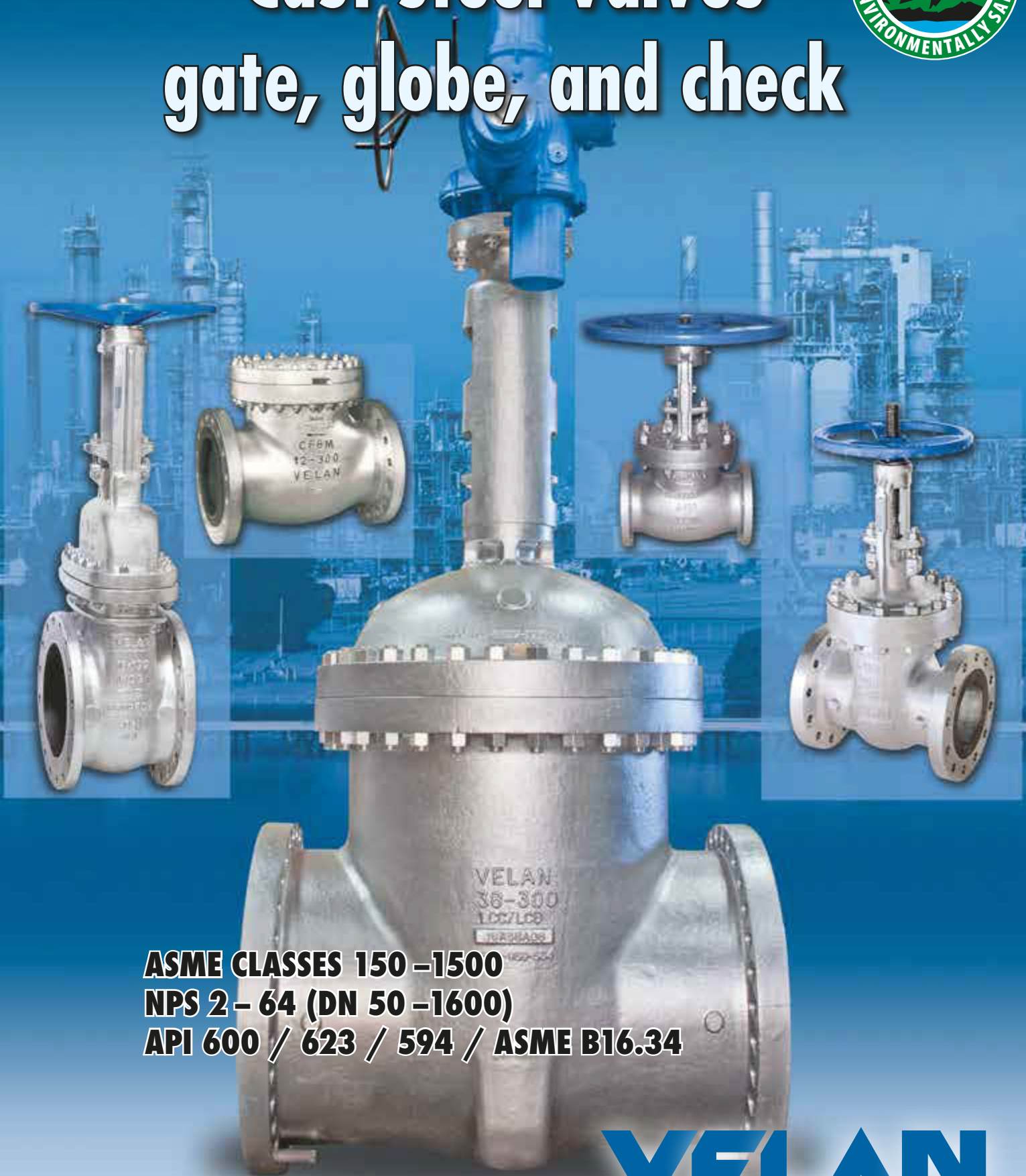


# Cast steel valves gate, globe, and check



**ASME CLASSES 150 - 1500  
NPS 2 - 64 (DN 50 - 1600)  
API 600 / 623 / 594 / ASME B16.34**

**VELAN**

# VELAN'S PROFILE

## VELAN AT A GLANCE

### History

- Founded in 1950

### 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

### Primary industries served

- Fossil, nuclear, and cogeneration power
- Oil and gas
- Refining and petrochemicals
- Chemicals and pharmaceutical
- LNG and cryogenics
- Marine
- HVAC
- Mining
- Water and wastewater
- Pulp and paper
- Subsea

### Velan holds major applicable approvals:

- ASME Section III N and NPT for nuclear valves (since 1970)
- ISO 9001 (since 1991) and ISO 14001
- OHSAS 18001
- PED
- SIL
- GOST
- API 6A and API 6D
- TA-Luft
- Comprehensive quality programs that are compliant with the most stringent industry standards such as ISO 9001, API Q1, API 624, NCA 4000, ASME NQA-1, and 10 CFR 50 Appendix B.
- Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, Newport News Shipbuilding, and DCMA.
- Total Process Improvement Program, including Lean Manufacturing and Six Sigma.



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

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

Velan concentrates on one business—the design, manufacture and marketing of steel valves and steam traps 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.

## TABLE OF CONTENTS

Velan's global network .....	3
Cast steel manufacturing program .....	4
Total quality and process improvement systems .....	5
Cast steel valves - industries served .....	6
Fugitive emission qualification .....	7
Design of stem seals and live-loading options .....	8
Body-bonnet design .....	9
API 600 Gate wedge and seats .....	10
API 623 Globe conical seat and API 594 Swing check disc .....	11
Bolted bonnet gate valves .....	12-13
Bolted bonnet globe and stop check valves .....	14-15
Swing check valves .....	16-17
Valves for special service: Hydrofluoric (HF) acid valves .....	18
Valves for special service: Cryogenic valves .....	19
Valves for special service: Block and bleed gate valves .....	20
Actuators and accessories .....	21
Bypasses, flanges, weights and Cv flow coefficients .....	22-23
Pressure-temperature ratings .....	24-25
Specification of cast valve materials .....	26
How to order cast steel gate, globe, and check valves .....	27

# VELAN'S GLOBAL NETWORK

## Head office



Montreal, Canada  
Velan Inc.

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

## Manufacturing plants

### North America



Montreal, Canada  
Velan Inc., Plant 1 and 5



### Europe



Lyon, France  
Velan SAS



### Asia



Ansan City, South Korea  
Velan Ltd., Plant 1

## Distribution centers



Missouri City, TX, U.S.A.  
Velan Valve Corp.



Montreal, Canada  
Velan Inc., Plant 2 and 7



Mennecy, France  
Segault SAS



Ansan City, South Korea  
Velan Ltd., Plant 2



Willich, Germany  
Velan GmbH



Granby, Canada  
Velan Inc., Plant 4 and 6



Lisbon, Portugal  
Velan Válvulas Industriais, Lda.



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



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



Lucca, Italy  
Velan ABV S.r.l.



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



Coimbatore, India  
Velan Valves India Pvt. Ltd.

 – ASME N-stamp accredited manufacturer



# 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

(1) For gate valves larger than NPS 42 (DN 1050), in pressure class 150 and 300, and gate valves larger than NPS 24 (DN 600) in pressure class 600 and greater, wall thickness is based on B16.34 plus additional wall thickness allowance.

- Valves comply with API 600.
- Valves comply with API 623.
- Valves comply with API 594.

### GASKET MATERIALS

VALVE TYPE	MATERIAL
Gate <sup>(1)</sup>	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.

### 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's number-one priority is quality. From order entry to design engineering to the shop floor, the entire company is totally committed to offering 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.

## 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

## 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 and 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.

## CERTIFICATIONS AND APPROVALS

- ASME N/NPT (since 1970)
- ISO 9001 (since 1991)
- ISO 14001
- OHSAS 18001
- TR-010 and TR-032
- PED
- API
- SIL
- TA-Luft

## 6 Systems ensure the final quality goals

### 1. Design

All valves are designed to comply with the requirements of ASME B16.34, the API standards, 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 four North American plants are certified to ISO 9001 and five 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."

### 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.

### 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.

## Certifications and approvals

Velan holds major applicable approvals, including ASME N/NPT, ISO 9001, ISO 14001, OHSAS 18001, PED, API, SIL, TA-Luft, etc. Velan designs and manufactures valves in accordance with ASME B16.34 and other recognized International standards such as API and ASME Section III; we implement comprehensive quality programs that are compliant with the most stringent industry standards such as ISO 9001, API Q1, NCA 4000, ASME NQA-1, and 10 CFR 50 Appendix B.

Velan has been surveyed and audited by leading organizations around the world such as Bureau Veritas, API, ASME, NUPIC, Newport News Shipbuilding, and DCMA.

# VELAN CAST STEEL VALVES

## Tight shutoff and low emissions for the process and power industries

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 including API 624 and ISO 15848-1.

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

- **Process industries:** oil, chemical, petrochemical, refining, pulp and paper, pharmaceutical, mining, food processing, and water treatment.
- **Power industries:** nuclear, fossil fuel (coal and gas), and renewable and district heating.
- **Upstream and midstream industries:** Offshore production platforms, LNG liquefaction and regasification terminals, tankers carriers and tank farms, and ship-building.



*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.*



# FUGITIVE EMISSION QUALIFICATION

## The importance of fugitive emission (FE) testing and qualification

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. The four widely recognized standards regarding valve fugitive emissions for gate and globe cast steel valves are API 622, API 624, ISO 15848-1 and ISO 15848-2.

