

# VELAN

## CAST STEEL Gate, Globe and Check Valves



API 600 & 603 • ASME Class 150–1500 • 2 – 60" (50 – 1500 mm)

# VELAN COMPANY PROFILE

Velan is one of the world's leading manufacturers of industrial valves, supplying forged and cast steel gate, globe, check, ball, butterfly and knife gate valves for critical applications in the chemical, petrochemical, oil and gas, fossil and nuclear power, cogeneration, pulp and paper and cryogenic industries.

Founded in 1950, Velan earned a reputation for excellence as a major supplier of forged valves for nuclear power plants and the U.S. Navy. Velan Inc., pioneered many designs which became industry standards, including bellows seal valves, all stainless steel knife gate valves and forged valves up to 24".

Velan valves are manufactured in 12 specialized manufacturing plants, including five in Canada, two in Korea, and one each in the U.S., France, U.K., Portugal and Taiwan. We have a total of 1,126 employees in North America and 374 overseas.

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The **Velan Corporate Philosophy** is to bring to the market new and innovative valve designs with special emphasis on quality, safety, ease of operation, simple in-line maintenance and most of all, long service life. All this combined with the use of high quality materials, advanced manufacturing technology and automation in all stages of manufacturing ensures the highest possible quality at a competitive price. Velan is strongly committed to defending its market position and aggressively competing in all countries around the world.

## HEAD OFFICE & PLANT 5



**MONTREAL, CANADA** 115,000 sq. ft. (10,683 m<sup>2</sup>)  
3–24" (80–600 mm) butterfly, 3/8–4" (10–100 mm) metal & resilient seated ball valves

## MANUFACTURING LOCATIONS

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Granby, QC J2J 1E7  
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**PROQUIP**  
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Oakville, ON L6L 5B8  
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### U.S.A.

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**PLANT 3**  
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Whetstone  
Leicester LE8 6LH  
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Fax: 44-116-275-0224

### FRANCE

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90, rue Challemeil Lacour  
F 69 367 Lyon Cedex 7  
Tel: (33) 4 78 61 67 00  
Fax: (33) 4 78 72 12 18

### PORTUGAL

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1679-018 Famoses  
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**VELAN-VALVAC**  
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### KOREA

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1060-4 Shingil-Dong  
Ansan City,  
Kyunggi-do  
425-833  
Tel: (82) 31-491-2811  
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## DISTRIBUTION CENTERS

### U.S.A.

**VELCAL**  
537 Stone Road, Unit "A"  
Benicia, CA 94510  
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Fax: (707) 745-4708

**VELEAST**  
605 Commerce Park Drive SE  
Marietta, GA 30060  
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*Velan has sales offices and distributors located worldwide.*

## GENERAL INFORMATION

**Tel: (514) 748-7743 Fax: (514) 748-8635**

Visit the Velan website at [www.velan.com](http://www.velan.com) for an updated contact list.

**NOTE:** The material in this catalog is for general information. For specific performance data and proper material selection, consult your Velan representative. Although every attempt has been made to ensure that the information contained in this catalog is correct, Velan reserves the right to change designs, materials or specifications without notice.



# MANUFACTURING PLANTS AROUND THE WORLD

**PLANT 1**



**MONTREAL, CANADA** 109,000 sq. ft. (10,126 m<sup>2</sup>) ¼–4" (8–100 mm) forged gate, globe & check valves, ASME 'N' stamp, ISO 9001

**PLANT 2 & 7**



**MONTREAL, CANADA** 170,000 sq. ft. (15,800 m<sup>2</sup>) 2–60" (50–1500 mm) forged and cast steel gate, globe, check, ball, knife and butterfly valves 3–36" (80–700 mm) ASME 'N' stamp, ISO 9001

**PLANT 4 & 6**



**GRANBY, CANADA** 186,500 sq. ft. (17,325 m<sup>2</sup>) 2–12" (50–300 mm) cast steel gate and check valves, ½–12" (8–300 mm) ball valves, ISO 9001



**TORONTO, CANADA Velan-Proquip** 41,000 sq. ft. (3,800 m<sup>2</sup>) 2–48" (50–1200 mm) wafer check valves ½–24" (15–600 mm) clamp joint connectors, ISO 9001



**WILlich, GERMANY** 12,000 sq. ft. (1,115 m<sup>2</sup>) ISO 9002



**LEICESTER, ENGLAND** 14,000 sq. ft. (1,300 m<sup>2</sup>), ISO 9002

**PLANT 3**



**WILLISTON, VERMONT, U.S.A.** 155,000 sq. ft. (14,400 m<sup>2</sup>) 2–24" (50–600 mm) forged and cast steel gate, globe and check valves, ASME 'N' stamp, ISO 9001



**LYON, FRANCE** 160,000 sq. ft. (14,900 m<sup>2</sup>) ¼–40" (8–1,000 mm) forged and cast steel gate, globe and butterfly valves, ISO 9001



**LISBON, PORTUGAL** 60,000 sq. ft. (5,600 m<sup>2</sup>) ISO 9002 2–12" (50–300 mm) cast steel gate, globe and check valves



**ANSAN CITY, SOUTH KOREA Plant 1** 30,000 sq. ft. (2,800 m<sup>2</sup>) components and 2–4" (50–100 mm) cast steel valves, ISO 9002



**ANSAN CITY, SOUTH KOREA Plant 2** 65,000 sq. ft. (5,800 m<sup>2</sup>) 2–12" (50–300 mm) cast steel gate, globe, check, ball and knife gate valves



**TAICHUNG, TAIWAN Velan-Valvac** 20,000 sq. ft. (1,840 m<sup>2</sup>) ¼–2" (8–50 mm) ball valves, ISO 9002



# VELAN API 600 & 603 CAST STEEL VALVES

## FOR THE OIL, GAS, PETROCHEMICAL, CHEMICAL AND PULP & PAPER 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.

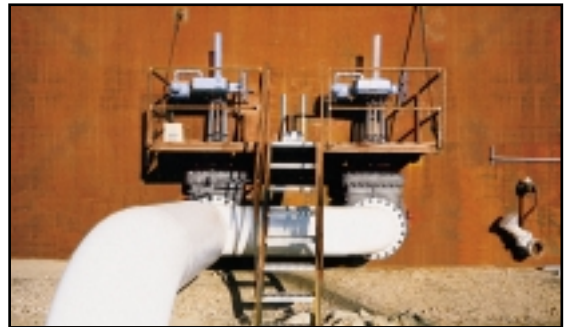
Our gate globe and check valves are widely used in many industries including:

- **Process Industries** – Oil, Chemical, Petrochemical, Refining, Pulp & 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.



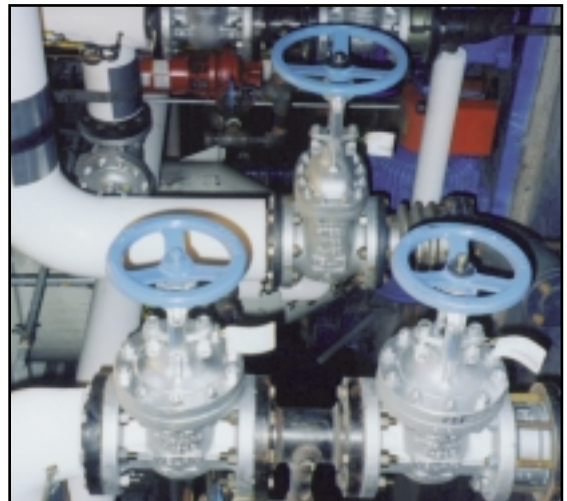
*Carbon steel gate valve (ASME Class 600), used for boiler feed water installation at a Hydrogen Plant in Texas.*



*Cast steel valve installation at an oil refinery.*



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



*API 600 gate valves in service for a boiler feed installation.*

# CAST STEEL VALVES MANUFACTURING PROGRAM

## API 600 CAST STEEL GATE, GLOBE & CHECK VALVES

| VALVE<br>TYPE &<br>CLASS |      | SIZE (in, mm) |          |         |          |          |          |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
|--------------------------|------|---------------|----------|---------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|--|
|                          |      | 2<br>50       | 2½<br>65 | 3<br>80 | 4<br>100 | 6<br>150 | 8<br>200 | 10<br>250 | 12<br>300 | 14<br>350 | 16<br>400 | 18<br>450 | 20<br>500 | 24<br>600 | 28<br>700 | 30<br>750 | 32<br>800 | 36<br>900 | 40<br>1000 | 42<br>1100 | 48<br>1200 | 54<br>1350 | 60<br>1500 |  |
| GATE                     | 150  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓          | ✓          | ✓          | ✓          | ✓          |  |
|                          | 300  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |            |            |            |            |            |  |
|                          | 600  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |           |            |            |            |            |            |  |
|                          | 900  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 1500 | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
| GLOBE                    | 150  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 300  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 600  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 900  | ✓             |          | ✓       | ✓        |          |          |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 1500 | ✓             |          | ✓       | ✓        |          |          |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
| CHECK                    | 150  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |           | ✓         |            |            |            |            |            |  |
|                          | 300  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |           |           |           |           |            |            |            |            |            |  |
|                          | 600  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |           |           |           |           |           |            |            |            |            |            |  |
|                          | 900  | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |
|                          | 1500 | ✓             | ✓        | ✓       | ✓        | ✓        | ✓        |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |  |

## API 603 CAST STAINLESS STEEL GATE, GLOBE & CHECK VALVES

| VALVE<br>TYPE &<br>CLASS |     | SIZE (in, mm)          |                        |                        |                         |         |          |         |          |          |          |           |           |           |           |           |           |           |
|--------------------------|-----|------------------------|------------------------|------------------------|-------------------------|---------|----------|---------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                          |     | ½ <sup>(1)</sup><br>15 | ¾ <sup>(1)</sup><br>20 | 1 <sup>(1)</sup><br>25 | 1½ <sup>(1)</sup><br>40 | 2<br>50 | 2½<br>65 | 3<br>80 | 4<br>100 | 6<br>150 | 8<br>200 | 10<br>250 | 12<br>300 | 14<br>350 | 16<br>400 | 18<br>450 | 20<br>500 | 24<br>600 |
| GATE                     | 150 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         | ✓         |
|                          | 300 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         | ✓         |           |           |           |           |
| GLOBE                    | 150 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        |          |           |           |           |           |           |           |           |
|                          | 300 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        |          |           |           |           |           |           |           |           |
| CHECK                    | 150 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         |           |           |           |           |           |
|                          | 300 | ✓                      | ✓                      | ✓                      | ✓                       | ✓       | ✓        | ✓       | ✓        | ✓        | ✓        | ✓         | ✓         |           |           |           |           |           |

(1) Refer to API 603 catalog.

### API 600 BONNET GASKET MATERIALS

| VALVE TYPE | MATERIAL                                                                    |
|------------|-----------------------------------------------------------------------------|
| GATE       | Class 150: corrugated steel/graphite (except 2-2½" (50-65 mm) spiral wound) |
|            | Class 300-1500: spiral wound stainless steel and graphite                   |
| GLOBE      | Spiral wound stainless steel and graphite                                   |
| CHECK      | Spiral wound stainless steel and graphite                                   |

### API 603 BONNET GASKET MATERIALS

| VALVE TYPE            | MATERIAL                      |                                    |
|-----------------------|-------------------------------|------------------------------------|
| GATE, GLOBE and CHECK | Trim SX or SY                 | Trim GX, GY or GS                  |
|                       | PTFE with stainless wire mesh | graphite with stainless steel foil |

### OPTIONAL BODY MATERIALS

| ASTM SPEC. GRADE | NOMINAL DESIGNATION | MIN. TEMP |      | MAX. TEMP. |      | VELAN CODE |
|------------------|---------------------|-----------|------|------------|------|------------|
|                  |                     | °F        | °C   | °F         | °C   |            |
| A216-WCB         | Carbon steel        | -20       | -29  | 800        | 427  | 02         |
| A217-WC6         | 1¼ CR-½ Mo          | -20       | -29  | 1100*      | 593  | 05         |
| A217-WC9         | 2¼ CR-1 Mo          | -20       | -29  | 1100*      | 593  | 06         |
| A217-C5          | 5 CR-½ Mo           | -20       | -29  | 1200*      | 649  | 04         |
| A217-C12         | 9 CR-1 Mo           | -20       | -29  | 1200*      | 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  | 26         |
| A351-CF8M        | 18 CR-9 Ni-2 Mo     | -425      | -254 | 1500*      | 816* | 13         |
| A351-CF3M        | 18 CR-9 Ni-2 Mo     | -425      | -254 | 850        | 454  | 14         |

Note: \*Flanged end ratings terminate at 1000°F (538°C) for Class 150.



## Mission Statement

*Our aim is to offer products and services which 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 goals are:  
Total Quality and On-time Delivery.  
Our method is Total Commitment.*

**A.K. Velan,  
President and C.E.O.**



### **ON-LINE NETWORKED SPC**

Velan has installed on-line networked SPC computers operated by machinists themselves.

Each unit can handle four gageports and provide instant feedback on tool wear and lubrication to a control manager station.



# 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 six North American plants are certified to ISO 9001 and Plants 1 and 2 have ASME "N" type Certificates of Authorization, Plant 3 has a Certificate of Accreditation. Furthermore, Velan has been fully approved to supply CE marked valves in accordance with the PED (European Pressure Equipment Directive). Orders are reviewed by Engineering and QA Departments and all special customer requirements are incorporated into QCI (Quality Control Instructions) issued for each project. The QA Department also maintains calibration and gauge control systems, and trains and qualifies skilled welders and NDT inspectors.

## 3. QUALITY CONTROL

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

## 4. PRESSURE TESTING

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



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

## 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. 1000 cold and 1000 thermal cycles with 1000°F superheated steam and five blowdowns with "0" leakage.



*Operator on CNC horizontal boring mill monitors his own quality.*

# WORLD'S LARGEST MASS PRODUCTION OF API 600 CAST STEEL VALVES



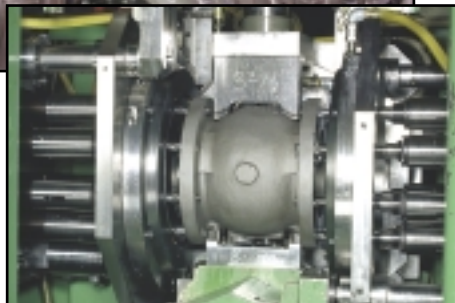
*Automatic 3-way facing machine.*



*For smaller runs, complete automatic machining and drilling in one set-up.*



*Automatic multiple drilling machine.*



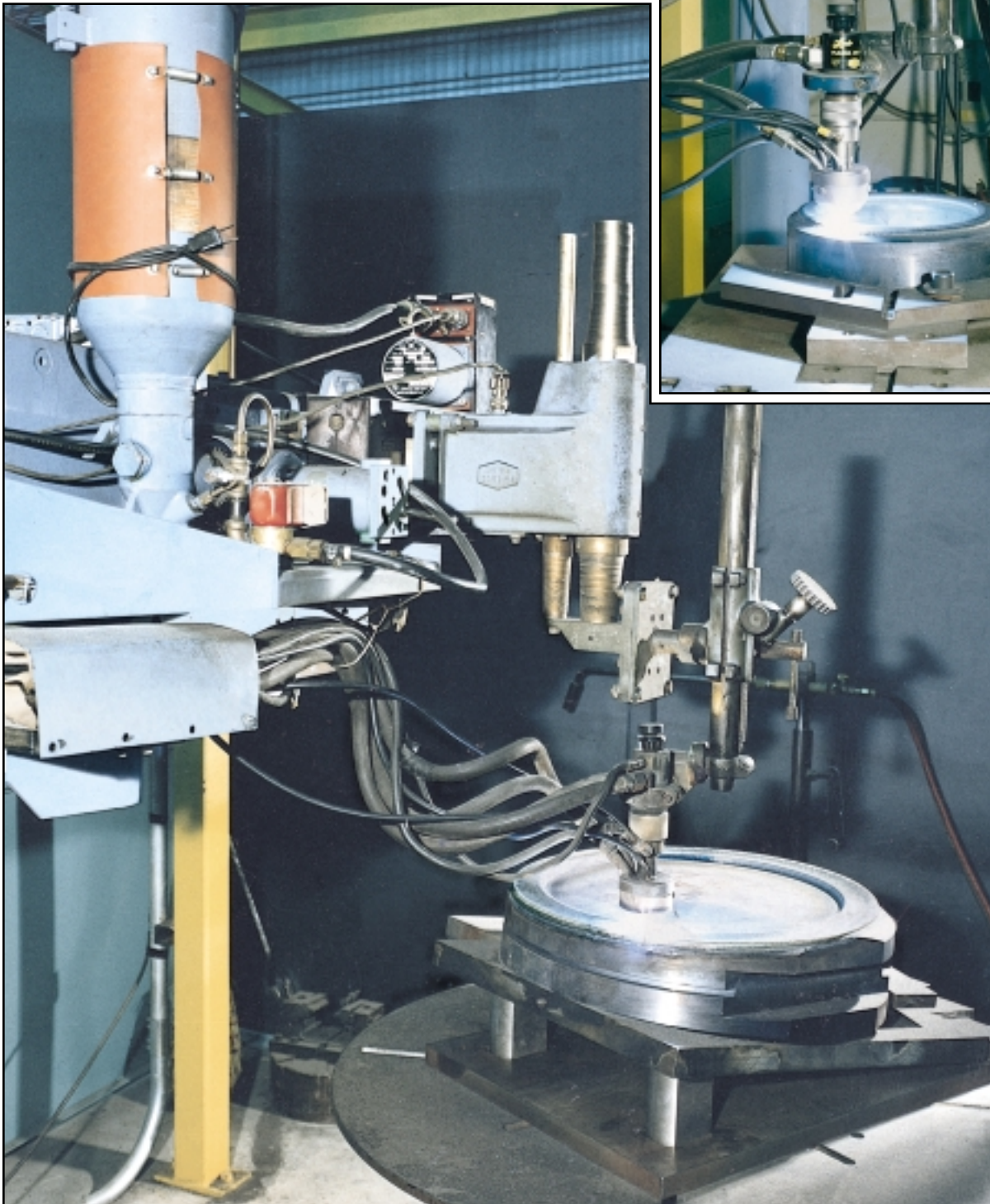
*Automatic bonnet machine.*





## AUTOMATIC PLASMA ARC HARDFACING FOR SEATS AND DISCS

High quality deposits of Stellite 6 and other hardfacing alloys are assured by the use of the following state of the art technology: controlled preheating, automatic Plasma Arc hardfacing equipment and a controlled cooling process. Shown below is the hardfacing of a gate valve wedge and to the right a cast steel seat.





# RELIABILITY THROUGH TESTING



**Top:**  
*Semi-automatic  
stations for  
testing 2–12"  
(50–300 mm)  
valves to API 598.*

**Bottom Right:**  
*Operational test for  
electric actuators.*

**Bottom Left:**  
*TA-LUFT  
qualification test  
on a 4" Class 600  
gate valve with  
live-loading.  
The test medium  
is helium at  
1500 psi (100 bar).*



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





# CONTINUOUS CASTING QUALITY IMPROVEMENT AND COMPUTERIZED CASTING PROCESS SIMULATION

## VELAN'S VEL-QCI-955 PROGRAM (API 600/ISO 10434)

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.

1. X-Ray Sample (pattern) Approval Process;
2. X-Ray Monitoring Program;
3. Casting Monitoring Program.

## SAMPLE CASTINGS

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

## X-RAY MONITORING:

Random x-ray monitoring requires that castings taken every six months from each vendor, randomly by size and quantity sets and x-rayed per B16.34 requirement.

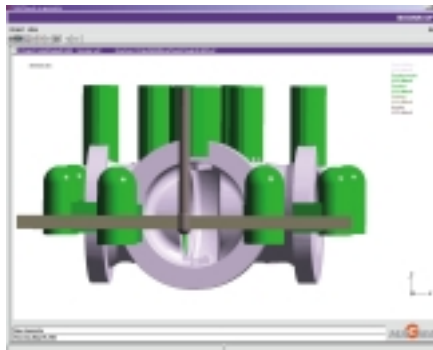


*Pro-Engineering model imported into Magmasoft® casting simulation program.*

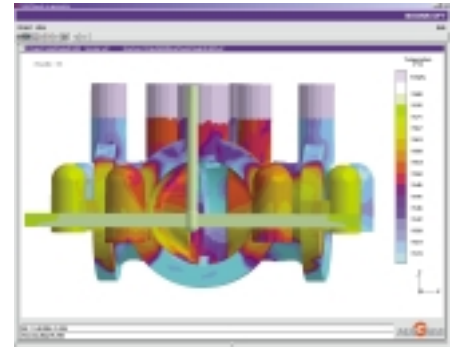
If casting fails to meet the x-ray requirements of B16.34, Velan's Senior Metallurgist will issue a corrective action request to the vendor, including recommendations for detailed methoding change and re-x-ray.

## CASTING MONITORING:

Rejected castings due to defects such as hydro-test leakage, porosity, inclusions, shrinkage indication discovered by x-ray or machining, are entered into the computer, as part of the statistical control of each vendor.



*Risering and gating simulation on a 30" Class 600 gate body.*



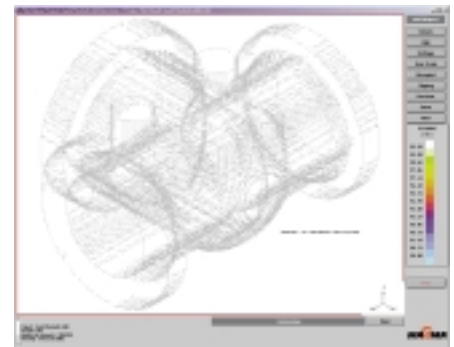
*90% filling simulation on a 30" Class 600 gate body.*

One example of the successful cooperation of Engineering, our Metallurgist and the foundry, using the MAGMASOFT® simulation, is shown for 30" Class 600 Gate body on this page.

## 3-D SOLIDIFICATION SIMULATION:

Velan is one of the first valve manufacturers in the world to have the MAGMASOFT® computer casting simulation program at its design facilities.

Working together with foundry engineers and our designers, we continue improving the internal integrity of castings, to X-Ray Level II or better as a general standard.



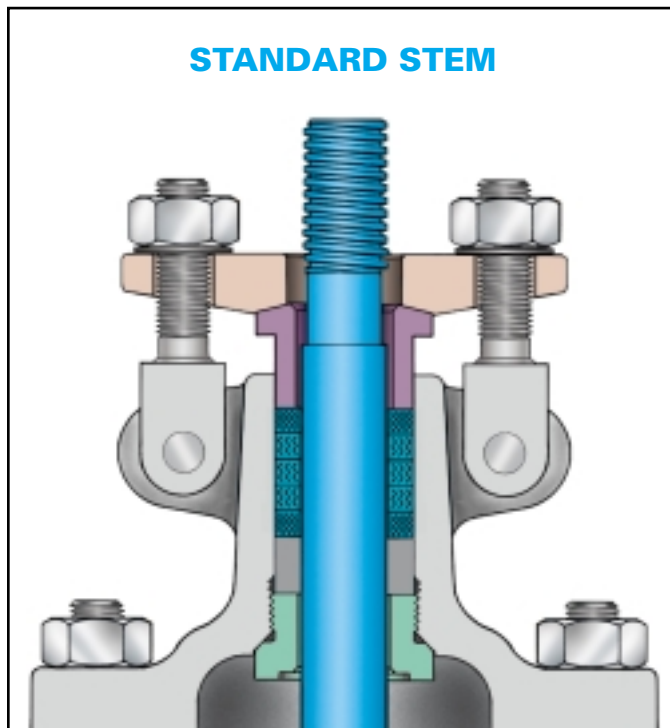
*No shrinkage on a 30" Class 600 gate body simulation.*

## Benefits to Velan's customers and to the foundries:

- Shorter delivery time,
- Higher quality of commercial castings,
- Optimum methoding system,
- Elimination of trial at sample approval,
- Improves the internal integrity of castings (RT level 2 or better) at pattern approval,
- Optimizes the metal flow and solidification pattern,
- Predicts internal defects,
- Reduces scrap,
- Optimizes the design of the castings,
- Solves problems such as shrinkage and porosity, without test castings,
- Reduces NDE (x-ray) upgrading.

