	50	8.50	6.50	1.00	8	7/8	150	185	68	150	135	165	230	45	80
	2 1/2	65	9.63	7.50	1.13	8	1	—	—	—	—	175	210	—	—	200
	3	80	9.50	7.50	1.00	8	7/8	235	270	165	225	175	210	560	100	200
	4	100	11.50	9.25	1.25	8	1 1/8	270	355	260	350	245	330	1050	190	380
	6	150	15.00	12.50	1.25	12	1 1/8	830	980	641	831	485	635	2400	430	875
	8	200	18.50	15.50	1.50	12	1 1/8	1220	1500	1278	1588	700	900	4200	760	1325
	10	250	21.50	18.50	1.50	16	1 1/8	2000	2400	—	—	1600	2100	6750	—	2400
	12	300	24.00	21.00	1.50	20	1 1/8	3170	3670	—	—	—	—	9700	—	—
	14	350	25.25	22.00	1.62	20	1 1/2	3900	4460	—	—	—	—	12,000	—	—
	16	400	27.75	24.25	1.75	20	1 1/2	5570	6250	—	—	—	—	16,000	—	—
	20	500	33.75	29.50	2.13	20	2	—	—	—	—	5961	7081	—	—	11177
32	800	51.75	45.50	3.38	20	3 1/4	—	—	—	—	13674	18368	—	—	24036	
38	950	—	—	—	—	—	—	—	—	—	20,250	26,800	—	—	34,500	
1500 1/4 RAISED FACE	2	50	8.50	6.50	1.00	8	7/8	150	185	68	150	135	165	230	45	80
	2 1/2	65	9.63	7.50	1.13	8	1	—	—	—	—	205	275	—	—	185
	3	80	10.50	8.00	1.25	8	1 1/8	255	325	188	274	205	275	510	90	185
	4	100	12.25	9.50	1.37	8	1 1/4	430	520	—	—	340	430	925	—	330
	6	125	15.50	12.50	1.50	12	1 1/8	1045	1205	—	—	805	965	2100	—	750
	8	200	19.00	15.50	1.75	12	1 1/8	1850	2550	—	—	1350	2050	3650	—	1325
10	250	23.00	19.00	2.00	12	1 1/8	2600	3300	—	—	2233	2821	5850	—	2103	

(1) NPS 26 (DN 650) and up: ASME B16.47 Series A (MSS-SP-44). For Series B (API 605) contact the factory.

# PRESSURE-TEMPERATURE RATINGS – °F

## STANDARD CLASS VALVES FLANGED AND BUTT WELD END

NOTE: FOR SPECIAL CLASS VALVES, WITH HIGHER RATINGS CONTACT THE COMPANY.

### CAST ASTM MATERIAL STANDARD – TO ASME B16.34

ASME Boiler and Pressure Vessel Code Section II materials that also meet the requirements of the listed ASTM specifications.

psig/°F (bar/°C) Classes 150–4500

### A 216 Gr. WCB (1)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	285	740	1,480	2,220	3,705	6,170	11,110
200	260	680	1,360	2,035	3,395	5,655	10,185
300	230	655	1,310	1,965	3,270	5,450	9,815
400	200	635	1,265	1,900	3,170	5,280	9,505
500	170	605	1,205	1,810	3,015	5,025	9,040
600	140	570	1,135	1,705	2,840	4,730	8,515
650	125	550	1,100	1,650	2,745	4,575	8,240
700	110	530	1,060	1,590	2,665	4,425	7,960
750	95	505	1,015	1,520	2,535	4,230	7,610
800	80	410	825	1,235	2,055	3,430	6,170
850	65	320	640	955	1,595	2,655	4,785
900	50	230	460	690	1,150	1,915	3,455
950	35	135	275	410	685	1,145	2,055
1,000	20	85	170	255	430	715	1,285