### API 622

The primary intention of API 622 is to qualify performance of graphite packing sets, from the perspective of FE, stem corrosion and packing material properties. These tests are typically performed in test fixtures.

### API 624

The primary intention of API 624 is to type test multi-turn valve designs equipped with graphite packing to a maximum of 100 ppm FE using Methane gas and EPA method 21.

### ISO 15848-1

The primary intention of ISO 15848-1 is to type test the valve design for FE using either Helium or Methane gas. This specification provides numerous testing parameters and FE performance options, which need to be specified or agreed between valve buyer and manufacturer.

### ISO 15848-2

The primary intention of ISO 15848-2 is to specify production testing requirements for FE performance of newly produced valves, in production and from a QA/QC perspective.

#### API standard 624 FE test in a valve

We certify that Velan API 600 gate and API 623 globe valves have been qualified to API Standard 624 *Type Testing of Rising Stem Valves Equipped with Flexible Graphite Packing for Fugitive Emissions*.

Certified test reports and performance results are available upon request.

Note that valves greater than NPS 24 (DN 600 and API 594 check valves do not fall under the scope of the API 624 standard so the valves are not marked API 624 but utilize the same low fugitive emission technology.

All API 624 qualified valves use API 622 qualified packing sets.

#### ISO 15848-1 type test and ISO 15848-2 production tests

In addition to API 624 qualification, Velan has also dual qualified its API 600 gate and API 623 globe valves to ISO 15848-1 class A with methane gas.

Contact us for specific solutions regarding ISO 15848-1 with Helium gas as well as ISO 15848-2 production test requirements.



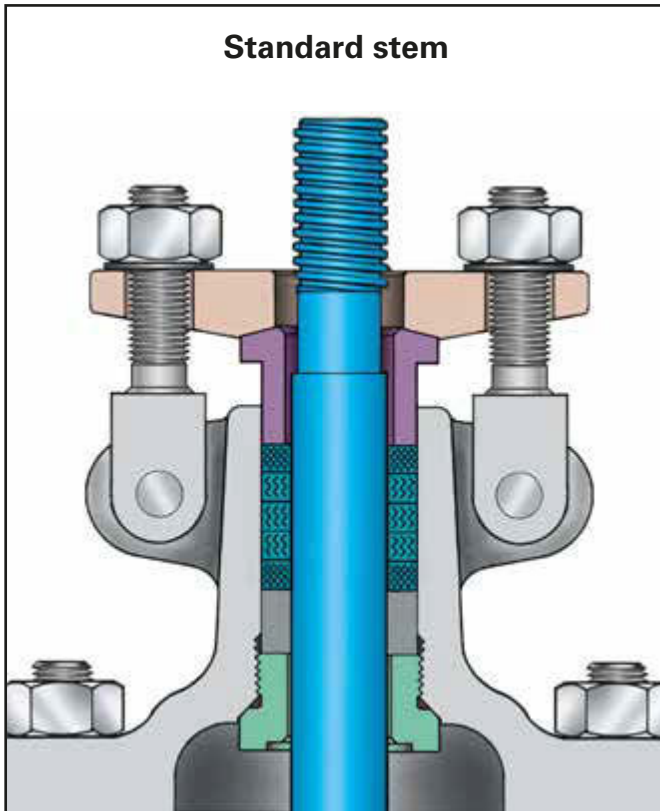
Velan's API 624 research and development test lab. Velan's R&D department is fully equipped for testing API 624, API 622, ISO 15848-1, and ISO 15848-2 as well.



All our FE qualification reports are either third party witnessed or performed at an independent laboratory. Velan also provides a low fugitive emissions certificate for Velan API 600 gate, API 623 globe, and API 594 check valves.

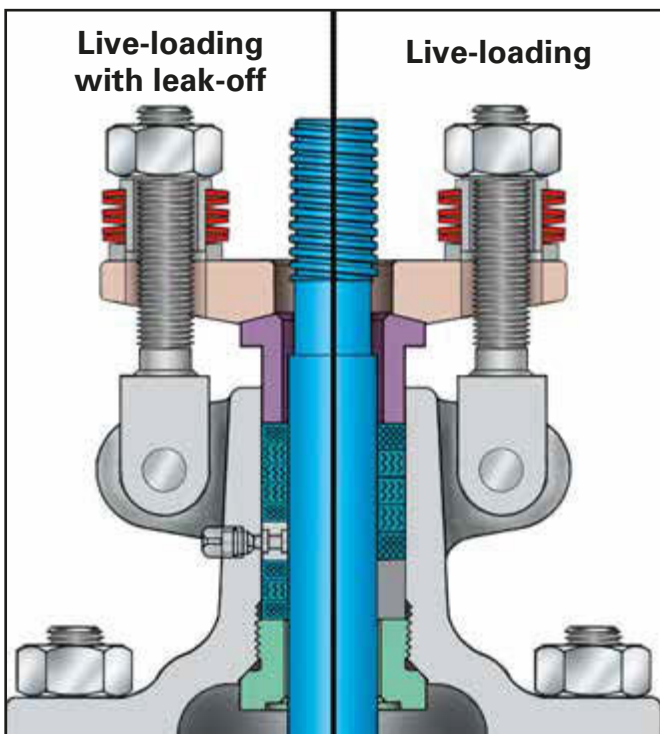
# DESIGN OF STEM SEALS

Velan offers standard cast steel bolted bonnet gate and globe valves that are qualification tested for compliance with EPA fugitive emissions regulations, API 622, API 624, as well as ISO 15848-1



The Velan stem seal evolved from these test findings:

- **Ensures leakage of less than 100 ppm** as demonstrated through extensive laboratory testing.
- Velan's low emission valve technology meets latest standards requirements, with a design optimized for extended service life:
  - a. Lower compression packing design reduces friction and allows more room to re-torque in the field;
  - b. Rugged packing gland to withstand continued field maintenance and provides lower total cost of ownership;
  - c. Optimized packing ring construction for excellent sealing and a corrosion inhibitor which demonstrated no corrosion indication based on API 622 tests.
- **Tight clearances and tolerances 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.**
- **Stem and packing chamber walls.** Superior burnished surface finish for the stem and packing chamber.
- **Hardened stem for longer life.**



## Live-loading options

**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.

- **Live-loading.** Two sets of Belleville springs 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.



# CAST STEEL VALVE BODY-BONNET DESIGN

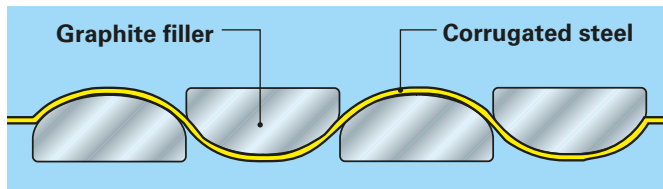
## Gasket design for gate valves with oval flanges

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** as illustrated below.



### Oval body-bonnet gasket

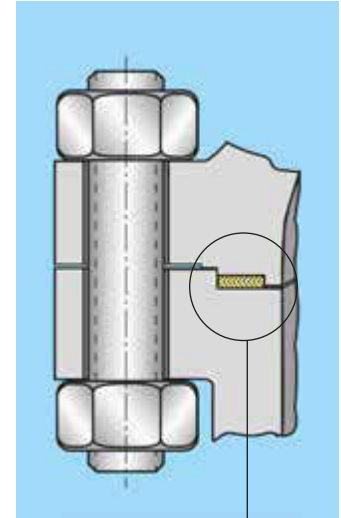


### Design features

- We certify that this gasket has been qualified to meet the requirements of API 624.
- 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).
- Low stress sealing capability.
- Modern torquing methods.

Gate	Class 150	NPS 2–64 (DN 50–600)
------	-----------	----------------------

## Gasket design for gate valves with round flanges



### Round body-bonnet gasket

Fully-encased spiral wound 316 or 347 SS/graphite body-bonnet gasket <sup>(1)</sup>.

### Design features

- Full enclosure to allow gasket to retain positive radial support during loading.
- We certify that this gasket has been qualified to meet the requirements of API 624.
- 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.
- Seal offers the advantage of flexible graphite (0–14pH, -328°F to +2,000°F).
- Modern torquing methods.

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

(1) Other materials are available.

# VELAN API 600 GATE VALVES

## FLEXIBLE WEDGE VERSUS SOLID WEDGE



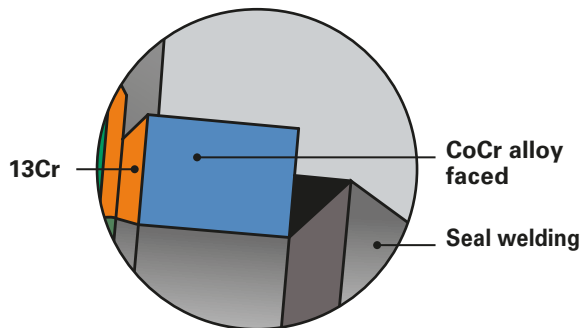
### Flexible round wedge pioneered by Velan

- 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



### 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.
- Seat surface ground and lapped 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.

