



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



## **VELAN'S PROFILE**

#### **VELAN AT A GLANCE**

#### History

• Founded in 1950

#### Sales

• Over \$450 million

#### **People**

• Over 1,800 employees

#### **Product line**

A world-leading range of valves across all major industrial applications:

- Cast steel gate, globe, check, and ball valves
- Forged steel gate, globe, check, and ball valves
- Triple-offset butterfly valves
- Knife gate valves
- Severe service valves
- Bellows seal valves
- · Steam traps

#### Quality

All major certifications and approvals

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

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www.velan.com



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

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

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

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#### **TABLE OF CONTENTS**

Velan cast steel valves target industries and manufacturing program
Total quality and process improvement and systems
Production machines8
Automatic plasma arc hardfacing and testing <b>9</b>
Continuous casting quality improvement and computerized casting process simulation
Design of stem seals and live-loading options 11
Fugitive emission testing 12–13
Accessories 14
Body-bonnet design 15
Technology of seat-disc tightness and assembly and testing <b>16–17</b>
Wedge and seat comparisons 18
Globe valve conical seat and API 594 swing check valves <b>19</b>
Bolted bonnet gate valves 20–21
Bolted bonnet globe and stop check valves <b>22–23</b>
API 594 swing check valves 24–25
Valves for special service— live-loaded <b>26</b>
Valves for special service— hydrofluoric acid <b>27</b>
Valves for special service— cryogenic <b>28</b>
Valves for special service— block and bleed gate <b>29</b>
Bypasses, flanges, weights and Cv flow cofficients <b>30–31</b>
Pressure-temperature ratings 32–33
Specification of cast valve materials <b>34</b>
How to order cast steel gate, globe, and check valves <b>35</b>

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

## **VELAN'S GLOBAL NETWORK**

#### **Head office**



Montreal, Canada Velan Inc.

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

#### **Manufacturing Plants**

#### **North America**



Montreal, Canada Velan Inc., Plant 1

Montreal, Canada

Granby, Canada

Montreal, Canada

Velan Inc., Plant 5

Williston, VT, USA

Velan Valve Corp., Plant 3

Velan Inc., Plant 4 and 6

Velan Inc., Plant 2 and 7



Lvon, France

**Europe** 



Velan S.A.S.



Mennecy, France



Segault S.A.



Leicester, UK Velan Valves Ltd.



Lisbon, Portugal Velan Válvulas Industriais, Lda.



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



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

#### **Asia**



Ansan City, South Korea Velan Ltd., Plant 1



Ansan City, South Korea Velan Ltd., Plant 2



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



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



Coimbatore, India Velan Valves India Pvt. Ltd.

#### **Distribution centers**



Granby, Canada Vel*CAN* 



Benicia, CA, USA Vel*CAL* 



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



Willich, Germany Velan GmbH

N-stamp accredited manufacturer

## **VELAN CAST STEEL VALVES**

#### FOR PROCESS AND POWER INDUSTRIES

## **LOW FUGITIVE EMISSIONS**

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

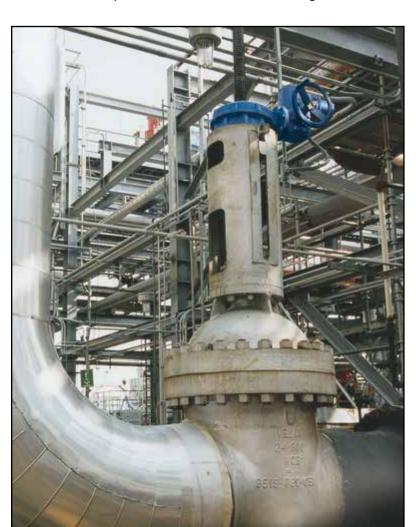
Our gate, globe, and check valves are widely used in many industries including:

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

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



Cast steel valve installation at an oil refinery.



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



A geothermal power plant valve installation for sour gas service.



Gate valves in service for a boiler feed installation.

# **CAST STEEL VALVES MANUFACTURING PROGRAM**

#### CAST STEEL GATE, GLOBE, AND CHECK VALVES

be															SIZ	E (N	PS/I	ON)													
a)	ASME Class	2	<b>2</b> ½	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
Va		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
	150	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1
	300	1	1	✓	<b>\</b>	✓	1	<b>✓</b>	1	1	<b>^</b>	<	1	1	1	<b>\</b>	<b>✓</b>	✓	1	1		1	1								
GATE	600	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1			1				
	900	1		1	1	1	1	1	1	1	1																				
	1500	1		/	1	1	1	1																							
	150	1	1	1	1	1	1	1	1	1	1	1		1																	
	300	1	1	1	1	1	1	1	1	1	1	1		1																	
GLOBE	600	1	1	1	1	1	1	1	1																						
	900	1		/	1	1	1																								
	1500	1		/																											
	150	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	/		1	1		1			1					
	300	1	1	1	1	1	1	1	1	1	1	1	1	1		1			1				1								
CHECK	600	1	1	1	1	1	1	1	1	1	1	1	1	1	1																
	900	1		/	1	1	1	1					1					/			1										
	1500	<b>\</b>		1	1	1	1	1																							

#### **GASKET MATERIALS**

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

#### NOTE:

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

#### **OPTIONAL BODY MATERIALS**

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

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

## **TOTAL QUALITY AND PROCESS IMPROVEMENT**

# **VELAN**

## ▼ Total Quality Commitment ▼

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

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

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



A.K. Velan,
Founder of Velan

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

#### **TOTAL PROCESS IMPROVEMENT**

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

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

#### **CERTIFICATES/APPROVALS**

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











# TOTAL PROCESS IMPROVEMENT PROGRAM

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

#### **CERTIFICATIONS/APPROVALS**

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

## **6 SYSTEMS ENSURE THE FINAL QUALITY GOALS**

#### 1. DESIGN

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

#### 2. QUALITY ASSURANCE

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

#### 3. QUALITY CONTROL

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



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

#### 4. PRESSURE TESTING

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



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

#### **5. IMPROVEMENT TEAMS**

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

#### 6. QUALIFICATION **TESTING**

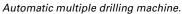
A key to reliability is the performance of functional qualification tests. These tests are performed on all valves to determine reliability and service life. 1,000 cold and 1,000 thermal cycles with 1,000°F (555.6°C) superheated steam and five blowdowns with "0" leakage.

# MASS PRODUCTION OF CAST STEEL VALVES











Automatic three-way facing machine.

# AUTOMATIC PLASMA ARC HARDFACING FOR SEATS AND DISCS



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

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



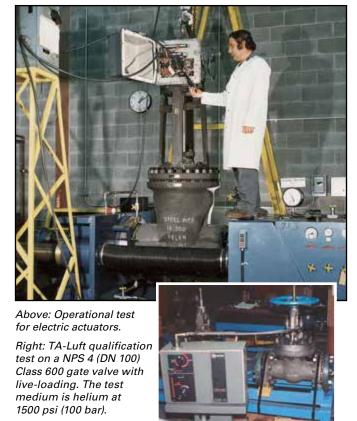
Automatic plasma arc hardfacing equipment for seats.

## **RELIABILITY THROUGH TESTING**

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



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



## **CONTINUOUS CASTING QUALITY IMPROVEMENT**

#### AND COMPUTERIZED CASTING PROCESS SIMULATION

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

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

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

#### Sample castings

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

#### Radiographic monitoring

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

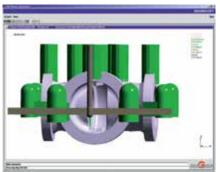


3-D solid model of casting imported into MAGMASOFT® simulation program.

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

#### **Casting monitoring**

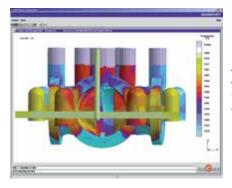
Castings rejected due to defects such as shrinkage, porosity, and inclusions discovered by radiography, hydrostatic tests, or machining are recorded as part of the statistical control of each vendor.



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

#### 3-D solidification simulation

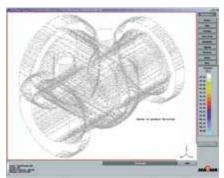
Velan works with foundries that use computer-based casting simulation programs such as MAGMASOFT® to optimize casting design and manufacturing methods before and during the production process.



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

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

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



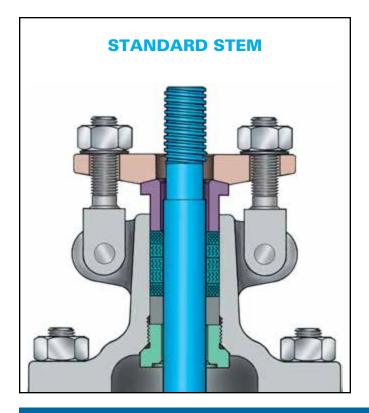
No shrinkage on a NPS 30 (DN 750) Class 600 gate valve body simulation.