### A 217 Gr. WC6 (3) (4) (5)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250
200	260	750	1,500	2,250	3,750	6,250	11,250
300	230	720	1,445	2,165	3,610	6,015	10,830
400	200	695	1,385	2,080	3,465	5,775	10,400
500	170	665	1,330	1,995	3,325	5,540	9,965
600	140	605	1,210	1,815	3,025	5,040	9,070
650	125	590	1,175	1,765	2,940	4,905	8,825
700	110	570	1,135	1,705	2,840	4,730	8,515
750	95	530	1,065	1,595	2,660	4,430	7,970
800	80	510	1,015	1,525	2,540	4,230	7,610
850	65	485	975	1,460	2,435	4,060	7,305
900	50	450	900	1,350	2,245	3,745	6,740
950	35	320	640	955	1,595	2,655	4,785
1,000	20	215	430	650	1,080	1,800	3,240
1,050	20(a)	145	290	430	720	1,200	2,160
1,100	20(a)	95	190	290	480	800	1,440
1,150	20(a)	65	130	195	325	545	975
1,200	15(a)	40	80	125	205	345	615

(a) Flanged-end valve ratings terminate at 1,000°F.

### A217 Gr. WC9 (3) (4) (5)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250
200	260	750	1,500	2,250	3,750	6,250	11,250
300	230	730	1,455	2,185	3,640	6,070	10,925
400	200	705	1,410	2,115	3,530	5,880	10,585
500	170	665	1,330	1,995	3,325	5,540	9,965
600	140	605	1,210	1,815	3,025	5,040	9,070
650	125	590	1,175	1,765	2,940	4,905	8,825
700	110	570	1,135	1,705	2,840	4,730	8,515
750	95	530	1,065	1,595	2,660	4,430	7,970
800	80	510	1,015	1,525	2,540	4,230	7,610
850	65	485	975	1,460	2,435	4,060	7,305
900	50	450	900	1,350	2,245	3,745	6,740
950	35	385	755	1,160	1,930	3,220	5,795
1,000	20	265	535	800	1,335	2,230	4,010
1,050	20(a)	175	350	525	875	1,455	2,625
1,100	20(a)	110	220	330	550	915	1,645
1,150	20(a)	70	135	205	345	570	1,030
1,200	15(a)	40	80	125	205	345	615

(a) Flanged-end valve ratings terminate at 1,000°F.

### A 217 Gr. C5 (3) (5)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250
200	260	750	1,500	2,250	3,750	6,250	11,250
300	230	730	1,455	2,185	3,640	6,070	10,925
400	200	705	1,410	2,115	3,530	5,880	10,585
500	170	665	1,330	1,995	3,325	5,540	9,965
600	140	605	1,210	1,815	3,025	5,040	9,070
650	125	590	1,175	1,765	2,940	4,905	8,825
700	110	570	1,135	1,705	2,840	4,730	8,515
750	95	530	1,065	1,595	2,660	4,430	7,970
800	80	510	1,015	1,525	2,540	4,230	7,610
850	65	485	975	1,460	2,435	4,060	7,305
900	50	375	745	1,120	1,870	3,115	5,605
950	35	275	550	825	1,370	2,285	4,115
1,000	20	200	400	595	995	1,655	2,985
1,050	20(a)	145	290	430	720	1,200	2,160
1,100	20(a)	100	200	300	495	830	1,490
1,150	20(a)	60	125	185	310	515	925
1,200	15(a)	35	70	105	170	285	515

(a) Flanged-end valve ratings terminate at 1,000°F.

### A 217 Gr. C12 (3) (5)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250
200	260	750	1,500	2,250	3,750	6,250	11,250
300	230	730	1,455	2,185	3,640	6,070	10,925
400	200	705	1,410	2,115	3,530	5,880	10,585
500	170	665	1,330	1,995	3,325	5,540	9,965
600	140	605	1,210	1,815	3,025	5,040	9,070
650	125	590	1,175	1,765	2,940	4,905	8,825
700	110	570	1,135	1,705	2,840	4,730	8,515
750	95	530	1,065	1,595	2,660	4,430	7,970
800	80	510	1,015	1,525	2,540	4,230	7,610
850	65	485	975	1,460	2,435	4,060	7,305
900	50	450	900	1,350	2,245	3,745	6,740
950	35	375	755	1,130	1,885	3,145	5,655
1,000	20	255	505	760	1,270	2,115	3,805
1,050	20(a)	170	345	515	855	1,430	2,570
1,100	20(a)	115	225	340	565	945	1,695
1,150	20(a)	75	150	225	375	630	1,130
1,200	20(a)	50	105	155	255	430	770

(a) Flanged-end valve ratings terminate at 1,000°F.