## API 600 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

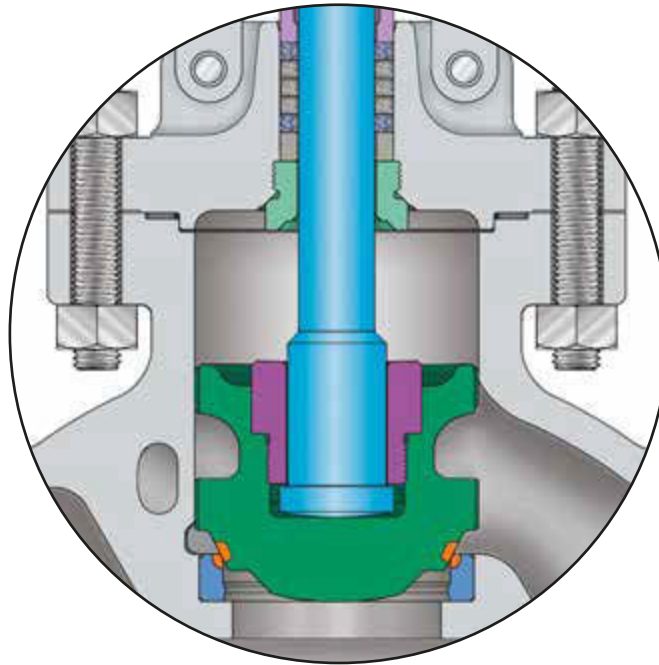
Size		Multiplier K		
		Velan standard	API 598 – 2009	
NPS	DN		Low-pressure test	High-pressure test
≤ 2	≤ 50	0	0	0
2½–12	65–300	0	4	2
14 ≥	350 ≥	2	4	2

Allowable leakage = (K) x (NPS)

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

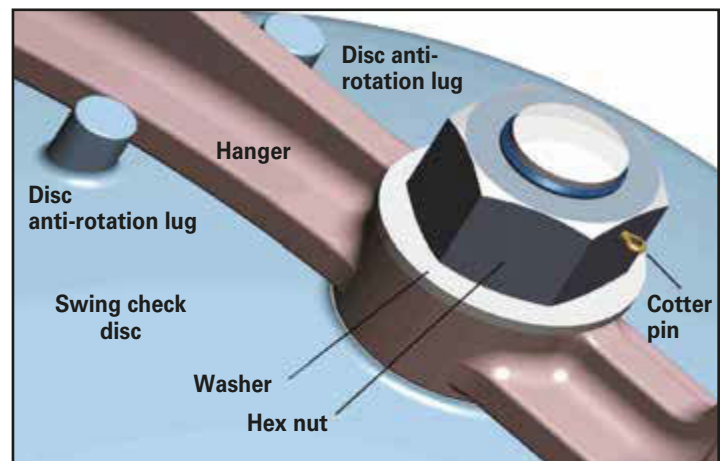
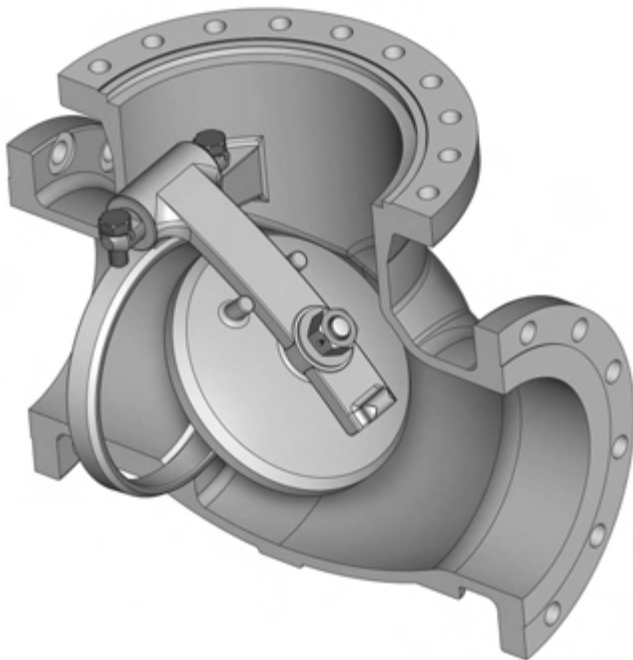
## VELAN API 623 GLOBE VALVES CONICAL SEATS

- Line contact seal.
- Non-rotating stem, torque arm and a body guided disc – easily adaptable to actuation and easier to seal.



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

## VELAN API 594 SWING CHECK VALVES



Swing check disc assembly detail

- Cage unit design with no penetration of body prevents:
  - a) No possibility of leakage with gasketed or packed hinge pin.
  - b) No 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.

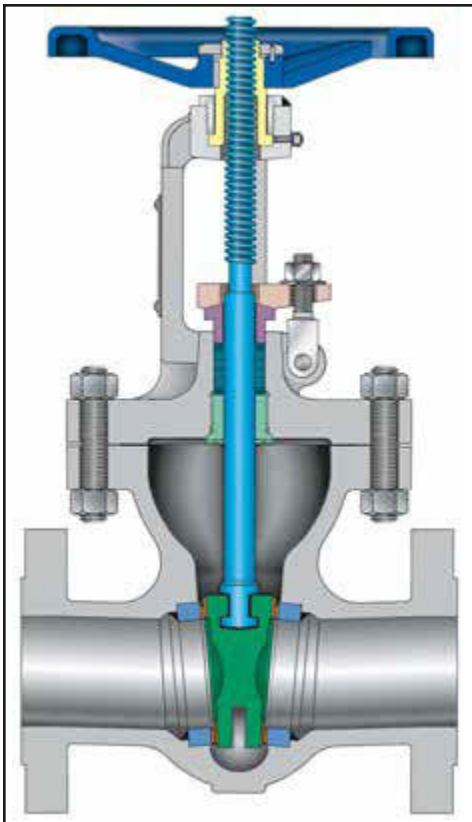
\* CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys.



# 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			
Body <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Bonnet <sup>(1)</sup>	WCB	WC6	WC9	CF8M
Stem <sup>(1)(3)</sup>	SS 410			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(4)			F316, B8M or 630(5)
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 4, details on page 9.
- **Body and bonnet** castings are precision machined. One-piece bonnet<sup>(1)</sup> 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, 2 bearings  
ASME Classes 600–1500: NPS 6 (DN 150) and up.

(1) One-piece bonnet for Class 150 up to NPS 16 (DN 400) and Class 1500 up to NPS 6 (DN 150) only.

## DESIGN SPECIFICATIONS

ITEM	APPLICABLE SPECIFICATION
Wall thickness and general design ≤ NPS 42 in Pressure Class 150 and 300 and ≤ NPS 24 in Pressure Class 600 and greater.	API 600
Wall thickness and general design > NPS 42 in Pressure Class 150 and 300 and > NPS 24 in Pressure Class 600 and greater.	ASME B16.34 plus additional allowance
Pressure-temperature rating	ASME B16.34
Face-to-face dimensions	ASME B16.10 for butt weld and flanged valves
Flange design	ASME B16.5
Butt welding design	ASME B16.25
Materials	ASTM