# BENEFITS TO VELAN'S CUSTOMERS AND TO THE FOUNDRIES

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

## **DESIGN OF STEM SEALS**

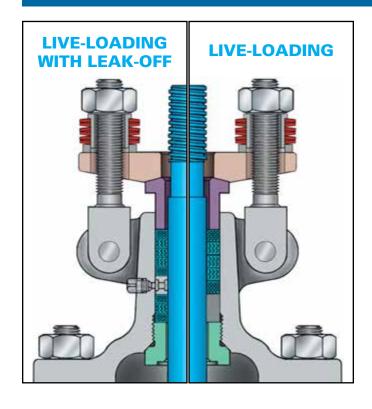
Velan offers standard cast steel bolted bonnet gate and globe valves that are qualification tested for compliance with EPA fugitive emissions regulations as well as ISO 15848 and API 622 standards



The Velan stem seal evolved from these test findings:

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

## **LIVE-LOADING OPTIONS**



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

## **FUGITIVE EMISSION TESTING**

#### WHY FUGITIVE EMISSION (FE) TESTING IS SO IMPORTANT:

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

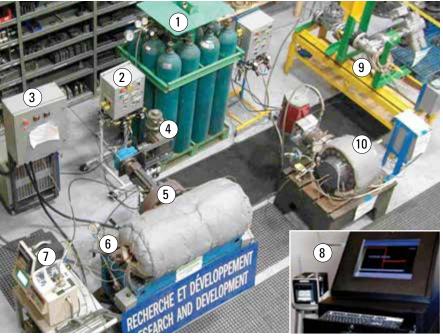
ISO 15848-1 type test and ISO 15848-2 production tests	API standard 622 FE test in a test fixture	API standard 624 FE test in a valve
Introduced in 2006.	Introduced in 2006.	Introduced in 2011
<ul> <li>Velan has tested our standard packing set to ISO 15848-1 and re-validated our FE certification.</li> </ul>	<ul> <li>Velan has tested our standard packing set to API 622 and re-validated our FE certification.</li> </ul>	<ul><li>Intended for fugitive emissions valves</li><li>Uses sniffing as a test method</li></ul>
<ul> <li>Uses the "global" test method.</li> <li>ISO 15848-1 test is carried out with a standard valve and additional bonnet enclosure.</li> </ul>	<ul> <li>Uses the "sniffing / flushing" test method (local method).</li> <li>API 622 test is carried out in a test fixture designed to simulate a valve.</li> </ul>	<ul> <li>Testing is carried out using assembled valves</li> </ul>

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

- (1) No correlation between mg/second and ppmv.
- (2) The test pressure shall be in accordance with the temperature rating for the test valve per ASME B16.34 for the applicable body material and pressure class or 600 psig, whichever is lower.
- (3) NPS 4, 6, & 12 (DN 100, 150, and 300): Class 300 qualifies Classes 150–600
- (4) NPS 4 (DN 100): Class 1500 qualifies Classes 900 and 1500
- (5) NPS 4 (DN 100): Class 2500 qualifies only Class 2500

## **FUGITIVE EMISSION TESTING**

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



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

Class 600 API 600 cast steel gate

Qualification valve NPS 10

(DN 250) Class 300 Torqseal®

(10)

## THIRD PARTY FUGITIVE EMISSIONS **TESTING OF VELAN VALVES**



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

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



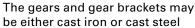


## **ACCESSORIES**

## **GEAR, ELECTRIC, AND CYLINDER ACTUATORS**

#### **GEAR ACTUATORS**

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



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.

Ä	Size	0	PTIONAL	STA	ANDARD
TYPE	ASME CLASS	NPS	DN	NPS	DN
	150	6-24	150-600	30-60	750-1500
삗	300	6–16	150-400	18-36	450-900
GATE	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
	150	6–12	150-300	14-16	350-400
BE	300	6–12	150-300	14-16	350-400
GLOBI	600	4-10	100-250		_
اتا	900	2–4	50-100	_	_
	1500	2–4	50-100	_	

#### **ELECTRIC ACTUATORS**

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

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



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

#### **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.

#### **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
ELECTRIC	Specified by customer	Specified by customer	Voltage, type, phase, specified by customer
PNEUMATIC	Specified by customer	Specified by customer	Air pressure specified by customer
HYDRAULIC	Specified by customer	Specified by customer	Hydraulic pressure specified by customer
HANDWHEEL/ GEAR ACTUATED	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	200 lb. rimpull <sup>(2)</sup> unless otherwise advised by customer

- (1) CWP = cold working pressure per ASME B16.34 at 100°F (e.g., Class 150, CWP = 285 psig, 70% of CWP = 200 psig).
- (2) Rimpull is defined as the total tangential force acting on the handwheel (e.g., 200 lb rimpull requires 100 lb force per hand). This rimpull figure is given for closing/opening conditions. For running conditions (travel from open to closed or vice versa), the rimpull is considerably less. For details, contact the company.

#### **OTHER ACCESSORIES**

#### **CHAIN WHEELS**

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

#### **FLOOR STANDS**

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

## **BODY-BONNET DESIGN**

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

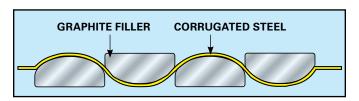




Standard corrugated steel gaskets without graphite as specified in API 600 were found to be an unacceptable choice for low emission service, even under ideal laboratory test conditions, and regardless of the flange finish and gasket load. After testing several alternative gaskets, we selected the best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

#### TYPICAL TEST RESULT

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

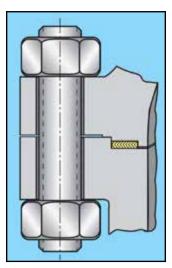


#### **DESIGN FEATURES**

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

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





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

Gate Class 150: NPS 2-2½ (DN 50-65) Class 300-1500: 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)

#### **DESIGN FEATURES**

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

#### TYPICAL TEST RESULT

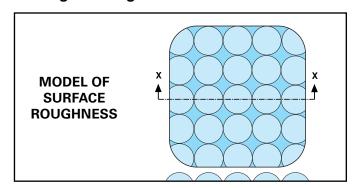
3,100 cycles with zero ppm for NPS 10 (DN 250) Class 300

## **TECHNOLOGY OF SEAT-DISC TIGHTNESS**

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

#### SEAT-DISC CONTACT MECHANICS

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



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

#### **VELAN API 600 GATE VALVE SEAT TIGHTNESS**

#### **GATE VALVE SEAT TIGHTNESS**

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

# Factory acceptance standard for gate valve seat leakage

	ize		Multiplier K					
3	126		API 598 – 2009					
NPS	DN	Velan standard	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 =  $(K) \times (NPS)$ 

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

## **8 IMPORTANT STEPS IN ASSEMBLY AND TESTING**

#### MAKE THE DIFFERENCE IN SEAT TIGHTNESS AND PERFORMANCE



Automatic seal welding of CoCr alloy hardfaced seats.



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



Relapping of seating faces after seal welding.



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



Precision grinding of individually fit wedge seating surfaces.



Lapping of wedge seating surfaces.



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



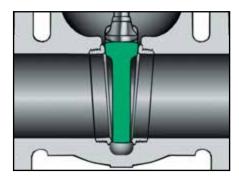
After assembly, pressure testing of shell, seats, packing, and backseat to API 598.

## **VELAN API 600 GATE VALVES**

#### FLEXIBLE WEDGE VERSUS SOLID WEDGE







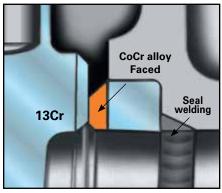
#### Flexible round wedge pioneered by Velan

- Universal use for temperatures up to 1,000°F (538°C).
- Flexibility compensates for seat face distortion.
- Compensates for deformation of body due to pipe stresses.
- Long cycle life.
- Ideal for processes with large temperature fluctuations.
- Assures valve tightness on both seats over wide range of pressures.
- Stem-to-wedge connection is inside the seating faces supporting the wedge ears during opening. More robust with less mass.

# Classical solid wedge on competitive designs

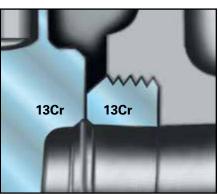
- Wedge may cause severe jamming at temperatures over 200°F (93°C).
- Suitable for small valves NPS  $\frac{1}{2}$  –2, (DN 15–50).
- Wedge will stick when valve is closed hot and allowed to cool.
- No compensation for deformation of body due to pressuretemperature or pipe stresses.
- Difficult to make valve tight on both seats due to seat face distortion.

#### SEAL WELDED SEATS VERSUS SCREWED-IN SEATS



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

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



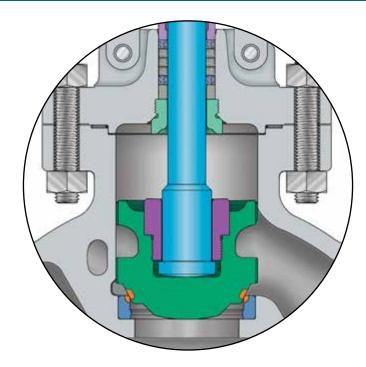
#### Competing screwed-in seats in 13Cr

- Can loosen up due to corrosion and cause substantial leakage.
- Replacement is difficult if not impossible.
- Threads can corrode and cause leakage.
- Seat is unsecured from unscrewing.

- Seat can become loose due to temperature fluctuations, corrosion, or vibration, and can leak.
- Not suitable for steam service.
   Steam and other fluids will wear draw body threads of loose seats beyond repair.
- 13Cr seat suitable only for certain fluids.

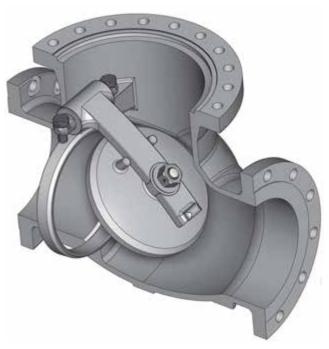
## **VELAN GLOBE VALVES CONICAL SEATS**

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

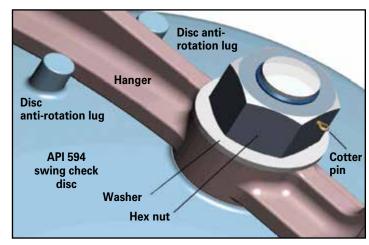


- Seat has good elasticity.
- Low closing torques.
- Ideal for high pressure-temperature.

## **VELAN API 594 SWING CHECK VALVES**



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



#### API 594 swing check disc assembly detail

- 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.

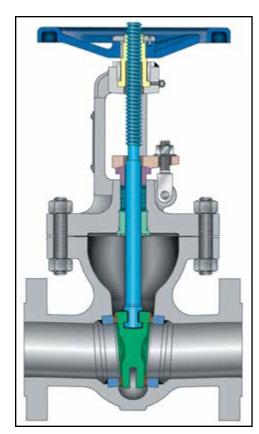
<sup>\*</sup> CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite, and other approved manufacturers.

