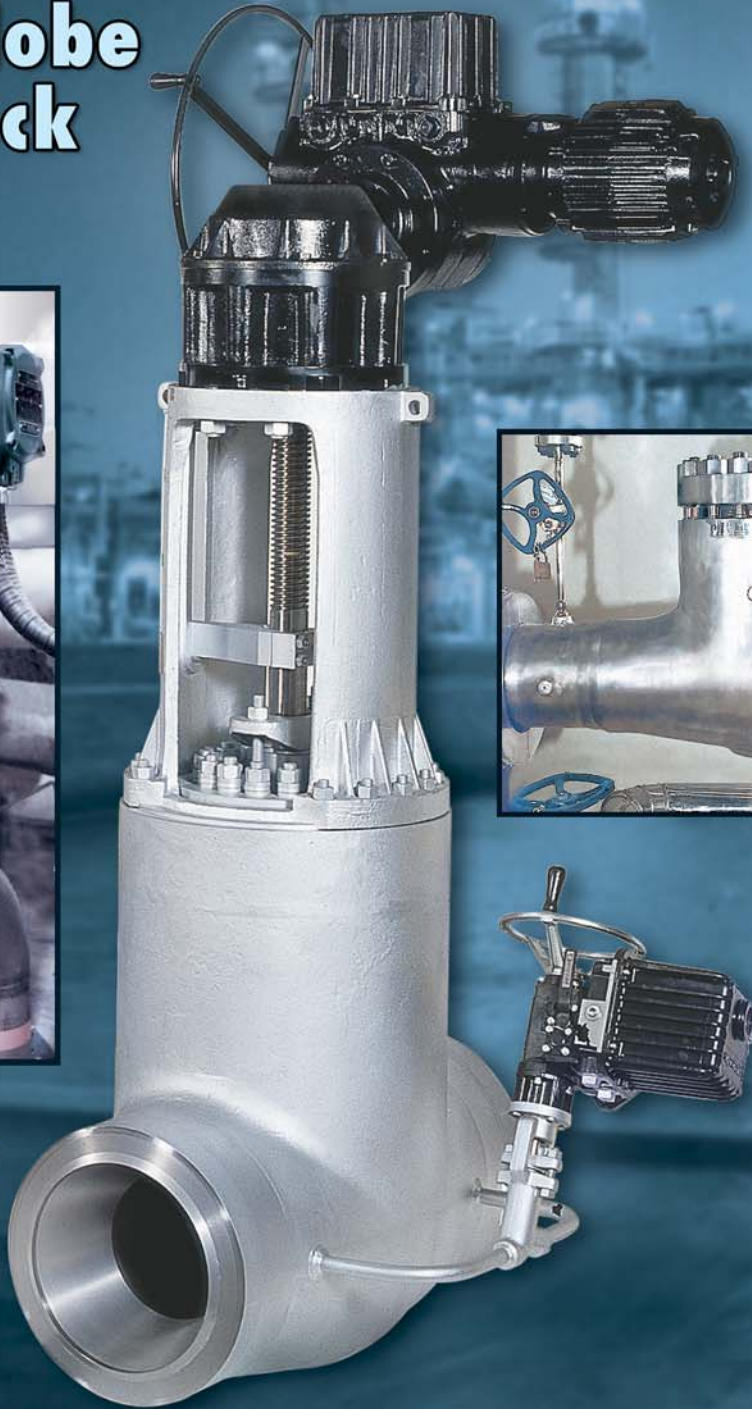


# VELAN

## Pressure Seal & Bolted Bonnet

### Gate, Globe and Check Valves



**ASME Classes:  
150–4500**

**Sizes: 2–24"  
(50–600 mm)**

**The Only Source for Forged One-Piece  
High Pressure / Temperature Valves to 24" (600 mm)**


# VELAN'S GLOBAL NETWORK

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## Manufacturing - North America



**Plant 1**  
**Montreal, Canada - Velan Inc.**   
 98,000 sq. ft. (9,108 m<sup>2</sup>)  
 Small forged gate, globe, y-pattern globe, and check valves



**Plant 2 and 7**  
**Montreal, Canada - Velan Inc.**   
 170,000 sq. ft. (15,800 m<sup>2</sup>)  
 Large forged and cast steel gate, globe, check, ball, and triple-offset butterfly valves




**Plant 4 and 6**  
**Granby, Canada - Velan Inc.**  
 223,000 sq. ft. (20,720 m<sup>2</sup>)  
 Cast steel gate, globe, check, and resilient and metal-seated ball valves



**Plant 5**  
**Montreal, Canada - Velan Inc.**  
 119,000 sq. ft. (10,220 m<sup>2</sup>)  
 Dual plate check, triple-offset butterfly, metal-seated ball, and Power Ball valves



**Plant 3**  
**Williston, VT, U.S.A. - Velan Valve Corp.**   
 156,000 sq. ft. (14,400 m<sup>2</sup>),  
 Forged and cast steel gate, globe, and check valves

## Manufacturing - Europe



**Plant**  
**Lyon, France - Velan S.A.S.**  
 176,000 sq. ft. (16,350 m<sup>2</sup>)  
 Forged gate, globe, check, control, and butterfly valves mainly for nuclear and cryogenic applications



**Plant**  
**Mennecy, France - Segault**  
 21,530 sq. ft. (2,000 m<sup>2</sup>)  
 Globe, safety, instrumentation, relief, and control valves mainly for nuclear applications



**Plant**  
**Leicester, England - Velan Valves Ltd.**  
 14,000 sq. ft. (1,300 m<sup>2</sup>)  
 Steam traps and bonnetless globe valves