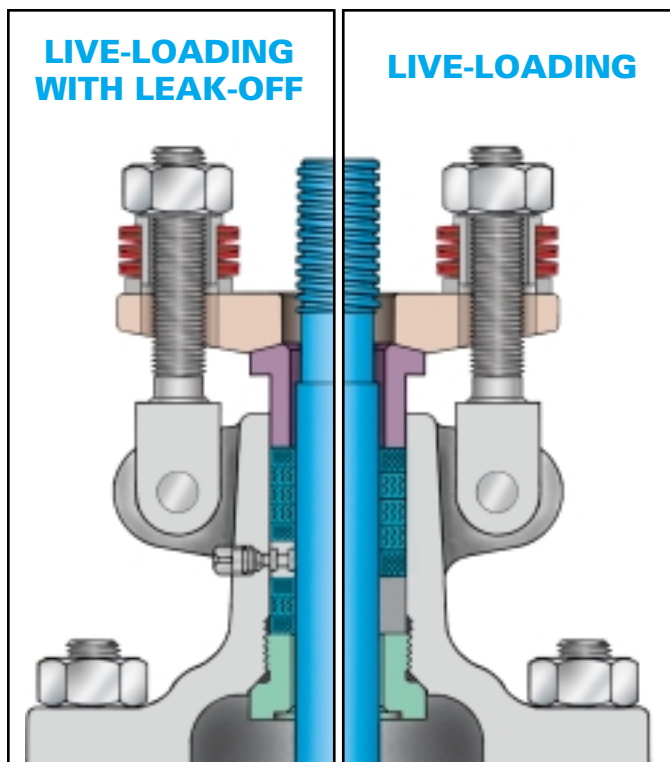
## DESIGN OF STEM SEALS

***Velan now offers standard cast steel bolted bonnet gate and globe valves qualification tested for compliance with EPA fugitive emissions regulations***



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 when compression load is high 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 stem and packing chamber wall are essential.
- **Short and narrow packing chambers improve sealing.** Maximum six rings in a single set chamber and wherever possible, only  $\frac{1}{4}$ " wide.
- **Stem and packing chamber walls.** Close roundness, straightness and superior surface finish of 6 RMS or better for the stem and 63 RMS for the packing chamber.



### LIVE-LOADING OPTIONS

- **Live-loading.** Two sets of Belleville springs maintain a permanent packing stress of 3500–4000 psi. Live-loading extends 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 3500–4000 psi for graphite and 2,000 psi PTFE to ensure equal stress distribution and effectiveness of all rings.
- Velan has extensive experience in valve live-loading. The original live-loading concept was developed by Velan in 1972 in a research project for AECL to eliminate leakage in Nuclear service. Velan has been supplying live loaded valves for Nuclear and non-Nuclear service for more than 30 years.



# API 600 CAST STEEL VALVES

## TYPICAL TEST REPORT



### TEST CONDITIONS

**Test Medium:** Propane at 115 psi, ambient temperature

**Instrument:** Organic vapor analyzer OVA-108, range 1–10,000 ppm

**Valve Type:** Gate, Class 150, API 600

**Sizes:** 3", 6", 12" (80, 150, 300 mm)

**Packing:** Graphite

**Gasket:** Corrugated steel with graphite filler

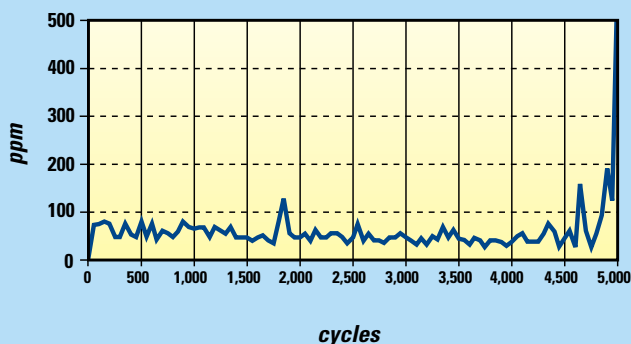
**Trim:** Wedge: 13 CR  
Seat: Stellite

**Quantity:** 3" (80 mm)–one valve  
6" (150 mm)–four valves  
12" (300 mm)–one valve

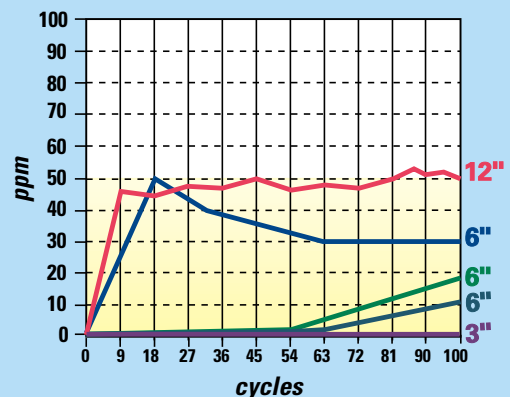
### TEST COMPARISON TO API 598 TEST

- API 598 test standard requires no visible external leakage (gasket, packing chamber and casting). The organic vapor analyzer measures leakage in parts per million (ppm). "Visible leakage" in API 598 is one drop of liquid per minute which we estimate is equivalent to about 2,400 ppm of gas. The API 598 test does not invoke cycling while we have cycled valves between 100 and 5000 cycles in our research testing.
- Critical factors in low emission service life include severity of pressure-temperature transients, number of cycles and cleanliness. During extensive cycling tests it was found that after leak paths developed, leakage could be reduced or eliminated by retightening gland bolts. For example a 150 ppm leak that developed after 350 cycles could be reduced to zero after retightening gland bolts.

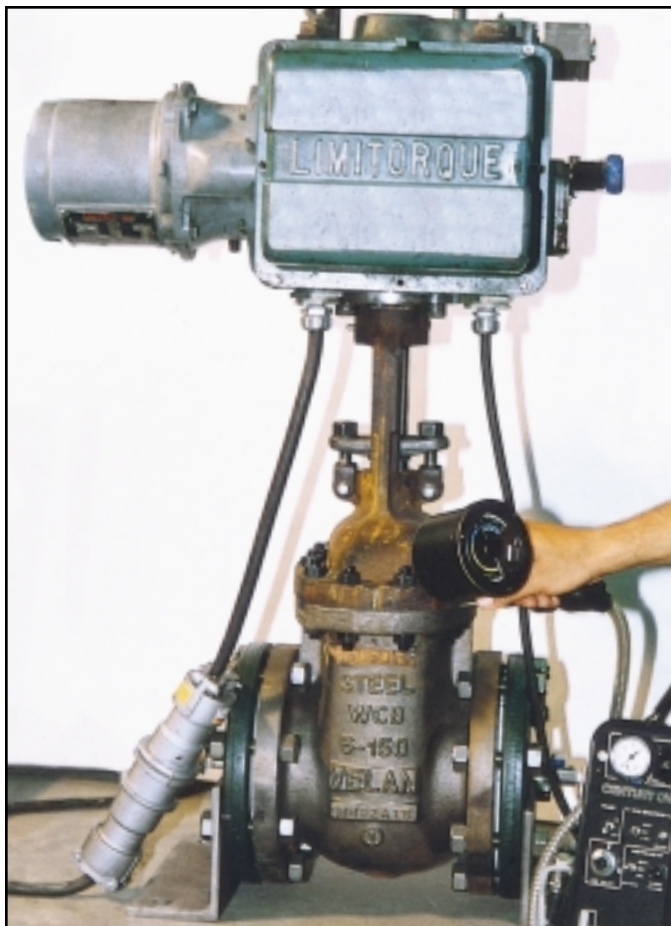
### 6" GATE VALVE 5,000 CYCLE TEST



### 3", 6" & 12" GATE VALVES 100 CYCLE TEST



# TESTING GASKET PERFORMANCE



**Upper left:**  
3000 cycles  
with propane  
at 125 psi  
Leakage:  
zero ppm.



**Upper right:** 50 cycles with steam at 400°F (204°C)  
Leakage: zero ppm.



**Left:**  
Thermal shock  
with water at  
60°F (15°C)  
Leakage:  
zero ppm.

|                    |                                                       |
|--------------------|-------------------------------------------------------|
| <b>Valve type:</b> | <b>Class 150 gate valve</b>                           |
| <b>Size:</b>       | <b>6" (150 mm)</b>                                    |
| <b>Gasket:</b>     | <b>Corrugated steel<br/>with graphite filler</b>      |
| <b>Instrument:</b> | <b>OVA-108 vapor analyzer<br/>Range: 1–10,000 ppm</b> |



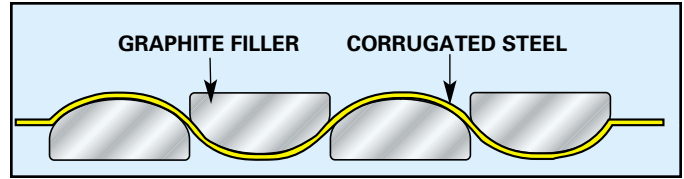
## BODY-BONNET GASKET DESIGN GATE VALVES WITH OVAL FLANGES



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 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:

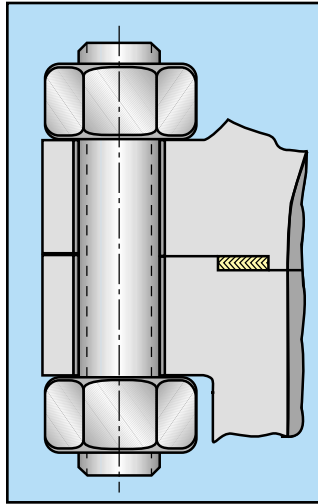
3700 cycles with zero ppm for 6" Class 150.



### 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 +2000°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

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| <b>Gate</b>  | Class 150: 2–2½" (50–65 mm)<br>Class 300–1500: 2–36" (50–900 mm) |
| <b>Globe</b> | Class 150–600: 2–16" (50–400 mm)                                 |
| <b>Check</b> | Class 150–1500: 2–36" (50–900 mm)                                |

### 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.
- Minimum of three inner wraps to prevent buckling.
- Minimum of three tack welds.
- Minimum of three filler wraps.
- Close tolerance ( $\pm 0.005"$  or 0.13 mm) for gasket thickness.
- Regular testing of gasket resiliency and inspection at Receiving due to sensitivity to inconsistent quality.
- Modern torquing methods.

### TYPICAL TEST RESULT:

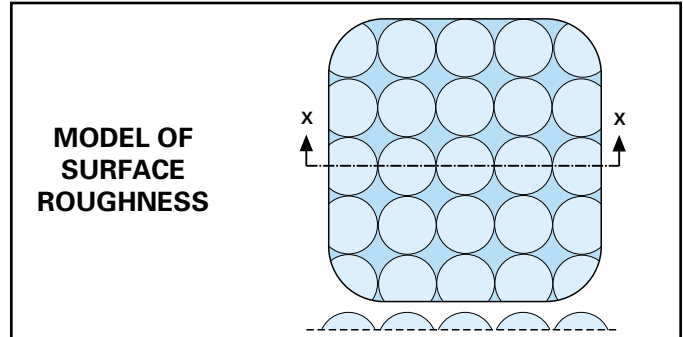
3100 cycles with zero ppm for 10" Class 300.

# 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 between 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 3 times the yield (for 70,000 psi–210,000 psi).
- Sufficient contact pressure generated by the torque is essential. A small increase in contact pressure produces a rapid decrease in leakage.
- The valve seat should be either very narrow or very wide, depending on the valve type.



|                                           |                           |
|-------------------------------------------|---------------------------|
| <b>Globe Valves</b>                       | Conical seat-line contact |
| <b>Gate Valves and Swing Check Valves</b> | Large, flat-faced seats   |

## VELAN API 600 GATE VALVE SEAT TIGHTNESS

### GATE VALVE SEAT TIGHTNESS

- Welded-in Stellite 6 faced seats and a flexible wedge in 13 CR, SS 316, Monel or hardfaced with Stellite 6.
- Seating faces ground and lapped to 2 RMS.

### Factory Acceptance Standard for Gate Valve Seat Leakage

| Size in | Velan Standard (VEL-NDT-571) | Seat Leakage Rate <sup>(1)</sup> (API 598 – October 1996) |                    |
|---------|------------------------------|-----------------------------------------------------------|--------------------|
|         |                              | Low Pressure Test                                         | High Pressure Test |
| 2       | 0                            | 0                                                         | 0                  |
| 2½–6    | 0                            | 24                                                        | 12                 |
| 8–12    | 0                            | 40                                                        | 20                 |
| 14+     | 28                           | 56                                                        | 28                 |

(1) Leakage rates are in bubbles per minute for low pressure test and drops per minute for high pressure test

## EIGHT IMPORTANT STEPS IN ASSEMBLY & TESTING

*Make the Difference in Seat Tightness and Performance*

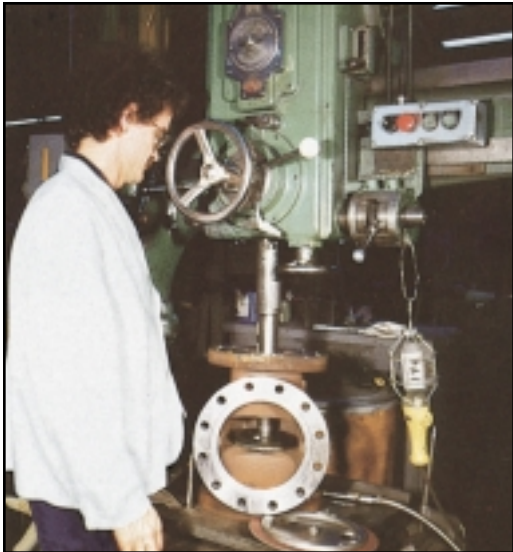


**1** Automatic seal welding of Stellite 6 hardfaced seats.

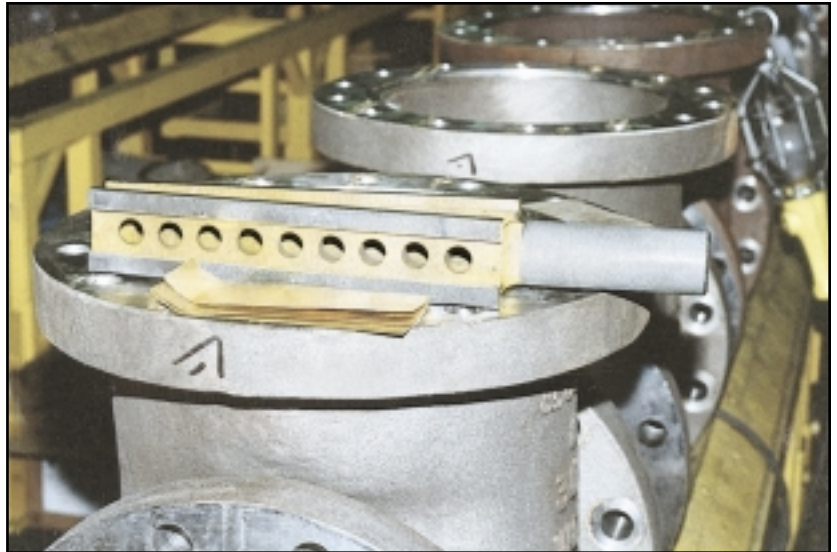


**2** Air-under-water test of the seat's welds.

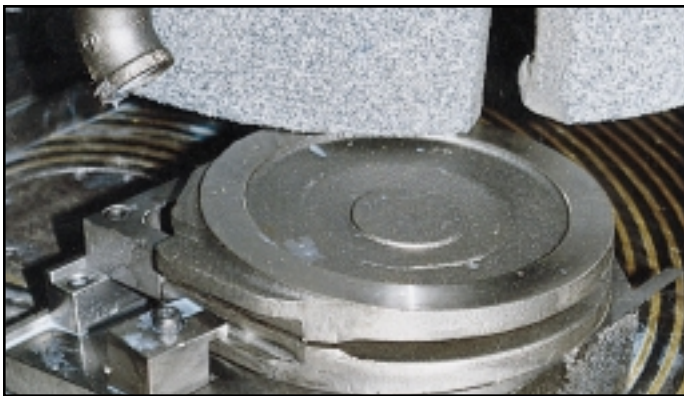




**3** Relapping of seating faces after seal welding.



**4** Determination of final seat/seat angle with gauge and shims to determine ideal wedge angle (6-60").



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



**6** Lapping of wedge seating surfaces.

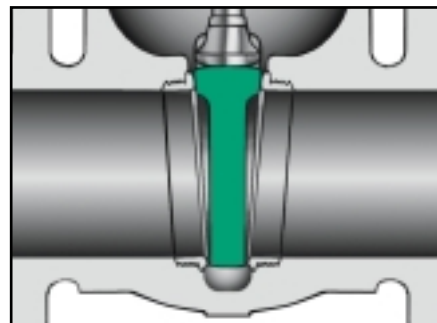


**7** Assigning the ideally fitted wedge, ground and lapped, to proper valve body.



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

## VELAN API 600 GATE VALVES FLEXIBLE WEDGE VERSUS SOLID WEDGE



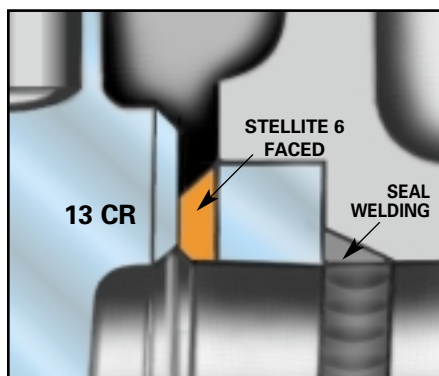
### FLEXIBLE ROUND WEDGE PIONEERED BY VELAN

- Universal use for temperatures up to 1000°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

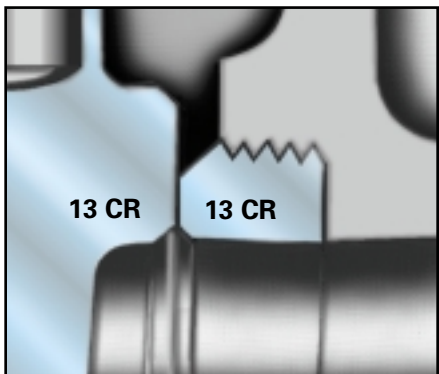
- Wedge may cause severe jamming at temperatures over 200°F (93°C).
- Suitable for small valves (½–2", 15–50 mm).
- Wedge will stick when valve is closed hot and allowed to cool.
- No compensation for deformation of body due to pressure-temperature or pipe stresses.
- Difficult to make valve tight on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

## SEAL WELDED SEATS VS SCREWED-IN SEATS



### VELAN STANDARD GROUND AND LAPPED SEAL WELDED SEAT RINGS FACED WITH STELLITE 6

- Pioneered by Velan and considered state-of-the-art technology.
- Welded-in leakproof.
- Weld quality 100% tested.
- Stellite 6 seating faces for long service life.
- Ground and lapped to 2 RMS finish after weld-in.
- Standardized use for steam up to 1000°F (538°C), oil and gas.
- Stellite face will wear less than the 13 CR wedge, which can easily be repaired or replaced.



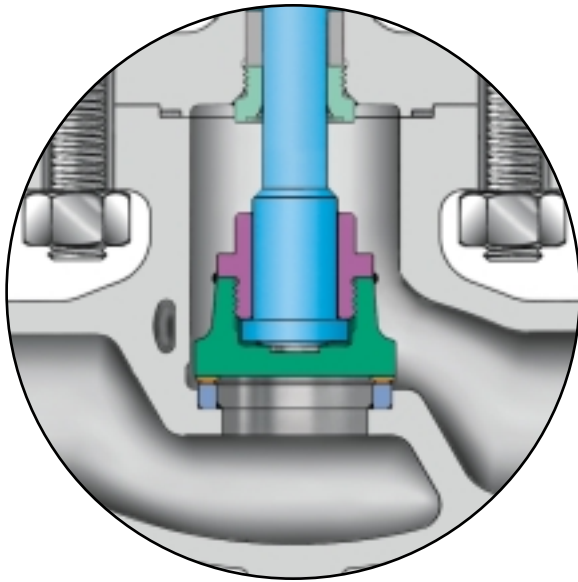
### COMPETING SCREWED-IN SEATS IN 13 CR

- 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 wire draw body threads of loose seats beyond repair.
- 13 CR seat suitable only for certain fluids.



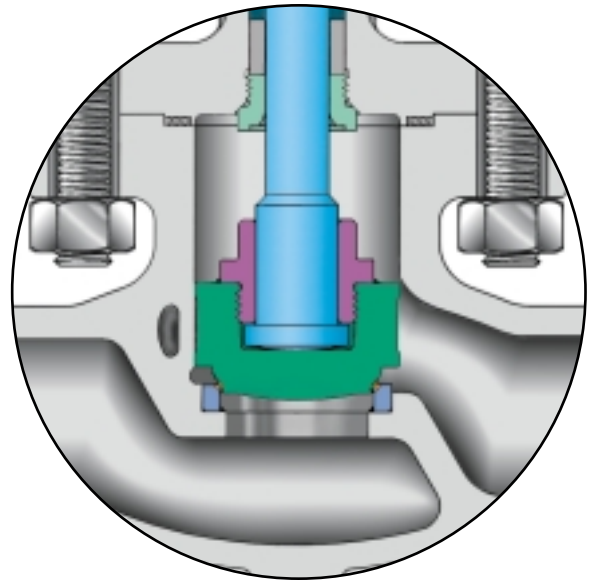
## VELAN API 600 GLOBE VALVES FLAT AND CONICAL SEATS

FLAT SEAT



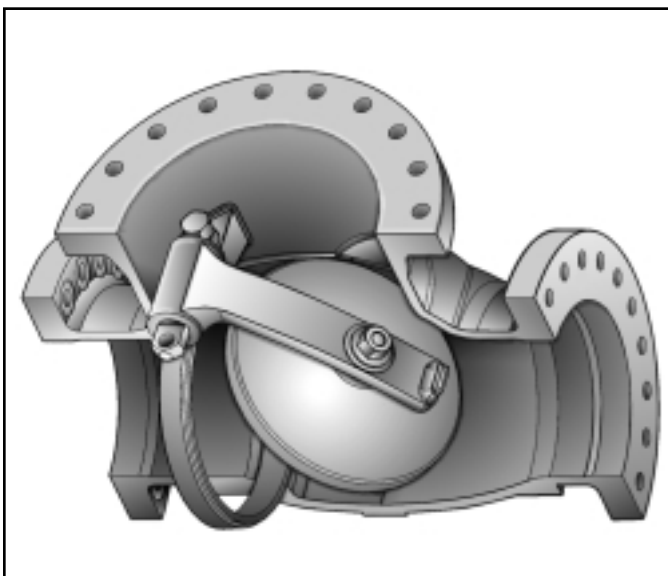
- Machining, lapping to close tolerances is easy.
- Flatness tolerance easy to control.
- Area contact wide seat.
- Disc is guided by the mating surface of the seat.
- Hard thrust pad prevents galling.
- Faster maintenance in-line. Flat seating faces can be lapped and checked for flatness easier.

CONICAL SEAT

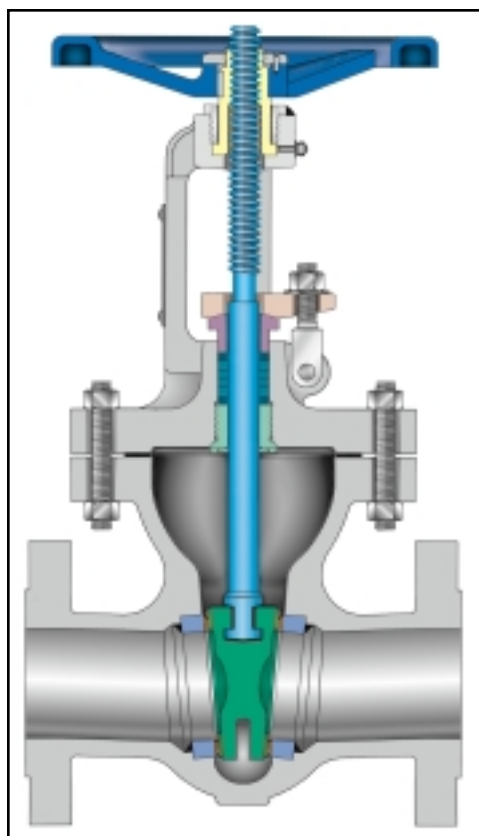


- Line contact seal.
- Contact pressure increase by 1.5–5 with same stems and yokes.
- Seat has greater elasticity.
- Lower closing torques.
- Recommended for high pressure-temperature.

## VELAN API 600 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.
- All parts are accessible from the top for easy servicing.
- Welded-in seat is Stellite 6 faced.
- Disc is free to rotate to prevent localized wear.
- Ground and lapped seating surfaces.