## **VELAN CAST STEEL API 600 GATE VALVES**

#### **BOLTED BONNET CAST CARBON, STAINLESS OR ALLOY STEEL**

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

**STANDARD MATERIALS** 



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

PART	MATERIALS						
Body <sup>(1)</sup>	WCB	WC6	WC9	CF8M			
Bonnet(1)	WCB WC6 WC9			CF8M			
Stem <sup>(1)(3)</sup>		SS 410		SS 630, 600 or SS 316			
Wedge <sup>(1)</sup>	CA 15 or 13Cr faced WCB	CA 15 or 13Cr faced WC6	CA 15 or 13Cr faced WC9	CF8M			
Seat <sup>(1)(2)</sup>	CoCr alloy faced carbon steel	CoCr alloy faced F11	CoCr alloy faced F22	CoCr alloy faced F316			
Packing flange		Carbon steel		Stainless steel			
Gland bushing		Carbon steel		Stainless steel			
Packing ring <sup>(1)</sup>		Graphite		Graphite			
Gland stud		Gr. B or B7(4)		F316, B8M or 630 <sup>(5)</sup>			
Gland nut		Gr. 2H		Gr. 8M			
Body/bonnet nut	Gr. 2H	Gr.	4	Gr. 8M			
Body/bonnet stud	B7	B16	3	B8M or 630			
Back seat <sup>(1)(3)</sup>		SS 410		SS 316			
Gasket <sup>(1)</sup>	Clas	Class 150: corru ss 300–1500: spiral w	gated steel/graphite ound stainless steel	e /graphite			
Key		Carbon steel					
Yoke bushing		Carbon steel		Stainless steel			
Bearing		Steel					
Handwheel nut	l N	lalleable iron or stee					
Handwheel <sup>(1)</sup>	Mall	Malleable iron or ductile iron					
Grease fitting							
Groove pin		Stainless steel					
Bushing		Stainless steel					
Washer		Carbon steel					

Stainless steel

Stainless steel

Stainless steel

A 439 Austenitic ductile iron Gr. D-2C

- (1) Other materials available.
- (2) Hardfaced.
- (3) Hardened.

Rivet

Stem nut

Name plate

Identification tag

- (4) For eye bolts Gr.B, for studs B7 is used.
- (5) For eye bolts F316, for studs B8M or 630 is used.

#### **DESIGN FEATURES**

- Universal trim. 13Cr stem, wedge in CA 15 or 13Cr faced, and CoCr alloy faced seat API Trim 8 suitable for applications up to 850°F (454°C).
- Seat face CoCr alloy hardfaced, ground, and lapped to a mirror finish.
- Flexible wedge with low center stem-wedge contact, in solid CA15 (13Cr) or hardfaced with 13Cr, SS 316, Monel or CoCr alloy. Wedge is ground and lapped to a mirror finish and tightly guided to prevent dragging and seat damage. A CoCr alloy hardfaced CF8M wedge is also available.
- Non-rotating stem with precision Acme threads and burnished finish. Double Acme for faster operation.
- Body and bonnet joint accurately machined. Gasket materials on page 5, details on page 15.

- Body and bonnet castings are precision machined. One-piece bonnet up to NPS 12 (DN 300) for better alignment and fewer parts.
- Gland has two-piece construction for easy alignment.
- Flanges:

ASME Classes 150-300: 1/16" raised face. ASME Classes 600-1500: 1/4" raised face. Finish 125-250 AARH for all valves.

Rotating stem nut is Austenitic ductile iron Gr. D-2C renewable in line (as shown). Thrust bearings are supplied as follows:

ASME Classes 150-300: NPS 10-12 (DN 250-300), 1 bearing (top), NPS 16 (DN 400) and up, two bearings

ASME Classes 600-1500: NPS 6 (DN 150) and up.

#### **DESIGN SPECIFICATIONS**

ITEM	APPLICABLE SPECIFICATION
Wall thickness and general design ≤ NPS 24	API 600, ISO 10434
Wall thickness and general design > NPS 24	ASME B16.34 plus additional allowance
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

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

#### **GATE VALVE DIMENSIONS**

SIZE	E V		E DII			N2		ASME CLASS 300				ASME CLASS 600						ASME CLASS 900					ASME CLASS 1500			
					50					300					000					5 500		A			1300	
NPS DN	BW	<b>A</b> FLG	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	E	Α	B <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	B <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε
2 50	8.50 216	7.00 178	15.63 397	20.38 518	2.00 51	8 203	8.50 216	15.63 397	20.38 518	2.00 51	8 203	11.50 292	15.66 398	20.51 521	2.00 51	8 203	14.50 368	21.25 540	29.00 737	1.88 48	10 254	14.50 368	21.25 540	29.00 737	1.88 48	10 254
2½ 65	9.50 241	7.50 191	16.88 429	22.14 562	2.50 64	8 203	9.50 241	16.94 430	22.20 564	2.50 64	8 203	13.00 330	18.59 472	24.19 614	2.50 64	10 254	_	_	-	_	-	_	1	1	1	-
3 80	11.13 282	8.00 203	18.56 471	24.26 616	3.00 76	10 254	11.13 283	20.22 514	26.38 670	3.00 76	10 254	14.00 356	21.63 549	27.78 706	3.00 76	10 254	15.00 381	25.75 654	34.50 876	2.88 73	14 356	18.50 470	25.75 654	34.50 876	2.75 70	14 356
4 100	12.00 305	9.00 229	22.25 565	28.32 719	4.00 102	10 254	12.00 305	23.90 607	30.95 786	4.00 102	10 254	17.00 432	25.75 654	32.76 832	4.00 102	14 356	18.00 457	28.75 730	37.50 953	3.88 99	18 457	21.50 546	28.75 730	37.50 953	3.63 92	18 457
6 150	15.88 403	10.50 267	31.19 792	38.00 965	6.00 152	14 356	15.87 403	32.31 821	40.38 1026	6.00 152	14 356	22.00 559	36.28 922	44.18 1122	6.00 152	20 508	24.00 610	991	49.00 1245	5.75 146	20 508	27.75 705	39.00 991	49.00 1245	5.38 137	(2)
8 200	16.50 419	11.50 292	38.19 970	46.13 1172	8.00 203	18 457	16.50 419	40.94 1040	50.16 1274	8.00 203	18 457	26.00 660	43.72 1110	53.25 1353	7.88 200	24 610	29.00 737	51.75 1315	62.75 1594	7.50 191	(2)	832	45.25 1149	1524	7.00 178	(2)
10 250	18.00 457	330	47.16 1198	56.28 1430	254	20 508	18.00 457	49.19 1249	59.87 1521	10.00 254	508	31.00 787	49.06 1246	59.87 1521	9.75 248	30 762	838	57.75 67.25 9.38 1467 1708 238 (2)				39.00 991	57.75 1467	71.00 1803	8.75 222	(2)
12 300	19.75 502	356	55.91 1420	66.75 1695	305	20 508	19.75 502	59.00 1499	70.61 1763		508	33.00 838	61.13 1553	72.74 1848	11.75 298	30 762	38.00 965	66.57 1691	83.00 2108	11.13 283	(2)	-	_	_	-	_
14 350	22.50 572	381	61.50 1562	75.50 1918	337	24 610	30.00 762	61.38 1559	77.75 1975	13.25 337	610	35.00 889	72.50 1842	83.50 2121	12.88 327	(2)	1029		90.00 2286	311	(2)	-	-	_	-	-
16 400	24.00 610	406	68.75 1746	85.00 2159		24 610	33.00 838	68.75 1746	85.50 2172		762	39.00 991	82.25 2089	91.00 2311	14.75 375	(2)	44.50 1130		100.00 2540	14.00 356	(2)	_	_	_	-	-
18 450	26.00 660	17.00 432	73.25 1861	90.00 2286		24 610	36.00 914	77.88 1978	94.00 2388	17.00 432	(2)	43.00 1092	87.06 2211	116.00 2946	16.50 419	(2)	_	_	_	_	_	_	_	_	-	-
20 500	711	18.00 457	2108	100.00 2540	489	30 762	39.00 991	86.50 2197	100.00 2540	483	(2)	47.00 1194	2616	123.00 3124	18.25 464	(2)	_	А	SME (					_	gate	•
24 600	32.00 813	20.00 508	2464	115.00 2921	591	30 762	45.00 1143	101.25 2572	125.00 3175	584	(2)	55.00 1397	2921	132.00 3353	22.00 559	(2)	_		See			lso av ≀and ≎			e	
26 650	34.00 864	22.00 559	114.50 2908	125.00 3175	25.00 635	(2)	1245	114.50 2908	125.00 3175	25.00 635	(2)	57.00 1448	103.86 2638	125.00 3175	21.38 543	(2)	_		000			ts and			•	
28 700	36.00 914	24.00 610	118.63 3013	130.00 3302	27.00 686	(2)	53.00 1346	118.63 3013	130.00 3302	27.00 686	(2)	ı	_	_	_	-	_									
30 750	36.00 914	24.00 610	124.13 3153	140.00 3556	29.25 743	(2)	55.00 1397	124.13 3153	145.00 3683	29.25 743	(2)	65.00 1651	122.50 3112	150.00 3810	24.75 629	(2)	_			<b>—</b>		- E		·	-	
32 800	38.00 965	26.00 660	129.63 3293	150.00 3810	30.75 781	(2)	60.00 1524	129.63 3293	150.00 3810	30.75 781	(2)	-	-	-	-	-	_			0		1 100	- D	[		
34 850	1000		143.00 3632	4140	832	(2)	64.00 1626	3750	168.00 4267	832	(2)	76.00 1930	3505	187.00 4750	787	(2)	_				4					
36 900	40.00 1016		146.68 3726	170.00 4318	35.25 895	(2)	68.00 1727	147.81 3754	185.00 4699	35.25 895	(2)	68.00 1727	3686	170.00 4318	29.00 737	(2)	_				1					
38 950	1041	29.00 736	155.91 3960	175.00 4445	36.50 927	(2)	-	-	-	-	-	86.00 2184	3073	162.00 4115	34.50 876	(2)	_				ł	ďβ	h	В,	С	
40 1000	1067	30.00 762	4030	188.00 4775	978	(2)	76.00 1930	167.00 4242	4826	978	(2)	90.00 2286	175.00 4445	198.00 5030	36.38 924	(2)	_			ŵ	7		î			
42 1050	44.00 1118	31.00 787	166.50 4229	195.00 4953	40.25 1022	(2)	76.00 1930	167.00 4242	190.00 4826	38.50 978	(2)	_	-	-	_	-	_			Ü	U	W	₩.	_		
44 1100	_	_	_	_	_	-	-	_	-	_	-	98.00 2490	185.00 4700	211.00 5360	40.50 1028	(2)	_		<u> </u>	L		H.,				
46 1150	43.00 1092	850		5715	1117	(2)												D							-	
48 1200	_	36.00 914	189.81 4821	225.00 5715		(2)	-	_	-	_	-	-	_	-	-	-	_	1								
50 1250	-	950		5867	1200	(2)	-		-	-	-	110.00 2794	214.00 5435	230.00 5842	46.00 1168	(2)	-	<b>←</b> —A——								
54 1350	-	1016		6299	1308	(2)	-		-	-	-	-	-	-	-	_	-		BW :							
56 1400		1041		6458	1364		_	-	-	_	-	-	-	-	_	-	-		FL :		_	jed o-top	004	en		
60 1500	_	42.00 1067		6985	1461	(2)	-	-	-	_	-	-	-	-	_	-	-		$\mathbf{C} = \mathbf{C}$							
64 1600	_	44.00 1118	259.5 6591	300.00 7620	61.25 1556	(2)	-	-	-	_	-	-	_	_	_	-	_									

<sup>(1)</sup> Height does not include actuator. (2) Gear actuator.