### A 351 Gr. CF8M (6)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	275	720	1,440	2,160	3,600	6,000	10,800
200	235	620	1,240	1,860	3,095	5,160	9,290
300	215	560	1,120	1,680	2,795	4,660	8,390
400	195	515	1,025	1,540	2,570	4,280	7,705
500	170	480	955	1,435	2,390	3,980	7,165
600	140	450	900	1,355	2,255	3,760	6,770
650	125	440	885	1,325	2,210	3,680	6,625
700	110	435	870	1,305	2,170	3,620	6,515
750	95	425	855	1,280	2,135	3,560	6,410
800	80	420	845	1,265	2,110	3,520	6,335
850	65	420	835	1,255	2,090	3,480	6,265
900	50	415	830	1,245	2,075	3,460	6,230
950	35	385	775	1,160	1,930	3,220	5,795
1,000	20	365	725	1,090	1,820	3,030	5,450
1,050	20	360	720	1,080	1,800	3,000	5,400
1,100	20(a)	305	610	915	1,525	2,545	4,575
1,150	20(a)	235	475	710	1,185	1,970	3,550
1,200	20(a)	185	370	555	925	1,545	2,775
1,250	20(a)	145	295	440	735	1,230	2,210
1,300	20(a)	115	235	350	585	970	1,750
1,350	20(a)	95	190	290	480	800	1,440
1,400	20(a)	75	150	225	380	630	1,130
1,450	20(a)	60	115	175	290	485	875
1,500	15(a)	40	85	125	205	345	620

(a) Flanged-end valve ratings terminate at 1,000°F.

### A 351 Gr. CF3M (7)

TEMP. °F	WORKING PRESSURES BY CLASS, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	230	600	1,200	1,800	3,000	5,000	9,000
200	195	510	1,020	1,535	2,555	4,260	7,670
300	175	455	910	1,370	2,280	3,800	6,840
400	160	420	840	1,260	2,100	3,500	6,300
500	150	395	785	1,180	1,970	3,280	5,905
600	140	370	745	1,115	1,860	3,100	5,580
650	125	365	730	1,095	1,825	3,040	5,470
700	110	360	720	1,080	1,800	3,000	5,400

# PRESSURE-TEMPERATURE RATINGS – °C

## STANDARD CLASS VALVES FLANGED AND BUTT WELD END

NOTE: FOR SPECIAL CLASS VALVES, WITH HIGHER RATINGS CONTACT THE COMPANY.

### CAST ASTM MATERIAL STANDARD – TO ASME B16.34

ASME Boiler and Pressure Vessel Code Section II materials that also meet the requirements of the listed ASTM specifications.  
psig/°F (bar/°C) Classes 150–4500

#### A216 Gr. WCB (1)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.6	51.1	102.1	153.2	255.3	425.5	765.9
50	19.2	50.1	100.2	150.4	250.6	417.7	751.9
100	17.7	46.6	93.2	139.8	233.0	388.3	699.0
150	15.8	45.1	90.2	135.2	225.4	375.6	676.1
200	13.8	43.8	87.6	131.4	219.0	365.0	657.0
250	12.1	41.9	83.9	125.8	209.7	349.5	629.1
300	10.2	39.8	79.6	119.5	199.1	331.8	597.3
325	9.3	38.7	77.4	116.1	193.6	322.6	580.7
350	8.4	37.6	75.1	112.7	187.8	313.0	563.5
375	7.4	36.4	72.7	109.1	181.8	303.1	545.5
400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
425	5.5	28.8	57.5	86.3	143.8	239.7	431.5
450	4.6	23.0	46.0	69.0	115.0	191.7	345.1
475	3.7	17.4	34.9	52.3	87.2	145.3	261.5
500	2.8	11.8	23.5	35.3	58.8	97.9	176.3
538	1.4	5.9	11.8	17.7	29.5	49.2	88.6