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

### DESIGN FEATURES:

- **Universal Trim.** 13 CR stem, wedge in CA 15 or 13 CR faced, and Stellite seat API Trim 8 suitable for applications up to 850°F (454°C).
- **Seat face** Stellite, ground and lapped to a mirror finish.
- **Flexible Wedge** with low center stem-wedge contact, in solid CA15 (13 CR) or hardfaced with 13 CR, SS 316, Monel or Stellite. Wedge is ground and lapped to a mirror finish and tightly guided to prevent dragging and seat damage. A Stellite 6 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 3, details on page 13.

### STANDARD MATERIALS

| PART                        | MATERIALS                                                                                     |                          |                          |                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------|--------------------------|--------------------------|---------------------------------|
| Body <sup>(1)</sup>         | WCB                                                                                           | WC6                      | WC9                      | CF8M                            |
| Bonnet <sup>(1)</sup>       | WCB                                                                                           | WC6                      | WC9                      | CF8M                            |
| Stem <sup>(1)(3)</sup>      | SS 410                                                                                        |                          |                          | SS 630, 600 or SS 316           |
| Wedge <sup>(1)</sup>        | CA 15 or 13 CR faced WCB                                                                      | CA 15 or 13 CR faced WC6 | CA 15 or 13 CR faced WC9 | CF8M                            |
| Seat <sup>(1)(2)</sup>      | Stellite 6 faced carbon steel                                                                 | Stellite 6 faced F11     | Stellite 6 faced F22     | Stellite 6 faced F316           |
| Packing flange              | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Gland bushing               | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Packing ring <sup>(1)</sup> | Graphite                                                                                      |                          |                          | Graphite                        |
| Gland stud                  | Gr. B or B7 <sup>(4)</sup>                                                                    |                          |                          | F316, B8M or 630 <sup>(5)</sup> |
| Gland nut                   | Gr. 2H                                                                                        |                          |                          | Gr. 8M                          |
| Body/bonnet nut             | Gr. 2H                                                                                        | Gr. 4                    |                          | Gr. 8M                          |
| Body/bonnet stud            | B7                                                                                            | B16                      |                          | B8M or 630                      |
| Back seat <sup>(1)(3)</sup> | SS 410                                                                                        |                          |                          | SS 316                          |
| Gasket <sup>(1)</sup>       | Class 150: corrugated steel/graphite<br>Class 300-1500: spiral wound stainless steel/graphite |                          |                          |                                 |
| Key                         | Carbon steel                                                                                  |                          |                          |                                 |
| Yoke bushing                | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Bearing                     | Steel                                                                                         |                          |                          |                                 |
| Handwheel nut               | Malleable iron or steel                                                                       |                          |                          |                                 |
| Handwheel <sup>(1)</sup>    | Malleable iron or steel                                                                       |                          |                          |                                 |
| Grease fitting              | Steel                                                                                         |                          |                          |                                 |
| Groove pin                  | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Bushing                     | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Washer                      | Carbon steel                                                                                  |                          |                          | Stainless steel                 |
| Name plate                  | Stainless steel                                                                               |                          |                          |                                 |
| Identification tag          | Stainless steel                                                                               |                          |                          |                                 |
| Rivet                       | Stainless steel                                                                               |                          |                          |                                 |
| Stem nut                    | A 439 Austenitic ductile iron Gr. D-2C                                                        |                          |                          |                                 |

(1) Other materials available. (2) Stellite. (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 |
|----------------------------------------------------------|--------------------------|
| Wall thickness and general valve design                  | API 600, BS1414          |
| 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                     |

- **Body and bonnet** castings are precision machined. One-piece bonnet up to 12" (300 mm) for better alignment and fewer parts.
- **Gland** has two-piece construction for easy alignment.
- **Flanges:**  
Classes 150–300: 1/16" raised face,  
Class 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:  
**150–300:** 10–12" (250–300 mm), 1 bearing (top),  
16" (400 mm) and up, two bearings  
**600:** 6" (150 mm) and up  
**900–1500:** 6" (150 mm) and up.

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



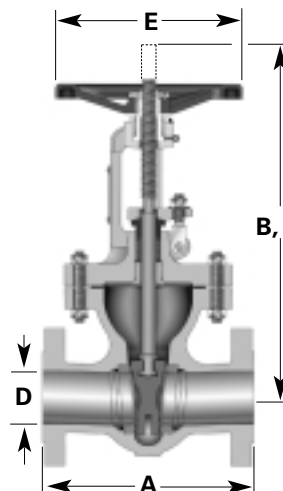
# GATE VALVE DIMENSIONS (CLASSES 150–600)

| SIZE     | ASME 150 (PN 20) |       |                  |                  |       |     | ASME 300 (PN 50) |                  |                  |       |     | ASME 600 (PN 100) |                  |                  |       |     |
|----------|------------------|-------|------------------|------------------|-------|-----|------------------|------------------|------------------|-------|-----|-------------------|------------------|------------------|-------|-----|
| in<br>mm | A                |       | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E   | A <sup>(3)</sup> | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E   | A <sup>(3)</sup>  | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E   |
|          | BW               | FL    |                  |                  |       |     |                  |                  |                  |       |     |                   |                  |                  |       |     |
| 2        | 8.50             | 7.00  | 15.63            | 20.38            | 2.00  | 8   | 8.50             | 15.63            | 20.38            | 2.00  | 8   | 11.50             | 15.66            | 20.51            | 2.00  | 8   |
| 50       | 216              | 178   | 397              | 518              | 51    | 203 | 216              | 397              | 518              | 51    | 203 | 292               | 398              | 521              | 51    | 203 |
| 2½       | 9.50             | 7.50  | 16.88            | 22.14            | 2.50  | 8   | 9.50             | 16.94            | 22.20            | 2.50  | 8   | 13.00             | 18.59            | 24.19            | 2.50  | 10  |
| 65       | 241              | 191   | 429              | 562              | 64    | 203 | 241              | 430              | 564              | 64    | 203 | 330               | 472              | 614              | 64    | 254 |
| 3        | 11.12            | 8.00  | 18.56            | 24.26            | 3.00  | 10  | 11.12            | 20.22            | 26.38            | 3.00  | 10  | 14.00             | 21.63            | 27.78            | 3.00  | 10  |
| 80       | 282              | 203   | 471              | 616              | 76    | 254 | 283              | 514              | 670              | 76    | 254 | 356               | 549              | 706              | 76    | 254 |
| 4        | 12.00            | 9.00  | 22.25            | 28.32            | 4.00  | 10  | 12.00            | 23.90            | 30.95            | 4.00  | 10  | 17.00             | 25.75            | 32.76            | 4.00  | 14  |
| 100      | 305              | 229   | 565              | 719              | 102   | 254 | 305              | 607              | 786              | 102   | 254 | 432               | 654              | 832              | 102   | 356 |
| 6        | 15.88            | 10.50 | 31.19            | 38.00            | 6.00  | 14  | 15.87            | 32.31            | 40.38            | 6.00  | 14  | 22.00             | 36.28            | 44.18            | 6.00  | 20  |
| 150      | 403              | 267   | 792              | 965              | 152   | 356 | 403              | 821              | 1026             | 152   | 356 | 559               | 922              | 1122             | 152   | 508 |
| 8        | 16.50            | 11.50 | 38.19            | 46.13            | 8.00  | 18  | 16.50            | 40.94            | 50.16            | 8.00  | 18  | 26.00             | 43.72            | 53.25            | 7.88  | 24  |
| 200      | 419              | 292   | 970              | 1172             | 203   | 457 | 419              | 1040             | 1274             | 203   | 457 | 660               | 1110             | 1353             | 200   | 610 |
| 10       | 18.00            | 13.00 | 47.16            | 56.28            | 10.00 | 20  | 18.00            | 49.19            | 59.87            | 10.00 | 20  | 31.00             | 49.06            | 59.87            | 9.75  | 30  |
| 250      | 457              | 330   | 1198             | 1430             | 254   | 508 | 457              | 1249             | 1521             | 254   | 508 | 787               | 1246             | 1521             | 248   | 762 |
| 12       | 19.75            | 14.00 | 55.91            | 66.75            | 12.00 | 20  | 19.75            | 59.00            | 70.61            | 12.00 | 20  | 33.00             | 61.13            | 72.74            | 11.75 | 30  |
| 300      | 502              | 356   | 1420             | 1695             | 305   | 508 | 502              | 1499             | 1763             | 305   | 508 | 838               | 1553             | 1848             | 298   | 762 |
| 14       | 22.50            | 15.00 | 61.50            | 75.50            | 13.25 | 24  | 30.00            | 61.38            | 77.75            | 13.25 | 24  | 35.00             | 72.50            | 83.50            | 12.88 | (2) |
| 350      | 572              | 381   | 1562             | 1918             | 337   | 610 | 762              | 1559             | 1975             | 337   | 610 | 889               | 1842             | 2121             | 327   | (2) |
| 16       | 24.00            | 16.00 | 68.75            | 85.00            | 15.25 | 24  | 33.00            | 68.75            | 85.50            | 15.25 | 30  | 39.00             | 82.25            | 91.00            | 14.75 | (2) |
| 400      | 610              | 406   | 1746             | 2159             | 387   | 610 | 838              | 1746             | 2172             | 387   | 762 | 991               | 2089             | 2311             | 375   | (2) |
| 18       | 26.00            | 17.00 | 73.25            | 90.00            | 17.25 | 24  | 36.00            | 77.88            | 94.00            | 17.00 | (2) | 43.00             | 87.06            | 116.00           | 16.50 | (2) |
| 450      | 660              | 432   | 1861             | 2286             | 438   | 610 | 914              | 1978             | 2388             | 432   | (2) | 1092              | 2211             | 2946             | 419   | (2) |
| 20       | 28.00            | 18.00 | 83.00            | 100.00           | 19.25 | 30  | 39.00            | 86.50            | 100.00           | 19.00 | (2) | 47.00             | 103.00           | 123.00           | 18.25 | (2) |
| 500      | 711              | 457   | 2108             | 2540             | 489   | 762 | 991              | 2197             | 2540             | 483   | (2) | 1194              | 2616             | 3124             | 464   | (2) |
| 24       | 32.00            | 20.00 | 97.00            | 115.00           | 23.25 | 30  | 45.00            | 101.25           | 125.00           | 23.00 | (2) | 55.00             | 115.00           | 132.00           | 22.00 | (2) |
| 600      | 813              | 508   | 2464             | 2921             | 591   | 762 | 1143             | 2572             | 3175             | 584   | (2) | 1397              | 2921             | 3353             | 559   | (2) |
| 26       | 34.00            | 22.00 | 114.50           | 125.00           | 25.00 | (2) | 49.00            | 114.50           | 125.00           | 25.00 | (2) | —                 | —                | —                | —     | —   |
| 650      | 864              | 559   | 2908             | 3175             | 635   | (2) | 1245             | 2908             | 3175             | 635   | (2) | —                 | —                | —                | —     | —   |
| 28       | 36.00            | 24.00 | 118.63           | 130.00           | 27.00 | (2) | 53.00            | 118.63           | 130.00           | 27.00 | (2) | —                 | —                | —                | —     | —   |
| 700      | 914              | 610   | 3013             | 3302             | 686   | (2) | 1346             | 3013             | 3302             | 686   | (2) | —                 | —                | —                | —     | —   |
| 30       | 36.00            | 24.00 | 124.12           | 140.00           | 29.25 | (2) | 55.00            | 124.13           | 145.00           | 29.25 | (2) | 65.00             | 122.50           | 150.00           | 24.75 | (2) |
| 750      | 914              | 610   | 3153             | 3556             | 743   | (2) | 1397             | 3153             | 3683             | 743   | (2) | 1651              | 3112             | 3810             | 629   | (2) |
| 32       | 38.00            | 26.00 | 129.63           | 150.00           | 30.75 | (2) | 60.00            | 129.63           | 150.00           | 30.75 | (2) | —                 | —                | —                | —     | —   |
| 750      | 965              | 660   | 3293             | 3810             | 781   | (2) | 1524             | 3293             | 3810             | 781   | (2) | —                 | —                | —                | —     | —   |
| 36       | 40.00            | 28.00 | 146.68           | 170.00           | 35.25 | (2) | 68.00            | 147.81           | 185.00           | 35.25 | (2) | 68.00             | 145.13           | 170.00           | 29.00 | (2) |
| 900      | 1016             | 711   | 3726             | 4318             | 895   | (2) | 1727             | 3754             | 4699             | 895   | (2) | 1727              | 3686             | 4318             | 737   | (2) |
| 40       | 42.00            | 30.00 | 158.66           | 188.00           | 38.50 | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 1000     | 1067             | 762   | 4030             | 4775             | 978   | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 42       | 44.00            | 31.00 | 166.50           | 195.00           | 40.25 | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 1050     | 1118             | 787   | 4229             | 4953             | 1022  | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 48       | —                | 36.00 | 189.81           | 225.00           | 46.00 | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 1200     | —                | 914   | 4821             | 5715             | 1168  | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 54       | 52.00            | 40.00 | 216.56           | 248.00           | 51.50 | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 1350     | 1321             | 1016  | 5501             | 6299             | 1308  | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 60       | —                | 42.00 | 238.80           | 275.00           | 57.50 | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |
| 1500     | —                | 1067  | 6066             | 6985             | 1461  | (2) | —                | —                | —                | —     | —   | —                 | —                | —                | —     | —   |

## CLASSES 900-1500

| SIZE     | ASME 900 (PN 150) |                  |                  |       |     | ASME 1500 (PN 250) |                  |                  |      |     |
|----------|-------------------|------------------|------------------|-------|-----|--------------------|------------------|------------------|------|-----|
| in<br>mm | A <sup>(3)</sup>  | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E   | A <sup>(3)</sup>   | B <sup>(1)</sup> | C <sup>(1)</sup> | D    | E   |
| 2        | 14.50             | 21.25            | 29.00            | 1.88  | 10  | 14.50              | 21.25            | 29.00            | 1.88 | 10  |
| 50       | 368               | 540              | 737              | 48    | 254 | 368                | 540              | 737              | 48   | 254 |
| 3        | 15.00             | 25.75            | 34.50            | 2.88  | 14  | 18.50              | 25.75            | 34.50            | 2.75 | 14  |
| 80       | 381               | 654              | 876              | 73    | 356 | 470                | 654              | 876              | 70   | 356 |
| 4        | 18.00             | 28.75            | 37.50            | 3.88  | 18  | 21.50              | 28.75            | 37.50            | 3.63 | 18  |
| 100      | 457               | 730              | 953              | 99    | 457 | 546                | 730              | 953              | 92   | 457 |
| 6        | 24.00             | 39.00            | 49.00            | 5.75  | 20  | 27.75              | 39.00            | 49.00            | 5.38 | (2) |
| 150      | 610               | 991              | 1245             | 146   | 508 | 705                | 991              | 1245             | 137  | (2) |
| 8        | 29.00             | 51.75            | 62.75            | 7.50  | (2) | 32.75              | 45.25            | 60.00            | 7.00 | (2) |
| 200      | 737               | 1315             | 1594             | 191   | (2) | 832                | 1149             | 1524             | 178  | (2) |
| 10       | 33.00             | 57.75            | 67.25            | 9.38  | (2) | 39.00              | 57.75            | 71.00            | 8.75 | (2) |
| 250      | 838               | 1467             | 1708             | 238   | (2) | 991                | 1467             | 1803             | 222  | (2) |
| 12       | 38.00             | 66.57            | 83.00            | 11.12 | (2) | —                  | —                | —                | —    | —   |
| 300      | 965               | 1691             | 2108             | 283   | (2) | —                  | —                | —                | —    | —   |
| 14       | 40.50             | 73.88            | 90.00            | 12.25 | (2) | —                  | —                | —                | —    | —   |
| 350      | 1029              | 1877             | 2286             | 311   | (2) | —                  | —                | —                | —    | —   |
| 16       | 44.50             | 80.44            | 100.00           | 14.00 | (2) | —                  | —                | —                | —    | —   |
| 400      | 1130              | 2043             | 2540             | 356   | (2) | —                  | —                | —                | —    | —   |

(1) Height does not include actuator. (2) Gear actuator. (3) Butt weld & flanged valves have the same end-to-end dimensions for Class 300 and up.



BW = Butt weld  
FL = Flanged

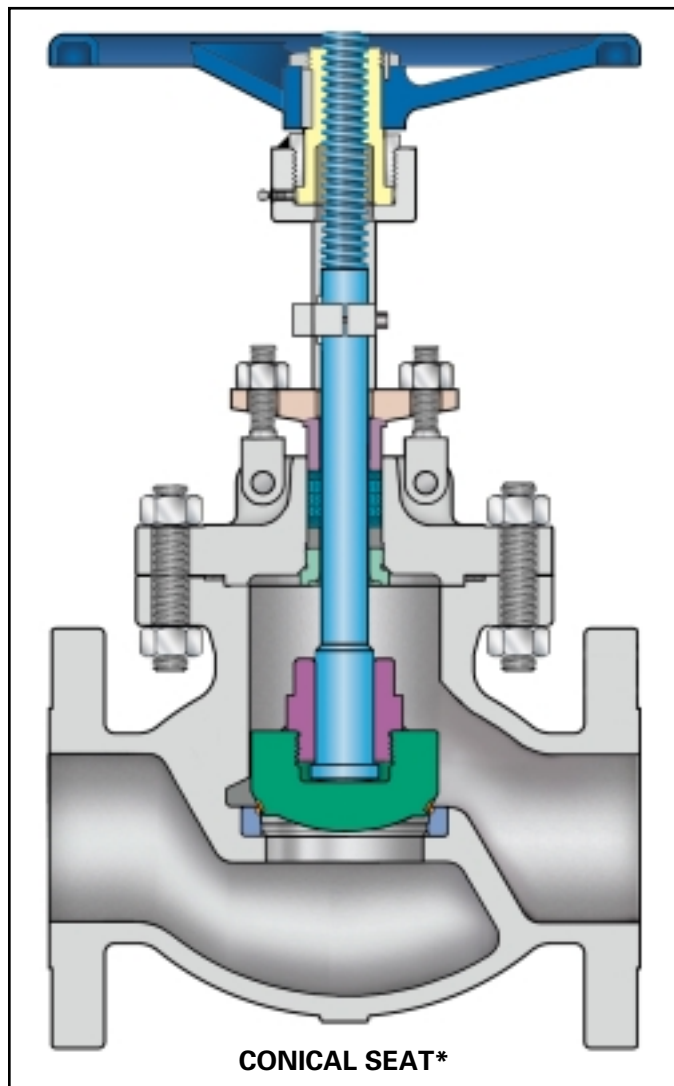
B = Center-to-Top, Open  
C = Dismantling Height

Classes 900–2500  
forged gate valves  
also available.  
See page 32 & 33 for valve  
weights and CVs.

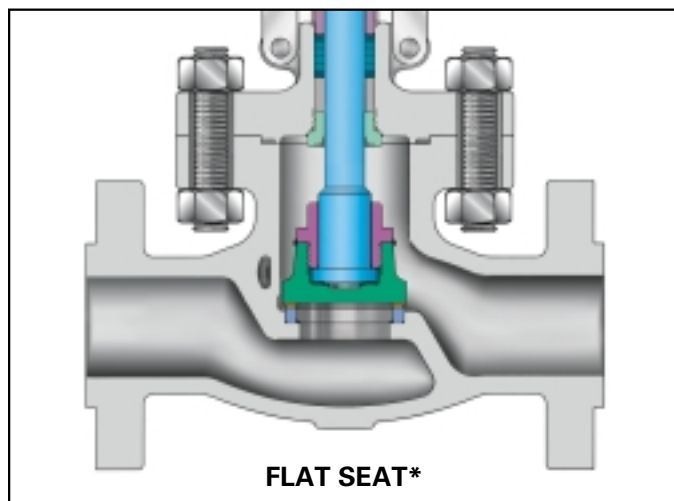


**CAST CARBON, STAINLESS OR ALLOY STEEL API 600  
BOLTED BONNET GLOBE AND STOP CHECK VALVES,  
2–16" (50 – 400 mm) ASME CLASSES 150, 300 AND 600**

**NOW THE ONLY API 600 GLOBE VALVE WITH NON-ROTATING STEM**



CONICAL SEAT\*



FLAT SEAT\*

**DESIGN FEATURES:**

- **Non-rotating Stem** with precision Acme threads and burnished finish. Valve suitable for horizontal installation.
- **Universal Trim.** 13 CR stem, 13 CR faced disc and Stellite 6 faced seats API Trim 8 suitable for service up to 850°F.
- **Seat face** Stellite, ground and lapped to a mirror finish. Conical seat machined to 8 RMS.
- **Flat disc.** Floating stem-disc engagement, hardfaced with 13 CR, Stellite 6, SS 316 or Monel, ground and lapped with seat. Disc in SS 316 hardfaced with Stellite 6 also available.
- **Tapered disc.** Disc is guided by the mating surface of the seat, hardfaced with 13 CR, Stellite 6, SS 316 or Monel, ground and lapped with seat. Disc in SS 316 hardfaced with Stellite 6 also available. 2–6" (50–150 mm) valves may have solid CA15 (13 CR) 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 3. Details on page 13.
- **Gland** has two-piece construction for easy alignment.
- **Rotating Stem nut.** Austenitic ductile iron Gr. D-2C, renewable in-line.
- **Torque arm.** To reduce wear on packing rings, to enable better sealing and to reduce torque.
- **Impactor handwheels.** Globe and stop check valves require higher closing torques than gate valves with the same seat diameter and pressure class. The most economical mechanism for tight shutoff is the impactor handwheel. Two lugs cast under the wheel strike simultaneous blows and give 3–10 times the closing force of standard handwheels. Impactor handwheels are supplied at manufacturer's option unless specified by customer (see page 21).
- **Flanges.** Class 150–300:  $\frac{1}{16}$ " raised face. Class 600:  $\frac{1}{4}$ " raised face. Finish 125–250 AARH for all valves.

**\*NOTE:** Most sizes and pressure classes have conical seats. Choice of flat or conical seat is manufacturer's option unless specified by customer.