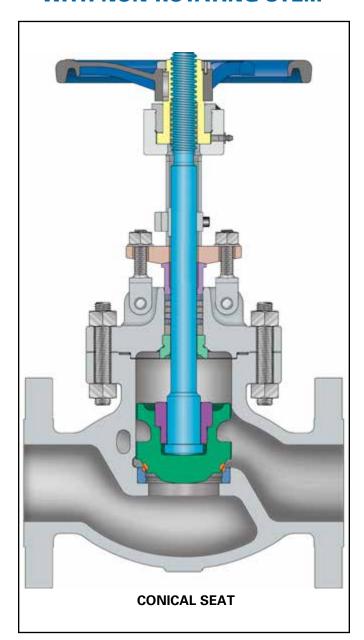
<sup>(3)</sup> Butt weld and flanged valves have the same end-to-end dimensions for class 300 and up.

## **VELAN CAST STEEL GLOBE & STOP CHECK VALVES**

## **BOLTED BONNET CAST CARBON, STAINLESS OR ALLOY STEEL**

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

# NOW THE ONLY GLOBE VALVE WITH NON-ROTATING STEM



All sizes and pressure classes have conical seats.

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

#### **DESIGN FEATURES:**

- Non-rotating stem with precision Acme threads and burnished finish. Valve suitable for horizontal installation.
- Universal trim.
   13Cr stem, 13Cr faced disc, and CoCr alloy faced seats
   API Trim 8 suitable for service up to 850°F (454°C).
- Seat face CoCr alloy hardfaced, ground, and lapped to a mirror finish. Conical seat machined to 8 RMS.
- Tapered disc.

Body guided disc accurately mates the hardfaced surface of the disc with the surface of the seat, hardfaced with 13Cr, CoCr alloy, SS 316, or Monel, ground and lapped with seat.

Disc in SS 316 hardfaced with CoCr alloy also available.

NPS 2–6 (DN 50–150) valves may have solid CA15 (13Cr) discs.

- Body and bonnet.
  - Castings are precision machined. One-piece bonnet for better alignment, fewer parts.
- Stuffing box finish to 63 RMS or better.
- Body and bonnet joint accurately machined.
   Fully enclosed gasket. Gasket materials on page 5.
   Details on page 15.
- Gland has two-piece construction for easy alignment.
- Rotating stem nut.

Austenitic ductile iron Gr. D-2C, renewable in-line.

- Torque arm reduces wear on packing rings and enables better sealing and reduces torque.
- Impactor handwheels.

Globe and stop check valves require higher closing torques than gate valves with the same seat diameter and pressure class. The most economical mechanism for tight shutoff is the impactor handwheel. Two lugs cast under the wheel strike simultaneous blows and give 3–10 times the closing force of standard handwheels. Impactor handwheels are supplied at manufacturer's option unless specified by customer (see page 23).

#### Flanges:

ASME Classes 150–300: 1/16" raised face. ASME Classes 600–1500: 1/4" raised face. Finish 125–250 AARH for all valves.

#### **STANDARD MATERIALS**

PART		MATE	RIALS						
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>	Stem <sup>(1)(3)</sup> SS 410								
Backseat <sup>(1)(3)</sup>	kseat <sup>(1)(3)</sup> SS 410								
Packing ring <sup>(1)</sup>		Graphite							
Gland stud		Gr. B or B7 <sup>(4)</sup> F316, or 63							
Gland nut		Gr. 2H		Gr. 8M					
Packing flange		Carbon steel		SS					
Gland bushing		Carbon steel		SS					
Bonnet stud	B7	[ E	316	B8M or 630					
Bonnet nut	Gr. 2H	G	ir. 4	Gr. 8M					
Hinge pin		Steel		SS					
Gasket <sup>(1)</sup>	Spira	l wound stainle:	ss steel/graphite	)					
Torque arm		Carbon s	steel						
Yoke bushing	Carbon steel Stainles steel								
Stem nut	A 439	Austenitic ducti	ile iron Gr. D-2C						
Handwheel nut		Malleable iron	or steel						
Handwheel <sup>(1)</sup>	Malleable iron or Ductile iron								

- (1) Other materials available.
- (2) Hardfaced.
- (3) Hardened.
- (4) For eye bolts Gr.B, for studs B7 is used.
- (5) For eye bolts F316, for studs B8M or 630 is used.

#### **DESIGN SPECIFICATIONS**

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

ASME CLASS	FIGURE NUMBERS									
ASINE CLASS	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		ASM	E CLAS	S 150			ASM	E CLAS	SS 300			ASME CLASS 600					ASME CLASS 900					ASME CLASS 1500				
NPS DN	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	Ε	Α	<b>B</b> <sup>(1)</sup>	<b>C</b> <sup>(1)</sup>	D	E	
2 50	8.00 203	16.85 428	20.88 530	2.00 51	8 203.2	10.50 267	16.85 428	20.88 530	2.00 51	8 203	11.50 292	17.10 434	21.13 537	2.00 51	10 254	14.50 368	19.75 502	25.00 635	1.88 48	18 457	14.50 368	19.75 502	25.00 635	1.88 48	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	13.00 330	18.67 474	22.88 581	2.50 64	10 254	1	-	1	-	_	-	1	1	-	-	
3 80	9.50 241	18.42 468	22.75 578	3.00 76	10 254	12.50 318	18.42 468	22.75 578	3.00 76	10 254	14.00 356	20.19 513	24.13 613	3.00 76	14 356	15.00 381	24.09 612	30.50 775	2.88 73	14(2)(3) 356	18.50 470	24.09 612	30.50 775	2.75 70	14(2)(3) 356	
4 100	11.50 292	20.88 530	26.18 665	4.00 102	14 356	14.00 356	20.88 530	26.18 665	4.00 102	14 356	17.00 432	23.88 607	29.25 743	4.00 102	24(2)(3) 610	18.00 457	27.50 699	35.38 899	3.88 99	18.00 457	В=	Cer	nter-t en	o-to	ο,	
6 150	16.00 406	25.75 654	32.00 813	6.00 152	24 610	17.50 445	26.38 670	32.88 835	6.00 152	24(2)(3) 610	22.00 559	31.22 793	37.88 962	6.00 152	24(2)(3) 610	24.00 610	39.13 939	45.03 1143	5.75 146	(4)	<b>C</b> =	Disn hei	nantl ght	ing		
8 200	19.50 495	30.73 780	38.38 975	8.00 203	24 610	22.00 559	32.00 813	38.88 988	8.00 203	24 <sup>(2)or(4)</sup> 610	26.00 660	41.75 1060	57.88 1470	7.88 200	(4)	29.00 737	50.13 1273	62.63 1590	7.50 191	(4)		<b>←</b>	-E_	<b></b>		
10 250	24.50 622	39.25 997	46.75 1187	10.00 254	24(2)(3) 610	24.50 622	42.34 1075	52.18 1325	10.00 254	24 <sup>(2)or(4)</sup> 610	31.00 787	47.16 1198	59.00 1499	9.75 248	(4)						(	-				
12 300	27.50 699	42.52 1080	53.00 1346	12.00 305	24 <sup>(2)or(4)</sup> 610	28.00 711	46.19 1173	62.75 1594	12.00 305	(4)	_	_	_	ı	ı								T.			
14 350	31.00 787	54.21 1377	65.44 1662	13.25 337	(4)	33.00 838	54.21 1377	72.00 1829	13.25 337	(4)	_			Se	e pag	e 30 -	-31					D.		la.	B, C	
16 400	36.00 914	59.94 1522	72.63 1845	15.25 387	(4)	34.00 863	59.94 1522	76.00 1930	15.25 387	(4)	_		for	valv	e wei	ghts	and C	γs.			↓ I	ij.				
18 450	38.50 978	59.62 1514	75.00 1905	17.50 444	(4)	38.50 978	59.62 1514	75.00 1905	17.50 444	(2)											D	1			<b> </b>	
24 600	51.00 1295	85.00 2159	119.00 3023	21.00 533	(4)	55.00 1397	85.00 2159	119.00 3023	21.00 533	(2)											T   <b>-</b>   <b>-</b>		- A -		<b>A</b>	

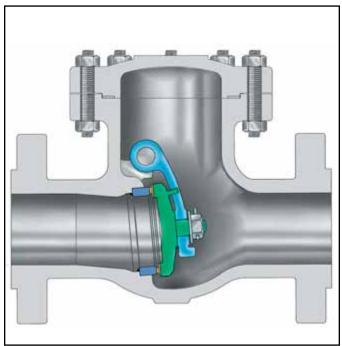
- (1) Height does not include actuators. (2) Impactor handwheel. (3) Gear actuator is optional. (4) Gear actuator.

## **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		MATE	RIALS						
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(1)(3)	SS 410 SS 630 or								
Gasket <sup>(1)</sup>	Spiral wound stainless steel/graphite								
Cover stud	Gr. B7	E	B8M or 630						
Cover nut	Gr. 2H	Gi	r. <b>4</b>	Gr. 8M					
Cover <sup>(1)</sup>	WCB	WC6	WC9	CF8M					
Washer		Commerc	ial						
Disc(1)	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	G	r. 4	Gr. 8M					

- (1) Other materials available.
- (2) Hardfaced.
- (3) Hardened.