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

## GATE VALVE DIMENSIONS

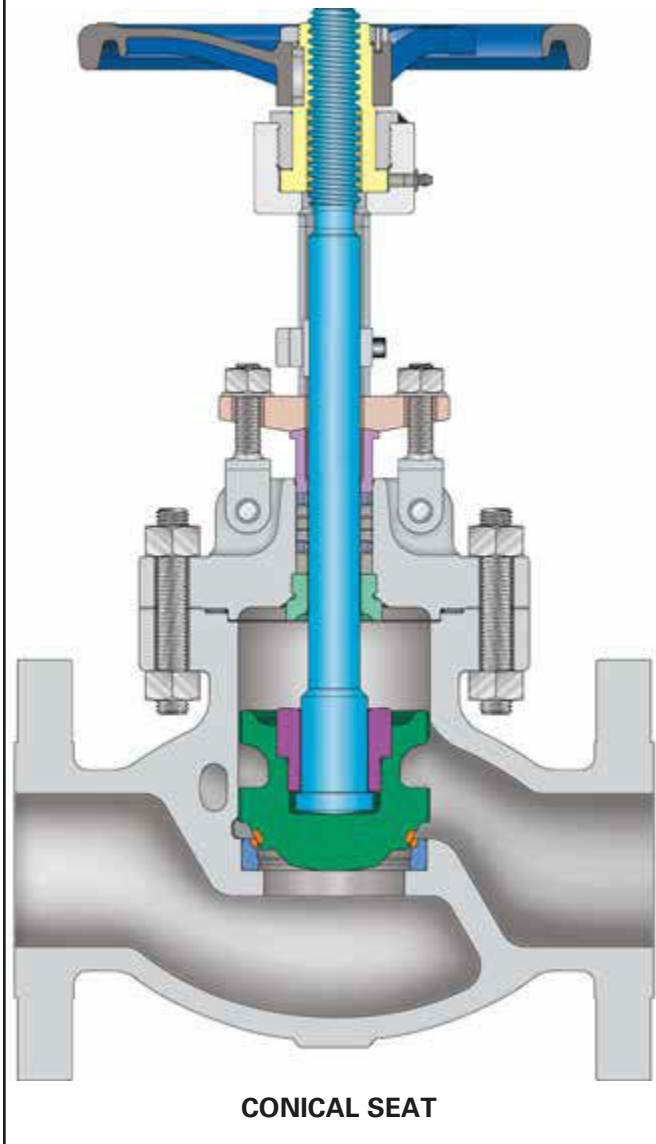
SIZE NPS DN	ASME CLASS 150					ASME CLASS 300					ASME CLASS 600					ASME CLASS 900					ASME CLASS 1500						
	A		B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	A	B <sup>(1)</sup>	C <sup>(1)</sup>	D	E	
	BW	FLG																									
2	8.50	7.00	15.63	20.38	2.00	8	8.50	15.63	20.38	2.00	8	11.50	15.66	20.51	2.00	8	14.50	21.25	29.00	1.88	10	14.50	21.25	29.00	1.88	10	
50	216	178	397	518	51	203	216	397	518	51	203	292	398	521	51	203	368	540	737	48	254	368	540	737	48	254	
2½	9.50	7.50	16.88	22.14	2.50	8	9.50	16.94	22.20	2.50	8	13.00	18.59	24.19	2.50	10	-	-	-	-	-	-	-	-	-	-	-
65	241	191	429	562	64	203	241	430	564	64	203	330	472	614	64	254	-	-	-	-	-	-	-	-	-	-	-
3	8.00	8.00	18.56	24.26	3.00	10	11.13	20.22	26.38	3.00	10	14.00	21.63	27.78	3.00	10	15.00	25.75	34.50	2.88	14	18.50	25.75	34.50	2.75	14	
80	282	203	471	616	76	254	283	514	670	76	254	356	549	706	76	254	381	654	876	73	356	470	654	876	70	356	
4	12.00	9.00	22.25	28.32	4.00	10	12.00	23.90	30.95	4.00	10	17.00	25.75	32.76	4.00	14	18.00	28.75	37.50	3.88	18	21.50	28.75	37.50	3.63	18	
100	305	229	565	719	102	254	305	607	786	102	254	432	654	832	102	356	457	730	953	99	457	546	730	953	92	457	
6	15.88	10.50	31.19	38.00	6.00	14	15.87	32.31	40.38	6.00	14	22.00	36.28	44.18	6.00	20	24.00	39.00	49.00	5.75	20	27.75	39.00	49.00	5.38	20	
150	403	267	792	965	152	356	403	821	1026	152	356	559	922	1122	152	508	610	991	1245	146	508	705	991	1245	137	(2)	
8	16.50	11.50	38.19	46.13	8.00	18	16.50	40.94	50.16	8.00	18	26.00	43.72	53.25	7.88	24	29.00	51.75	62.75	7.50	(2)	32.75	45.25	60.00	7.00	(2)	
200	419	292	970	1172	203	457	419	1040	1274	203	457	660	1110	1353	200	610	737	1315	1594	191	(2)	832	1149	1524	178	(2)	
10	18.00	13.00	47.16	56.28	10.00	20	18.00	49.19	59.87	10.00	20	31.00	49.06	59.87	9.75	30	33.00	57.75	67.25	9.38	(2)	39.00	57.75	71.00	8.75	(2)	
250	457	330	1198	1430	254	508	457	1249	1521	254	508	787	1246	1521	248	762	838	1467	1708	238	(2)	991	1467	1803	222	(2)	
12	19.75	14.00	55.91	66.75	12.00	20	19.75	59.00	70.61	12.00	20	33.00	61.13	72.74	11.75	30	38.00	66.57	83.00	11.13	(2)	44.50	73.56	92.00	10.38	(2)	
300	502	356	1420	1695	305	508	502	1499	1763	305	508	838	1553	1848	298	762	965	1691	2108	283	(2)	1130	1868	2337	264	(2)	
14	22.50	15.00	61.50	75.50	13.25	24	30.00	61.38	77.75	13.25	24	35.00	72.50	83.50	12.88	(2)	40.50	73.88	90.00	12.25	(2)	-	-	-	-	-	
350	572	381	1562	1918	337	610	762	1559	1975	337	610	889	1842	2121	327	(2)	1029	1877	2286	311	(2)	-	-	-	-	-	
16	24.00	16.00	68.75	85.00	15.25	24	33.00	68.75	85.50	15.25	30	39.00	82.25	91.00	14.75	(2)	44.50	80.44	100.00	14.00	(2)	-	-	-	-	-	
400	610	406	1746	2159	387	610	838	1746	2172	387	762	991	2089	2311	375	(2)	1130	2043	2540	356	(2)	-	-	-	-	-	
18	26.00	17.00	73.25	90.00	17.25	24	36.00	77.88	94.00	17.00	(2)	43.00	87.06	116.00	16.50	(2)	-	-	-	-	(2)	-	-	-	-	-	-
450	660	432	1861	2286	438	610	914	1978	2388	432	(2)	1092	2211	2946	419	(2)	-	-	-	-	(2)	-	-	-	-	-	-
20	28.00	18.00	83.00	100.00	19.25	30	39.00	86.50	100.00	19.00	(2)	47.00	103.00	123.00	18.25	(2)	-	-	-	-	(2)	ASME Classes 900–2500 Forged gate valves also available. See page 22 and 23 for valve weights and Cvs.					
500	711	457	2108	2540	489	762	991	2197	2540	483	(2)	1194	2616	3124	464	(2)	-	-	-	-	(2)						
24	32.00	20.00	97.00	115.00	23.25	30	45.00	101.25	125.00	23.00	(2)	55.00	115.00	132.00	22.00	(2)	-	-	-	-	(2)						
600	813	508	2464	2921	591	762	1143	2572	3175	584	(2)	1397	2921	3353	559	(2)	-	-	-	-	(2)						
26	34.00	22.00	114.50	125.00	25.00	(2)	49.00	114.50	125.00	25.00	(2)	57.00	103.86	125.00	21.38	(2)	-	-	-	-	(2)						
650	864	559	2908	3175	635	(2)	1245	2908	3175	635	(2)	1448	2638	3175	543	(2)	-	-	-	-	(2)						
28	36.00	24.00	118.63	130.00	27.00	(2)	53.00	118.63	130.00	27.00	(2)	61.00	108.25	135.00	23.00	(2)	-	-	-	-	(2)						
700	914	610	3013	3302	686	(2)	1346	3013	3302	686	(2)	1549	2750	3429	584	(2)	-	-	-	-	(2)						
30	36.00	24.00	124.13	140.00	29.25	(2)	55.00	124.13	145.00	29.25	(2)	65.00	122.50	150.00	24.75	(2)	-	-	-	-	(2)						
750	914	610	3153	3556	743	(2)	1397	3153	3683	743	(2)	1651	3112	3810	629	(2)	-	-	-	-	(2)						
32	38.00	26.00	129.63	150.00	30.75	(2)	60.00	129.63	150.00	30.75	(2)	70.00	145.06	170.00	29.25	(2)	-	-	-	-	(2)						
800	965	660	3293	3810	781	(2)	1524	3293	3810	781	(2)	1778	3684	4318	743	(2)	-	-	-	-	(2)						
34	40.00	28.00	143.00	163.00	32.75	(2)	64.00	147.63	168.00	32.75	(2)	76.00	138.00	187.00	31.00	(2)	-	-	-	-	(2)						
850	1000	700	3632	4140	832	(2)	1626	3750	4267	832	(2)	1930	3505	4750	787	(2)	-	-	-	-	(2)						
36	40.00	28.00	146.68	170.00	35.25	(2)	68.00	147.81	185.00	35.25	(2)	80.00	145.13	170.00	29.00	(2)	-	-	-	-	(2)						
900	1016	711	3726	4318	895	(2)	1727	3754	4699	895	(2)	1727	3686	4318	737	(2)	-	-	-	-	(2)						
38	41.00	29.00	155.91	175.00	36.50	(2)	-	-	-	-	(2)	86.00	121.00	162.00	34.50	(2)	-	-	-	-	(2)						
950	1041	736	3960	4445	927	(2)	-	-	-	-	(2)	2184	3073	4115	876	(2)	-	-	-	-	(2)						
40	42.00	30.00	158.66	188.00	38.50	(2)	76.00	167.00	190.00	38.50	(2)	90.00	175.00	198.00	36.38	(2)	-	-	-	-	(2)						
1000	1067	762	4030	4775	978	(2)	1930	4242	4826	978	(2)	2286	4445	5030	924	(2)	-	-	-	-	(2)						
42	44.00	31.00	166.50	195.00	40.25	(2)	76.00	167.00	190.00	38.50	(2)	-	-	-	-	(2)	-	-	-	-	(2)						
1050	1118	787	4229	4953	1022	(2)	1930	4242	4826	978	(2)	-	-	-	-	(2)	-	-	-	-	(2)						
44	-	-	-	-	-	-	80.00	186.75	286.00	42.25	(2)	98.00	185.00	211.00	40.50	(2)	-	-	-	-	(2)						
1100	-	-	-	-	-	-	2032	4743	7264	1073	(2)	2490	4700	5360	1028	(2)	-	-	-	-	(2)						
46	43.00	34.00	186.79	225.00	44.00	(2)	80.00	189.47	193.92	42.25	(2)	-	-	-	-	(2)	-	-	-	-	(2)						
1150	1092	850	4744	5715	1117	(2)	2032	4813	4926	1073	(2)	-	-	-	-	(2)	-	-	-	-	(2)						
48	-	36.00	189.81	225.00	46.00	(2)	88.00	201.68	330	46.00	(2)	-	-	-	-	(2)	-	-	-	-	(2)						
1200	-	914	4821	5715	1168	(2)	2235																				

# VELAN CAST STEEL API 623 GLOBE & STOP CHECK VALVES

## BOLTED BONNET CAST CARBON, STAINLESS OR ALLOY STEEL

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

### Unique non-rotating design (Easily adaptable for actuation)



All sizes and pressure classes  
have conical seats.