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



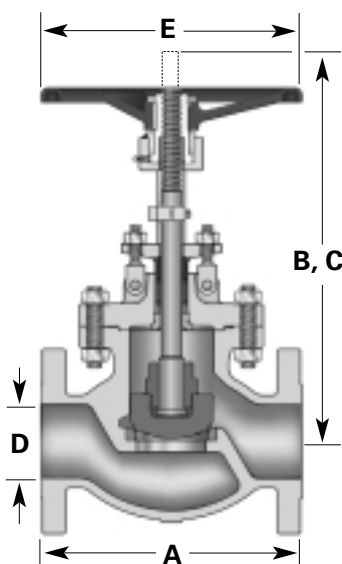
## GLOBE VALVE DIMENSIONS (CLASSES 150-600)

| SIZE     | ASME 150 (PN 20) |                  |                  |       |                      | ASME 300 (PN 50) |                  |                  |       |                      | ASME 600 (PN 100)                                          |                  |                  |      |                      |
|----------|------------------|------------------|------------------|-------|----------------------|------------------|------------------|------------------|-------|----------------------|------------------------------------------------------------|------------------|------------------|------|----------------------|
| in<br>mm | A                | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E                    | A                | B <sup>(1)</sup> | C <sup>(1)</sup> | D     | E                    | A                                                          | B <sup>(1)</sup> | C <sup>(1)</sup> | D    | E                    |
| 2        | 8.00             | 16.85            | 20.88            | 2.00  | 8                    | 10.50            | 16.85            | 20.88            | 2.00  | 8                    | 11.50                                                      | 17.10            | 21.13            | 2.00 | 10                   |
| 50       | 203              | 428              | 530              | 51    | 203.2                | 267              | 428              | 530              | 51    | 203                  | 292                                                        | 434              | 537              | 51   | 254                  |
| 2½       | 8.50             | 17.10            | 21.25            | 2.50  | 10                   | 11.50            | 17.10            | 21.25            | 2.50  | 10                   | 13.00                                                      | 18.67            | 22.88            | 2.50 | 10                   |
| 65       | 216              | 434              | 540              | 64    | 254                  | 292              | 434              | 540              | 64    | 254                  | 330                                                        | 474              | 581              | 64   | 254                  |
| 3        | 9.50             | 18.42            | 22.75            | 3.00  | 10                   | 12.50            | 18.42            | 22.75            | 3.00  | 10                   | 14.00                                                      | 20.19            | 24.13            | 3.00 | 14                   |
| 80       | 241              | 468              | 578              | 76    | 254                  | 318              | 468              | 578              | 76    | 254                  | 356                                                        | 513              | 613              | 76   | 356                  |
| 4        | 11.50            | 20.88            | 26.18            | 4.00  | 14                   | 14.00            | 20.88            | 26.18            | 4.00  | 14                   | 17.00                                                      | 23.88            | 29.25            | 4.00 | 24 <sup>(2)(3)</sup> |
| 100      | 292              | 530              | 665              | 102   | 356                  | 356              | 530              | 665              | 102   | 356                  | 432                                                        | 607              | 743              | 102  | 610                  |
| 6        | 16.00            | 25.75            | 32.00            | 6.00  | 24                   | 17.50            | 26.38            | 32.88            | 6.00  | 24 <sup>(2)(3)</sup> | 22.00                                                      | 31.22            | 37.88            | 6.00 | 24 <sup>(2)(3)</sup> |
| 150      | 406              | 654              | 813              | 152   | 610                  | 445              | 670              | 835              | 152   | 610                  | 559                                                        | 793              | 962              | 152  | 610                  |
| 8        | 19.50            | 30.73            | 38.38            | 8.00  | 24                   | 22.00            | 32.00            | 38.88            | 8.00  | 24 <sup>(2)(4)</sup> | 26.00                                                      | 41.75            | 57.88            | 7.88 | (4)                  |
| 200      | 495              | 780              | 975              | 203   | 610                  | 559              | 813              | 988              | 203   | 610                  | 660                                                        | 1060             | 1470             | 200  | (4)                  |
| 10       | 24.50            | 39.25            | 46.75            | 10.00 | 24 <sup>(2)(3)</sup> | 24.50            | 42.34            | 52.18            | 10.00 | 24 <sup>(2)(4)</sup> | 31.00                                                      | 47.16            | 59.00            | 9.75 | (4)                  |
| 250      | 622              | 997              | 1187             | 254   | 610                  | 622              | 1075             | 1325             | 254   | 610                  | 787                                                        | 1198             | 1499             | 248  | (4)                  |
| 12       | 27.50            | 42.52            | 53.00            | 12.00 | 24 <sup>(2)(4)</sup> | 28.00            | 46.19            | 62.75            | 12.00 | (4)                  | —                                                          | —                | —                | —    | —                    |
| 300      | 699              | 1080             | 1346             | 305   | 610                  | 711              | 1173             | 1594             | 305   | (4)                  | —                                                          | —                | —                | —    | —                    |
| 14       | 31.00            | 54.21            | 65.44            | 13.25 | (4)                  | 33.00            | 54.21            | 72.00            | 13.25 | (4)                  | —                                                          | —                | —                | —    | —                    |
| 350      | 787              | 1377             | 1662             | 337   | (4)                  | 838              | 1377             | 1829             | 337   | (4)                  | —                                                          | —                | —                | —    | —                    |
| 16       | 36.00            | 59.94            | 72.63            | 15.25 | (4)                  | 34.00            | 59.94            | 76.00            | 15.25 | (4)                  | Inclined cast classes 900-2500 globe valves also available |                  |                  |      |                      |
| 400      | 914              | 1522             | 1845             | 387   | (4)                  | 863              | 1522             | 1930             | 387   | (4)                  |                                                            |                  |                  |      |                      |
| 18       | 38.50            | 59.62            | 75.00            | 17.50 | (4)                  | 38.50            | 59.62            | 75.00            | 17.50 | (4)                  |                                                            |                  |                  |      |                      |
| 450      | 978              | 1514             | 1905             | 444   | (4)                  | 978              | 1514             | 1905             | 444   | (4)                  |                                                            |                  |                  |      |                      |

## CLASSES 900-1500

| SIZE     | ASME 900 (PN 150) |                  |                  |      |                      | ASME 1500 (PN 250) |                  |                  |      |                      |
|----------|-------------------|------------------|------------------|------|----------------------|--------------------|------------------|------------------|------|----------------------|
| in<br>mm | A                 | B <sup>(1)</sup> | C <sup>(1)</sup> | D    | E                    | A                  | B <sup>(1)</sup> | C <sup>(1)</sup> | D    | E                    |
| 2        | 14.50             | 19.75            | 25.00            | 1.88 | 18                   | 14.50              | 19.75            | 25.00            | 1.88 | 18                   |
| 50       | 368               | 502              | 635              | 48   | 457                  | 368                | 502              | 635              | 48   | 457                  |
| 3        | 15.00             | 24.09            | 30.50            | 2.88 | 14 <sup>(2)(3)</sup> | 18.50              | 24.09            | 30.50            | 2.75 | 14 <sup>(2)(3)</sup> |
| 80       | 381               | 612              | 775              | 73   | 356                  | 470                | 612              | 775              | 70   | 356                  |
| 4        | 18.00             | 27.50            | 35.38            | 3.88 | 18 <sup>(2)(3)</sup> | 21.50              | 27.50            | 35.38            | 3.63 | 18 <sup>(2)(3)</sup> |
| 100      | 457               | 699              | 899              | 99   | 457                  | 546                | 699              | 899              | 92   | 457                  |

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



Forged globe valves  
classes 900–2500 also  
available.

See page 32 & 33 for valve  
weights and CVs.

B = Center-to-Top, Open  
C = Dismantling Height

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

## STANDARD MATERIALS

| PART                        | MATERIALS                              |                             |                             |                                    |
|-----------------------------|----------------------------------------|-----------------------------|-----------------------------|------------------------------------|
| Body <sup>(1)</sup>         | WCB                                    | WC6                         | WC9                         | CF8M                               |
| Bonnet <sup>(1)</sup>       | WCB                                    | WC6                         | WC9                         | CF8M                               |
| Seat <sup>(1)(2)</sup>      | Stellite 6 faced<br>Carbon steel       | Stellite 6<br>faced F11     | Stellite 6<br>faced F22     | Stellite 6<br>F316                 |
| Disc                        | CA 15 or 13 CR<br>faced A105           | CA 15 or 13 CR<br>faced F11 | CA 15 or 13 CR<br>faced F22 | CF8M<br>or F316                    |
| Disc nut                    | Carbon steel                           | SS 304 or 316               |                             |                                    |
| Stem <sup>(1)(3)</sup>      | SS 410                                 |                             |                             | SS 316 or 630                      |
| Backseat <sup>(1)(3)</sup>  | SS 410                                 |                             |                             | SS 316                             |
| Packing ring <sup>(1)</sup> | Graphite                               |                             |                             |                                    |
| Gland stud                  | Gr. B or B7 <sup>(4)</sup>             |                             |                             | F316, B8M<br>or 630 <sup>(5)</sup> |
| Gland nut                   | Gr. 2H                                 |                             |                             | Gr. 8M                             |
| Packing flange              | Carbon steel                           |                             |                             | SS                                 |
| Gland bushing               | Carbon steel                           |                             |                             | SS                                 |
| Bonnet stud                 | B7                                     | B16                         | B8M or 630                  |                                    |
| Bonnet nut                  | Gr. 2H                                 | Gr. 4                       | Gr. 8M                      |                                    |
| Hinge pin                   | Steel                                  |                             |                             | SS                                 |
| Gasket <sup>(1)</sup>       | Spiral wound stainless steel/graphite  |                             |                             |                                    |
| Torque arm                  | Carbon steel                           |                             |                             |                                    |
| Yoke bushing                | Carbon steel                           |                             |                             | Stainless<br>steel                 |
| Stem nut                    | A 439 Austenitic ductile iron Gr. D-2C |                             |                             |                                    |
| Handwheel nut               | Malleable iron or steel                |                             |                             |                                    |
| Handwheel <sup>(1)</sup>    | Malleable iron or steel                |                             |                             |                                    |

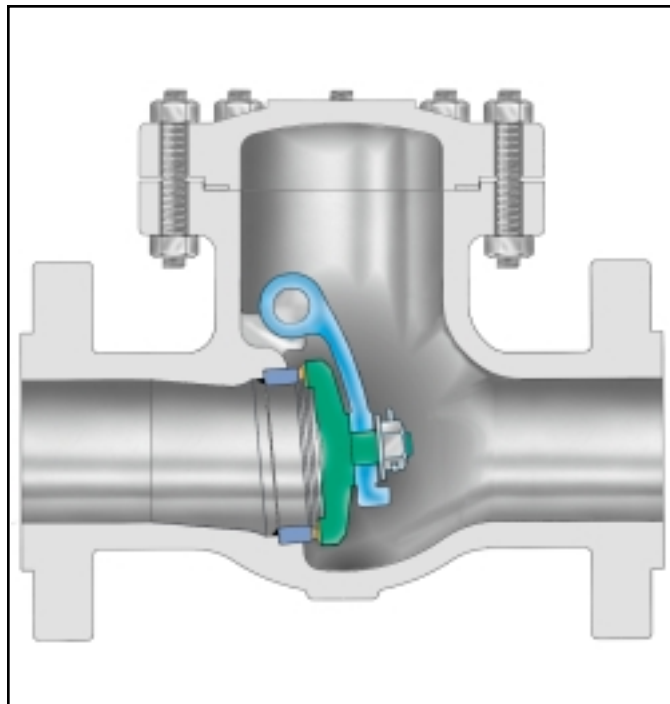
(1) Other materials available. (2) Stellite. (3) Hardened.  
(4) For eye bolts Gr.B, for studs B7 is used.  
(5) For eye bolts F316, for studs B8M or 630 is used.

## DESIGN SPECIFICATIONS

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



# CAST CARBON, STAINLESS OR ALLOY STEEL API 600 SWING CHECK VALVES, 2–36" (50–900 mm) ASME CLASSES 150, 300, 600, 900 AND 1500



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

## STANDARD MATERIALS

| PART                        | MATERIALS                             |                          |                          |                       |
|-----------------------------|---------------------------------------|--------------------------|--------------------------|-----------------------|
| Body <sup>(1)</sup>         | WCB                                   | WC6                      | WC9                      | CF8M                  |
| Seat <sup>(1)(2)</sup>      | Stellite 6 faced CS                   | Stellite 6 faced F11     | Stellite 6 faced F22     | Stellite 6 faced F316 |
| Hinge pin <sup>(1)(3)</sup> | SS 410                                |                          |                          | SS 630 or 660         |
| Gasket <sup>(1)</sup>       | Spiral wound stainless steel/graphite |                          |                          |                       |
| Cover stud                  | Gr. B7                                | B16                      |                          | B8M or 630            |
| Cover nut                   | Gr. 2H                                | Gr. 4                    |                          | Gr. 8M                |
| Cover <sup>(1)</sup>        | WCB                                   | WC6                      | WC9                      | CF8M                  |
| Washer                      | Commercial                            |                          |                          |                       |
| Disc <sup>(1)</sup>         | CA 15 or 13 CR faced WCB              | CA 15 or 13 CR faced WC6 | CA 15 or 13 CR faced WC9 | CF8M                  |
| Disc hanger                 | WCB                                   | WC6                      | WC9                      | CF8M                  |
| Disc nut                    | Gr. 2H                                | Gr. 4                    |                          | Gr. 8M                |

(1) Other materials available.

(2) Stellite.

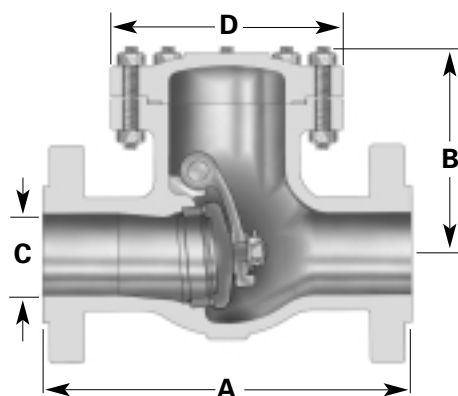
(3) Hardened.

## 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 3).
- **Disc.** Robust one-piece construction to withstand the severe shock of check valve service. Hardfaced with 13 CR, Stellite 6, SS 316, or Monel, ground and lapped to mirror finish. Sizes 2–6" (50–150 mm) may have solid CA15 (13 CR) disc. SS 316 disc with Stellite 6 facing also available.
- **Disc assembly.** Disc is fastened securely to disc hanger with a lock nut and cotter pin. Disc is free to rotate to avoid localized wear. 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.**  
Class 150/300: 1/16" raised face.  
Class 600: 1/4" raised face.  
Finish: 125–250 AARH for all valves.

## DESIGN SPECIFICATIONS

| ITEM                                                     | APPLICABLE SPECIFICATION |
|----------------------------------------------------------|--------------------------|
| Wall thickness and general valve design                  | API 600, BS1868          |
| 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 32 & 33 for valve weights and CVs.

## CHECK VALVE DIMENSIONS

| SIZE      | ASME 150 (PN 20) |               |              |               | ASME 300 (PN 50) |              |              |               | ASME 600 (PN 100) |              |              |               | ASME 900 (PN 150) |                             |             |              | ASME 1500 (PN 250) |              |             |              |
|-----------|------------------|---------------|--------------|---------------|------------------|--------------|--------------|---------------|-------------------|--------------|--------------|---------------|-------------------|-----------------------------|-------------|--------------|--------------------|--------------|-------------|--------------|
| in<br>mm  | A                | B             | C            | D             | A                | B            | C            | D             | A                 | B            | C            | D             | A                 | B                           | C           | D            | A                  | B            | C           | D            |
| 2<br>50   | 8.00<br>203      | 5.75<br>146   | 2.00<br>51   | 6.75<br>171   | 10.50<br>267     | 6.00<br>152  | 2.00<br>51   | 6.75<br>171   | 11.50<br>292      | 6.25<br>159  | 2.00<br>51   | 6.75<br>171   | 14.50<br>368      | 9.50<br>241                 | 1.88<br>48  | 8.63<br>219  | 14.50<br>368       | 9.50<br>241  | 1.88<br>48  | 8.63<br>219  |
| 2½<br>65  | 8.50<br>216      | 6.25<br>159   | 2.50<br>64   | 6.75<br>171   | 11.50<br>292     | 6.25<br>159  | 2.50<br>64   | 6.75<br>171   | 13.00<br>330      | 6.50<br>165  | 2.50<br>64   | 7.50<br>191   | 16.50<br>419      | 10.00<br>254                | 2.25<br>57  | 9.25<br>235  | 16.50<br>419       | 10.00<br>254 | 2.25<br>57  | 9.25<br>235  |
| 3<br>80   | 9.50<br>241      | 7.75<br>197   | 3.00<br>76   | 8.50<br>216   | 12.50<br>318     | 7.75<br>197  | 3.00<br>76   | 8.50<br>216   | 14.00<br>356      | 8.75<br>222  | 3.00<br>76   | 9.75<br>248   | 15.00<br>381      | 10.50<br>267                | 2.88<br>73  | 10.50<br>267 | 18.50<br>470       | 11.50<br>292 | 2.75<br>70  | 10.50<br>267 |
| 4<br>100  | 11.50<br>292     | 8.75<br>222   | 4.00<br>102  | 10.25<br>260  | 14.00<br>356     | 8.75<br>222  | 4.00<br>102  | 10.25<br>260  | 17.00<br>432      | 9.25<br>235  | 4.00<br>102  | 12.00<br>305  | 18.00<br>457      | 11.75<br>299                | 3.88<br>99  | 12.25<br>311 | 21.50<br>546       | 12.00<br>305 | 3.63<br>92  | 12.25<br>311 |
| 6<br>150  | 14.00<br>356     | 10.75<br>273  | 6.00<br>152  | 12.50<br>318  | 17.50<br>445     | 10.75<br>273 | 6.00<br>152  | 12.50<br>318  | 22.00<br>559      | 11.50<br>292 | 6.00<br>152  | 15.75<br>400  | 24.00<br>610      | 15.00<br>381                | 5.75<br>146 | 15.25<br>387 | 27.75<br>705       | 16.50<br>419 | 5.38<br>137 | 16.00<br>406 |
| 8<br>200  | 19.50<br>495     | 12.75<br>324  | 8.00<br>203  | 15.75<br>400  | 21.00<br>533     | 12.75<br>324 | 8.00<br>203  | 15.75<br>400  | 26.00<br>660      | 13.50<br>343 | 7.88<br>200  | 15.75<br>400  | 29.00<br>737      | 19.25<br>489                | 7.50<br>191 | 18.38<br>467 | 32.75<br>832       | 21.00<br>533 | 7.00<br>178 | 20.75<br>527 |
| 10<br>250 | 24.50<br>622     | 15.50<br>394  | 10.00<br>254 | 18.50<br>470  | 24.50<br>622     | 16.25<br>413 | 10.00<br>254 | 18.50<br>470  | 31.00<br>787      | 16.75<br>425 | 9.75<br>248  | 19.50<br>495  | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 12<br>300 | 27.50<br>699     | 17.00<br>432  | 12.00<br>305 | 20.50<br>521  | 28.00<br>711     | 17.00<br>432 | 12.00<br>305 | 20.50<br>521  | 33.00<br>838      | 18.50<br>470 | 11.75<br>298 | 22.50<br>572  | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 14<br>350 | 31.00<br>787     | 19.63<br>499  | 13.25<br>337 | 23.00<br>584  | 33.00<br>838     | 19.63<br>499 | 13.25<br>337 | 23.00<br>584  | 35.00<br>889      | 20.93<br>532 | 12.88<br>327 | 26.25<br>667  | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 16<br>400 | 34.00<br>864     | 22.00<br>559  | 15.25<br>387 | 26.50<br>673  | 34.00<br>864     | 22.50<br>572 | 15.25<br>387 | 26.50<br>673  | 39.00<br>991      | 23.38<br>594 | 14.75<br>375 | 28.25<br>718  | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 18<br>450 | 38.50<br>978     | 25.00<br>635  | 17.13<br>435 | 28.50<br>724  | 38.50<br>978     | 25.00<br>635 | 17.13<br>435 | 28.50<br>724  | 43.00<br>1092     | 28.67<br>728 | 16.50<br>419 | 31.50<br>800  | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 20<br>500 | 38.50<br>978     | 26.50<br>673  | 19.00<br>483 | 31.50<br>800  | 40.00<br>1016    | 26.50<br>673 | 19.00<br>483 | 31.50<br>800  | 47.00<br>1194     | 27.12<br>689 | 18.25<br>464 | 35.25<br>895  | —                 | Other sizes on application. |             |              |                    |              |             | —            |
| 24<br>600 | 51.00<br>1295    | 31.25<br>794  | 23.25<br>591 | 37.00<br>940  | 53.00<br>1346    | 31.25<br>794 | 23.25<br>591 | 37.00<br>940  | 55.00<br>1397     | 35.69<br>907 | 22.00<br>559 | 40.25<br>1022 | —                 |                             |             |              |                    |              |             | —            |
| 26<br>650 | 51.00<br>1295    | 32.63<br>829  | 25.00<br>635 | 37.25<br>946  | 53.00<br>1346    | 32.63<br>829 | 25.00<br>635 | 37.25<br>946  | —                 | —            | —            | —             | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 28<br>700 | 57.00<br>1448    | 36.55<br>928  | 27.00<br>686 | 42.00<br>1067 | 59.00<br>1499    | 36.55<br>928 | 27.00<br>686 | 42.00<br>1067 | —                 | —            | —            | —             | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 30<br>750 | 60.00<br>1524    | 36.89<br>937  | 29.25<br>743 | 44.50<br>1130 | —                | —            | —            | —             | —                 | —            | —            | —             | —                 | —                           | —           | —            | —                  | —            | —           | —            |
| 36<br>900 | 77.00<br>1956    | 41.78<br>1061 | 35.25<br>895 | 53.00<br>1346 | —                | —            | —            | —             | —                 | —            | —            | —             | —                 | —                           | —           | —            | —                  | —            | —           | —            |

See catalog VEL-PS for Classes 900 and 1500  
FORGED STEEL CHECK VALVES.





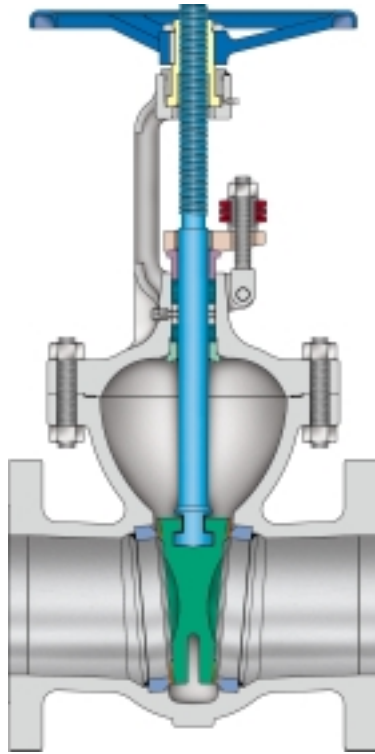
## CAST STEEL API 600 GATE, 2– 60" (50– 1500 mm) & GLOBE VALVES, 2–16" (50– 400 mm)

ASME CLASSES 150, 300, 600, 900 AND 1500

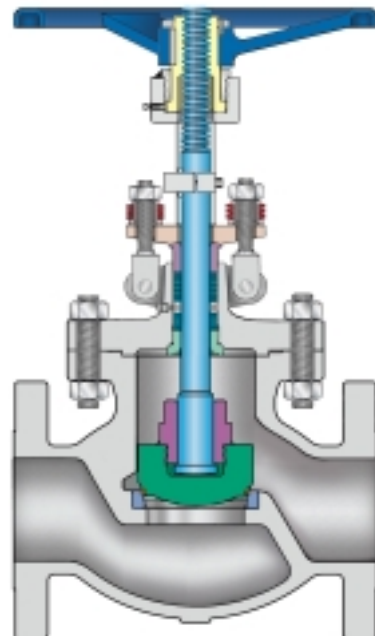
WITH SINGLE OR DOUBLE PACKING, LEAK-OFF AND LIVE-LOADING

### LIVE-LOADED VALVES

GATE VALVE



GLOBE VALVE



CONICAL SEAT

### DESIGN FEATURES:

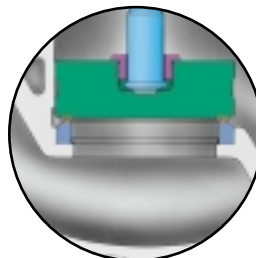
- **Safer and tighter stem seal.**
- **Short and narrow packing chamber** improves sealing effectiveness.
- **Long-life leakproof packing chamber** with double packing and leak-off or single set packing.  
**Double packing:** two sets of graphite packing rings compressed to 4000 psi. A lantern ring and 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, 80-90 lbs./cu. ft. density.
- **Live-loading.**  
Two sets of Belleville springs keep stem tight for long periods of time without maintenance.
- **Two-piece stem drive** is renewable in-line.
- **Stronger leakproof body-bonnet joint.**  
**Class 150:** Corrugated graphite-filled steel gasket.  
**Class 300-600:** Fully-encased spiral wound graphite-filled stainless steel gasket.
- **Classes 300, 600, 900 and 1500** have round bonnet and encased gasket
- **Welded-in seats** hardfaced with Stellite 6.
- **Flexible one-piece wedge**, hardfaced with Stellite 6 or 13 CR (solid 13 CR up to 8").
- **13 CR hardened stem** with mirror-like, burnished finish for longer packing life.

For dimensions on Gate valves see page 19.

For dimensions on Globe valves see page 21.

For other Globe valve design features see page 20.

Most sizes and pressure classes have conical seats.



FLAT SEAT

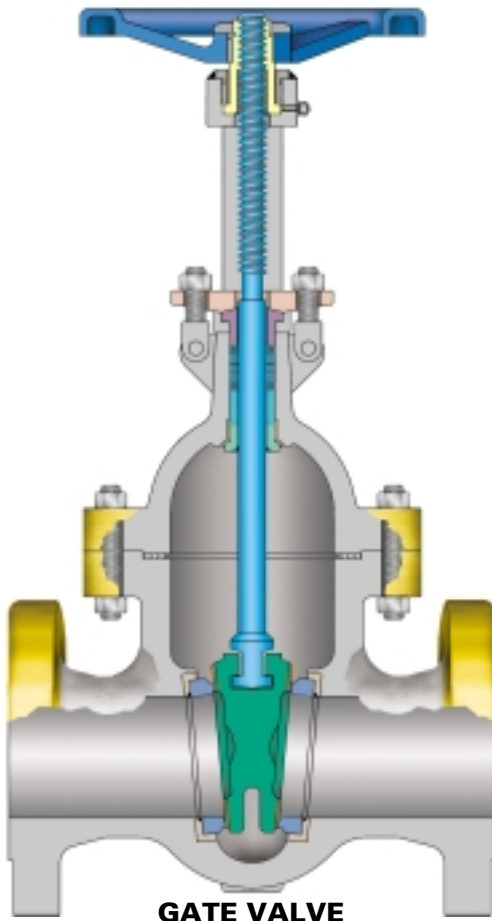
Choice of flat or conical seat is manufacturer's option unless specified by customer.