#### A 217 Gr. WC6 (3) (4) (5)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103	154.4	257.4	429	772.2
150	15.8	49.7	99.5	149.2	248.7	414.5	746.2
200	13.8	48	95.9	143.9	239.8	399.6	719.4
250	12.1	46.3	92.7	139	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169	281.8	507
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	25.7	51.5	77.2	128.6	214.4	385.9
538	1.4	14.9	29.8	44.7	74.5	124.1	223.4
550	1.4(a)	12.7	25.4	38.1	63.5	105.9	190.6
575	1.4(a)	8.8	17.6	26.4	44	73.4	132
600	1.4(a)	6.1	12.2	18.3	30.5	50.9	91.6
625	1.4(a)	4.3	8.5	12.8	21.3	35.5	63.9
650	1.1(a)	2.8	5.7	8.5	14.2	23.6	42.6

(a) Flanged-end valve ratings terminate at 538°C.

#### A217 Gr. WC9 (3) (4) (5)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103	154.6	257.6	429.4	773
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169	281.8	507
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235	423
538	1.4	18.4	36.9	55.3	92.2	153.7	276.6
550	1.4(a)	15.6	31.3	46.9	78.2	130.3	234.5
575	1.4(a)	10.5	21.1	31.6	52.6	87.7	157.9
600	1.4(a)	6.9	13.8	20.7	34.4	57.4	103.3
625	1.4(a)	4.5	8.9	13.4	22.3	37.2	66.9
650	1.1(a)	2.8	5.7	8.5	14.2	23.6	42.6

(a) Flanged-end valve ratings terminate at 538°C.

#### A 217 Gr. C5 (3) (5)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103	154.6	257.6	429.4	773
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169	281.8	507
475	3.7	27.9	55.7	83.6	139.3	232.1	417.8
500	2.8	21.4	42.8	64.1	106.9	178.2	320.7
538	1.4	13.7	27.4	41.1	68.6	114.3	205.7
550	1.4(a)	12	24.1	36.1	60.2	100.4	180.7
575	1.4(a)	8.9	17.8	26.7	44.4	74	133.3
600	1.4(a)	6.2	12.5	18.7	31.2	51.9	93.5
625	1.4(a)	4	8	12	20	33.3	59.9
650	0.9(a)	2.4	4.7	7.1	11.8	19.7	35.5

(a) Flanged-end valve ratings terminate at 538°C.

#### A 217 Gr. C12 (3)(5)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103	154.6	257.6	429.4	773
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169	281.8	507
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235	423
538	1.4	17.5	35	52.5	87.5	145.8	262.4
550	1.4(a)	15	30	45	75	125	225
575	1.4(a)	10.5	20.9	31.4	52.3	87.1	156.8
600	1.4(a)	7.2	14.4	21.5	35.9	59.8	107.7
625	1.4(a)	5	9.9	14.9	24.8	41.4	74.5
650	1.4(a)	3.5	7.1	10.6	17.7	29.5	53.2

(a) Flanged-end valve ratings terminate at 538°C.

#### A 351 Gr. CF8M (6)

TEMP. °C	WORKING PRESSURES BY CLASS, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19	49.6	99.3	148.9	248.2	413.7	744.6
50	18.4	48.1	96.2	144.3	240.6	400.9	721.7
100	16.2	42.2	84.4	126.6	211	351.6	632.9
150	14.8	38.5	77	115.5	192.5	320.8	577.4
200	13.7	35.7	71.3	107	178.3	297.2	534.9
250	12.1	33.4	66.8	100.1	166.9	278.1	500.6
300	10.2	31.6	63.2	94.9	158.1	263.5	474.3
325	9.3	30.9	61.8	92.7	154.4	257.4	463.3
350	8.4	30.3	60.7	91	151.6	252.7	454.9
375	7.4	29.9	59.8	89.6	149.4	249	448.2
400	6.5	29.4	58.9	88.3	147.2	245.3	441.6
425	5.5	29.1	58.3	87.4	145.7	242.9	437.1
450	4.6	28.8	57.7	86.5	144.2	240.4	432.7
475	3.7	28.7	57.3	86	143.4	238.9	430.1
500	2.8	28.2	56.5	84.7	140.9	235	423
538	1.4	25.2	50	75.2	125.5	208.9	375.8
550	1.4(a)	25	49.8	74.8	124.9	208	374.2
575	1.4(a)	24	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	19.9	39.8	59.7	99.5	165.9	298.6
625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2
650	1.4(a)	12.7	25.3	38	63.3	105	