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

#### **DESIGN FEATURES**

#### Body and cover.

Precision machined castings.

Exclusive: Disc shaft does not penetrate body.

#### Body and cover joint.

Accurately machined, fully-enclosed gasket (gasket materials on page 5).

#### Disc.

Robust one-piece construction to withstand the severe shock of check valve service. Hardfaced with 13Cr, CoCr alloy, SS 316, or Monel, ground and lapped to a mirror finish. Sizes NPS 2–6 (DN 50–150) may have solid CA 15 (13Cr) disc. SS 316 disc with CoCr alloy facing also available.

#### Disc assembly.

Non-rotating disc is fastened securely to disc hanger with a lock nut and cotter pin. Disc hanger is supported on a sturdy disc carrier hinge pin of excellent bearing qualities. All parts are accessible from top for easy servicing.

#### Flanges:

ASME Classes 150–300: 1/16" raised face. ASME Classes 600–1500: 1/4" raised face.

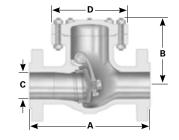
Finish 125-250 AARH for all valves.

#### **DESIGN SPECIFICATIONS**

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

See page 30 and 31 for valve weights and CVs.	Other sizes on
	annlication

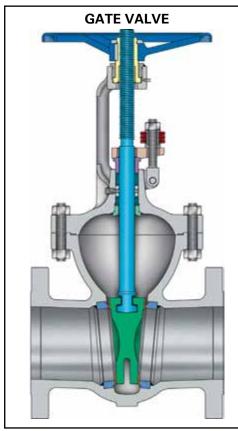
CLASS	FIGURE NUMBER	CLASS	FIGURE NUMBER
150	0114C	900	7114C
300	1114C	4500	01110
600	2114C	1500	3114C



#### **CHECK VALVE DIMENSIONS**

SIZE	Þ	ASME CI	ASS 15	0	<b>P</b>	SME CI	LASS 30	0	P	SME CL	ASS 60	0	A	SME CI	ASS 90	0	ASME CLASS 1500			
NPS DN	A	В	С	D	Α	В	C	D	A	В	C	D	Α	В	С	D	Α	В	C	D
2 50	8.00 203	5.75 146	2.00 51	6.75 171	10.50 267	6.00 152	2.00 51	6.75 171	11.50 292	6.25 159	2.00 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	13.00 330	6.50 165	2.50 64	7.50 191	16.50 419	10.00 254	2.25 57	9.25 235	16.50 419	10.00 254	2.25 57	9.25 235
3 80	9.50 241	7.75 197	3.00 76	8.50 216	12.50 318	7.75 197	3.00 76	8.50 216	14.00 356	8.75 222	3.00 76	9.75 248	15.00 381	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	4.00 102	10.25 260	14.00 356	8.75 222	4.00 102	10.25 260	17.00 432	9.25 235	4.00 102	12.00 305	18.00 457	11.75 299	3.88 99	12.25 311	21.50 546	12.00 305	3.63 92	12.25 311
6 150	14.00 356	10.75 273	6.00 152	12.50 318	17.50 445	10.75 273	6.00 152	12.50 318	22.00 559	11.50 292	6.00 152	15.75 400	24.00 610	15.00 381	5.75 146	15.25 387	27.75 705	16.50 419	5.38 137	16.00 406
8 200	19.50 495	12.75 324	8.00 203	15.75 400	21.00 533	12.75 324	8.00 203	15.75 400	26.00 660	13.50 343	7.88 200	15.75 400	29.00 737	19.25 489	7.50 191	18.38 467	32.75 832	21.00 533	7.00 178	20.75 527
10 250	24.50 622	15.50 394	10.00 254	18.50 470	24.50 622	16.25 413	10.00 254	18.50 470	31.00 787	16.75 425	9.75 248	19.50 495	33.00 838	21.98 558	9.38 238	22.25 565	39.00 991	23.93 608	8.75 222	22.75 578
12 300	27.50 699	17.00 432	12.00 305	20.50 521	28.00 711	17.00 432	12.00 305	20.50 521	33.00 838	18.50 470	11.75 298	22.50 572	_	-	_	-	-	-	_	-
14 350	31.00 787	19.63 499	13.25 337	23.00 584	33.00 838	19.63 499	13.25 337	23.00 584	35.00 889	20.93 532	12.88 327	26.25 667	-	-	-	-	-	-	-	-
16 400	34.00 864	22.00 559	15.25 387	26.50 673	34.00 864	22.50 572	15.25 387	26.50 673	39.00 991	23.38 594	14.75 375	28.25 718	-	-	-	-	-	-	-	-
18 450	38.50 978	25.00 635	17.13 435	28.50 724	38.50 978	25.00 635	17.13 435	28.50 724	43.00 1092	28.67 728	16.50 419	31.50 800	-	-	_	-	-	-	_	-
20 500	38.50 978	26.50 673	19.00 483	31.50 800	40.00 1016	26.50 673	19.00 483	31.50 800	47.00 1194	27.12 689	18.25 464	35.25 895	52.00 1320	34.95 887	17.50 444	37.25 946	-		_ _	_
24 600	51.00 1295	31.25 794	23.25 591	37.00 940	53.00 1346	31.25 794	23.25 591	37.00 940	55.00 1397	35.69 907	22.00 559	40.25 1022	_ _	_ _	_ _	_ _	_ _	_ _	_ _	_
26 650	51.00 1295	32.63 829	25.00 635	37.25 946	-	-	-	_	57.00 1448	38.49 980	23.75 603	44.00 1118	-	_	-	_	-	-	_	-
28 700	57.00 1448	36.55 928	27.00 686	42.00 1067	59.00 1499	36.55 928	27.00 686	42.00 1067	-	_	_	-	_	_	_	-	-	-	_	-
30 750	60.00 1524	36.89 937	29.25 743	44.50 1130	-	_	-	_	-	_	-	-	_	-	_	-	_	-	_	-
32 800	64.00 1626	40.30 1026	30.75 781	47.25 1200	_	-	-	_	_	_	-	_	70.00 1778	47.56 1280	25.25 641	50.00 1270	-	_	_	_
34 850	-	_	_	_	64.00 1626	42.38 1076	32.75 832	48.75 1238	_	_	_	_	_	_	_	_	_	_	_	-
36 900	77.00 1956	41.78 1061	35.25 895	53.00 1346	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
38 950	80.00 2032	47.01 1194	36.63 930	53.00 1346	-	_	_	-	_	_	_	_	81.50 2070	50.38 1280	30.00 762	57.00 1448	_	_	_	_
42 1050	78.00 1981	49.72 1263	37.88 962	63.50 1613	78.00 1981	53.22 1352	37.88 962	63.50 1613	_	_	_	_	_	_	_	_	_	_	_	_
48 1200	94.00 2388	55.00 1397	46.00 1168	61.00 1549	-	_	-	_	-	_	_	-	_	_	_	-	_	_	_	-

#### LIVE-LOADED VALVES



# GLOBE VALVE CONICAL SEAT

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

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

#### **DESIGN FEATURES**

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

#### **Double packing**

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

#### Single set packing

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

Live-loading.

Two sets of Belleville springs keep stem tight for long periods of time reducing frequency of maintenance.

- Two-piece stem drive is renewable in-line.
- Stronger leakproof body-bonnet joint.
- Class 150 corrugated graphite-filled steel gasket.
- Classes 300-1500
- Welded-in seats hardfaced with CoCr alloy.
- Flexible one-piece wedge, hardfaced with CoCr alloy or 13Cr (solid 13Cr up to NPS 8 (DN 200)).

have round bonnet and fully encased spiral wound gasket

 13Cr hardened stem with mirror-like, burnished finish for longer packing life.

For dimensions on gate valves see page 21.

For other globe valve design features see page 22.

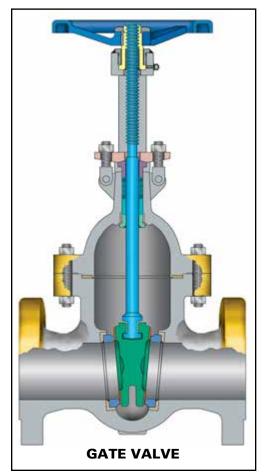
For dimensions on globe valves see page 23.

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

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

## **HYDROFLUORIC (HF) ACID PROCESSING VALVES**

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



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

PRESSURE CLASSES 150-300

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

#### **DESIGN FEATURES**

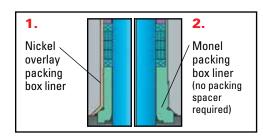
- Nickel plated overlay on backseat in stem hole to combat severe alkylation conditions.
- **HF acid detecting paint** to ensure valve integrity.
- Stem made from solid age hardened K-Monel 500 for increased strength and corrosion resistance.
- Casting design X ray "RT" quality castings as per B16.34 acceptance standards. Velan is one of the first valve manufacturers to have the MAGMASOFT® computer casting simulation program to ensure high quality levels.
- Bonnet joint accurately machined for better service life.
- Seal welded seats in Monel.

Monel seats are welded-in to ensure zero leakage behind and around the seat and then ground and lapped after welding using state-of-the-art technology to prevent in-service corrosion.

- Body/bonnet wall thickness to API 600.
- Velan's low-fugitive emissions guarantee. Based on extensive laboratory testing and field experience.

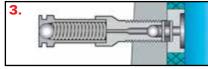
#### **OPTIONAL DESIGN FEATURES**

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

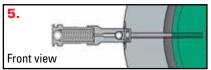


- 3. Grease injector and lantern ring: where grease injection is a requirement (UOP only).
- 4. PTFE seat insert: resists abrasion and corrosion.
- 5. PTFE seat seal grease injection: when required (UOP only).

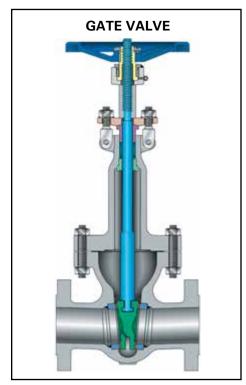
For more information on **VELAN HF ACID GATE, GLOBE AND CHECK VALVES** see flyer FLY-HFA.