For BELLOWS SEAL GATE & GLOBE VALVES ½–12" (15–300 mm) see VEL-BS catalog.



*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.*

Fugitive emissions are a critical factor in the performance of any HF Acid valve and at Velan, we have been committed to reducing emissions beyond the industry standards, and providing the highest quality products to our customers for over 50 years. Velan offers a comprehensive line of Phillips approved and UOP listed API 600 gate, globe and check HF acid valves with several benefits.

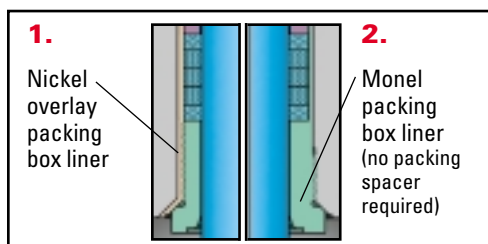


### DESIGN FEATURES:

- **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 for ensuring 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.

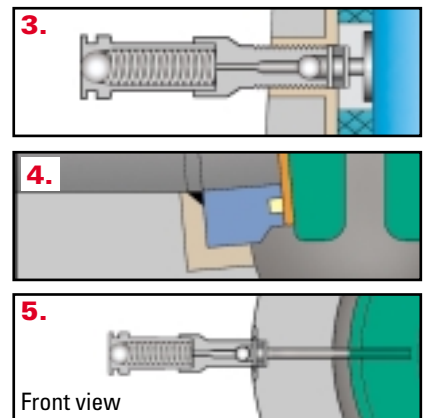
### OPTIONAL DESIGN FEATURES

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

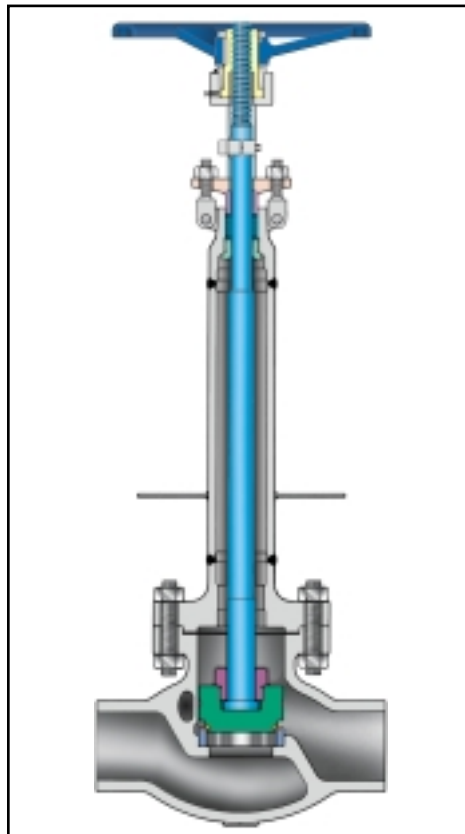
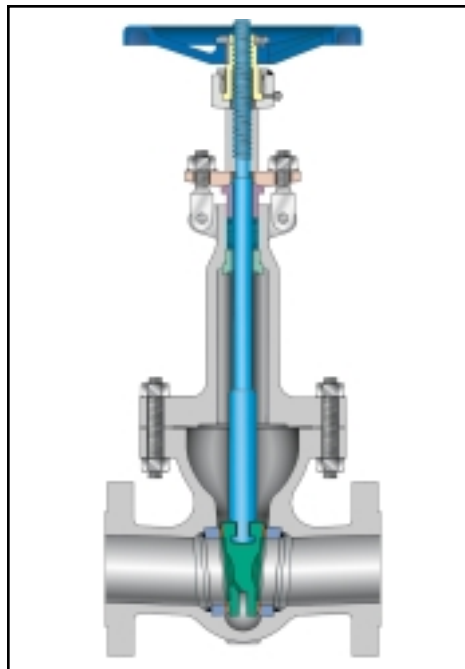


- 3. Grease injector & lantern ring**  
– where grease injection is a requirement (UOP only).
- 4. PTFE seat insert** – resists abrasion and corrosion
- 5. PTFE seat seal grease injection**  
– when required (UOP only)

For more information on  
VELAN HF ACID GATE, GLOBE  
& CHECK VALVES  
see VEL-HFA catalog.



### CAST STEEL CRYOGENIC VALVES



For more details on Cryogenic Gate, Globe & Check Valves see VEL-CRYO catalog.

The production, transport and storage of liquefied gases such as oxygen, nitrogen, argon, natural gas, hydrogen or helium (down to -425°F), 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 tensile strength even at extreme low temperatures, excellent low friction and galling-free movement at points of stem contact.
- **Wetted parts:** All Austenitic stainless steel and Stellite 6.
- **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:** Stellite 6 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 stem packing at sufficient distance away from the cold fluid to remain functional.
- **Flexible wedges** with Stellite seating faces for cryogenic service.
- **Neoflon inserts** are available for globe, piston, and swing check discs.
- **Cleaning:** All cryogenic valves are thoroughly degreased and cleaned and pipe ends are sealed to prevent contamination.

#### TABLE OF LIQUEFIED GASES

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





Valve shown has a special "Pipeline" bonnet.

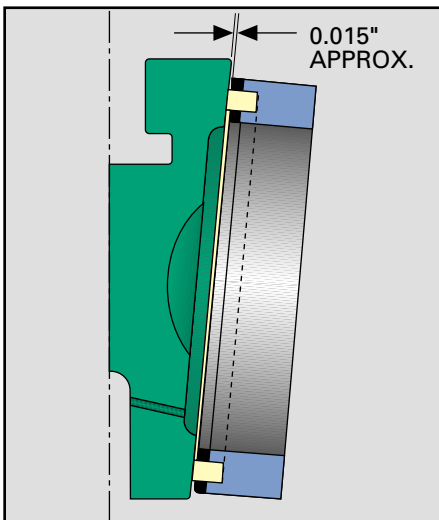
Standard bonnets with regular yoke also available.

#### DESIGN FEATURES:

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

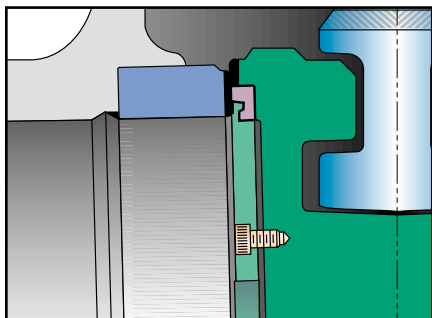
#### STYLE A

##### 2-12" SEAT - WEDGE DESIGN



#### STYLE B

##### 14-60" SEAT - WEDGE DESIGN\*



#### SPECIFICATIONS FOR SEAT INSERT MATERIALS

| TYPE   | MAXIMUM OPERATING TEMPERATURE       | NOT RECOMMENDED                                                                                          |
|--------|-------------------------------------|----------------------------------------------------------------------------------------------------------|
| PTFE   | -100°F to +400°F<br>-73°C to +204°C | Fluorinated hydrocarbons                                                                                 |
| Buna-N | -20°F to +200°F<br>-29°C to +93°C   | Halogenated hydrocarbons, Nitrobenzene, Aniline, Hydraulic fluids, Skydrol, Cellulube, Pydrazil, Acetone |
| Viton  | -20°F to +400°F<br>-29°C to +240°C  | Acetone, Anines, Anhydrous ammonia, Hot Hydrofluoric acid, Ester, Ethers                                 |

#### AVAILABLE RANGE

Velan block and bleed gate valves are available in the following sizes:

Class 150: carbon steel, flanged or butt weld, 2-60" (50-1500 mm).

Class 300: carbon steel, flanged or butt weld, 2-36" (50-900 mm).

#### 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 wedge from the body. Shut off flow and relieve pressure before replacing the seat insert.



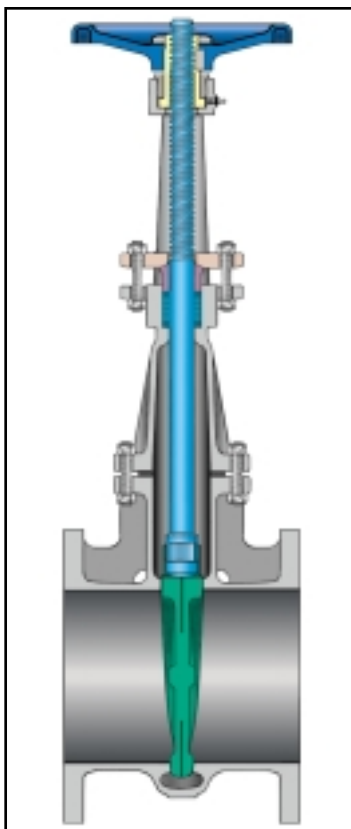
TEST PLUG

\*14-24" (350-600 mm) may be STYLE A or B at manufacturer's option



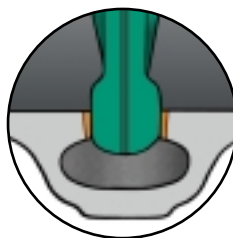
# CAST STAINLESS STEEL GATE VALVES API 603 INTEGRAL SEAT, 2–24", (50–600 mm)

FLANGED, ASME CLASSES 150, 300, WALL THICKNESS TO B16.34  
WITH FLEXIBLE WEDGE



## STANDARD MATERIALS

| PART             | MATERIAL                                                                                  |
|------------------|-------------------------------------------------------------------------------------------|
| Body             | A 351 Gr. CF8M                                                                            |
| Bonnet           | A 351 Gr. CF8M                                                                            |
| Wedge            | A 351 Gr. CF8M                                                                            |
| Stem             | Gr. 316                                                                                   |
| Gland            | Gr. 316                                                                                   |
| Gland flange     | A 351 Gr. CF8M                                                                            |
| Yoke bushing     | Gr. 316                                                                                   |
| Handwheel        | Malleable iron (painted)                                                                  |
| Handwheel nut    | Carbon steel                                                                              |
| Body/bonnet stud | Gr. B8M                                                                                   |
| Body/Bonnet nut  | Gr. 8M                                                                                    |
| Gland stud       | Gr. 304                                                                                   |
| Gland nut        | Gr. 8M                                                                                    |
| Spring pin       | Stainless steel                                                                           |
| Gland packing    | SX or SY PTFE<br>GS, GX or GY Graphite                                                    |
| Gasket           | SX or SY PTFE with stainless wire mesh<br>GS, GX or GY Graphite with stainless steel foil |
| Name plate       | Stainless steel                                                                           |
| Stem nut         | A 439 Austenitic ductile iron Gr. D-2C                                                    |

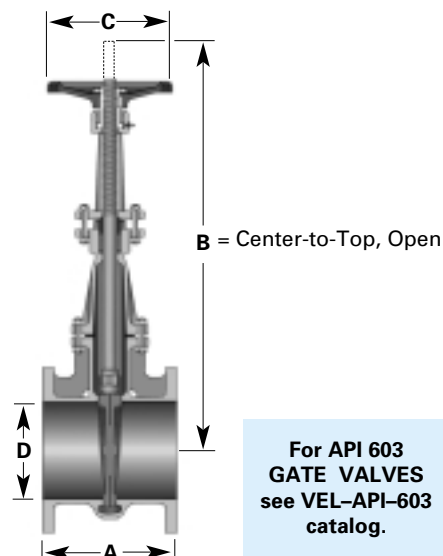


**Optional integral  
Stellited seat face  
available for longer  
service life.**

## DIMENSIONS AND WEIGHTS

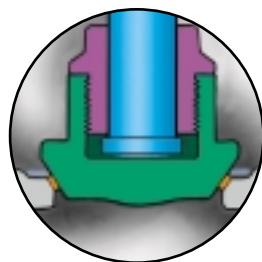
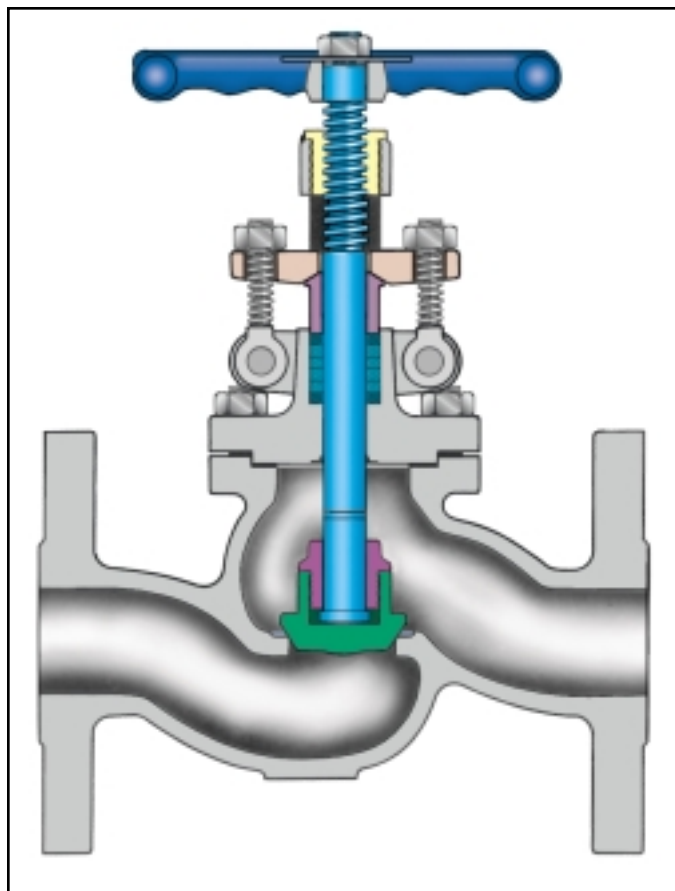
| SIZE<br>in<br>mm | FLANGED, ASME 150 (PN 20) |                |              |              |                   | FLANGED, ASME 300 (PN 50) |               |              |              |                   |
|------------------|---------------------------|----------------|--------------|--------------|-------------------|---------------------------|---------------|--------------|--------------|-------------------|
|                  | A                         | B              | C            | D            | WEIGHT<br>lb (kg) | A                         | B             | C            | D            | WEIGHT<br>lb (kg) |
| 2<br>50          | 7.00<br>178               | 13.00<br>330   | 8.00<br>203  | 2.00<br>51   | 30<br>13.6        | 8.50<br>216               | 14.00<br>356  | 8.00<br>203  | 2.00<br>51   | 44<br>20.0        |
| 2½<br>65         | 7.50<br>191               | 15.75<br>400   | 8.00<br>203  | 2.50<br>64   | 46<br>20.9        | 9.50<br>241               | 16.75<br>425  | 8.00<br>203  | 2.50<br>64   | 60<br>27.2        |
| 3<br>80          | 8.00<br>203               | 17.75<br>451   | 8.00<br>203  | 3.00<br>76   | 52<br>23.6        | 11.13<br>283              | 18.50<br>470  | 8.00<br>203  | 3.00<br>76   | 86<br>39.0        |
| 4<br>100         | 9.00<br>229               | 21.50<br>546   | 10.00<br>254 | 4.00<br>102  | 80<br>36.4        | 12.00<br>305              | 22.63<br>575  | 10.00<br>254 | 4.00<br>102  | 134<br>60.8       |
| 6<br>150         | 10.50<br>267              | 28.25<br>718   | 10.00<br>254 | 6.00<br>152  | 135<br>61.2       | 15.88<br>403              | 29.75<br>756  | 10.00<br>254 | 6.00<br>152  | 247<br>112.07     |
| 8<br>200         | 11.50<br>292              | 36.50<br>927   | 14.00<br>356 | 8.00<br>203  | 222<br>100.9      | 16.50<br>419              | 39.19<br>995  | 14.00<br>356 | 8.00<br>203  | 390<br>177.3      |
| 10<br>250        | 13.00<br>330              | 45.00<br>1143  | 18.00<br>457 | 10.00<br>254 | 324<br>147.3      | 18.00<br>457              | 45.50<br>1150 | 18.00<br>457 | 10.00<br>254 | 630<br>285.8      |
| 12<br>300        | 14.00<br>356              | 60.25<br>1530  | 18.00<br>457 | 12.00<br>305 | 472<br>214.1      | 19.75<br>502              | 65.38<br>1661 | 18.00<br>457 | 12.00<br>305 | 880<br>400.0      |
| 14<br>350        | 15.00<br>381              | 65.00<br>1651  | 21.63<br>549 | 13.25<br>337 | 685<br>310.7      | —                         | —             | —            | —            | —                 |
| 16<br>400        | 16.00<br>406              | 75.00<br>1905  | 23.63<br>600 | 15.25<br>387 | 1000<br>453.5     | —                         | —             | —            | —            | —                 |
| 18<br>450        | 17.00<br>432              | 81.00<br>2057  | 29.50<br>749 | 17.25<br>438 | 1300<br>589.6     | —                         | —             | —            | —            | —                 |
| 20<br>500        | 18.00<br>457              | 93.00<br>2362  | 29.50<br>749 | 19.25<br>489 | 1500<br>680.3     | —                         | —             | —            | —            | —                 |
| 24<br>600        | 20.00<br>508              | 107.00<br>2718 | 31.50<br>800 | 23.25<br>591 | 2000<br>907.0     | —                         | —             | —            | —            | —                 |

| CLASS | FIGURE NUMBERS   |                      |
|-------|------------------|----------------------|
|       | STAINLESS SEAT   | STELLITE SEAT        |
| 150   | 0064C-13SX or GX | 0064C-13SY, GS or GY |
| 300   | 1064C-13SX or GX | 1064C-13SY, GS or GY |





# CAST STAINLESS STEEL GLOBE VALVES API 603 INTEGRAL SEAT, 2–6" (50–150 mm) FLANGED, ASME CLASSES 150, 300, WALL THICKNESS TO B16.34



**Optional integral  
Stellited seat face  
available for longer  
service life.**

## STANDARD MATERIALS

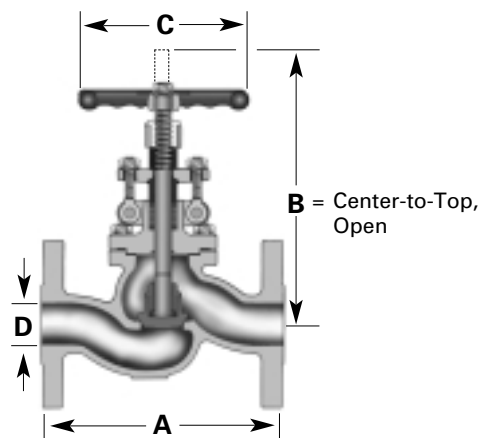
| PART          |                          | MATERIAL                                                            |
|---------------|--------------------------|---------------------------------------------------------------------|
| Body          |                          | A 351 Gr. CF8M                                                      |
| Bonnet        |                          | A 351 Gr. CF8M                                                      |
| Disc          |                          | A 351 Gr. CF8M                                                      |
| Stem          |                          | Gr. 316                                                             |
| Disc nut      |                          | A 351 Gr. CF8M                                                      |
| Gland pin     |                          | Gr. 316                                                             |
| Gland         |                          | Gr. 316                                                             |
| Gland flange  |                          | A 351 Gr. CF8M                                                      |
| Yoke bushing  |                          | Austenitic ductile iron Gr. D-2C                                    |
| Handwheel     |                          | Malleable iron                                                      |
| Handwheel nut |                          | Carbon steel                                                        |
| Name plate    |                          | Stainless steel                                                     |
| Bonnet stud   |                          | Gr. B8M                                                             |
| Bonnet nut    |                          | Gr. 8M                                                              |
| Gland stud    |                          | Gr. 304                                                             |
| Gland nut     |                          | Gr. 8M                                                              |
| Gland packing | SX or SY<br>GS, GX or GY | PTFE<br>Graphite                                                    |
| Gasket        | SX or SY<br>GS, GX or GY | PTFE with stainless wire mesh<br>Graphite with stainless steel foil |

| CLASS | FIGURE NUMBERS   |                      |
|-------|------------------|----------------------|
|       | STAINLESS SEAT   | STELLITE SEAT        |
| 150   | 0074C-13SX or GX | 0074C-13SY, GS or GY |
| 300   | 1074C-13SX or GX | 1074C-13SY, GS or GY |

For API 603  
GLOBE VALVES  
see VEL-API-603  
catalog.

## DIMENSIONS AND WEIGHTS

| SIZE<br>in<br>mm | FLANGED, ASME 150 (PN 20) |              |              |             |                   | FLANGED, ASME 300 (PN 50) |              |              |             |                   |
|------------------|---------------------------|--------------|--------------|-------------|-------------------|---------------------------|--------------|--------------|-------------|-------------------|
|                  | A                         | B            | C            | D           | WEIGHT<br>lb (kg) | A                         | B            | C            | D           | WEIGHT<br>lb (kg) |
| 2<br>50          | 8.00<br>203               | 9.50<br>241  | 8.00<br>203  | 2.00<br>51  | 27<br>12.3        | 10.50<br>267              | 11.06<br>281 | 8.00<br>203  | 2.00<br>51  | 45<br>20.4        |
| 2½<br>65         | 8.50<br>216               | 10.44<br>265 | 10.00<br>254 | 2.50<br>64  | 40<br>18.2        | 11.50<br>292              | 12.25<br>311 | 10.00<br>254 | 2.50<br>64  | 70<br>31.7        |
| 3<br>80          | 9.50<br>241               | 12.19<br>310 | 10.00<br>254 | 3.00<br>76  | 50<br>22.7        | 12.50<br>318              | 13.75<br>349 | 10.00<br>254 | 3.00<br>76  | 87<br>39.5        |
| 4<br>100         | 11.50<br>292              | 14.81<br>376 | 10.00<br>254 | 4.00<br>102 | 83<br>37.6        | 14.00<br>356              | 16.44<br>418 | 10.00<br>254 | 4.00<br>102 | 130<br>59.0       |
| 6<br>150         | 16.00<br>406              | 19.19<br>487 | 10.00<br>254 | 6.00<br>152 | 154<br>69.9       | 17.50<br>445              | 21.38<br>543 | 14.00<br>356 | 6.00<br>152 | 252<br>114.3      |

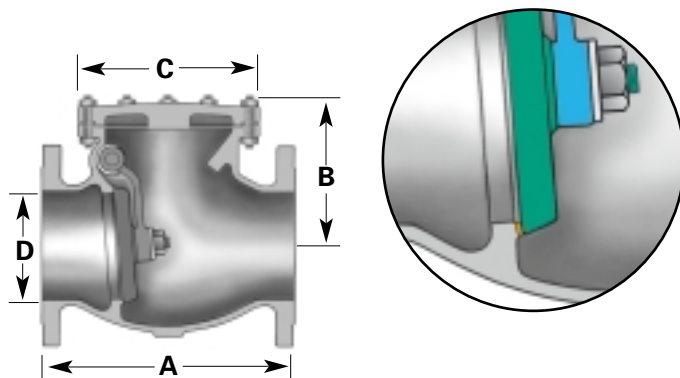
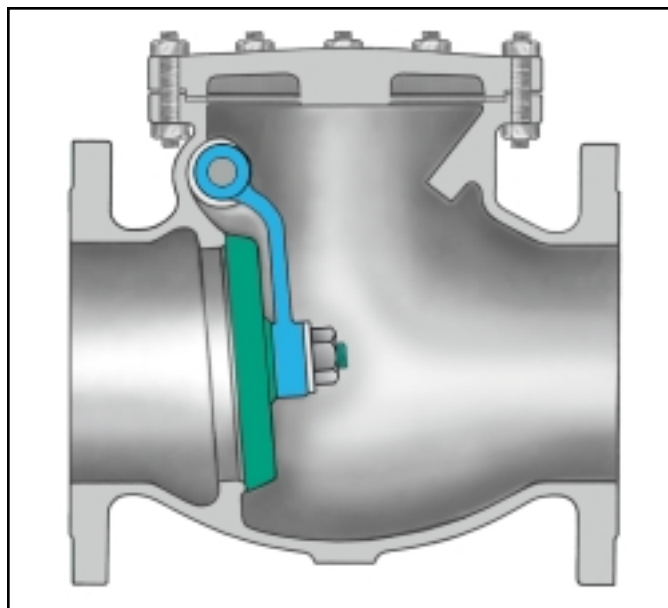






# CAST STAINLESS STEEL SWING CHECK VALVES API 603 INTEGRAL SEAT, 2–12" (50–300 mm)

FLANGED, ASME CLASSES 150, 300, WALL THICKNESS TO B16.34



**Optional integral  
Stellited seat  
face available  
for longer  
service life.**

For API 603 CHECK VALVES  
see VEL-API-603 catalog.