For Bellows seal valves see our on-line catalog (VEL-BS)  
at [www.velan.com](http://www.velan.com)

### 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 fine surface finish.
- **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** machined to fine surface finish.
- **Body and bonnet joint** accurately machined to fine surface finish. Fully enclosed gasket. Gasket materials on page 4. Details on page 9.
- **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 21).
- **Flanges:**  
ASME Classes 150–300: 1/16" raised face.  
ASME Classes 600–1500: 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
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

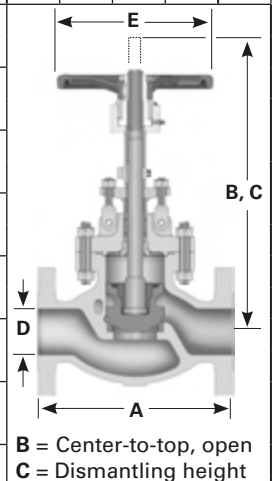
ITEM	APPLICABLE SPECIFICATION
General design	API 623
Wall thickness	API 623
Pressure-temperature rating	ASME B16.34
Face-to-face dimensions for butt weld and flanged valves	ASME B16.10
Flange design	ASME B16.5
Butt welding design	ASME B16.25
Materials	ASTM

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 50	8 203	16.85 428	20.88 530	2 51	8 203.2	10.50 267	16.85 428	20.88 530	2 51	8 203	11.50 292	17.10 434	21.13 537	2 51	10 254	14.50 368	19.75 502	25 635	1.65 42	18 457	14.50 368	19.75 502	25 635	1.65 42	18 457		
2½ 65	8.50 216	17.10 434	21.25 540	2.50 64	10 254	11.50 292	17.10 434	21.25 540	2.50 64	10 254	13 330	18.67 474	22.88 581	2.20 56	10 254	–	–	–	–	–	–	–	–	–	–	–	
3 80	9.50 241	18.42 468	22.75 578	3 76	10 254	12.50 318	18.42 468	22.75 578	3 76	10 254	14 356	20.19 513	24.13 613	3 76	14 356	15 381	24.09 612	30.50 775	2.71 69	14 <sup>(2)(3)</sup> 356	18.50 470	24.09 612	30.50 775	2.48 63	14 <sup>(2)(3)</sup> 356		
4 100	11.50 292	20.88 530	26.18 665	4 102	14 356	14 356	20.88 530	26.18 665	4 102	14 356	17 432	23.88 607	29.25 743	3.54 90	24 <sup>(2)(3)</sup> 610	18 457	27.50 699	35.38 899	3.54 90	18 457	21.50 546	27.42 696	35.38 899	3.26 83	–		
6 150	16 406	25.75 654	32 813	6 152	24 610	17.50 445	26.38 670	32.88 835	5.31 135	24 <sup>(2)(3)</sup> 610	22 559	31.22 793	37.88 962	5.31 135	24 <sup>(2)(3)</sup> 610	24 610	39.13 939	45.03 1143	5.18 132	(4)							
8 200	19.50 495	30.73 780	38.38 975	8 203	24 610	22 559	32 813	38.88 988	7.17 182	24 <sup>(2)or(4)</sup> 610	26 660	41.75 1060	57.88 1470	7.17 182	(4)	29 737	50.13 1273	62.63 1590	6.76 172	(4)							
10 250	24.50 622	39.25 997	46.75 1187	8.82 224	24 <sup>(2)(3)</sup> 610	24.50 622	42.34 1075	52.18 1325	8.82 224	24 <sup>(2)or(4)</sup> 610	31 787	47.16 1198	59 1499	8.74 222	(4)	33 838	59.38 1508	75.65 1922	8.45 215								
12 300	27.50 699	42.52 1080	53 1346	12 305	24 <sup>(2)or(4)</sup> 610	28 711	46.19 1173	62.75 1594	10.81 275	(4)	33 838	57.53 1461	72.16 1833	9.84 250	(4)												
14 350	31 787	54.21 1377	65.44 1662	13.25 337	(4)	33 838	54.21 1377	72 1829	11.93 303	(4)	–	See page 22–23 for valve weights and C <sub>v</sub> s.															
16 400	36 914	59.94 1522	72.63 1845	15.25 387	(4)	34 863	59.94 1522	76 1930	13.73 349	(4)	–																
18 450	38.50 978	59.62 1514	75 1905	17.50 444	(4)	38.50 978	59.62 1514	75 1905	15.53 394																		
24 600	51 1295	85 2159	119 3023	21.21 539	(4)	55 1397	85 2159	119 3023	20.93 532																		



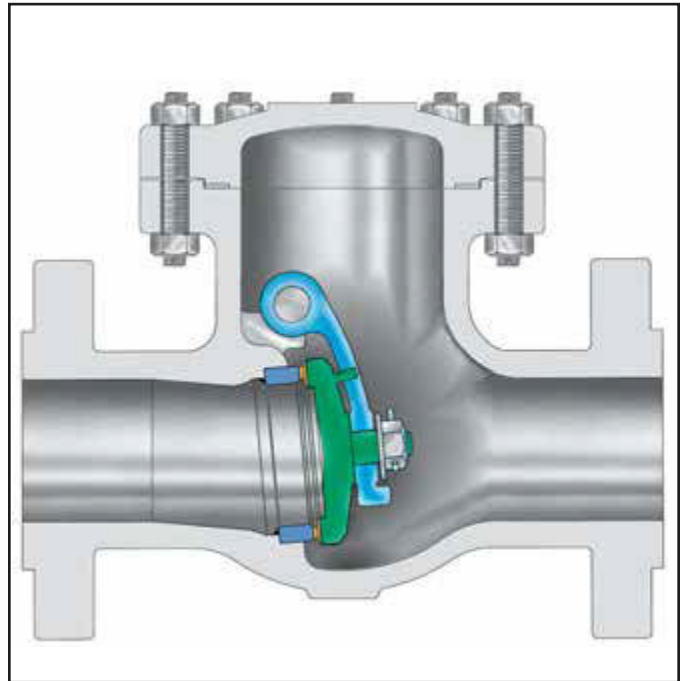
(1) Height does not include actuators. (2) Impactor handwheel.

(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)</sup>	SS 410			SS 316
Gasket <sup>(1)</sup>	Spiral wound stainless steel/graphite			
Cover stud	Gr. B7	B16		B8M Cl. 2
Cover nut	Gr. 2H	Gr. 7		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.

**For Forged steel check valves, ASME Classes 900–2500  
See our on-line catalog (CAT-PS) at [www.velan.com](http://www.velan.com).**

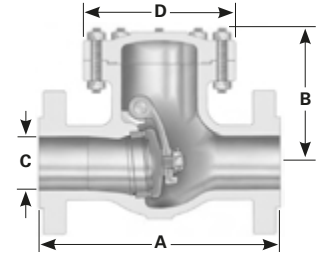
### Design features

- 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 4).
- 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
General design	API 594
Wall thickness	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 22 and 23 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 50	8 203	5.75 146	2 51	6.75 171	10.50 267	6 152	2 51	6.75 171	11.50 292	6.25 159	2 51	6.75 171	14.50 368	9.50 241	1.88 48	8.63 219	14.50 368	9.50 241	1.88 48	8.63 219
2½ 65	8.50 216	6.25 159	2.50 64	6.75 171	11.50 292	6.25 159	2.50 64	6.75 171	13 330	6.50 165	2.50 64	7.50 191	16.50 419	10 254	2.25 57	9.25 235	16.50 419	10 254	2.25 57	9.25 235
3 80	9.50 241	7.75 197	3 76	8.50 216	12.50 318	7.75 197	3 76	8.50 216	14 356	8.75 222	3 76	9.75 248	15 381	10.50 267	2.88 73	10.50 267	18.50 470	11.50 292	2.75 70	10.50 267
4 100	11.50 292	8.75 222	4 102	10.25 260	14 356	8.75 222	4 102	10.25 260	17 432	9.25 235	4 102	12 305	18 457	11.75 299	3.88 99	12.25 311	21.50 546	12 305	3.63 92	12.25 311
6 150	14 356	10.75 273	6 152	12.50 318	17.50 445	10.75 273	6 152	12.50 318	22 559	11.50 292	6 152	15.75 400	24 610	15 381	5.75 146	15.25 387	27.75 705	16.50 419	5.38 137	16 406
8 200	19.50 495	12.75 324	8 203	15.75 400	21 533	12.75 324	8 203	15.75 400	26 660	13.50 343	7.88 200	15.75 400	29 737	19.25 489	7.50 191	18.38 467	32.75 832	21 533	7 178	20.75 527
10 250	24.50 622	15.50 394	10 254	18.50 470	24.50 622	16.25 413	10 254	18.50 470	31 787	16.75 425	9.75 248	19.50 495	33 838	21.98 558	9.38 238	22.25 565	39 991	23.93 608	8.75 222	22.75 578
12 300	27.50 699	17 432	12 305	20.50 521	28 711	17 432	12 305	20.50 521	33 838	18.50 470	11.75 298	22.50 572	-	-	-	-	-	-	-	-
14 350	31 787	19.63 499	13.25 337	23 584	33 838	19.63 499	13.25 337	23 584	35 889	20.93 532	12.88 327	26.25 667	-	-	-	-	-	-	-	-
16 400	34 864	22 559	15.25 387	26.50 673	34 864	22.50 572	15.25 387	26.50 673	39 991	23.38 594	14.75 375	28.25 718	-	-	-	-	-	-	-	-
18 450	38.50 978	25 635	17.13 435	28.50 724	38.50 978	25 635	17.13 435	28.50 724	43 1092	28.67 728	16.50 419	31.50 800	-	-	-	-	-	-	-	-
20 500	38.50 978	26.50 673	19 483	31.50 800	40 1016	26.50 673	19 483	31.50 800	47 1194	27.12 689	18.25 464	35.25 895	52 1320	34.95 887	17.50 444	37.25 946	-	-	-	-
24 600	51 1295	31.25 794	23.25 591	37 940	53 1346	31.25 794	23.25 591	37 940	55 1397	35.69 907	22 559	40.25 1022	-	-	-	-	-	-	-	-
26 650	51 1295	32.63 829	25 635	37.25 946	-	-	-	-	57 1448	38.49 980	23.75 603	44 1118	-	-	-	-	-	-	-	-
28 700	57 1448	36.55 928	27 686	42 1067	59 1499	36.55 928	27 686	42 1067	-	-	-	-	-	-	-	-	-	-	-	-
30 750	60 1524	36.89 937	29.25 743	44.50 1130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32 800	64 1626	40.30 1026	30.75 781	47.25 1200	-	-	-	-	-	-	-	-	70 1778	47.56 1280	25.25 641	50 1270	-	-	-	-
34 850	-	-	-	-	64 1626	42.38 1076	32.75 832	48.75 1238	-	-	-	-	-	-	-	-	-	-	-	-
36 900	77 1956	41.78 1061	35.25 895	53 1346	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38 950	80 2032	47.01 1194	36.63 930	53 1346	-	-	-	-	-	-	-	-	81.50 2070	50.38 1280	30 762	57 1448	-	-	-	-
42 1050	78 1981	49.72 1263	37.88 962	63.50 1613	78 1981	53.22 1352	37.88 962	63.50 1613	-	-	-	-	-	-	-	-	-	-	-	-
48 1200	94 2388	55 1397	46 1168	61 1549	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