# SPECIFICATION OF CAST VALVE MATERIALS

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

DESCRIPTION	CARBON STEEL			ALLOY STEEL				STAINLESS STEEL					
	A216 WCB	A352 LCB	A352 LCC	1¼Cr-½Mo	2¼Cr-1Mo	5Cr	9Cr-1Mo	13Cr		316	316L	304	
ASTM DESIGNATION	A216 WCB	A352 LCB	A352 LCC	A217 WC6	A217 WC9	A217 C5	A217 C12	A217 CA15	A296 CA40	A351 CF8M	A351 CF3M	A351 CF8	
COMPOSITION %	Carbon	0.25(1)	0.25(1)	0.25	0.20	0.18	0.20	0.20	0.15	0.10-0.40	0.08	0.03	0.08
	Manganese	1.00	1.00	1.20	0.50-0.80	0.40-0.70	0.40-0.70	0.35-0.65	1.00	1.00	1.50	1.50	1.50
	Phosphorus	0.04	0.04	0.04	0.04	0.40	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	Sulphur	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.040	0.040	0.040	0.040	0.040
	Silicon	0.60	0.60	0.60	0.60	0.60	0.75	1.00	1.50	1.50	1.50	1.50	2.00
	Nickel	0.50	—	0.50	0.50	0.50	0.50	0.50	1.00	1.00	9.00-12.00	9.00-13.00	8.00-11.00
	Chromium	0.50	—	0.50	1.00-1.50	2.00-2.75	4.00-6.50	8.00-10.00	11.5-14.0	11.5-14.0	18.00-21.00	17.00-21.00	18.00-21.00
	Molybdenum	0.20	—	0.20	0.45-0.65	0.90-1.20	0.45-0.65	0.90-1.20	0.50	0.50	2.0-3.00	2.0-3.00	0.50
	Copper	0.30	0.30	0.30	0.50	—	0.50	0.50	—	—	—	—	—
Heat treatment	Anneal	Quench and temper		Temper				Solution anneal					
Tensile psi min.	70,000	65,000-90,000	70,000-95,000	70,000-90,000		90,000-115,000		90,000-115,000	100,000	70,000	70,000	70,000	
Yield psi min.	36,000	35,000	40,000	40,000	40,000	60,000	60,000	65,000	70,000	30,000	30,000	30,000	
Elongation % min.	22	24	22	20	20	18	18	18	15	30	30	35	
Reduction of area % min.	35	35	35	35	35	35	35	30	25	—	—	—	
Hardness HB	187 max.	197 max.	200 max.	207 max.	207 max.	241 max.	241 max.	327-381	475 min.	—	187 max.	—	
Parts	BODIES-BONNETS-LARGE DISCS							DISC MATERIALS		BODIES-BONNETS-DISCS			

(1) Velan standard: 0.25 or less.

## TRIM SPECIFICATION

ASTM DESIGNATION	BAR STOCK								CAST			
	13Cr		Stainless steels			Monel		Hastelloy	Monel	CoCr alloy	Austenitic ductile	
	A479 410*	A582 416*	A 479 316 St. Hard.	A479 316	A564 630	B164 Monel	AMS 4676D K-Monel	B574 N 10276	A494 M-25S	AMS 5387 A	A439 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	1.00-24.00
	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	—	—	—	—	—	3.00	—	3.00	—	—	—
	Cobalt	—	—	—	—	—	—	—	—	—	Balance	—
	Tungsten	—	—	—	—	—	—	—	—	—	3.5-5.5	—
Iron	—	—	—	—	—	—	—	—	3.50	3.0	—	
Special condition	Temper	Hard	Level 2	—	—	Hot worked	Hot finished	—	Age hardened	—	—	
Heat treatment	Class 2	Hard temper	Solution annealed	Solution 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	
Elongation % min.	15	—	25	30	14	30	20	40	—	1	20	
Reduction of area % min.	45	—	40	40	45	—	—	—	—	—	—	
Hardness HB	269 max.	293-352	—	—	302 min.	—	326 min.	—	300 min.	344 min.	121-171	

\* 13Cr or Monel trim also available in soft form (less than 237 HB). Non-cobalt hardfacing also available.