## DIMENSIONS AND WEIGHTS

| SIZE<br>in<br>mm | FLANGED, ASME 150 (PN 20) |              |                            |              |                   | FLANGED, ASME 300 (PN 50) |              |                            |              |                   |
|------------------|---------------------------|--------------|----------------------------|--------------|-------------------|---------------------------|--------------|----------------------------|--------------|-------------------|
|                  | A                         | B            | C                          | D            | WEIGHT<br>lb (kg) | A                         | B            | C                          | D            | WEIGHT<br>lb (kg) |
| 2<br>50          | 8.00<br>203               | 4.00<br>102  | 4.00 <sup>(1)</sup><br>102 | 2.00<br>51   | 21<br>9.5         | 10.50<br>267              | 4.75<br>121  | 5.00 <sup>(1)</sup><br>127 | 2.00<br>51   | 42<br>19.1        |
| 2½<br>65         | 8.50<br>216               | 4.50<br>114  | 5.50<br>140                | 2.50<br>64   | 30<br>13.6        | 11.50<br>292              | 5.50<br>140  | 6.50<br>165                | 2.50<br>64   | 62<br>28.2        |
| 3<br>80          | 9.50<br>241               | 5.00<br>127  | 6.75<br>172                | 3.00<br>76   | 43<br>19.5        | 12.50<br>318              | 6.25<br>159  | 8.00<br>203                | 3.00<br>76   | 80<br>36.4        |
| 4<br>100         | 11.50<br>292              | 5.75<br>146  | 8.00<br>203                | 4.00<br>102  | 68<br>30.9        | 14.00<br>356              | 7.00<br>178  | 9.00<br>229                | 4.00<br>102  | 118<br>53.6       |
| 6<br>150         | 14.00<br>356              | 7.56<br>192  | 10.00<br>254               | 6.00<br>152  | 128<br>58.2       | 17.50<br>445              | 8.63<br>219  | 11.00<br>279               | 6.00<br>152  | 212<br>96.4       |
| 8<br>200         | 19.50<br>495              | 9.50<br>241  | 13.25<br>337               | 8.00<br>203  | 226<br>102.7      | 21.00<br>533              | 10.63<br>270 | 13.00<br>330               | 8.00<br>203  | 330<br>150.0      |
| 10<br>250        | 24.50<br>622              | 10.75<br>273 | 16.00<br>406               | 10.00<br>254 | 317<br>143.8      | 24.50<br>622              | 12.00<br>305 | 17.00<br>432               | 10.00<br>254 | 528<br>240.0      |
| 12<br>300        | 27.50<br>699              | 13.00<br>330 | 19.00<br>482               | 12.00<br>305 | 530<br>240.9      | 28.00<br>711              | 15.00<br>381 | 20.00<br>508               | 12.00<br>305 | 802<br>364        |

(1) Square.

| CLASS | FIGURE NUMBERS   |                      |
|-------|------------------|----------------------|
|       | STAINLESS SEAT   | STELLITE SEAT        |
| 150   | 0114C-13SX or GX | 0114C-13SY, GS or GY |
| 300   | 1114C-13SX or GX | 1114C-13SY, GS or GY |

## STANDARD MATERIALS

| PART       | MATERIAL         |                             |
|------------|------------------|-----------------------------|
| Body       | A 351 Gr. CF8M   |                             |
| Cover      | A 351 Gr. CF8M   |                             |
| Disc       | A 351 Gr. CF8M   |                             |
| Hinge      | A 351 Gr. CF8M   |                             |
| Pin        | Gr. 316          |                             |
| Plug       | Gr. 316          |                             |
| Disc nut   | Gr. 8M           |                             |
| Washer     | Gr. 316          |                             |
| Cotter pin | Gr. 316          |                             |
| Cover stud | Gr. B8M          |                             |
| Cover nut  | Gr. 8M           |                             |
| Gasket     | SB, SX or SY     | PTFE gasket and packing     |
|            | GB, GS, GX or GY | Graphite gasket and packing |
| Nameplate  | Stainless steel  |                             |

# ACCESSORIES



## GEAR ACTUATORS

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

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

|       | CLASS | OPTIONAL           | STANDARD             |
|-------|-------|--------------------|----------------------|
| GATE  | 150   | 6–24" (150–600 mm) | 30–60" (750–1500 mm) |
|       | 300   | 6–16" (150–400 mm) | 18–36" (450–900 mm)  |
|       | 600   | 4–12" (100–400 mm) | 14–36" (350–900 mm)  |
|       | 900   | 3–6" (80–150 mm)   | 8–10" (200–250 mm)   |
|       | 1500  | 3–4" (80–100 mm)   | 6–10" (150–250 mm)   |
| GLOBE | 150   | 6–12" (150–300 mm) | 14–16" (350–400 mm)  |
|       | 300   | 6–12" (150–300 mm) | 14–16" (350–400 mm)  |
|       | 600   | 4–10" (100–250 mm) | —                    |
|       | 900   | 2–4" (50–100 mm)   | —                    |
|       | 1500  | 2–4" (50–100 mm)   | —                    |



## 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 disc fastened directly

to them. 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 which 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 and frequency 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.

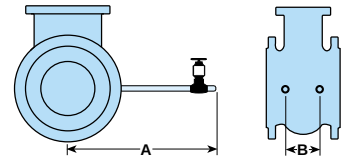
## CHAIN WHEELS

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.

# BYPASSES



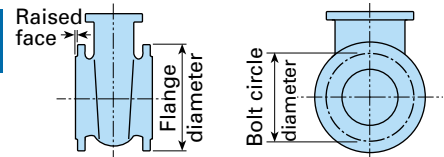
AVAILABLE FOR ALL VELAN CAST STEEL VALVES  
IN ACCORDANCE WITH MSS-SP45 - SERIES A  
API 600 GLOBE (Note: Dimensions are in inches)

| SIZE<br>in | CLASS 150 |       |       |       | CLASS 300 |       |       |       | CLASS 600 |       |       |       |
|------------|-----------|-------|-------|-------|-----------|-------|-------|-------|-----------|-------|-------|-------|
|            | BYPASS    | A     | ELBOW | B     | BYPASS    | A     | ELBOW | B     | BYPASS    | A     | ELBOW | B     |
| 3          | 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          | 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          | 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          | 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         | 1         | 18.00 | 1     | 14.88 | 1         | 18    | 1     | 15.00 | —         | —     | —     | —     |
| 12         | 1         | 18.00 | 1     | 19.00 | 1         | 18    | 1     | 18.00 | —         | —     | —     | —     |
| 14         | 1         | 18.00 | 1     | 19.50 | 1         | 18    | 1     | 19.50 | —         | —     | —     | —     |
| 16         | 1         | 18.00 | 1     | 24.00 | 1         | 18    | 1     | 24.00 | —         | —     | —     | —     |

API 600 GATE (Note: Dimensions are in inches)

| SIZE<br>in | CLASS 150 |       |       |       | CLASS 300 |       |       |       | CLASS 600 |       |       |       |
|------------|-----------|-------|-------|-------|-----------|-------|-------|-------|-----------|-------|-------|-------|
|            | BYPASS    | A     | ELBOW | B     | BYPASS    | A     | ELBOW | B     | BYPASS    | A     | ELBOW | B     |
| 3          | 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          | 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          | 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          | 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         | 1         | 18.00 | 1     | 7.69  | 1         | 18.00 | 1     | 11.00 | 1         | 18.50 | 1     | 11.00 |
| 12         | 1         | 18.00 | 1     | 8.13  | 1         | 18.00 | 1     | 12.50 | 1         | 18.50 | 1     | 12.50 |
| 14         | 1         | 23.00 | 1     | 9.00  | 1         | 18.50 | 1     | 16.00 | 1         | 18.50 | 1     | 19.13 |
| 16         | 1         | 24.00 | 1     | 10.00 | 1         | 18.50 | 1     | 15.50 | 1         | 20.50 | 1     | 20.00 |
| 18         | 1         | 26.63 | 1     | 12.00 | 1         | 19.50 | 1     | 14.00 | 1         | 20.50 | 1     | 24.00 |
| 20         | 1         | 26.63 | 1     | 12.00 | 1         | 19.50 | 1     | 16.00 | 1         | 20.50 | 1     | 24.00 |
| 24         | 1         | 28.75 | 1     | 12.25 | 1         | 22.50 | 1     | 18.25 | 1         | 22.50 | 1     | 32.00 |
| 30         | 1         | 33.63 | 1     | 14.00 | 1         | 26    | 1     | 24.00 | 1         | 27    | 1     | 36.00 |
| 36         | 1         | 34.00 | 1     | 15.25 | 1         | 28    | 1     | 50.00 | 1         | 30    | 1     | 35.00 |
| 42         | 1         | 32.00 | 1     | 18.00 | —         | —     | —     | —     | —         | —     | —     | —     |
| 48         | 1         | 38.00 | 1     | 22.00 | —         | —     | —     | —     | —         | —     | —     | —     |
| 60         | 1         | 44.00 | 1     | 24.00 | —         | —     | —     | —     | —         | —     | —     | —     |

# FLANGES, WEIGHTS & CV FLOW COEFFICIENTS



API 600 CAST STEEL VALVES CLASS 150

DRILLED AND FACED AS FOLLOWS: 2-24" ASME B16.5<sup>(1)</sup>

| ASME CLASS                    | DIMENSIONS IN INCHES |                 |                         |               |               |                | WEIGHT IN LBS. |        |       |      |       |      | CV FLOW FLOW COEFFICIENTS |       |        |
|-------------------------------|----------------------|-----------------|-------------------------|---------------|---------------|----------------|----------------|--------|-------|------|-------|------|---------------------------|-------|--------|
|                               | SIZE<br>in           | FLANGE<br>DIAM. | BOLT<br>CIRCLE<br>DIAM. | HOLE<br>DIAM. | QTY.<br>HOLES | DIAM.<br>BOLTS | GATE           |        | GLOBE |      | SWING |      | GATE                      | GLOBE | CHECK  |
|                               |                      |                 |                         |               |               |                | BW             | FL     | BW    | FL   | BW    | FL   |                           |       |        |
| 150<br>1/16<br>RAISED<br>FACE | 2                    | 6.00            | 4.75                    | 0.75          | 4             | 5/8            | 42             | 48     | 48    | 55   | 31    | 40   | 260                       | 35    | 95     |
|                               | 2 1/2                | 7.00            | 5.50                    | 0.75          | 4             | 5/8            | 50             | 59     | 54    | 58   | 35    | 44   | 420                       | 60    | 150    |
|                               | 3                    | 7.50            | 6.00                    | 0.75          | 4             | 5/8            | 67             | 78     | 82    | 102  | 59    | 78   | 625                       | 92    | 220    |
|                               | 4                    | 9.00            | 7.50                    | 0.75          | 8             | 5/8            | 97             | 117    | 120   | 152  | 98    | 121  | 1150                      | 180   | 410    |
|                               | 6                    | 11.00           | 9.50                    | 0.88          | 8             | 3/4            | 180            | 198    | 240   | 280  | 179   | 212  | 2650                      | 430   | 950    |
|                               | 8                    | 13.50           | 11.75                   | 0.88          | 8             | 3/4            | 278            | 319    | 405   | 435  | 314   | 360  | 4850                      | 810   | 1750   |
|                               | 10                   | 16.00           | 14.25                   | 1.00          | 12            | 7/8            | 456            | 515    | 500   | 550  | 513   | 586  | 7750                      | 1400  | 2800   |
|                               | 12                   | 19.00           | 17.00                   | 1.00          | 12            | 7/8            | 646            | 738    | 1050  | 1200 | 602   | 823  | 11,500                    | 1950  | 4100   |
|                               | 14                   | 21.00           | 18.75                   | 1.13          | 12            | 1              | 875            | 954    | 1700  | 1850 | 765   | 960  | 14,000                    | 2500  | 6200   |
|                               | 16                   | 23.50           | 21.25                   | 1.13          | 16            | 1              | 1120           | 1200   | 2300  | 2500 | 1120  | 1300 | 19,000                    | 3400  | 8400   |
|                               | 18                   | 25.00           | 22.75                   | 1.25          | 16            | 1 1/8          | 1485           | 1570   | 2640  | 2850 | 1450  | 1660 | 24,000                    | 4500  | 11,000 |
|                               | 20                   | 27.50           | 25.00                   | 1.25          | 20            | 1 1/8          | 1825           | 1910   | —     | —    | 1700  | 2050 | 31,000                    | —     | 13,500 |
|                               | 24                   | 32.00           | 29.50                   | 1.38          | 20            | 1 1/4          | 2870           | 2960   | —     | —    | 2900  | 3300 | 45,000                    | —     | 20,000 |
|                               | 26 <sup>(1)</sup>    | 34.25           | 31.75                   | 1.38          | 24            | 1 1/4          | 3600           | 3700   | —     | —    | 3600  | 4000 | 53,000                    | —     | 23,500 |
|                               | 28 <sup>(1)</sup>    | 36.50           | 34.00                   | 1.38          | 28            | 1 1/4          | 4400           | 4500   | —     | —    | 4300  | 5000 | 62,000                    | —     | 28,000 |
|                               | 30 <sup>(1)</sup>    | 38.75           | 36.00                   | 1.37          | 28            | 1 1/4          | 4705           | 4750   | —     | —    | 6300  | 7000 | 73,000                    | —     | 33,000 |
|                               | 32 <sup>(1)</sup>    | 41.75           | 38.50                   | 1.62          | 28            | 1 1/2          | 5800           | 6000   | —     | —    | —     | —    | 81,000                    | —     | —      |
|                               | 36 <sup>(1)</sup>    | 46.00           | 42.75                   | 1.63          | 32            | 1 1/2          | 6500           | 6850   | —     | —    | 8500  | 9500 | 108,000                   | —     | 48,000 |
|                               | 40 <sup>(1)</sup>    | 50.75           | 47.25                   | 1.62          | 36            | 1 1/2          | 8400           | 9000   | —     | —    | —     | —    | 130,000                   | —     | —      |
|                               | 42 <sup>(1)</sup>    | 53.00           | 49.50                   | 1.63          | 36            | 1 1/2          | 10,000         | 11,000 | —     | —    | —     | —    | 142,000                   | —     | —      |
|                               | 48 <sup>(1)</sup>    | 59.50           | 56.00                   | 1.63          | 44            | 1 1/2          | 14,000         | 15,000 | —     | —    | —     | —    | 190,000                   | —     | —      |
|                               | 54 <sup>(1)</sup>    | 66.25           | 62.75                   | 1.88          | 44            | 1 3/4          | 21,000         | 23,000 | —     | —    | —     | —    | 238,000                   | —     | —      |
|                               | 60 <sup>(1)</sup>    | 73.00           | 69.25                   | 1.88          | 52            | 1 3/4          | 22,600         | 26,600 | —     | —    | —     | —    | 300,000                   | —     | —      |

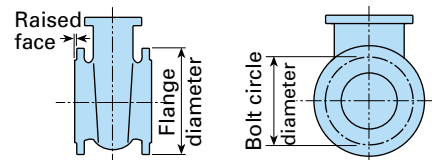
(1) 30" and up: ASME B16.47 Series A (MSS-SP-44), for Series B (API 605) contact the factory.



# FLANGES, WEIGHTS & CV FLOW COEFFICIENTS

API 600 CAST STEEL VALVES CLASS 300, 600, 900 & 1500

DRILLED AND FACED AS FOLLOWS: 2-24" ASME B16.5



| ASME CLASS                 | DIMENSIONS IN INCHES |              |                   |            |            |             | WEIGHT IN LBS. |        |       |      |       |      | CV FLOW FLOW COEFFICIENTS |       |        |
|----------------------------|----------------------|--------------|-------------------|------------|------------|-------------|----------------|--------|-------|------|-------|------|---------------------------|-------|--------|
|                            | SIZE in              | FLANGE DIAM. | BOLT CIRCLE DIAM. | HOLE DIAM. | QTY. HOLES | DIAM. BOLTS | GATE           |        | GLOBE |      | SWING |      | GATE                      | GLOBE | CHECK  |
|                            |                      |              |                   |            |            |             | BW             | FL     | BW    | FL   | BW    | FL   |                           |       |        |
| 300<br>1/16<br>RAISED FACE | 2                    | 6.50         | 5.00              | 0.75       | 8          | 3/8         | 46             | 60     | 45    | 60   | 37    | 45   | 260                       | 35    | 95     |
|                            | 2 1/2                | 7.50         | 5.88              | 0.88       | 8          | 3/8         | 55             | 76     | 63    | 72   | 49    | 57   | 420                       | 60    | 150    |
|                            | 3                    | 8.25         | 6.62              | 0.88       | 8          | 3/8         | 90             | 115    | 88    | 114  | 70    | 96   | 625                       | 92    | 220    |
|                            | 4                    | 10.00        | 7.88              | 0.88       | 8          | 3/8         | 136            | 166    | 130   | 171  | 110   | 150  | 1150                      | 180   | 410    |
|                            | 6                    | 12.50        | 10.62             | 0.88       | 12         | 3/8         | 245            | 314    | 261   | 337  | 204   | 265  | 2650                      | 430   | 950    |
|                            | 8                    | 15.00        | 13.00             | 1.00       | 12         | 3/8         | 415            | 506    | 447   | 565  | 360   | 455  | 4850                      | 810   | 1750   |
|                            | 10                   | 17.50        | 15.25             | 1.13       | 16         | 1           | 646            | 762    | 1000  | 1150 | 582   | 650  | 7750                      | 1325  | 2800   |
|                            | 12                   | 20.50        | 17.75             | 1.25       | 16         | 1 1/8       | 900            | 1100   | 1300  | 1550 | 825   | 945  | 11,500                    | 1950  | 4100   |
|                            | 14                   | 23.00        | 20.25             | 1.25       | 20         | 1 1/8       | 1392           | 1720   | 1800  | 2100 | 1200  | 1350 | 14,000                    | 2500  | 6200   |
|                            | 16                   | 25.50        | 22.50             | 1.38       | 20         | 1 1/8       | 1870           | 2220   | 2300  | 2700 | 1500  | 1800 | 19,000                    | 3400  | 8400   |
|                            | 18                   | 28.00        | 24.75             | 1.38       | 24         | 1 1/8       | 2405           | 2960   | 2640  | 3200 | 2000  | 2400 | 23,500                    | 4500  | 11,000 |
|                            | 20                   | 30.50        | 27.00             | 1.38       | 24         | 1 1/8       | 3260           | 3700   | —     | —    | 2600  | 3000 | 30,000                    | —     | 13,500 |
|                            | 24                   | 36.00        | 32.00             | 1.63       | 24         | 1 1/2       | 4250           | 5100   | —     | —    | 3000  | 4050 | 44,000                    | —     | 20,000 |
|                            | 26 <sup>(1)</sup>    | 38.25        | 34.50             | 1.75       | 28         | 1 1/2       | 5000           | 5500   | —     | —    | 4000  | 5000 | 53,000                    | —     | 23,500 |
|                            | 28 <sup>(1)</sup>    | 40.75        | 37.00             | 1.75       | 28         | 1 1/2       | 7000           | 7500   | —     | —    | 5000  | 6000 | 62,000                    | —     | 28,000 |
| 600<br>1/4<br>RAISED FACE  | 30 <sup>(1)</sup>    | 43.00        | 39.25             | 1.88       | 28         | 1 1/2       | 8550           | 9000   | —     | —    | —     | —    | 73,000                    | —     | —      |
|                            | 32 <sup>(1)</sup>    | 45.25        | 41.50             | 2.00       | 28         | 1 1/2       | 8200           | 8800   | —     | —    | —     | —    | 81,000                    | —     | —      |
|                            | 36 <sup>(1)</sup>    | 50.00        | 46.00             | 2.13       | 32         | 2           | 13,500         | 15,500 | —     | —    | —     | —    | 108,000                   | —     | —      |
|                            | 2                    | 6.50         | 5.00              | 0.75       | 8          | 3/8         | 60             | 72     | 60    | 72   | 48    | 52   | 260                       | 35    | 95     |
|                            | 2 1/2                | 7.50         | 5.88              | 0.88       | 8          | 3/8         | 89             | 102    | 89    | 100  | 59    | 87   | 420                       | 60    | 150    |
|                            | 3                    | 8.25         | 6.62              | 0.88       | 8          | 3/8         | 130            | 157    | 130   | 150  | 96    | 130  | 625                       | 92    | 220    |
|                            | 4                    | 10.75        | 8.50              | 1.00       | 8          | 3/8         | 224            | 275    | 213   | 285  | 167   | 225  | 1150                      | 180   | 410    |
|                            | 6                    | 14.00        | 11.50             | 1.13       | 12         | 1           | 394            | 540    | 415   | 515  | 332   | 476  | 2650                      | 430   | 950    |
|                            | 8                    | 16.50        | 13.75             | 1.25       | 12         | 1 1/8       | 726            | 884    | 1050  | 1220 | 525   | 715  | 4850                      | 800   | 1750   |
|                            | 10                   | 20.00        | 17.00             | 1.38       | 16         | 1 1/8       | 1125           | 1405   | 1550  | 1830 | 1000  | 1250 | 7750                      | 1250  | 2800   |
|                            | 12                   | 22.00        | 19.25             | 1.38       | 20         | 1 1/8       | 1490           | 1812   | —     | —    | 1500  | 1750 | 11,500                    | —     | 4100   |
|                            | 14                   | 23.75        | 20.75             | 1.50       | 20         | 1 1/8       | 2200           | 2500   | —     | —    | 1750  | 2050 | 13,000                    | —     | 5900   |
| 900<br>1/4<br>RAISED FACE  | 16                   | 27.00        | 23.75             | 1.62       | 20         | 1 1/2       | 3000           | 3700   | —     | —    | 2400  | 3100 | 18,000                    | —     | 7800   |
|                            | 18                   | 29.25        | 25.75             | 1.75       | 20         | 1 1/8       | 4000           | 4800   | —     | —    | 3200  | 4000 | 22,000                    | —     | 9900   |
|                            | 20                   | 32.00        | 28.50             | 1.75       | 24         | 1 1/8       | 5600           | 6800   | —     | —    | 4500  | 6100 | 27,000                    | —     | 12,000 |
|                            | 24                   | 37.00        | 33.00             | 2.00       | 24         | 1 1/8       | 8000           | 9800   | —     | —    | 6400  | 7600 | 40,000                    | —     | 18,000 |
|                            | 30 <sup>(1)</sup>    | 44.50        | 40.25             | 2.12       | 28         | 2           | 12,000         | 14,000 | —     | —    | —     | —    | 52,000                    | —     | —      |
|                            | 36 <sup>(1)</sup>    | 51.75        | 47.00             | 2.62       | 28         | 2 1/2       | 17,000         | 19,500 | —     | —    | —     | —    | 72,000                    | —     | —      |
|                            | 2                    | 8.50         | 6.50              | 1.00       | 8          | 3/8         | 150            | 185    | —     | —    | 135   | 165  | 230                       | —     | 80     |
|                            | 2 1/2                | 9.63         | 7.50              | 1.12       | 8          | 1           | 235            | 270    | —     | —    | 175   | 210  | 560                       | —     | 200    |
|                            | 3                    | 9.50         | 7.50              | 1.00       | 8          | 3/8         | 235            | 270    | —     | —    | 175   | 210  | 560                       | —     | 200    |
|                            | 4                    | 11.50        | 9.25              | 1.25       | 8          | 1 1/8       | 270            | 355    | —     | —    | 245   | 330  | 1050                      | —     | 380    |
| 1500<br>1/4<br>RAISED FACE | 6                    | 15.00        | 12.50             | 1.25       | 12         | 1 1/8       | 830            | 980    | —     | —    | 485   | 635  | 2400                      | —     | 875    |
|                            | 8                    | 18.50        | 15.50             | 1.50       | 12         | 1 1/8       | 1220           | 1500   | —     | —    | 700   | 900  | 4200                      | —     | 1325   |
|                            | 10                   | 21.50        | 18.50             | 1.50       | 16         | 1 1/8       | 2000           | 2400   | —     | —    | —     | —    | 6750                      | —     | 1525   |
|                            | 12                   | 24.00        | 21.00             | 1.50       | 20         | 1 1/8       | 3170           | 3670   | —     | —    | —     | —    | 9700                      | —     | —      |
|                            | 14                   | 25.25        | 22.00             | 1.62       | 20         | 1 1/2       | 3900           | 4460   | —     | —    | —     | —    | 12,000                    | —     | —      |
|                            | 16                   | 27.75        | 24.25             | 1.75       | 20         | 1 1/8       | 5570           | 6250   | —     | —    | —     | —    | 16,000                    | —     | —      |
|                            | 2                    | 8.50         | 6.50              | 1.00       | 8          | 3/8         | 150            | 185    | —     | —    | 135   | 165  | 230                       | —     | 80     |
|                            | 2 1/2                | 9.63         | 7.50              | 1.12       | 8          | 1           | 255            | 325    | —     | —    | 205   | 275  | 510                       | —     | 185    |
|                            | 3                    | 10.50        | 8.00              | 1.25       | 8          | 1 1/8       | 255            | 325    | —     | —    | 205   | 275  | 510                       | —     | 185    |
|                            | 4                    | 12.25        | 9.50              | 1.37       | 8          | 1 1/8       | 430            | 520    | —     | —    | 340   | 430  | 925                       | —     | 330    |
|                            | 6                    | 15.50        | 12.50             | 1.50       | 12         | 1 1/8       | 1045           | 1205   | —     | —    | 805   | 965  | 2100                      | —     | 750    |
|                            | 8                    | 19.00        | 15.50             | 1.75       | 12         | 1 1/8       | 1850           | 2550   | —     | —    | 1350  | 2050 | 3650                      | —     | 1325   |
|                            | 10                   | 23.00        | 19.00             | 2.00       | 12         | 1 1/8       | 2600           | 3300   | —     | —    | —     | —    | 5850                      | —     | —      |

(1) 30" and up: ASME B16.47 Series A (MSS-SP-44), for Series B (API 605) contact the factory.