# VELAN SPECIAL SERVICES

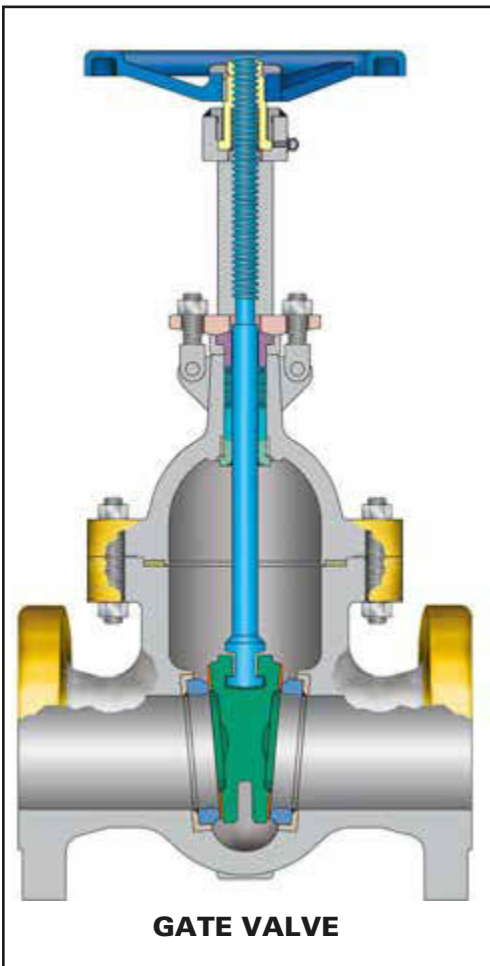
## HYDROFLUORIC (HF) ACID PROCESSING VALVES

*Hydrofluoric acid is a highly corrosive acid. 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: 150–600**

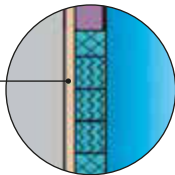
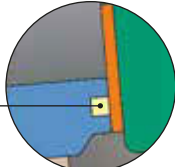
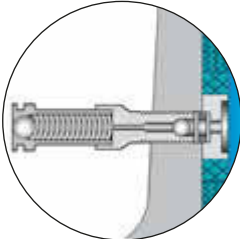
Fugitive emissions are a critical factor in the performance of any HF acid valve and at Velan, we have been committed to reducing emissions beyond the industry standards, and providing the highest quality products to our customers for over 60 years. Velan offers a comprehensive line of Phillips-approved and UOP-listed HF acid gate, globe, and check valves with several benefits.



#### Design features

- **Carbon steel bonnets** delivered with Nickel weld overlay on backseat in stem hole to combat severe alkylation conditions.
- **HF acid detecting paint** to ensure valve integrity.
- **Stem** made from aged hardened Monel K500 for increased strength and durability. **Rising stem** makes for easy visibility for open-close indications.
- **Casting design** X ray “RT” quality castings as per B16.34 acceptance standards.
- **High pressure Helium gas test.** In addition to API 598, featuring more stringent allowable leakage rates, each cast valve is subjected to a high pressure Helium gas test to ensure the valve integrity, as per ISO 15848-2.
- **Dual Nickel weld layers** in seat recess area coupled to single seal welded Monel seat ring ensuring, extended strength, corrosion resistance, and long term cost of ownership.
- **Body/bonnet wall thickness** to API 600.
- **Velan’s low-fugitive emissions guarantee.** Based on EPA Fugitive emissions regulations, API 624, ISO 15848 as well as TA-LUFT.

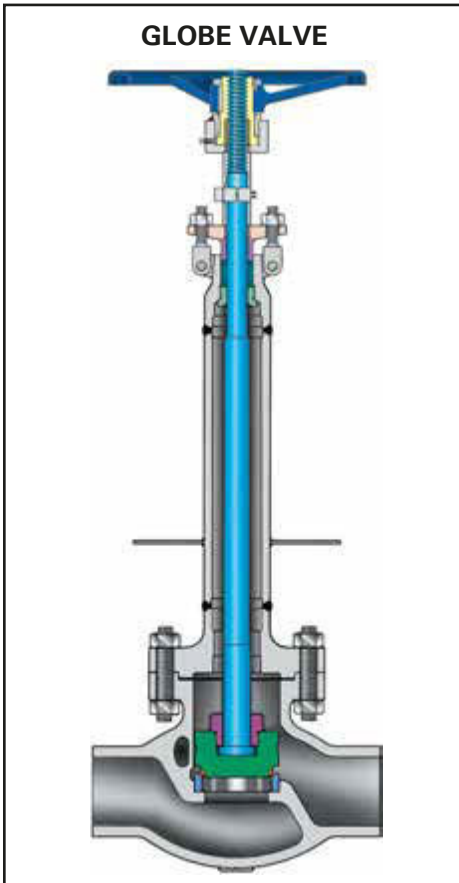
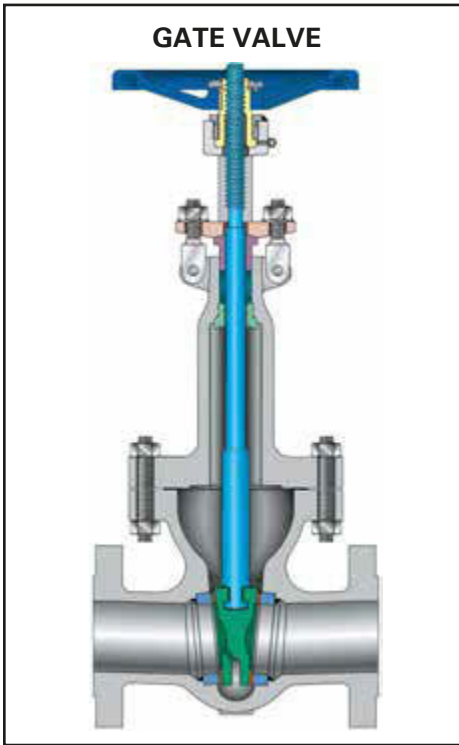
#### Optional design features

- **Full Nickel overlay packing box liner.** 
- **PTFE seat insert** resists abrasion and corrosion. 
- **Grease injector and lantern ring:** where grease injection is a requirement. 

For more information on Velan HF Acid gate, globe and check valves see our on-line catalog (CAT-HFA) at [www.velan.com](http://www.velan.com)

# VELAN SPECIAL SERVICES

## CAST STEEL CRYOGENIC VALVES



### 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 swing check discs.
- **Cleaning:** All cryogenic valves are thoroughly degreased and cleaned and pipe ends are sealed to prevent contamination.

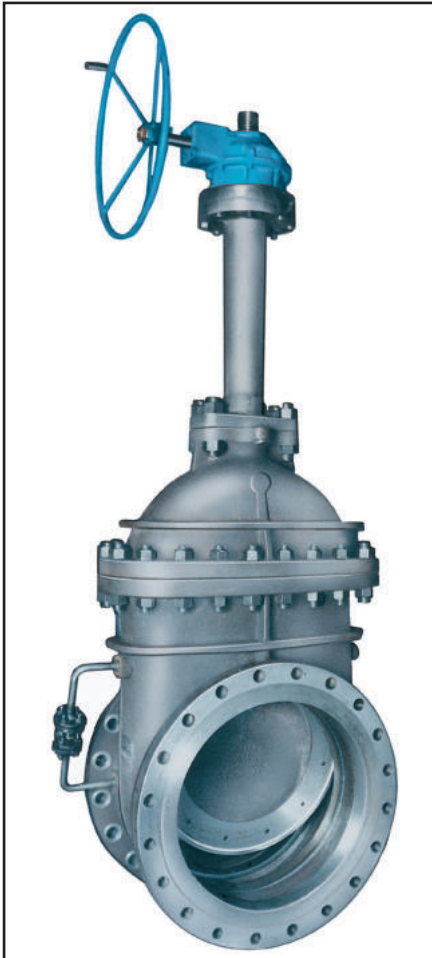
For more information on cryogenic valves see our on-line catalog (VEL-CRYO) at [www.velan.com](http://www.velan.com).