## SOUR SERVICE VALVES

Where NACE or sour service is specified, valves comply with NACE MR0103 or MR0175 / ISO15156. It is the end user's responsibility to install the valves in the service conditions permitted by these standards.

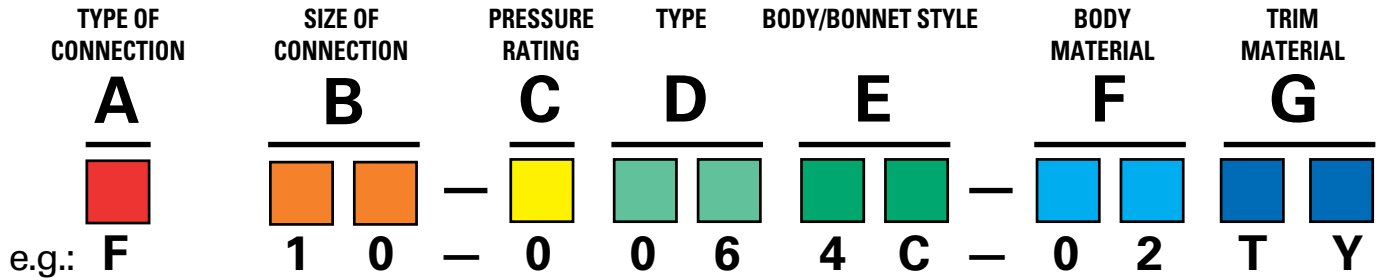
**For trim material (wedge/disc surface, seat surface, and stem) see page 35.**

TRIM	
NA, ND, NE, NF:	B7M / 2HM Rc. 22 Max.
NB, NC, NN:	B7M / 2HM, B8M / 8 or Rc. 22 Max.

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

# HOW TO ORDER

## CAST STEEL GATE, GLOBE, AND CHECK VALVES



**Example:** Flanged NPS 3 (DN 80) Class 150 cast carbon steel full bore gate valve with TY trim.

The figure numbers shown on this key are designed to cover essential features of Velan valves. Please use figure numbers to ensure prompt and accurate processing of your order. A detailed description must accompany any special orders.

A TYPE OF CONNECTION			
A - Special	E - Welded studs (butt weld)	R - Flanged ring joint	
B - Butt weld	F - Flanged B16.5 (B16.47 series A)	U - Undrilled flanges	
C - Combination	P - Flanged B16.47 series B (API 605)		
D - DIN flanged			
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. Size below shows NPS (DN)			
<b>EXAMPLES:</b>			
F10-0064C-02TY (valve size is part of figure number)			
3 (80) F-0064C-02TY (valve size is shown separately)			
08 - 2 (50)	18 - 12 (300)	30 - 30 (750)	48 - 48 (1200)
09 - 2½ (65)	19 - 14 (350)	32 - 32 (800)	50 - 50 (1250)
10 - 3 (80)	20 - 16 (400)	34 - 34 (850)	54 - 54 (1350)
11 - 3½ (90)	21 - 18 (450)	36 - 36 (900)	56 - 56 (1400)
12 - 4 (100)	22 - 20 (500)	38 - 38 (950)	60 - 60 (1500)
13 - 5 (125)	23 - 22 (550)	40 - 40 (1000)	64 - 64 (1600)
14 - 6 (150)	24 - 24 (600)	42 - 42 (1050)	99 - Special
15 - 8 (200)	26 - 26 (650)	44 - 44 (1100)	
16 - 10 (250)	28 - 28 (700)	46 - 46 (1150)	
C PRESSURE RATING			
0 - 150	1 - 300	2 - 600	
3 - 1500	7 - 900	X - Butt weld (intermediate class)	
D VALVE TYPE			
01 - Flow control	07 - Stop globe	09 - Needle	99 - Special
06 - Full port gate	08 - Stop check	11 - API 594 swing check	
E BODY / BONNET STYLE			
4 - Vertical	A - Special		
	C - Bolted bonnet (cast)		
	E - Extended bonnet (cryogenic)		
	V - Cast bolted bonnet bellows seal		
F BODY MATERIAL			
01 - Special	09 - C12	19 - Monel M35	31 - LCC
02 - WCB	11 - CF8	23 - Alloy 20	34 - C12A (F91)
03 - WC1	12 - CF3	25 - LCB	38 - LC1
04 - C5	13 - CF8M	27 - LC3	39 - LC2
05 - WC6	14 - CF3M	28 - CG8M	46 - GS-C25N
06 - WC9	15 - CF8C	29 - CG3M	