#### **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°F/ -253.9°C) presents several technical problems. Velan specially-adapted extended bonnet cast valves offer safe and efficient service.

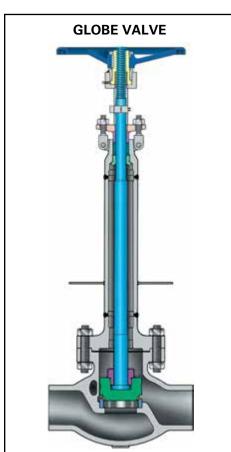
#### **MATERIALS**

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

#### **DESIGN FEATURES**

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

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



#### **TABLE OF LIQUEFIED GASES**

T	Boiling	g point	Liquid	T	Boiling	Liquid	
Туре	°C	°F	density lb / ft.³	Туре	°C	°F	density lb / ft.₃
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 (0 <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	_

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



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



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

**FLANGED OR BUTT WELD ENDS** 

#### **DESIGN FEATURES**

- Positive shutoff with visual or remote proof of seat tightness.
- No product contamination due to absolute tightness.

**STYLE B\*** 

NPS 14-60

- 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**

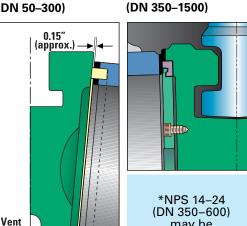
Seats are hardfaced with SS 410 and welded-in for lifetime service. A worn soft seat insert can easily be replaced after removal of the wedge from the body. Shut off flow and relieve pressure before replacing the seat insert.

#### SEAT/WEDGE DESIGN

**STYLE A** NPS 2-12

(DN 50-300)

Hole



may be STYLE A or B at manufacturer's option

#### SPECIFICATIONS FOR SEAT **INSERT MATERIALS**

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

#### **CAVITY OVER-PRESSURIZATION PROTECTION**

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

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

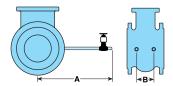
For gate valves larger than NPS 24 (DN 600), wall thickness is based on B16.34 plus additional wall thickness allowance.

## **BYPASSES**

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

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

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



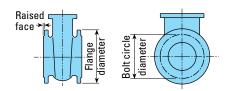
API 600 GATE (Note: Dimensions are in inches)

SI	ZE		CLAS	S 15	0		CLAS	S 300			CLASS 600		0
NPS	DN	Bypass	A	Elbow	В	Bypass	A	Elbow	В	Bypass	A	Elbow	В
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	<u> </u>	_	_	_	_	_	_	_	_	28.00	1	42.38
36	900	1	34.00	1	15.25	1	28.00	1	50.00	1	30.00	1	35.00
38	950	_	_	_	_	_	_	_	_	_	31.00	1	47.38
40	1000	_	_	_	_	_	32.00	_	45.00	_	32.00	1	50.50
42	1050	_	_	_	_	_	32.00	_	45.00	_	_	_	_
44	1100								_		35.00		50.00
50	1250								_		39.00		61.75
60	1500	1	44.00	1	24.00								

# FLANGES, WEIGHTS, AND Cv FLOW COFFICIENTS

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

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



ACNAF	ASME DIMENSIONS IN INCHES								WEIGHT IN LBS.						CV		
CLASS	SI	ZE	FLANGE	BOLT CIRCLE	HOLE	QTY.	DIAM.	G/	ATE	GLO	)BE	sw	ING	FLOW	COEFFIC	IENTS	
ULASS	NPS	DN	DIAM.	DIAM.	DIAM.	HOLES	BOLTS	BW	FL	BW	FL	BW	FL	GATE	GLOBE	CHECK	
	2	50	6.00	4.75	0.75	4	5/8	42	48	48	55	31	40	260	35	95	
1	<b>2</b> <sup>1</sup> / <sub>2</sub>	65	7.00	5.50	0.75	4	5/8	50	59	54	58	35	44	420	60	150	
	3	80	7.50	6.00	0.75	4	5/8	67	78	82	102	59	78	625	92	220	
	4	100	9.00	7.50	0.75	8	5/8	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	
1	10	250	16.00	14.25	1.00	12	1/8	456	515	500	550	513	586	7750	1400	2800	
1	12	300	19.00	17.00	1.00	12	1/8	646	738	1050	1200	602	823	11,500	1950	4100	
1	14	350	21.00	18.75	1.13	12	1	875	954	1700	1850	765	960	14,000	2500	6200	
1	16	400	23.50	21.25	1.13	16	1	1120	1200	2300	2500	1120	1300	19,000	3400	8400	
1	18	450	25.00	22.75	1.25	16	11//8	1485	1570	2640	2850	1450	1660	24,000	4500	11,000	
1	20	500	27.50	25.00	1.25	20	11//8	1825	1910	_	_	1700	2050	31,000	_	13,500	
150	24	600	32.00	29.50	1.38	20	11/4	2870	2960	7035	7403	2900	3300	45,000	6580	20,000	
1/16	26(1)	650	34.25	31.75	1.38	24	11/4	3600	3700	_		3600	4000	53,000		23,500	
RAISED	28(1)	700	36.50	34.00	1.38	28	11/4	4400	4500	_		4300	5000	62,000		28,000	
FACE	30(1)	750	38.75	36.00	1.37	28	11/4	4705	4750	_		6300	7000	73,000	_	33,000	
FACE	32(1)	800	41.75	38.50	1.63	28	1½	5800	6000	_		6000	6600	81,000	_	36,245	
1	34(1)	850	43.75	40.50	1.63	32	11/2		6000	_				92,500	_		
1	36(1)	900	46.00	42.75	1.63	32	1½	6500	6850	_		8500	9500	108,000	_	48,000	
1	38 (1)	950	48.75	45.25	1.63	32	1½	8857	9674	_			_	115,000	_	_	
	40(1)	1000	50.75	47.25	1.63	36	1½	8400	9000					130,000			
	42(1)	1050	53.00	49.50	1.63	36	1½	10,000	11,000	_			_	142,000		_	
1	46 (1)	1150	57.25	53.75	1.63	40	1½	14,000	15,719	_				171,000		_	
	48(1)	1200	59.50	56.00	1.63	44	1½	14,000	15,000					190,000		_	
1	50 (1)	1250	56.81	54.56	1.25	44	11/8	_	8775	_			_	198,000	_	_	
1	54(1)	1350	66.25	62.75	1.88	44	13/4	21,000	23,000	_			_	238,000	_	_	
1	56(1)	1400	68.75	65.00	1.88	48	13/4	_	20,000	_			_	260,000	_	_	
	60(1)	1500	73.00	69.25	1.88	52	13/4	22,600	26,600	_			_	300,000	_	_	
	64(1)	1600	_	_		_			29,043	_			_	340,000		_	

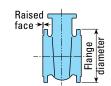
(1) NPS 26 (DN 650) and up: ASME B16.47 Series A (MSS-SP-44). For Series B (API 605) contact the factory.