#### 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.



TEST PLUG

### 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.

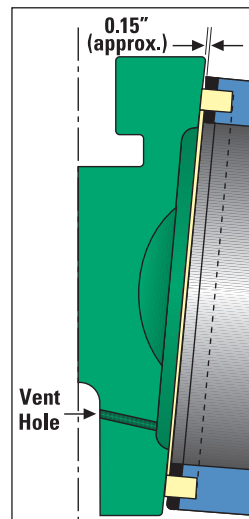
#### Easy in-line valve reseating

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

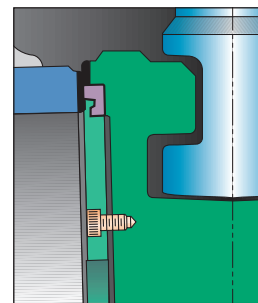
##### Style A

NPS 2–12  
(DN 50–300)



##### Style B <sup>(1)</sup>

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 temperature	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 +204°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.

(1) For gate valves larger than NPS 42 (DN 1050), in pressure class 150 and 300, and gate valves larger than 24" in pressure classes 600 and greater, wall thickness is based on B16.34 plus additional wall thickness allowance.

# 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:

Actuator type	Line pressure	Differential pressure (closed)	Power supply
<b>Electric</b>	Specified by customer	Specified by customer	Voltage, type, phase, specified by customer
<b>Pneumatic</b>	Specified by customer	Specified by customer	Air pressure specified by customer
<b>Hydraulic</b>	Specified by customer	Specified by customer	Hydraulic pressure specified by customer
<b>Handwheel gear actuated</b>	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.

(2) Rimpull is defined as the total tangential force acting on the outer rim of 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.

## 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 can be varied to fit special requirements.

# OTHER ACCESSORIES

## Chain wheels

Chainwheels are used to enable remote actuation of a valve that is typically at a higher elevation than the person operating it. Chainwheels may be used on Velan cast steel valves covered in this catalogue. Velan strongly recommends the use of appropriately designed safety accessories to prevent the risk of the chainwheel falling in the event it becomes detached from the valve assembly. Please contact Velan for additional information on the correct application of chainwheels on our valves.

## 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.

## Lifting points

Lifting points are available to facilitate handling of larger and heavier valves.



# BYPASSES

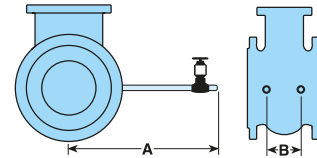
AVAILABLE FOR ALL VELAN CAST STEEL VALVES IN ACCORDANCE WITH MSS-SP45 - SERIES A

**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	—	—	—	—	—	—	—	—

**API 623 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	—	—	—	—



# FLANGES, WEIGHTS, AND Cv FLOW COEFFICIENTS

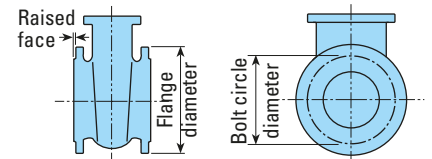
**API 600 CAST STEEL VALVES**

**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)



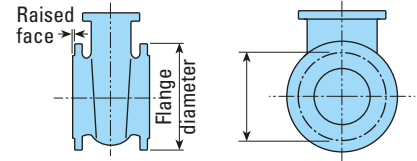
ASME CLASS	DIMENSIONS IN INCHES							WEIGHT IN LBS.						CV FLOW COEFFICIENTS		
	SIZE		FLANGE DIAM.	BOLT CIRCLE DIAM.	HOLE DIAM.	QTY. HOLES	DIAM. BOLTS	GATE		GLOBE		SWING		GATE	GLOBE	CHECK
	NPS	DN						BW	FL	BW	FL	BW	FL			
150 1/16 RAISED FACE	2	50	6.00	4.75	0.75	4	3/8	42	48	48	55	31	40	260	35	95
	2 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	1070	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 1/4	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	6720	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	370	950
	8	200	15.00	13.00	1.00	12	3/4	415	506	447	565	360	455	4850	695	1750
	10	250	17.50	15.25	1.13	16	1	646	762	1000	1150	582	650	7750	1065	2800
	12	300	20.50	17.75	1.25	16	1 1/8	900	1100	1300	1550	825	945	11,500	1640	4100
	14	350	23.00	20.25	1.25	20	1 1/8	1392	1720	1800	2100	1200	1350	14,000	2015	6200
	16	400	25.50	22.50	1.38	20	1 1/4	1870	2220	2300	2700	1500	1800	19,000	2705	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	30	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	155	410
	6	150	14.00	11.50	1.13	12	1	394	540	415	515	332	476	2650	369	950
	8	200	16.50	13.75	1.25	12	1 1/8	726	884	1050	1220	525	715	4850	695	1750
	10	250	20.00	17.00	1.38	16	1 1/8	1125	1405	1550	1830	1000	1250	7750	1050	2800
	12	300	22.00	19.25	1.38	20	1 1/4	1490	1812	—	—	1500	1750	11,500	1345	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	30	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	90	200
	4	100	11.50	9.25	1.25	8	1 1/8	270	355	260	350	245	330	1050	155	380
	6	150	15.00	12.50	1.25	12	1 1/8	830	980	641	831	485	635	2400	350	875
	8	200	18.50	15.50	1.50	12	1 1/8	1220	1500	1278	1588	700	900	4200	610	1325
	10	250	21.50	18.50	1.50	16	1 1/8	2000	2400	—	—	1600	2100	6750	975	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	30	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	75	185
	4	100	12.25	9.50	1.37	8	1 1/4	430	520	—	—	340	430	925	130	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 (psig – °F)

## STANDARD CLASS VALVES FLANGED AND BUTT WELD END

NOTE: FOR SPECIAL CLASS VALVES, WHICH HAVE 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
750	110	355					

# PRESSURE-TEMPERATURE RATINGS (bars – °C)

## STANDARD CLASS VALVES FLANGED AND BUTT WELD END

NOTE: FOR SPECIAL CLASS VALVES, WHICH HAVE 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		



# 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 27.**

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

# How to order cast steel gate, globe, and check valves

Type of connection	Size of connection	Pressure rating	Valve type	Body/bonnet style	Body material	Trim material
<b>A</b> 	<b>B</b> 	<b>C</b> 	<b>D</b> 	<b>E</b> 	<b>F</b> 	<b>G</b> 
<b>F</b>	<b>1 0</b>	<b>— 0</b>	<b>0 6</b>	<b>4 C</b>	<b>— 0 2</b>	<b>T Y</b>

**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.

<b>A TYPE OF CONNECTION</b>					
<b>A</b>	Special	<b>D</b>	DIN Flanged	<b>P</b>	Flanged B16.47 series B (API 605)
<b>B</b>	Butt weld	<b>E</b>	Welded studs (butt weld)	<b>R</b>	Flanged ring joint
<b>C</b>	Combination	<b>F</b>	Flanged B16.5 (B16.47 series A)	<b>U</b>	Undrilled flanges

<b>B SIZE OF CONNECTION</b>											
Customers have the choice of specifying valve size as part of the valve figure number (B) using the numbers below, or indicating valve size separately. Sizes shown in NPS (DN)											
<b>EXAMPLES:</b>											
F10-0064C-02TY (valve size is part of figure number)											
3 (80) F-0064C-02TY (valve size is shown separately)											
<b>08</b>	2 (50)	<b>14</b>	6 (150)	<b>21</b>	18 (450)	<b>30</b>	30 (750)	<b>42</b>	42 (1050)	<b>56</b>	56 (1400)
<b>09</b>	2½ (65)	<b>15</b>	8 (200)	<b>22</b>	20 (500)	<b>32</b>	32 (800)	<b>44</b>	44 (1100)	<b>60</b>	60 (1500)
<b>10</b>	3 (80)	<b>16</b>	10 (250)	<b>23</b>	22 (550)	<b>34</b>	34 (850)	<b>46</b>	46 (1150)	<b>64</b>	64 (1600)
<b>11</b>	3½ (90)	<b>18</b>	12 (300)	<b>24</b>	24 (600)	<b>36</b>	36 (900)	<b>48</b>	48 (1200)	<b>99</b>	Special
<b>12</b>	4 (100)	<b>19</b>	14 (350)	<b>26</b>	26 (650)	<b>38</b>	38 (950)	<b>50</b>	50 (1250)		
<b>13</b>	5 (125)	<b>20</b>	16 (400)	<b>28</b>	28 (700)	<b>40</b>	40 (1000)	<b>54</b>	54 (1350)		

<b>C PRESSURE RATING</b>											
<b>0</b>	150	<b>1</b>	300	<b>2</b>	600	<b>3</b>	1500	<b>7</b>	900	<b>X</b>	Butt weld

<b>D VALVE TYPE</b>							
<b>01</b>	Flow control	<b>07</b>	Stop globe	<b>09</b>	Needle	<b>99</b>	Special
<b>06</b>	Full port gate	<b>08</b>	Stop check	<b>11</b>	Swing check		

<b>E BODY/BONNET STYLE</b>			
<b>4</b>	Vertical	<b>A</b>	Special
		<b>C</b>	Bolted bonnet (cast)
		<b>E</b>	Extended bonnet (cryogenic)
		<b>V</b>	Cast bolted bonnet bellows seal

<b>F BODY MATERIAL<sup>(1)</sup></b>							
<b>01</b>	Special	<b>09</b>	C12	<b>19</b>	Monel M35	<b>31</b>	LCC
<b>02</b>	WCB	<b>11</b>	CF8	<b>23</b>	Alloy 20	<b>34</b>	C12A (F91)
<b>03</b>	WC1	<b>12</b>	CF3	<b>25</b>	LCB	<b>38</b>	LC1
<b>04</b>	C5	<b>13</b>	CF8M	<b>27</b>	LC3	<b>39</b>	LC2
<b>05</b>	WC6	<b>14</b>	CF3M	<b>28</b>	CG8M	<b>46</b>	GS-C25N
<b>06</b>	WC9	<b>15</b>	CF8C	<b>29</b>	CG3M		

(1) Pressure-containing valve components which may include body, bonnet, cover and body end.