- (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 refers to cobalt-chrome alloys in Grade 6 (e.g. AWS CoCr-A, UNS 30006 & 30106) or Grade 21 (e.g. AWS CoCr-E, UNS 30021). Use of Grade 6 or 21 is at Velan's option.
- (4) 616HT Manufacturer's standard. (F91 and C12A only).
- (5) Inserts may be in seat or wedge at manufacturer's option.
- (6) Valves with "NACE" Figure Numbers will meet the material requirements of NACE MRO103 and MRO175/ISO 15156.
- (7) SB, SX, SY PTFE gasket and packing GS, GX, GY graphite gasket and packing.

G TRIM				API Number	If applicable BELLOWS <sup>(2)</sup>
CODE	WEDGE/DISC SURFACE <sup>(1)</sup>	SEAT SURFACE <sup>(1)</sup>	STEM		
MS	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		321
MY	CF8M or 316	CoCr alloy <sup>(3)</sup>	316	12	321
TS	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410) <sup>(4)</sup>	5	321
TY	13Cr (410 or CA15)	CoCr alloy <sup>(3)</sup>	13Cr (410)	8	
NA	13Cr (410 or CA15) HRC 22 max	CoCr alloy <sup>(3)</sup>	13Cr (410) HRC 22 max.	8 <sup>(6)</sup>	
NB	CF8M	CoCr alloy <sup>(3)</sup>	316	12 <sup>(6)</sup>	321
NC	Monel	CoCr alloy <sup>(3)</sup>	Monel	11 <sup>(6)</sup>	Hastelloy C
ND	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	630 (H1150M)		
NE	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410) HRC 22 max.	5 <sup>(6)</sup>	
NF	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	Same as Body		
NG	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		321
NN	CF8M	CoCr alloy <sup>(3)</sup>	316		IN 625
NX	Monel	Monel	Monel		
NY	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	XM-19		
AS	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	321		321
AY	CF8C/F321	CoCr alloy <sup>(3)</sup>	321		321
CC	Alloy 20	Alloy 20	Alloy 20	13	
ES	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	347		
EY	CF8C/F347	CoCr alloy <sup>(3)</sup>	347		
HC	Hastelloy C	CoCr alloy <sup>(3)</sup>	Hastelloy C		Hastelloy C
MF	CF8M or 316 w/ Teflon insert <sup>(5)</sup>	CoCr alloy <sup>(3)</sup>	316		
MH	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		Hastelloy C
MN	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		IN 625
MX	CF8M	316	316	10	
TF	13Cr (410 or CA15) w/ Teflon insert <sup>(5)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410)		
TH	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410) <sup>(4)</sup>		Hastelloy C
TN	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410) <sup>(4)</sup>		IN 625
XS	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	Monel		
XX	Monel	Monel	Monel	9	
XY	Monel	CoCr alloy <sup>(3)</sup>	Monel	11	

For a more detailed list of available trims, contact the factory or visit our web site at [www.velan.com](http://www.velan.com).

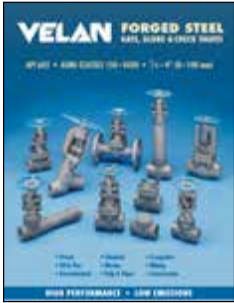
**Note:**  
CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite, and other approved manufacturers.

Class	150	300	600	900	1500
PN	20	50	110	150	260

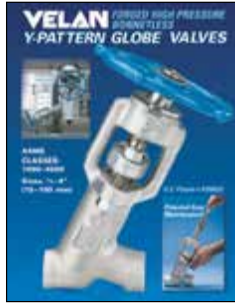
PN and Class designations are not exact equivalents and are provided for comparison purposes only, based on API 600/ISO 10434 2006 edition.