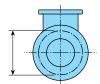
## FLANGES, WEIGHTS, AND Cv FLOW COFFICIENT

**API 600 CAST STEEL VALVES** CLASS 300, 600, 900, AND 1500 **DRILLED AND FACED AS FOLLOWS** 

**ASME B 16.5 and B16.47**(1)

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





ASME			DIN	IENSIONS IN IN	ICHES					WEIGHT	IN LBS.				CV	
CLASS	SI	ZE	FLANGE	BOLT CIRCLE	HOLE	QTY.	DIAM.	GA	ΙΤΕ	GLO	OBE	sw	ING	FLOW (	COEFFICI	ENTS
	NPS	DN	DIAM.	DIAM.	DIAM.	HOLES	BOLTS	BW	FL	BW	FL	BW	FL	GATE	GLOBE	CHECK
	2	50	6.50	5.00	0.75	8	5/8	46	60	45	60	37	45	260	35	95
	<b>2</b> <sup>1</sup> / <sub>2</sub>	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	100 150	10.00	7.88	0.88	12	3/4	136 245	166 314	130 261	171	110 204	150 265	1150 2650	180 430	410 950
	6 8	200	12.50 15.00	10.63 13.00	1.00	12	3/ <sub>4</sub> 3/ <sub>4</sub>	415	506	447	337 565	360	455	4850	810	1750
	10	250	17.50	15.25	1.13	16	1	646	762	1000	1150	582	650	7750	1325	2800
	12	300	20.50	17.75	1.25	16	11/8	900	1100	1300	1550	825	945	11,500	1950	4100
300	14	350	23.00	20.25	1.25	20	11/8	1392	1720	1800	2100	1200	1350	14,000	2500	6200
1	16	400	25.50	22.50	1.38	20	11/4	1870	2220	2300	2700	1500	1800	19,000	3400	8400
1/16	18	450	28.00	24.75	1.38	24	11/4	2405	2960	2640	3200	2000	2400	23,500	4500	11,000
RAISED	20	500	30.50	27.00	1.38	24	11/4	3260	3700			2600	3000	30,000		13,500
FACE	24	600	36.00	32.00	1.63	24	1½	4250	5100	7109	7995	3000	4050	44,000	6580	20,000
	26(1)	650	38.25	34.50	1.75	28	1%	5000	5500				-	53,000		20.000
	28 <sup>(1)</sup>	700 750	40.75 43.00	37.00 39.25	1.75 1.88	28 28	1% 1%	7000 8550	7500 9000			5000	6000	62,000 73,000		28,000
	32(1)	800	45.00	41.50	2.00	28	17/8	8200	8800			+=-		81,000		
	34(1)	850		— TI.30				— —	_		_	8350	10,100	— U1,000		41,330
	36(1)	900	50.00	46.00	2.13	32	2	13,500	15,500	_	_	_	_	108,000	_	
	40(1)	1000	48.75	45.50	1.75	32	15/8	14,500	16,200		_	_	_	129,500	_	_
	42(1)	1050	50.75	47.00	1.75	32	15/8	14,500	17,000					129,500	_	
	2	50	6.50	5.00	0.75	8	5/8	60	72	60	72	48	52	260	35	95
	21/2	65	7.50	5.88	0.88	8	3/4	89	102	89	100	59	87	420	60	150
	3	80	8.25	6.63	0.88	8	3/4	130	157	130	150	96	130	625	92	220
	6	100 150	10.75 14.00	8.50 11.50	1.00 1.13	8 12	7/8 1	224 394	275 540	213 415	285 515	167 332	225 476	1150 2650	180 430	410 950
	8	200	16.50	13.75	1.13	12	11//8	726	884	1050	1220	525	715	4850	800	1750
	10	250	20.00	17.00	1.38	16	11/8	1125	1405	1550	1830	1000	1250	7750	1250	2800
	12	300	22.00	19.25	1.38	20	11/4	1490	1812	_	_	1500	1750	11,500		4100
600	14	350	23.75	20.75	1.50	20	13/8	2200	2500	_	_	1750	2050	13,000	<u> </u>	5900
1/4	16	400	27.00	23.75	1.63	20	1½	3000	3700	_	_	2400	3100	18,000	_	7800
RAISED	18	450	29.25	25.75	1.75	20	15/8	4000	4800	_		3200	4000	22,000		9900
FACE	20	500	32.00	28.50	1.75	24	15/8	5600	6800	_		4500	6100	27,000	_	12,000
IAGE	24 26	600 650	37.00	33.00	2.00	24	1%	8000 6835	9800 8154	_		6400 7600	7600 8930	40,000 38,000		18,000 21,150
	30(1)	750	44.50	40.25	2.13	28	2	12,000	14,000			7000	0930	52,000	_	21,130
	34(1)	850	49.00	44.50	2.38	28	21/4	12,000	19,000		_	_	_	82,500	_	_
	36(1)	900	51.75	47.00	2.63	28	21/2	17.000	19,500		_	_	_	72,000	_	_
	38(1)	950	50.00	45.75	2.38	28	21/4	_	26,700	_	_	_	_	103,000	_	_
	40(1)	1000	52.00	45.75	2.38	32	21/4	_	33,200	_	_	_	_	115,000	_	_
	44(1)	1100	52.25	52.50	2.63	32	21/2		42,800		_			144,000	_	
	50(1)	1250	65.75	60.00	3.13	28	3		59,100		150	105		190,000	<u> </u>	<u> </u>
	2 2 <sup>1</sup> / <sub>2</sub>	50 65	8.50	6.50	1.00	8	½ 1	150	185	68	150	135	165	230	45	80
	3	80	9.63 9.50	7.50 7.50	1.13 1.00	8	7/8	235	<u> </u>	165	225	175 175	210 210	<u> </u>	100	200
	4	100	11.50	9.25	1.25	8	11/8	270	355	260	350	245	330	1050	190	380
900	6	150	15.00	12.50	1.25	12	11/8	830	980	641	831	485	635	2400	430	875
1/4	8	200	18.50	15.50	1.50	12	13/8	1220	1500	1278	1588	700	900	4200	760	1325
RAISED	10	250	21.50	18.50	1.50	16	1%	2000	2400		_	1600	2100	6750	_	2400
FACE	12	300	24.00	21.00	1.50	20	1%	3170	3670	_	_	_	_	9700	_	_
	14	350	25.25	22.00	1.62	20	1½	3900	4460					12,000		
	16	400	27.75	24.25	1.75	20	1%	5570	6250			<u> </u>	7004	16,000		11177
	20	500	33.75	29.50	2.13	20	21/		_			5961	7081			11177
	32 38	800 950	51.75	45.50	3.38	20	31/4		<u> </u>			13674 20,250	18368 26,800			24036 34,500
<del></del>	2	950 50	8.50	6.50	1.00	8	<u></u> ½	<u> </u>	185	<u></u>	150	135	165	230	45	80
1500	2 <sup>1</sup> / <sub>2</sub>	65	9.63	7.50	1.13	8	1 1		100		130	205	275		<del>40</del>	185
1500	3	80	10.50	8.00	1.25	8	11//8	255	325	188	274	205	275	510	90	185
1/4	4	100	12.25	9.50	1.37	8	11/4	430	520	_		340	430	925	_	330
RAISED	6	125	15.50	12.50	1.50	12	1%	1045	1205	_	_	805	965	2100	_	750
FACE	8	200	19.00	15.50	1.75	12	15/8	1850	2550	_		1350	2050	3650		1325
	10	250	23.00	19.00	2.00	12	11//8	2600	3300	_	_	2233	2821	5850	_	2103

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

## PRESSURE-TEMPERATURE RATINGS - °F

#### STANDARD CLASS VALVES FLANGED AND BUTT WELD END

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

#### **CAST ASTM MATERIAL STANDARD - TO ASME B16.34**

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

#### A 216 Gr. WCB (1)

TEMP.	WORKING PRESSURES BY CLASS, psig									
°F	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.		WORKI	NG PRE	SSURE	S BY CLA	SS, psi	g
°F	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)

	WORKING PRESSURES BY CLASS, psig								
TEMP.		WORKI	NG PRE	SSURE	S BY CLA	ISS, psi	g		
°F	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.		WORKING PRESSURES BY CLASS, psig										
°F	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.		WORKI	NG PRE	SSURE	S BY CLA	SS, psi	g			
°F	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.		WORKING PRESSURES BY CLASS, psig									
°F	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.		WORK	NG PRE	SSURE	S BY CLA	NSS, psi	g			
°F	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	705	1,060	1,765	2,940	5,290			
800	80	345	690	1,035	1,730	2,880	5,185			
850	65	340	675	1,015	1,690	2,820	5,075			

#### General Notes:

- (1) Upon prolonged exposure to temperatures above 800°F, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged use above 800°F.
- (3) Use normalized and tempered material only.
- (4) Not to be used over 1,100°F.
- (5) The deliberate addition of any element not listed in ASTM A 217, Table 1, is prohibited, except that Ca and Mg may be added for deoxidation.
- (6) At temperatures over 1,000°F, use only when the carbon content is 0.04% or higher.
- (7) Not to be used over 800°F.

## PRESSURE-TEMPERATURE RATINGS - °C

#### STANDARD CLASS VALVES FLANGED AND BUTT WELD END

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

#### **CAST ASTM MATERIAL STANDARD - TO ASME B16.34**

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

#### A216 Gr. WCB (1)

TEMP.	WORKING PRESSURES BY CLASS, bar								
°C	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.		WORKING PRESSURES BY CLASS, bar									
°C	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	l-end v	alve ra	tings	termina	ate at 5	38°C.					

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

TEMP.		WORK	ING PRE	SSURE	S BY CL	ASS, ba	r
°C	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.		WORK	ING PR	SSURE	S BY CL	ASS, ba	r
°C	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.		WORK	ING PRE	SSURE	S BY CL	ASS, ba	r
°C	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.		WORKING PRESSURES BY CLASS, bar										
°C	150	300	600	900	1500	2500	4500					
-29 to 38	19	49.6	99.3	148.9	248.2	413.7	744.6					
50	18.4	48.1	96.2	144.3	240.6	400.9	721.7					
100	16.2	42.2	84.4	126.6	211	351.6	632.9					
150	14.8	38.5	77	115.5	192.5	320.8	577.4					
200	13.7	35.7	71.3	107	178.3	297.2	534.9					
250	12.1	33.4	66.8	100.1	166.9	278.1	500.6					
300	10.2	31.6	63.2	94.9	158.1	263.5	474.3					
325	9.3	30.9	61.8	92.7	154.4	257.4	463.3					
350	8.4	30.3	60.7	91	151.6	252.7	454.9					
375	7.4	29.9	59.8	89.6	149.4	249	448.2					
400	6.5	29.4	58.9	88.3	147.2	245.3	441.6					
425	5.5	29.1	58.3	87.4	145.7	242.9	437.1					
450	4.6	28.8	57.7	86.5	144.2	240.4	432.7					
475	3.7	28.7	57.3	86	143.4	238.9	430.1					
500	2.8	28.2	56.5	84.7	140.9	235	423					
538	1.4	25.2	50	75.2	125.5	208.9	375.8					
550	1.4(a)	25	49.8	74.8	124.9	208	374.2					
575	1.4(a)	24	47.9	71.8	119.7	199.5	359.1					
600	1.4(a)	19.9	39.8	59.7	99.5	165.9	298.6					
625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2					
650	1.4(a)	12.7	25.3	38	63.3	105.5	189.9					
675	1.4(a)	10.3	20.6	31	51.6	86	154.8					
700	1.4(a)	8.4	16.8	25.1	41.9	69.8	125.7					
725	1.4(a)	7	14	21	34.9	58.2	104.8					
750	1.4(a)	5.9	11.7	17.6	29.3	48.9	87.9					
775	1.4(a)	4.6	9	13.7	22.8	38	68.4					
800	1.2(a)	3.5	7	10.5	17.4	29.2	52.6					
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7					

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

#### A 351 Gr. CF3M (7)

TEMP.		WORKING PRESSURES BY CLASS, bar									
°C	150	300	600	900	1500	2500	4500				
-29 to 38	15.9	41.4	82.7	124.1	206.8	344.7	620.5				
50	15.3	40	80	120.1	200.1	333.5	600.3				
100	13.3	34.8	69.6	104.4	173.9	289.9	521.8				
150	12	31.4	62.8	94.2	157	261.6	470.9				
200	11.2	29.2	58.3	87.5	145.8	243	437.3				
250	10.5	27.5	54.9	82.4	137.3	228.9	412				
300	10	26.1	52.1	78.2	130.3	217.2	391				
325	9.3	25.5	51	76.4	127.4	212.3	382.2				
350	8.4	25.1	50.1	75.2	125.4	208.9	376.1				
375	7.4	24.8	49.5	74.3	123.8	206.3	371.3				
400	6.5	24.3	48.6	72.9	121.5	202.5	364.6				
425	5.5	23.9	47.7	71.6	119.3	198.8	357.9				
450	4.6	23.4	46.8	70.2	117.1	195.1	351.2				

#### General Notes:

- (1) Upon prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged use above 425°C.
- (3) Use normalized and tempered material only.
- (4) Not to be used over 595°C.
- (5) The deliberate addition of any element not listed in ASTM A 217, Table 1, is prohibited, except that Ca and Mg may be added for deoxidation.
- (6) At temperatures over 538°C, use only when the carbon content is 0.04% or higher.
- (7) Not to be used over 425°C.