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

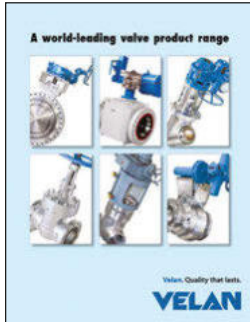
For a more detailed list of available trims, contact the factory or visit our web site at [www.velan.com](http://www.velan.com).

<b>G TRIM (standard trims)</b>					
Code	Wedge/disc surface <sup>(2)</sup>	Seat surface <sup>(2)</sup>	Stem	API Number	Bellows <sup>(3)</sup> (if applicable)
<b>MS</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	316	16	321
<b>MY</b>	CF8M or 316	CoCr alloy <sup>(4)</sup>	316	12	321
<b>TS</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	13 Cr (410) <sup>(5)</sup>	5	321
<b>TY</b>	13 Cr (410 or CA15)	CoCr alloy <sup>(4)</sup>	13 Cr (410)	8	
<b>NA</b>	13 Cr (410 or CA15) HRC 22 max.	CoCr alloy <sup>(4)</sup>	13 Cr 410 HRC 22 max.	8	
<b>NB</b>	CF8M	CoCr alloy <sup>(4)</sup>	316	12	321
<b>NC</b>	Monel	CoCr alloy <sup>(4)</sup>	Monel	11	Hastelloy C
<b>ND</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	630 (H1150M)	5 <sup>(8)</sup>	
<b>NE</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	13 Cr 410 HRC 22 max.	5	
<b>NF</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	Same as body		
<b>NG</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	316	16	
<b>NN</b>	CF8M	CoCr alloy <sup>(4)</sup>	316	12	
<b>NX</b>	Monel	Monel	Monel	9	
<b>NY</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	XM-19	16 <sup>(9)</sup>	
<b>AS</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	321	16 <sup>(10)</sup>	321
<b>AY</b>	CF8C/F321	CoCr alloy <sup>(4)</sup>	321	12 <sup>(10)</sup>	321
<b>CC</b>	Alloy 20	Alloy 20	Alloy 20	13	
<b>ES</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	347	16 <sup>(10)</sup>	
<b>EY</b>	CF8C/F347	CoCr alloy <sup>(4)</sup>	347	12 <sup>(10)</sup>	
<b>HC</b>	Hastelloy C	CoCr alloy <sup>(4)</sup>	Hastelloy C		Hastelloy C
<b>HM</b>	HF-acid trim	HF-acid trim	HF-acid trim		
<b>MF</b>	CF8M or 316 w/ Teflon insert <sup>(6)</sup>	CoCr alloy <sup>(4)</sup>	316	12	
<b>MH</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	316	16	Hastelloy C
<b>MN</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	316	16	Inconel 625
<b>MX</b>	CF8M	316	316	10	
<b>TF</b>	13Cr (410 or CA15) w/ Teflon insert <sup>(6)</sup>	CoCr alloy <sup>(4)</sup>	13 Cr (410)	8	
<b>TH</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	13 Cr (410) <sup>(5)</sup>	5	Hastelloy C
<b>TN</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	13 Cr (410) <sup>(5)</sup>	5	Inconel 625
<b>XS</b>	CoCr alloy <sup>(4)</sup>	CoCr alloy <sup>(4)</sup>	Monel		
<b>XX</b>	Monel	Monel	Monel	9	
<b>XY</b>	Monel	CoCr alloy <sup>(4)</sup>	Monel	11	

- Base material is either the same as the body or solid trim at manufacturer's option.
- 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.
- 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.
- 616HT manufacturer's standard. (F91 and C12A only).
- Inserts may be in seat or wedge at manufacturer's option.
- Valves with "NACE" figure numbers will meet the material requirements of NACE MRO103 and MRO175/ISO 15156. It is the equipment user's responsibility to ensure that the materials are suitable for the intended service.
- 630 SS is a Precipitation - Hardenable Stainless Steel (Also referred to as 17-4 PH stainless steel) Has superior Mechanical properties and adequate corrosion resistance when compared to 410 SS.
- XM-19 is an austenitic stainless steel known for its superior mechanical properties and corrosion resistance compared to 316 SS.
- An austenitic stainless steel which has comparable mechanical properties and corrosion resistance compared to 316.

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

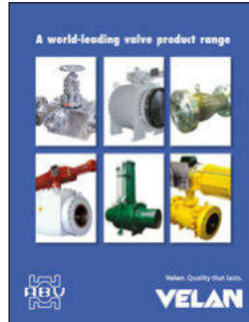
**ASME pressure classes 150–4500 in carbon, alloy, and stainless steel**



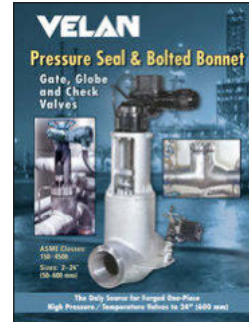
**BRO-FLB**



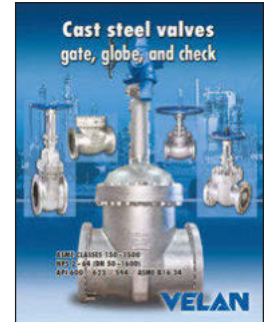
**SAS-FLB**



**ABV-FLB**



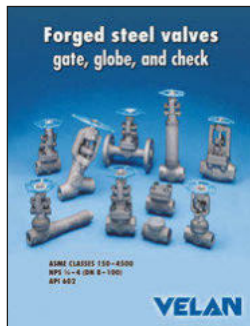
**VEL-PS**



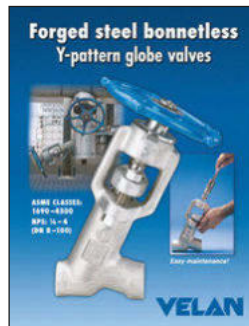
**CAT-CSV**



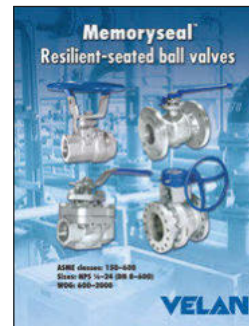
**CAT-CSSV**



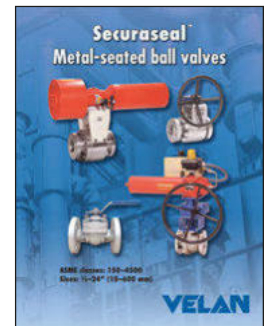
**CAT-SFV**



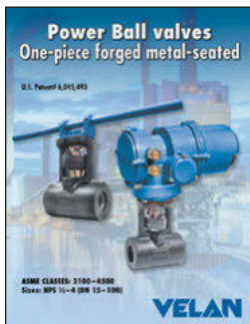
**CAT-BG**



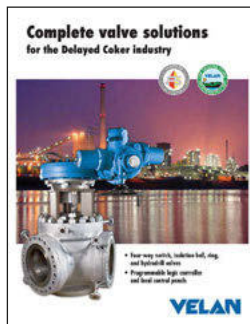
**CAT-BV**



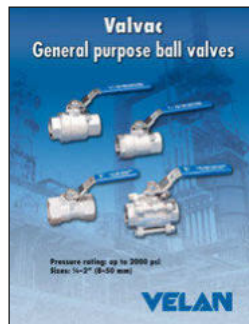
**VEL-MS**



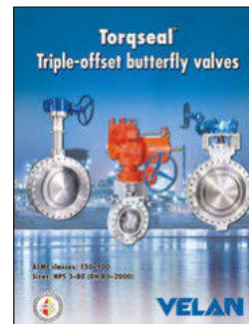
**CAT-PBV**



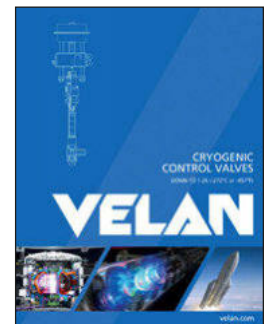
**BRO-CBV**



**CAT-GPBV**



**CAT-BF**



**SAS-CCV**

**⚠ WARNING:** The use of chainwheels may present a risk of serious injury to personnel or damage to property if the chainwheel becomes detached and falls. The end user and purchaser shall be responsible to ensure the correct installation, operation, maintenance and safety provisions related to chainwheels. Velan does not assume any liability whatsoever for the safe application and operation of chainwheels supplied by parties other than Velan or for chainwheels that are used without a suitably designed safety device.

Headquartered in Montreal, Canada, 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)

CAT-CSV-09-18a

Printed in Canada

© 2019 Velan Inc., Montreal, QC, Canada. All rights reserved. The contents hereof are confidential and proprietary to Velan. Any unauthorized reproduction or disclosure, in whole or in part, is strictly prohibited. The material in this catalog is for general information only and shall not be used for specific performance data and material selection without first consulting Velan. Velan reserves the right to change this information without notice. Velan does not accept any liability or damages arising from the use of information in this catalog. Velan, Velan Ultraflex, Steamless, Moss, Torqseal, Memoryseal, Securaseal, Velflex, Rama, Clama, Adareg, and Rama Clama II are trademarks or registered trademarks of Velan Inc. and/or another Velan company. One or more of these trademarks are registered in certain countries/regions, please contact Velan Inc.'s legal department for further information. All other trademarks and registered trademarks are owned by their respective companies.