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

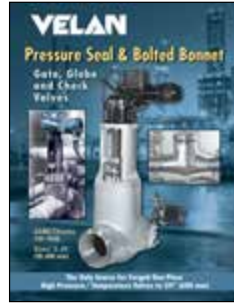
**ASME pressure classes 150–4500 in carbon, alloy, and stainless steel**



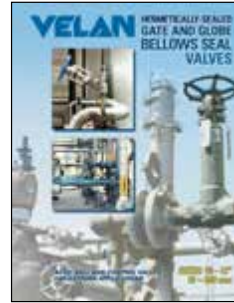
**CAT-SFV**



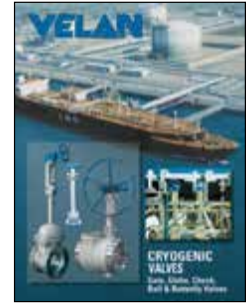
**CAT-BG**



**VEL-PS**



**VEL-BS**



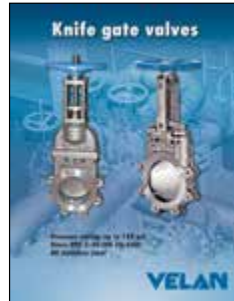
**VEL-CRYO**



**CAT-CSV**



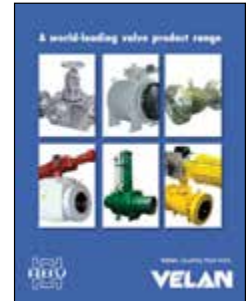
**VEL-API-603**



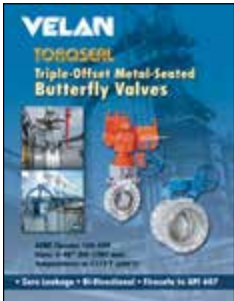
**CAT-KGV**



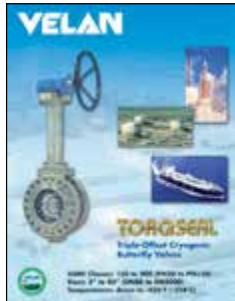
**VEL-PQCV**



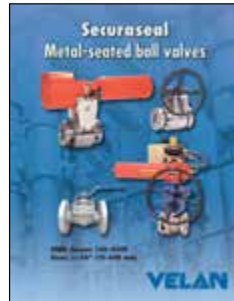
**BRO-FLBABV**



**VEL-BF**



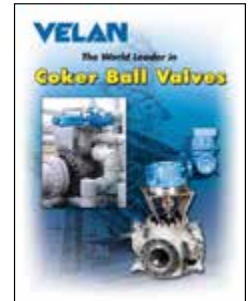
**CAT-SAS-CTORQ**



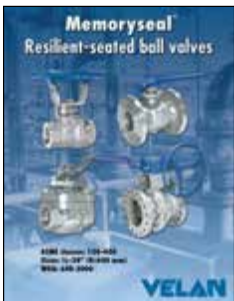
**VEL-MS**



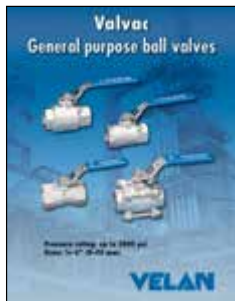
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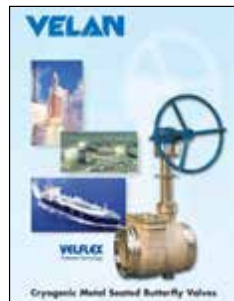
**VEL-CBV**



**VEL-BV**



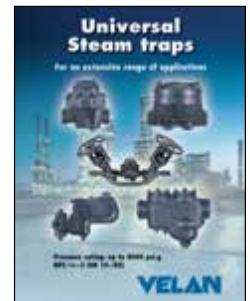
**CAT-GPBV**



**CAT-SAS-CFLEX**



**CAT-SAS-CCON**



**CAT-ST**

**alhab**

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