## **SPECIFICATION OF CAST VALVE MATERIALS**

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

	DESCRIPTION	CΔ	RBON ST	FFI		ALLOY S	ΓEEL				STAINLESS	STEEL	
	DEGGIIII TIGIL	0			11/4Cr-1/2Mo	21/4Cr-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
	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
Z	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
COMPOSITION	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
<u>∞</u>	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
18	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
5	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 a	nd temper		Tempe	er				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–L	ARGE DISCS			DISC MA	TERIALS	BODIES	BONNETS	-DISCS

<sup>(1)</sup> Velan standard: 0.25 or less.

#### TRIM SPECIFICATION

					BAR ST	OCK					CAST	
 	ASTM ESIGNATION	13	Cr	Si	tainless steels	3	М	onel	Hastelloy	Monel	CoCr alloy	Austenitic ductile
	LSIGNATION	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
	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
COMPOSITION	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
<u>S</u>	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
١۵	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	-	-
ပ	Aluminum	_	_	_	_	_	3.00	_	3.00	-	-	-
	Cobalt	_	_	_	_	_	-	_	-	-	Balance	-
	Tungsten	_	_	_	_	_	-	_	-	-	3.5-5.5	-
	Iron	_	-	-	_	_	-	_	-	3.50	3.0	-
Spe	ecial condition	Temper	Hard	Level 2	-	_	Hot worked	Hot finished	-	Age hardened	-	_
Не	eat treatment	Class 2	Hard temper	Solution annealed	Solution annealed	H 1100	-	-	-	_	-	-
Te	nsile psi min.	110,000	-	95,000	75,000	140,000	80,000	140,000	100,000	_	130,000	58,000
Y	ield psi min.	85,000	_	75,000	30,000	115,000	40,000	100,000	41,000	-	-	28,000
Eloi	ngation % min.	15	_	25	30	14	30	20	40	-	1	20
Red	luction of area % min.	45	-	40	40	45	-	-	-	_	-	-
Н	lardness HB	269 max.	293–352	-	_	302 min.	-	326 min.	-	300 min.	344 min.	121–171

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

#### **SOUR SERVICE VALVES**

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

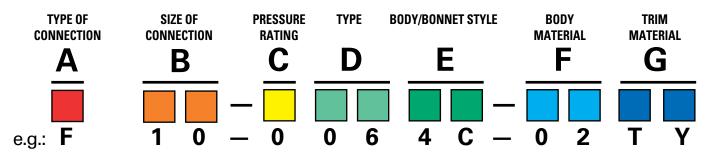
# For trim material (wedge/disc surface, seat surface, and stem) see page 35.

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

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

## **HOW TO ORDER**

#### CAST STEEL GATE, GLOBE, AND CHECK VALVES



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

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

7 Cactanea ac	oonphon must	accompany a	ny special order.								
A TYPE OF	CONNECTION										
A - Special B - Butt weld C - Combination D - DIN flanged	B - Butt weld F - Flanged B16.5 (B16.47 series A) U - Undrilled flanges C - Combination P - Flanged B16.47 series B (API 605)										
B SIZE OF CONNECTION											
Customers have the choice of specifying valve size as part of the valve figure number (B) using the numbers below, or indicating valve size separately. Size below shows NPS (DN)  EXAMPLES: F10-0064C-02TY (valve size is part of figure number) 3 (80) F-0064C-02TY (valve size is shown separately)											
08 - 2 (50)											
C PRESSUE	RE RATING	1									
<b>0</b> - 150 <b>3</b> - 1500	1 - 300 7 - 900	2 - 600 X - Butt weld (int	ermediate class)								
D VALVE T	YPE										
<b>01</b> - Flow control <b>06</b> - Full port gate	<b>07</b> - Stop globe <b>08</b> - Stop check	<b>09</b> - Needle <b>11</b> - API 594 swing o	99 - Special check								
E BODY / E	ONNET STYLE										
4 - Vertical  C - Bolted bonnet (cast)  E - Extended bonnet (cryogenic)  V - Cast bolted bonnet bellows seal											
F BODY MA	ATERIAL										
01 - Special 02 - WCB 03 - WC1 04 - C5	09 - C12 11 - CF8 12 - CF3 13 - CF8M	19 - Monel M35 23 - Alloy 20 25 - LCB 27 - LC3	31 - LCC 34 - C12A (F91) 38 - LC1 39 - LC2								

- (1) Base material is either the same as the body or solid trim at manufacturer's option.
  (2) Bellows material shown as standard, Inconel can be used in lieu of 321 and Hastelloy C
- (2) Bellows material shown as standard, Inconel can be used in lieu of 321 and Hastelloy C in lieu of Inconel, where design and/or pressure class applicable.
- (3) CoCr alloy refers to cobalt-chrome alloys in Grade 6 (e.g. AWS CoCr-A, UNS 30006 & 30106) or Grade 21 (e.g. AWS CoCr-E, UNS 30021). Use of Grade 6 or 21 is at Velan's option.

28 - CG8M

29 - CG3M

46 - GS-C25N

(4) 616HT Manufacturer's standard. (F91 and C12A only).

**05** - WC6

**06** - WC9

(5) Inserts may be in seat or wedge at manufacturer's option.

14 - CF3M

15 - CF8C

- (6) Valves with "NACE" Figure Numbers will meet the material requirements of NACE MR0103 and MR0175/ISO 15156.
- (7) SB, SX, SY PTFE gasket and packing GS, GX, GY graphite gasket and packing.

G	TR	ID A				16
CODE	IK	WEDGE/DISC SURFACE <sup>(1)</sup>	SEAT SURFACE <sup>(1)</sup>	STEM	API Number	If applicable BELLOWS <sup>(2)</sup>
MS		CoCr alloy <sup>(3)</sup>	CoCr alloy(3)	316		321
MY	STANDARD	CF8M or 316	CoCr alloy <sup>(3)</sup>	316	12	321
TS	₹	CoCr alloy <sup>(3)</sup>	CoCr alloy(3)	13Cr (410) <sup>(4)</sup>	5	321
TY	S	13Cr (410 or CA15)	CoCr alloy <sup>(3)</sup>	13Cr (410)	8	
NA	13Cr (410 or CA15) HRC 22 max		CoCr alloy <sup>(3)</sup>	13Cr (410) HRC 22 max.	8 <sup>(6)</sup>	
NB	CF8M		CoCr alloy <sup>(3)</sup>	316	12 <sup>(6)</sup>	321
NC	(9)	Monel	CoCr alloy <sup>(3)</sup>	Monel	11 <sup>(6)</sup>	Hastelloy C
ND	S	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	630 (H1150M)		
NE	E SERVICE <sup>(6)</sup>	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	13Cr (410) HRC 22 max.	5(6)	
NF	NACE	CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	Same as Body		
NG		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		321
NN		CF8M	CoCr alloy <sup>(3)</sup>	316		IN 625
NX		Monel	Monel	Monel		
NY		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	XM-19		
AS		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	321		321
AY		CF8C/F321	CoCr alloy <sup>(3)</sup>	321		321
CC		Alloy 20	Alloy 20	Alloy 20	13	
ES		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	347		
EY		CF8C/F347	CoCr alloy <sup>(3)</sup>	347		
HC		Hastelloy C	CoCr alloy <sup>(3)</sup>	Hastelloy C		Hastelloy C
MF	CF8	BM or 316 w/ Teflon insert <sup>(5)</sup>	CoCr alloy <sup>(3)</sup>	316		
MH		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		Hastelloy C
MN		CoCr alloy <sup>(3)</sup>	CoCr alloy <sup>(3)</sup>	316		IN 625
MX		CF8M	316	316	10	
TF	13Cr (410 or CA15) w/ Teflon insert <sup>(5)</sup>		CoCr alloy <sup>(3)</sup>	13Cr (410)		
TH	CoCr alloy <sup>(3)</sup>		CoCr alloy <sup>(3)</sup> CoCr alloy <sup>(3)</sup> 13Cr (410) <sup>(4</sup>			Hastelloy C
TN	CoCr alloy <sup>(3)</sup>		CoCr alloy <sup>(3)</sup>	13Cr (410) <sup>(4)</sup>		IN 625
XS	CoCr alloy <sup>(3)</sup>		CoCr alloy <sup>(3)</sup>	Monel		
XX		Monel	Monel	Monel	9	
XY		Monel	CoCr alloy <sup>(3)</sup>	Monel	11	

For a more detailed list of available trims, contact the factory or visit our web site at www.velan.com.

#### Note:

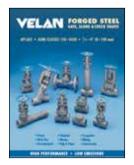
CoCr alloy as used throughout this catalog refers to cobalt chrome hardfacing alloys as supplied by Kennametal Stellite, and other approved manufacturers.

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

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

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

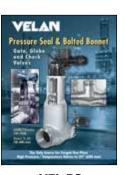
#### ASME pressure classes 150-4500 in carbon, alloy, and stainless steel



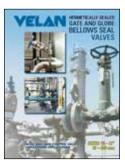
**CAT-SFV** 



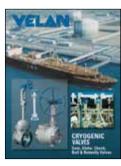
**CAT-BG** 



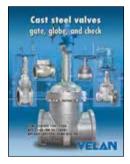
**VEL-PS** 



**VEL-BS** 



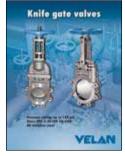
**VEL-CRYO** 



**CAT-CSV** 



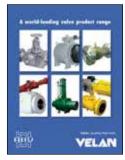
VEL-API-603



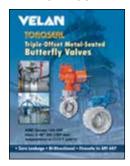
**CAT-KGV** 



VEL-PQCV



**BRO-FLBABV** 



**VEL-BF** 



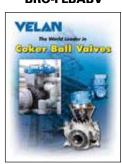
CAT-SAS-CTORQ



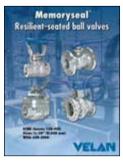
**VEL-MS** 



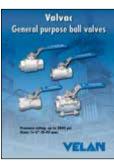
**CAT-PBV** 



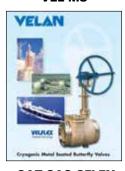
**VEL-CBV** 



**VEL-BV** 



**CAT-GPBV** 



**CAT-SAS-CFLEX** 



**CAT-SAS-CCON** 



CAT-ST

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