# ENGINEERING DATA

## PRESSURE-TEMPERATURE RATINGS STANDARD CLASS VALVES, FLANGED AND BUTT WELD END

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

### CAST

ASTM MATERIAL STANDARD—TO ASME B16.34

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

psig/°F (bar/°C) CLASSES 150–4500

#### A216 Gr. WCB

| TEMP.<br>°F         | WORKING PRESSURE by classes, psig |     |      |      |      |      |       |
|---------------------|-----------------------------------|-----|------|------|------|------|-------|
|                     | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100                 | 285                               | 740 | 1480 | 2220 | 3705 | 6170 | 11110 |
| 200                 | 260                               | 675 | 1350 | 2025 | 3375 | 5625 | 10120 |
| 300                 | 230                               | 655 | 1315 | 1970 | 3280 | 5470 | 9845  |
| 400                 | 200                               | 635 | 1270 | 1900 | 3170 | 5280 | 9505  |
| 500                 | 170                               | 600 | 1200 | 1795 | 2995 | 4990 | 8980  |
| 600                 | 140                               | 550 | 1095 | 1640 | 2735 | 4560 | 8210  |
| 650                 | 125                               | 535 | 1075 | 1610 | 2685 | 4475 | 8055  |
| 700                 | 110                               | 535 | 1065 | 1600 | 2665 | 4440 | 7990  |
| 750                 | 95                                | 505 | 1010 | 1510 | 2520 | 4200 | 7560  |
| 800                 | 80                                | 410 | 825  | 1235 | 2060 | 3430 | 6170  |
| 850 <sup>(1)</sup>  | 65                                | 270 | 535  | 805  | 1340 | 2230 | 4010  |
| 900 <sup>(1)</sup>  | 50                                | 170 | 345  | 515  | 860  | 1430 | 2570  |
| 950 <sup>(1)</sup>  | 35                                | 105 | 205  | 310  | 515  | 860  | 1545  |
| 1000 <sup>(1)</sup> | 20                                | 50  | 105  | 155  | 260  | 430  | 770   |

(1) Permissible, but not recommended for prolonged usage above 800°F (427°C).

| TEMP.<br>°C        | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|--------------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|                    | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38                 | 19.6                                        | 51.1  | 102.1  | 153.2  | 255.3  | 425.5  | 765.8  |
| 50                 | 19.2                                        | 50.1  | 100.2  | 150.2  | 250.4  | 417.3  | 751.1  |
| 100                | 17.7                                        | 46.4  | 92.8   | 139.1  | 231.9  | 386.5  | 695.7  |
| 150                | 15.8                                        | 45.2  | 90.5   | 135.7  | 226.1  | 376.9  | 678.4  |
| 200                | 14.0                                        | 43.8  | 87.6   | 131.5  | 219.1  | 365.2  | 657.3  |
| 250                | 12.1                                        | 41.7  | 83.4   | 125.2  | 208.6  | 347.7  | 625.8  |
| 300                | 10.2                                        | 38.7  | 77.5   | 116.2  | 193.7  | 322.8  | 581.0  |
| 350                | 8.4                                         | 37.0  | 73.9   | 110.9  | 184.8  | 308.0  | 554.4  |
| 375                | 7.4                                         | 36.5  | 72.9   | 109.4  | 182.3  | 303.9  | 547.0  |
| 400                | 6.5                                         | 34.5  | 69.0   | 103.5  | 172.5  | 287.5  | 517.5  |
| 425                | 5.6                                         | 28.8  | 57.5   | 86.3   | 143.8  | 239.6  | 431.4  |
| 450 <sup>(1)</sup> | 4.7                                         | 20.0  | 40.1   | 60.1   | 100.2  | 166.9  | 300.5  |
| 475 <sup>(1)</sup> | 3.7                                         | 13.5  | 27.1   | 40.6   | 67.7   | 112.9  | 203.2  |
| 500 <sup>(1)</sup> | 2.8                                         | 8.8   | 17.6   | 26.4   | 44.0   | 73.3   | 131.9  |
| 525 <sup>(1)</sup> | 1.9                                         | 5.2   | 10.4   | 15.5   | 25.9   | 43.2   | 77.7   |
| 540 <sup>(1)</sup> | 1.3                                         | 3.3   | 6.5    | 9.8    | 16.3   | 27.2   | 48.9   |

#### A217 Gr. WC6

| TEMP.<br>°F | WORKING PRESSURE by classes, psig |     |      |      |      |      |       |
|-------------|-----------------------------------|-----|------|------|------|------|-------|
|             | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100         | 290                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 200         | 260                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 300         | 230                               | 720 | 1445 | 2165 | 3610 | 6015 | 10830 |
| 400         | 200                               | 695 | 1385 | 2080 | 3465 | 5775 | 10400 |
| 500         | 170                               | 665 | 1330 | 1995 | 3325 | 5540 | 9965  |
| 600         | 140                               | 605 | 1210 | 1815 | 3025 | 5040 | 9070  |
| 650         | 125                               | 590 | 1175 | 1765 | 2940 | 4905 | 8825  |
| 700         | 110                               | 570 | 1135 | 1705 | 2840 | 4730 | 8515  |
| 750         | 95                                | 530 | 1065 | 1595 | 2660 | 4430 | 7970  |
| 800         | 80                                | 510 | 1015 | 1525 | 2540 | 4230 | 7610  |
| 850         | 65                                | 485 | 975  | 1460 | 2435 | 4060 | 7305  |
| 900         | 50                                | 450 | 900  | 1350 | 2245 | 3745 | 6740  |
| 950         | 35                                | 320 | 640  | 955  | 1595 | 2655 | 4785  |
| 1000        | 20                                | 215 | 430  | 650  | 1080 | 1800 | 3240  |
| 1050        | 20 <sup>(1)</sup>                 | 145 | 290  | 430  | 720  | 1200 | 2160  |
| 1100        | 20 <sup>(1)</sup>                 | 95  | 190  | 290  | 480  | 800  | 1440  |

(1) For welding end valves only. Flanged end ratings terminate at 1000°F (538°C).

| TEMP.<br>°C        | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|--------------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|                    | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38                 | 20.0                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 50                 | 19.5                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 100                | 17.7                                        | 51.4  | 103.0  | 154.5  | 257.4  | 429.1  | 772.4  |
| 150                | 15.8                                        | 49.6  | 99.6   | 149.2  | 248.8  | 414.5  | 746.3  |
| 200                | 13.9                                        | 48.1  | 95.9   | 143.9  | 239.8  | 399.6  | 719.6  |
| 250                | 12.1                                        | 46.2  | 92.4   | 138.6  | 231.0  | 385.0  | 692.6  |
| 300                | 10.2                                        | 42.9  | 85.8   | 128.6  | 214.4  | 357.2  | 642.8  |
| 350                | 8.3                                         | 40.3  | 80.3   | 120.8  | 201.1  | 335.4  | 603.5  |
| 375                | 7.4                                         | 38.9  | 77.6   | 116.6  | 194.1  | 323.3  | 582.0  |
| 400                | 6.5                                         | 36.5  | 73.3   | 109.8  | 183.1  | 305.0  | 548.7  |
| 425                | 5.6                                         | 35.2  | 70.2   | 105.4  | 175.7  | 292.6  | 526.3  |
| 450                | 4.6                                         | 33.7  | 67.7   | 101.4  | 169.1  | 281.9  | 507.2  |
| 475                | 3.7                                         | 31.7  | 63.4   | 95.1   | 158.2  | 263.9  | 475.0  |
| 500                | 2.8                                         | 25.3  | 50.6   | 75.7   | 126.1  | 210.1  | 378.6  |
| 525                | 1.9                                         | 18.1  | 36.3   | 54.5   | 90.8   | 151.2  | 272.5  |
| 550                | 1.4 <sup>(1)</sup>                          | 12.7  | 25.4   | 38.1   | 63.6   | 105.9  | 190.7  |
| 575                | 1.4 <sup>(1)</sup>                          | 8.8   | 17.7   | 26.3   | 44.0   | 73.4   | 132.1  |
| 600 <sup>(2)</sup> | 1.4 <sup>(1)</sup>                          | 6.0   | 12.0   | 18.3   | 30.3   | 50.5   | 90.8   |

(2) Not to be used over 593°C.

#### A217 Gr. WC9

| TEMP.<br>°F | WORKING PRESSURE by classes, psig |     |      |      |      |      |       |
|-------------|-----------------------------------|-----|------|------|------|------|-------|
|             | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100         | 290                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 200         | 260                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 300         | 230                               | 730 | 1455 | 2185 | 3640 | 6070 | 10925 |
| 400         | 200                               | 705 | 1410 | 2115 | 3530 | 5880 | 10585 |
| 500         | 170                               | 665 | 1330 | 1995 | 3325 | 5540 | 9965  |
| 600         | 140                               | 605 | 1210 | 1815 | 3025 | 5040 | 9070  |
| 650         | 125                               | 590 | 1175 | 1765 | 2940 | 4905 | 8825  |
| 700         | 110                               | 570 | 1135 | 1705 | 2840 | 4730 | 8515  |
| 750         | 95                                | 530 | 1065 | 1595 | 2660 | 4430 | 7970  |
| 800         | 80                                | 510 | 1015 | 1525 | 2540 | 4230 | 7610  |
| 850         | 65                                | 485 | 975  | 1460 | 2435 | 4060 | 7305  |
| 900         | 50                                | 450 | 900  | 1350 | 2245 | 3745 | 6740  |
| 950         | 35                                | 375 | 755  | 1130 | 1885 | 3145 | 5665  |
| 1000        | 20                                | 260 | 520  | 780  | 1305 | 2170 | 3910  |
| 1050        | 20 <sup>(1)</sup>                 | 175 | 350  | 525  | 875  | 1455 | 2625  |
| 1100        | 20 <sup>(1)</sup>                 | 110 | 220  | 330  | 550  | 915  | 1645  |

(1) For welding end valves only. Flanged end ratings terminate at 1000°F (538°C).

| TEMP.<br>°C        | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|--------------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|                    | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38                 | 20.0                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 50                 | 19.5                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 100                | 17.7                                        | 51.6  | 103.1  | 154.6  | 257.7  | 429.5  | 773.2  |
| 150                | 15.8                                        | 50.3  | 100.3  | 150.6  | 250.9  | 418.3  | 753.0  |
| 200                | 13.9                                        | 48.8  | 97.5   | 146.3  | 244.1  | 406.6  | 731.9  |
| 250                | 12.1                                        | 46.3  | 92.7   | 139.1  | 231.9  | 386.3  | 695.0  |
| 300                | 10.2                                        | 42.9  | 85.8   | 128.6  | 214.4  | 357.2  | 642.8  |
| 350                | 8.3                                         | 40.3  | 80.3   | 120.8  | 201.1  | 335.4  | 603.5  |
| 375                | 7.4                                         | 38.9  | 77.6   | 116.6  | 194.1  | 323.3  | 582.0  |
| 400                | 6.5                                         | 36.5  | 73.3   | 109.8  | 183.1  | 305.0  | 548.7  |
| 425                | 5.6                                         | 35.2  | 70.2   | 105.4  | 175.7  | 292.6  | 526.3  |
| 450                | 4.6                                         | 33.7  | 67.7   | 101.4  | 169.1  | 281.9  | 507.2  |
| 475                | 3.7                                         | 31.7  | 63.4   | 95.1   | 158.2  | 263.9  | 475.0  |
| 500                | 2.8                                         | 27.7  | 55.7   | 83.4   | 139.0  | 210.1  | 417.4  |
| 525                | 1.9                                         | 21.6  | 43.3   | 64.9   | 108.4  | 180.6  | 325.3  |
| 550                | 1.4 <sup>(1)</sup>                          | 15.4  | 30.7   | 46.1   | 77.0   | 127.9  | 230.7  |
| 575                | 1.4 <sup>(1)</sup>                          | 10.6  | 21.1   | 31.7   | 52.7   | 87.7   | 158.1  |
| 600 <sup>(2)</sup> | 1.4 <sup>(1)</sup>                          | 6.9   | 13.8   | 20.7   | 34.6   | 57.4   | 103.2  |

(2) Not to be used over 593°C.

# ENGINEERING DATA

## A217 Gr. C5

| TEMP.<br>°F | WORKING PRESSURE by classes, psig |     |      |      |      |      |       |
|-------------|-----------------------------------|-----|------|------|------|------|-------|
|             | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100         | 290                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 200         | 260                               | 745 | 1490 | 2235 | 3725 | 6205 | 11170 |
| 300         | 230                               | 715 | 1430 | 2150 | 3580 | 5965 | 10740 |
| 400         | 200                               | 705 | 1410 | 2115 | 3530 | 5880 | 10585 |
| 500         | 170                               | 665 | 1330 | 1995 | 3325 | 5540 | 9965  |
| 600         | 140                               | 605 | 1210 | 1815 | 3025 | 5040 | 9070  |
| 650         | 125                               | 590 | 1175 | 1765 | 2940 | 4905 | 8825  |
| 700         | 110                               | 570 | 1135 | 1705 | 2840 | 4730 | 8515  |
| 750         | 95                                | 530 | 1055 | 1585 | 2640 | 4400 | 7920  |
| 800         | 80                                | 510 | 1015 | 1525 | 2540 | 4230 | 7610  |
| 850         | 65                                | 485 | 965  | 1450 | 2415 | 4030 | 7250  |
| 900         | 50                                | 370 | 740  | 1110 | 1850 | 3085 | 5555  |
| 950         | 35                                | 275 | 550  | 825  | 1370 | 2285 | 4115  |
| 1000        | 20                                | 200 | 400  | 595  | 995  | 1655 | 2985  |
| 1050        | 20 <sup>(1)</sup>                 | 145 | 290  | 430  | 720  | 1200 | 2160  |
| 1100        | 20 <sup>(1)</sup>                 | 100 | 200  | 300  | 495  | 830  | 1490  |
| 1150        | 20 <sup>(1)</sup>                 | 60  | 125  | 185  | 310  | 515  | 925   |
| 1200        | 15 <sup>(1)</sup>                 | 35  | 70   | 105  | 170  | 285  | 515   |

(1) For welding end valves only. Flanged end ratings terminate at 1000°F (538°C).

| TEMP.<br>°C | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|-------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|             | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38          | 20.0                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 50          | 19.5                                        | 51.7  | 103.3  | 155.0  | 258.6  | 430.3  | 774.6  |
| 100         | 17.7                                        | 51.1  | 102.3  | 153.4  | 257.2  | 425.9  | 766.8  |
| 150         | 15.8                                        | 49.3  | 98.6   | 148.2  | 246.8  | 411.2  | 740.5  |
| 200         | 13.9                                        | 48.7  | 97.4   | 146.1  | 243.7  | 406.0  | 730.8  |
| 250         | 12.1                                        | 46.3  | 92.7   | 139.1  | 231.9  | 386.3  | 695.0  |
| 300         | 10.2                                        | 42.9  | 85.8   | 128.6  | 214.4  | 357.2  | 642.8  |
| 350         | 8.3                                         | 40.3  | 80.3   | 120.8  | 201.1  | 335.4  | 603.5  |
| 375         | 7.4                                         | 38.9  | 77.5   | 116.4  | 193.9  | 323.0  | 581.5  |
| 400         | 6.5                                         | 36.5  | 72.6   | 109.2  | 181.8  | 303.0  | 545.4  |
| 425         | 5.6                                         | 35.2  | 70.1   | 105.4  | 175.6  | 292.4  | 526.1  |
| 450         | 4.6                                         | 33.7  | 67.1   | 100.8  | 167.9  | 280.1  | 504.0  |
| 475         | 3.7                                         | 27.6  | 55.0   | 82.6   | 137.7  | 229.7  | 413.5  |
| 500         | 2.8                                         | 21.3  | 42.6   | 64.0   | 106.4  | 177.4  | 319.5  |
| 525         | 1.9                                         | 16.1  | 32.3   | 48.3   | 80.5   | 134.1  | 241.7  |
| 550         | 1.4 <sup>(1)</sup>                          | 12.1  | 24.3   | 36.0   | 60.3   | 100.3  | 180.8  |
| 575         | 1.4 <sup>(1)</sup>                          | 9.0   | 17.9   | 26.6   | 44.3   | 74.1   | 133.2  |
| 600         | 1.4 <sup>(1)</sup>                          | 6.2   | 12.6   | 18.8   | 31.1   | 52.0   | 93.4   |
| 625         | 1.3 <sup>(1)</sup>                          | 3.9   | 8.1    | 12.0   | 20.0   | 33.3   | 59.9   |
| 650         | 1.0 <sup>(1)</sup>                          | 2.4   | 4.8    | 7.2    | 11.7   | 19.7   | 35.5   |

## A217 Gr. C12

| TEMP.<br>°F | WORKING PRESSURE by classes, psig |     |      |      |      |      |       |
|-------------|-----------------------------------|-----|------|------|------|------|-------|
|             | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100         | 290                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 200         | 260                               | 750 | 1500 | 2250 | 3750 | 6250 | 11250 |
| 300         | 230                               | 730 | 1455 | 2185 | 3640 | 6070 | 10925 |
| 400         | 200                               | 705 | 1410 | 2115 | 3530 | 5880 | 10585 |
| 500         | 170                               | 665 | 1330 | 1995 | 3325 | 5540 | 9965  |
| 600         | 140                               | 605 | 1210 | 1815 | 3025 | 5040 | 9070  |
| 650         | 125                               | 590 | 1175 | 1765 | 2940 | 4905 | 8825  |
| 700         | 110                               | 570 | 1135 | 1705 | 2840 | 4730 | 8515  |
| 750         | 95                                | 530 | 1065 | 1595 | 2660 | 4430 | 7970  |
| 800         | 80                                | 510 | 1015 | 1525 | 2540 | 4230 | 7610  |
| 850         | 65                                | 485 | 975  | 1460 | 2435 | 4060 | 7305  |
| 900         | 50                                | 450 | 900  | 1350 | 2245 | 3745 | 6740  |
| 950         | 35                                | 375 | 755  | 1130 | 1855 | 3145 | 5655  |
| 1000        | 20                                | 255 | 505  | 760  | 1270 | 2115 | 3805  |
| 1050        | 20 <sup>(1)</sup>                 | 170 | 345  | 515  | 855  | 1430 | 2570  |
| 1100        | 20 <sup>(1)</sup>                 | 115 | 225  | 340  | 565  | 945  | 1695  |
| 1150        | 20 <sup>(1)</sup>                 | 75  | 150  | 225  | 375  | 630  | 1130  |
| 1200        | 20 <sup>(1)</sup>                 | 50  | 105  | 155  | 255  | 430  | 770   |

(1) For welding end valves only. Flanged end ratings terminate at 1000°F (538°C).

| TEMP.<br>°C | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|-------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|             | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38          | 20.0                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 50          | 19.5                                        | 51.7  | 103.4  | 155.2  | 258.6  | 431.0  | 775.9  |
| 100         | 17.7                                        | 51.6  | 103.1  | 154.6  | 257.7  | 429.5  | 773.2  |
| 150         | 15.8                                        | 50.3  | 100.3  | 150.6  | 250.9  | 418.3  | 753.0  |
| 200         | 13.9                                        | 48.8  | 97.5   | 146.3  | 244.1  | 406.6  | 731.9  |
| 250         | 12.1                                        | 46.3  | 92.7   | 139.1  | 231.9  | 386.3  | 695.0  |
| 300         | 10.2                                        | 42.9  | 85.8   | 128.6  | 214.4  | 357.2  | 642.8  |
| 350         | 8.3                                         | 40.3  | 80.3   | 120.8  | 201.1  | 335.4  | 603.5  |
| 375         | 7.4                                         | 38.9  | 77.6   | 116.6  | 194.1  | 323.3  | 582.0  |
| 400         | 6.5                                         | 36.5  | 73.3   | 109.8  | 183.1  | 305.0  | 548.7  |
| 425         | 5.6                                         | 35.2  | 70.2   | 105.4  | 175.7  | 292.6  | 526.3  |
| 450         | 4.6                                         | 33.7  | 67.7   | 101.4  | 169.1  | 281.9  | 507.2  |
| 475         | 3.7                                         | 31.7  | 63.4   | 95.1   | 158.2  | 263.9  | 475.0  |
| 500         | 2.8                                         | 27.7  | 55.7   | 83.4   | 139.0  | 231.8  | 417.0  |
| 525         | 1.9                                         | 21.4  | 42.8   | 64.1   | 107.1  | 178.6  | 321.1  |
| 550         | 1.4 <sup>(1)</sup>                          | 15.0  | 30.0   | 45.0   | 75.0   | 125.1  | 225.0  |
| 575         | 1.4 <sup>(1)</sup>                          | 0.4   | 21.0   | 31.4   | 52.1   | 87.2   | 156.7  |
| 600         | 1.4 <sup>(1)</sup>                          | 7.2   | 14.3   | 21.5   | 35.8   | 59.9   | 107.5  |
| 625         | 1.4 <sup>(1)</sup>                          | 4.9   | 9.9    | 14.8   | 24.7   | 41.5   | 74.5   |
| 650         | 1.4 <sup>(1)</sup>                          | 3.4   | 7.2    | 10.7   | 17.6   | 29.7   | 53.1   |

## A351 Gr. CF8M<sup>(3)</sup>, A351 Gr. CF3M<sup>(2)</sup>

| TEMP.<br>°F         | WORKING PRESSURE BY CLASSES, psig |     |      |      |      |      |       |
|---------------------|-----------------------------------|-----|------|------|------|------|-------|
|                     | 150                               | 300 | 600  | 900  | 1500 | 2500 | 4500  |
| 100                 | 275                               | 720 | 1440 | 2160 | 3600 | 6000 | 10800 |
| 200                 | 235                               | 620 | 1240 | 1860 | 3095 | 5160 | 9290  |
| 300                 | 215                               | 560 | 1120 | 1680 | 2795 | 4660 | 8390  |
| 400                 | 195                               | 515 | 1025 | 1540 | 2570 | 4280 | 7705  |
| 500                 | 170                               | 480 | 955  | 1435 | 2390 | 3980 | 7165  |
| 600                 | 140                               | 450 | 900  | 1355 | 2255 | 3760 | 6770  |
| 650                 | 125                               | 445 | 890  | 1330 | 2220 | 3700 | 6660  |
| 700                 | 110                               | 430 | 870  | 1305 | 2170 | 3620 | 6515  |
| 750                 | 95                                | 425 | 855  | 1280 | 2135 | 3560 | 6410  |
| 800                 | 80                                | 420 | 845  | 1265 | 2110 | 3520 | 6335  |
| 850                 | 65                                | 420 | 835  | 1255 | 2090 | 3480 | 6265  |
| 900                 | 50                                | 415 | 830  | 1245 | 2075 | 3460 | 6230  |
| 950                 | 35                                | 385 | 775  | 1160 | 1930 | 3220 | 5795  |
| 1000                | 20                                | 350 | 700  | 1050 | 1750 | 2915 | 5245  |
| 1050 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 345 | 685  | 1030 | 1720 | 2865 | 5155  |
| 1100 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 305 | 610  | 915  | 1525 | 2545 | 4575  |
| 1150 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 235 | 475  | 710  | 1185 | 1970 | 3550  |
| 1200 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 185 | 370  | 555  | 925  | 1545 | 2775  |
| 1250 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 145 | 295  | 440  | 735  | 1230 | 2210  |
| 1300 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 115 | 235  | 350  | 585  | 970  | 1750  |
| 1350 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 95  | 190  | 290  | 480  | 800  | 1440  |
| 1400 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 75  | 150  | 225  | 380  | 630  | 1130  |
| 1450 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 60  | 115  | 175  | 290  | 485  | 875   |
| 1500 <sup>(3)</sup> | 20 <sup>(1)</sup>                 | 40  | 85   | 125  | 205  | 345  | 620   |

(1) For welding end valves only. Flanged end ratings terminate at 1000°F (538°C).

(2) **CF3M**: Not to be used over 850°F (454°C).

(3) At temperatures over 1000°F (538°C), use only when the carbon content is 0.04% or higher.

| TEMP.<br>°C        | GAGE WORKING PRESSURE BY RATING NUMBER, bar |       |        |        |        |        |        |
|--------------------|---------------------------------------------|-------|--------|--------|--------|--------|--------|
|                    | PN 20                                       | PN 50 | PN 100 | PN 150 | PN 250 | PN 420 | PN 760 |
| 38                 | 19.0                                        | 49.7  | 99.3   | 149.0  | 248.3  | 413.8  | 744.8  |
| 50                 | 18.3                                        | 48.1  | 96.3   | 144.4  | 240.6  | 401.0  | 721.9  |
| 100                | 16.1                                        | 42.3  | 84.6   | 126.8  | 211.0  | 351.7  | 633.2  |
| 150                | 14.8                                        | 38.6  | 77.1   | 115.7  | 192.4  | 320.8  | 577.7  |
| 200                | 13.6                                        | 35.8  | 71.2   | 107.0  | 178.5  | 297.2  | 535.2  |
| 250                | 12.0                                        | 33.5  | 66.8   | 100.3  | 167.0  | 278.2  | 500.8  |
| 300                | 10.2                                        | 31.6  | 63.1   | 95.0   | 158.1  | 263.6  | 474.6  |
| 350                | 8.3                                         | 30.4  | 61.0   | 91.3   | 152.3  | 253.9  | 456.9  |
| 375                | 7.4                                         | 29.6  | 59.9   | 89.7   | 149.3  | 249.1  | 448.3  |
| 400                | 6.5                                         | 29.3  | 59.0   | 88.2   | 147.2  | 245.4  | 441.9  |
| 425                | 5.6                                         | 29.0  | 58.3   | 87.3   | 145.6  | 242.9  | 437.2  |
| 450                | 4.6                                         | 29.0  | 57.7   | 86.7   | 144.3  | 240.4  | 432.8  |
| 475                | 3.7                                         | 28.7  | 57.3   | 86.1   | 143.4  | 239.0  | 430.3  |
| 500                | 2.8                                         | 27.3  | 54.8   | 82.1   | 136.7  | 228.0  | 410.5  |
| 525                | 1.9                                         | 25.2  | 50.6   | 75.9   | 126.4  | 210.7  | 379.2  |
| 550 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 24.0  | 47.8   | 71.8   | 119.8  | 199.5  | 359.0  |
| 575 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 22.8  | 45.4   | 68.3   | 114.1  | 190.1  | 341.9  |
| 600 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 19.9  | 39.9   | 59.7   | 99.5   | 166.0  | 298.6  |
| 625 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 15.7  | 31.7   | 47.4   | 79.2   | 131.7  | 237.3  |
| 650 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 12.6  | 25.3   | 37.9   | 63.2   | 105.7  | 189.8  |
| 675 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 10.1  | 20.6   | 30.8   | 51.4   | 86.1   | 154.8  |
| 700 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 8.3   | 16.9   | 25.1   | 42.0   | 69.8   | 125.8  |
| 725 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 6.9   | 13.9   | 21.1   | 35.0   | 58.2   | 104.9  |
| 750 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 5.7   | 11.3   | 17.1   | 28.7   | 47.7   | 85.7   |
| 775 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 4.6   | 9.0    | 13.7   | 22.8   | 38.1   | 68.4   |
| 800 <sup>(3)</sup> | 1.4 <sup>(1)</sup>                          | 3.5   | 7.0    | 10.6   | 17.4   | 29.2   | 52.6   |



# SPECIFICATION OF CAST VALVE MATERIALS

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

| DESCRIPTION      |            | CARBON STEEL               |                     |               | ALLOY STEEL   |               |                |                | STAINLESS STEEL |           |                      |             |             |
|------------------|------------|----------------------------|---------------------|---------------|---------------|---------------|----------------|----------------|-----------------|-----------|----------------------|-------------|-------------|
|                  |            |                            |                     |               | 1% CR ½ Mo    | 2% CR-1 Mo    | 5 CR           | 9 CR-1Mo       | 13 CR           |           | 316                  | 316L        | 304         |
| ASTM DESIGNATION |            | A216 WCB                   | A352 LCB            | A352 LCC      | A217 WC6      | A217 WC9      | A217 C5        | A217 C12       | A217 CA15       | A296 CA40 | A351 CF8M            | A351 CF3M   | A351 CF8    |
| COMPOSITION %    | Carbon     | 0.25 <sup>(1)</sup>        | 0.25 <sup>(1)</sup> | 0.25          | 0.20          | 0.18          | 0.20           | 0.20           | 0.15            | 0.10-0.40 | 0.08                 | 0.03        | 0.08        |
|                  | Manganese  | 1.00                       | 1.00                | 1.20          | 0.50-0.80     | 0.40-0.70     | 0.40-0.70      | 0.35-0.65      | 1.00            | 1.00      | 1.50                 | 1.50        | 1.50        |
|                  | Phosphorus | 0.04                       | 0.04                | 0.04          | 0.04          | 0.40          | 0.04           | 0.04           | 0.04            | 0.04      | 0.04                 | 0.04        | 0.04        |
|                  | Sulphur    | 0.045                      | 0.045               | 0.045         | 0.045         | 0.045         | 0.045          | 0.045          | 0.040           | 0.040     | 0.040                | 0.040       | 0.040       |
|                  | Silicon    | 0.60                       | 0.60                | 0.60          | 0.60          | 0.60          | 0.75           | 1.00           | 1.50            | 1.50      | 1.50                 | 1.50        | 2.00        |
|                  | Nickel     | 0.50                       | —                   | 0.50          | 0.50          | 0.50          | 0.50           | 0.50           | 1.00            | 1.00      | 9.00-12.00           | 9.00-13.00  | 8.00-11.00  |
|                  | Chromium   | 0.50                       | —                   | 0.50          | 1.00-1.50     | 2.00-2.75     | 4.00-6.50      | 8.00-10.00     | 11.5-14.0       | 11.5-14.0 | 18.00-21.00          | 17.00-21.00 | 18.00-21.00 |
|                  | Molybdenum | 0.20                       | —                   | 0.20          | 0.45-0.65     | 0.90-1.20     | 0.45-0.65      | 0.90-1.20      | 0.50            | 0.50      | 2.0-3.00             | 2.0-3.00    | 0.50        |
|                  | Copper     | 0.30                       | 0.30                | 0.30          | 0.50          | —             | 0.50           | 0.50           | —               | —         | —                    | —           | —           |
| Heat Treat.      |            | Anneal                     | Quench and Temper   |               | Temper        | Temper        | Temper         | Temper         | Solution anneal |           |                      |             |             |
| Tensile psi min. |            | 70,000                     | 65,000-90,000       | 70,000-95,000 | 70,000-90,000 | 70,000-90,000 | 90,000-115,000 | 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      |
| Elong. % Min.    |            | 22                         | 24                  | 22            | 20            | 20            | 18             | 18             | 18              | 15        | 30                   | 30          | 35          |
| R. Area % Min.   |            | 35                         | 35                  | 35            | 35            | 35            | 35             | 35             | 30              | 25        | —                    | —           | —           |
| Hardness HB      |            | 187 max.                   | 197 max.            | 200 max.      | 207 max.      | 207 max.      | 241 max.       | 241 max.       | 327-381         | 475 min.  | —                    | 187 max.    | —           |
| Parts            |            | BODIES-BONNETS-LARGE DISCS |                     |               |               |               |                |                | DISC MATERIALS  |           | BODIES-BONNETS-DISCS |             |             |

(1) Velan standard: 0.25 or less.

## TRIM SPECIFICATION

| ASTM DESIGNATION  |            | BAR STOCK   |             |                     |             |             |             |                   |              | CAST        |            |                    |
|-------------------|------------|-------------|-------------|---------------------|-------------|-------------|-------------|-------------------|--------------|-------------|------------|--------------------|
|                   |            | CR 13       |             | Stainless Steels    |             |             | Monel       |                   | Hastelloy    | Monel       | Stellite 6 | Austenitic Ductile |
|                   |            | A 479 410*  | A 582 416*  | A 479 316 St. Hard. | A 479 316   | A 564 630   | B 164 Monel | AMS 4676A K-Monel | B574 N 10276 | A 494 M-25S | AMS 5387 A | A 439 D-2C         |
| COMPOSITION %     | Carbon     | 0.15        | 0.15        | 0.08                | 0.08        | 0.07        | 0.3         | 0.25              | 0.010        | 0.25        | 0.9-1.4    | 2.90               |
|                   | Manganese  | 1.00        | 1.25        | 2.00                | 2.00        | 1.00        | 2.0         | 1.50              | 1.0          | 1.50        | 1.0        | 1.80-2.40          |
|                   | Phosphorus | 0.040       | 0.06        | 0.045               | 0.045       | 0.040       | —           | 0.02              | 0.04         | 0.03        | 0.04       | 0.08               |
|                   | Sulphur    | 0.030       | 0.15 min.   | 0.030               | 0.030       | 0.030       | 0.024       | 0.010             | 0.03         | 0.03        | 0.04       | —                  |
|                   | Silicon    | 1.00        | 1.00        | 1.00                | 1.00        | 1.00        | 0.5         | 1.00              | 0.08         | 3.5-4.5     | 1.5        | 1.00-3.00          |
|                   | Nickel     | —           | —           | 10.00-14.00         | 10.00-14.00 | 3.00-5.00   | 63.0        | 63.00-70.00       | Balance      | Balance     | 3.0        | 21.00-24.00        |
|                   | Chromium   | 11.50-13.50 | 12.00-14.00 | 16.00-18.00         | 16.00-18.00 | 15.00-17.50 | —           | —                 | 14.5-16.5    | —           | 27.0-31.0  | 0.50               |
|                   | Molybdenum | —           | —           | 2.00-3.00           | 2.00-3.00   | —           | —           | —                 | 15.0-17.0    | —           | 1.5        | —                  |
|                   | Copper     | —           | —           | —                   | —           | 3.00-5.00   | 28.0-34.0   | Balance           | —            | 27.0-33.0   | —          | —                  |
|                   | Aluminum   | —           | —           | —                   | —           | —           | 3.00        | —                 | 3.00         | —           | —          | —                  |
|                   | Cobalt     | —           | —           | —                   | —           | —           | —           | —                 | —            | —           | Balance    | —                  |
|                   | Tungsten   | —           | —           | —                   | —           | —           | —           | —                 | —            | —           | 3.5-5.5    | —                  |
|                   | Iron       | —           | —           | —                   | —           | —           | —           | —                 | —            | 3.50        | 3.0        | —                  |
| Special Condition |            | Temper      | Hard        | Level 2             | —           | —           | Hot worked  | Hot Fin.          | —            | Age Hard.   | —          | —                  |
| Heat Treat.       |            | Class 2     | Hard Temper | Sol. Ann.           | Sol. Ann.   | H 1100      | —           | —                 | —            | —           | —          | —                  |
| Tensile psi min.  |            | 110,000     | —           | 95,000              | 75,000      | 140,000     | 80,000      | 140,000           | 100,000      | —           | 130,000    | 58,000             |
| Yield psi min.    |            | 85,000      | —           | 75,000              | 30,000      | 115,000     | 40,000      | 100,000           | 41,000       | —           | —          | 28,000             |
| Elong. % min.     |            | 15          | —           | 25                  | 30          | 14          | 30          | 20                | 40           | —           | 1          | 20                 |
| R. Area % min.    |            | 45          | —           | 40                  | 40          | 45          | —           | —                 | —            | —           | —          | —                  |
| Hardness HB       |            | 269 max.    | 293-352     | —                   | —           | 302 min.    | —           | 326 min.          | —            | 300 min.    | 344 min.   | 121-171            |

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

## SOUR SERVICE VALVES

To meet **NACE STANDARD MR0175** Velan manufactures the complete range of valves shown in this catalog in compliance with NACE standard MR0175. Trim materials must be selected by customers from table based on experience in corrosion resistance against sulphides (sour gas) found in processing crude oil.

**For trim material (wedge/disc surface, seat surface, stem) see page 37.**

| TRIM            |                          |
|-----------------|--------------------------|
| NA, ND, NE, NF: | B7M / 2HM<br>RC. 22 MAX. |
| NB, NC, NN:     | B7M / 2HM<br>OR B8M / 8  |

# CAST STEEL GATE, GLOBE & CHECK VALVES

| Type of Connection                                                                | Size of Connection                                                                                                                                                  | Pressure Rating                                                                   | Type                                                                                                                                                                | Body/Bonnet Style                                                                                                                                                     | Body Material                                                                                                                                                           | Trim Material                                                                                                                                                           |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                                                                                 | B                                                                                                                                                                   | C                                                                                 | D                                                                                                                                                                   | E                                                                                                                                                                     | F                                                                                                                                                                       | G                                                                                                                                                                       |
|  |   |  |   |   |   |   |
| e.g.: F                                                                           | 1 0                                                                                                                                                                 | — 0                                                                               | 0 6                                                                                                                                                                 | 4 C —                                                                                                                                                                 | 0 2                                                                                                                                                                     | T Y                                                                                                                                                                     |

**Example:** Flanged 3" class 150 cast carbon steel full bore gate valve with TY trim.

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

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

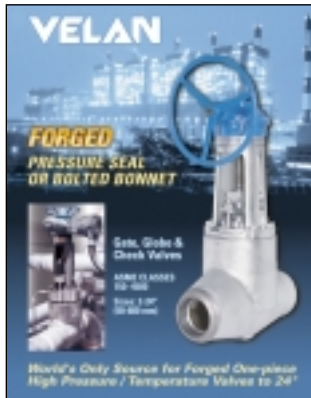
| G TRIM            |                                                     |                             |                            | API Number        | If applicable BELLOWS <sup>(2)</sup> |
|-------------------|-----------------------------------------------------|-----------------------------|----------------------------|-------------------|--------------------------------------|
| CODE              | WEDGE/DISC SURFACE <sup>(1)</sup>                   | SEAT SURFACE <sup>(1)</sup> | STEM                       |                   |                                      |
| MS                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 316                        |                   | 321                                  |
| MY                | CF8M or 316                                         | Stellite 6 <sup>(3)</sup>   | 316                        | 12                | 321                                  |
| TS                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 13 CR (410) <sup>(4)</sup> | 5                 | 321                                  |
| TY                | 13 CR (410 or CA15)                                 | Stellite 6 <sup>(3)</sup>   | 13 CR (410)                | 8                 |                                      |
| NA                | 13 CR (410 or CA15) HRC 22 max                      | Stellite 6 <sup>(3)</sup>   | 13 CR (410) HRC 22 max.    | 8 <sup>(6)</sup>  |                                      |
| NB                | CF8M                                                | Stellite 6 <sup>(3)</sup>   | 316                        | 12 <sup>(6)</sup> | 321                                  |
| NC                | Monel                                               | Stellite 6 <sup>(3)</sup>   | Monel                      | 11 <sup>(6)</sup> | Hastelloy C                          |
| ND                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 630 (H1150M)               |                   |                                      |
| NE                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 13 CR (410) HRC 22 max.    | 5 <sup>(6)</sup>  |                                      |
| NF                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | Same as Body               |                   |                                      |
| NG                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 316                        |                   | 321                                  |
| NN                | CF8M                                                | Stellite 6 <sup>(3)</sup>   | 316                        |                   | IN 625                               |
| NX                | Monel                                               | Monel                       | Monel                      |                   |                                      |
| AS                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 321                        |                   | 321                                  |
| AY                | CF8C/F321                                           | Stellite 6 <sup>(3)</sup>   | 321                        |                   | 321                                  |
| CC                | Alloy 20                                            | Alloy 20                    | Alloy 20                   | 13                |                                      |
| ES                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 347                        |                   |                                      |
| EY                | CF8C/F347                                           | Stellite 6 <sup>(3)</sup>   | 347                        |                   |                                      |
| HC                | Hastelloy C                                         | Stellite 6 <sup>(3)</sup>   | Hastelloy C                |                   | Hastelloy C                          |
| MF                | CF8M or 316 w/ Teflon insert <sup>(5)</sup>         | Stellite 6 <sup>(3)</sup>   | 316                        |                   |                                      |
| MH                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 316                        |                   | Hastelloy C                          |
| MN                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 316                        |                   | IN 625                               |
| MX                | CF8M                                                | 316                         | 316                        | 10                |                                      |
| TF                | 13 CR (410 or CA15) w/ Teflon insert <sup>(5)</sup> | Stellite 6 <sup>(3)</sup>   | 13 CR (410)                |                   |                                      |
| TH                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 13 CR (410) <sup>(4)</sup> |                   | Hastelloy C                          |
| TN                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | 13 CR (410) <sup>(4)</sup> |                   | IN 625                               |
| XS                | Stellite 6 <sup>(3)</sup>                           | Stellite 6 <sup>(3)</sup>   | Monel                      |                   |                                      |
| XX                | Monel                                               | Monel                       | Monel                      | 9                 |                                      |
| XY                | Monel                                               | Stellite 6 <sup>(3)</sup>   | Monel                      | 11                |                                      |
| SX <sup>(7)</sup> | Same as body                                        | Integral                    | Same as body               | 10                |                                      |
| GX <sup>(7)</sup> | Same as body                                        | Integral                    | Same as body               | 10                |                                      |
| SY <sup>(7)</sup> | Same as body                                        | Stellite 6 <sup>(3)</sup>   | 316                        | 12                |                                      |
| GY <sup>(7)</sup> | Same as body                                        | Stellite 6 <sup>(3)</sup>   | 316                        | 12                |                                      |
| GS                | Stellite 6 <sup>(3)</sup>                           | Integral                    | 316                        |                   |                                      |
| SB <sup>(7)</sup> | Bronze                                              | Integral                    | 316                        |                   |                                      |

- (1) Base material is either the same as the body or solid trim at manufacturer's option.  
 (2) Bellows material shown as standard, Inconel can be used in lieu of 321 and Hastelloy C in lieu of Inconel, where design and/or pressure class applicable.  
 (3) Stellite 6 or Stellite 21 based on material or application at manufacturer's option.  
 (4) 616HT Manufacturer's Std. (F91 and C12A only).  
 (5) Inserts may be in seat or wedge at manufacturer's option.  
 (6) NACE service valves are supplied with all materials conforming to NACE MRO175. (Including bolting with max. hardness of RC22).  
 (7) SB, SX, SY PTFE gasket and packing GS, GX, GY Graphite gasket and packing.

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

**THE MOST COMPREHENSIVE LINE OF INDUSTRIAL FORGED AND CAST STEEL,  
GATE, GLOBE, CHECK, BALL, KNIFE GATE AND BUTTERFLY VALVES**

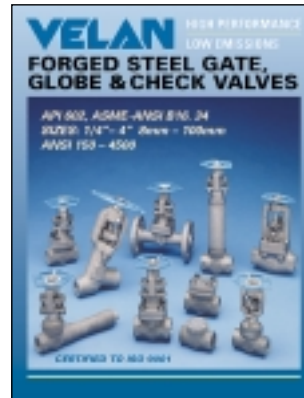
**ASME Pressure Classes 150–4500 in Carbon, Alloy and Stainless Steel**



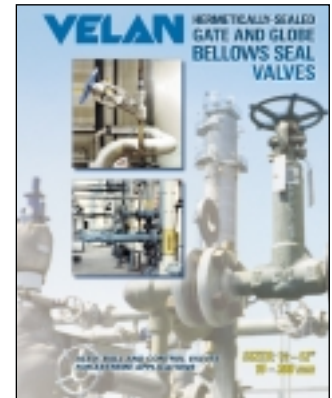
**VEL-PS**



**VEL-BG**



**VEL-SFV**



**VEL-BS**



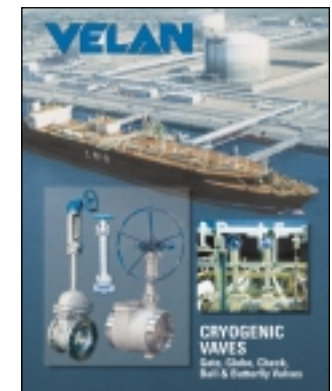
**VEL-PRO-CV**



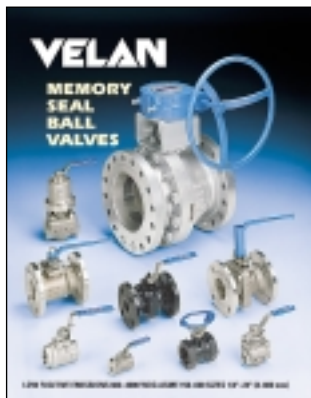
**VEL-API-603**



**VEL-KGV**



**VEL-CRYO**



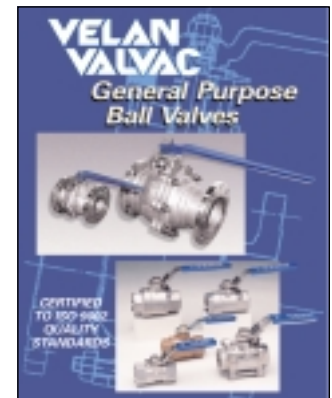
**VEL-BV**



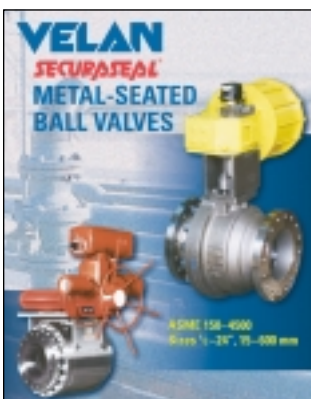
**VEL-UB**



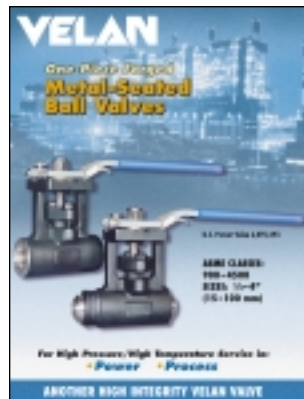
**VEL-TE**



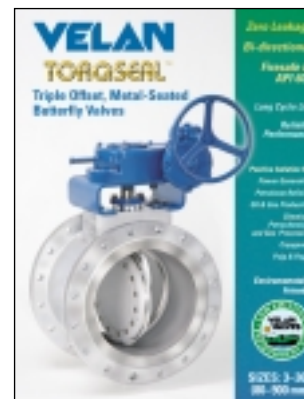
**VEL-GP2BV**



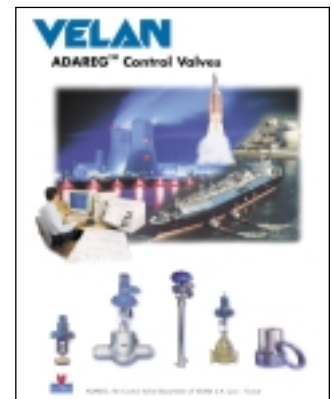
**VEL-MS**



**VEL-PBV**



**VEL-BF**



**VEL-ADCV**