**Plant**  
**Lisbon, Portugal - Válvulas Industriais, Lda.**  
 60,000 sq. ft. (5,600 m<sup>2</sup>)  
 Cast steel gate, globe, check, and bellows seal valves



**Plant**  
**Lucca, Italy - Velan ABV S.p.A**  
 80,000 sq. ft. (8,000 m<sup>2</sup>)  
 API 6D and specialty valves, actuators, and control systems



**Head Office**  
**Montreal, Canada - Velan Inc.**  
 47,000 sq. ft. (4,366 m<sup>2</sup>)

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

**Velan head office:**  
 7007 Côte de Liesse,  
 Montreal, QC H4T 1G2 Canada  
 Tel: (514) 748-7743  
 Fax: (514) 748-8635

 - ASME N-stamp accredited manufacturer

# VELAN'S GLOBAL NETWORK

## Manufacturing - Asia

Plant



**Ansan City, South Korea - Velan Ltd.**  
**Plant 1** - 20,000 sq. ft. (1,900 m<sup>2</sup>)  
Cast steel gate, globe, and check valves

Plant



**Ansan City, South Korea - Velan Ltd.**  
**Plant 2** - 62,500 sq. ft. (5,800 m<sup>2</sup>)  
Cast steel gate, globe, check, ball, and dual plate check valves

Plant



**Taichung, Taiwan - Velan-Valvac**  
20,000 sq. ft. (1,840 m<sup>2</sup>)  
Resilient-seated ball valves

Plant



**Suzhou, China - Velan Valve (Suzhou) Co., Ltd.**  
63,500 sq. ft. (5,900 m<sup>2</sup>)  
Machined components and y-pattern bonnetless valves

## Distribution centers



**Granby, Canada - VelCAN**  
50,000 sq. ft. (4,645 m<sup>2</sup>)



**Benicia, CA, U.S.A. - VelCAL**  
15,000 sq. ft. (1,400 m<sup>2</sup>)



**Marietta, GA, U.S.A. - VelEAST**  
6,500 sq. ft. (600 m<sup>2</sup>)



**Willich, Germany - Velan GmbH**  
12,000 sq. ft. (1,115 m<sup>2</sup>)

Check our website for more specific contact information.

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

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## VELAN AT A GLANCE

### History

- Founded in 1950

### Sales

- Over \$450 million

### People

- Over 1,800 employees

### Global network

- 15 production facilities
- 5 plants in North America
- 6 plants in Europe
- 4 plants in Asia
- 4 stocking and distribution centers
- Hundreds of distributors worldwide
- Service shops worldwide

### Product line

A world-leading range of cast and forged steel gate, globe, check, ball, triple-offset butterfly, knife gate, severe service, and bellows seal valves and steam traps across all major industrial applications.

### Quality

All major approvals

- ISO 9001 (since 1991)
- ASME N stamp for nuclear valves (since 1970)
- API 6D
- Total Process Improvement Program including Lean Manufacturing, Six Sigma

### Engineering

Leader in valve design with many first-to-market innovations:

- Extensive engineering, R&D, cycle test facilities, and stress analysis
- Proven ability to satisfy special project requirements
- Field Engineering Services

### Production capabilities

Leader in automated production:

- CNC and multi-station transfer machines

### Velan value

- Strong management team, stable company
- Products proven to offer:
  - Low emissions
  - Easy maintenance
  - Long and reliable service
  - Low total cost of ownership
  - Quality that lasts

# TOTAL QUALITY & PROCESS IMPROVEMENT

# VELAN

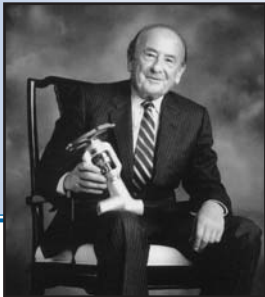
▼ Total Quality Commitment ▼

Velan Total Quality Program

*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 goal is Total Quality and On-Time Delivery; our method is Total Commitment.*



*A.K. Velan*

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

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

## TOTAL PROCESS IMPROVEMENT

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

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

## CERTIFICATES/APPROVALS

Velan holds all major applicable approvals, including ISO 9001:2000, PED, ASME N/NPT, TÜV, and TA-Luft. Velan's comprehensive quality program is fully compliant with the most stringent industry standards and has been surveyed and audited by leading organizations, regulatory bodies, utilities and architect/engineers from around the world.



## TOTAL PROCESS IMPROVEMENT PROGRAM:

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

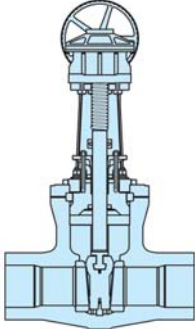
## CERTIFICATIONS/APPROVALS:

- ISO 9001:2000 (since 1991)
- PED
- ASME N and NPT (since 1970)
- AD2000-Merkblatt HP 0 and A4/TRD 110
- TA-Luft
- QA Program fully compliant with NCA 4000, ASME NQA-1 and 10 CFR 50 Appendix B
- Quality Programs surveyed by ASME and audited by NUPIC, Northrop Grumman Newport News, DCMA, utilities, architect/engineers and other organizations from around the world

# HIGH PRESSURE/HIGH TEMPERATURE PRESSURE SEAL & BOLTED BONNET VALVES

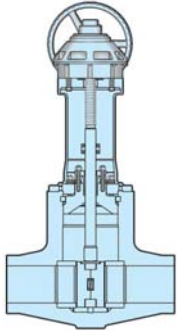
## STANDARD PRODUCTION RANGE

For valve sizes, ASME Classes and designs not shown below, please consult Velan Engineering.



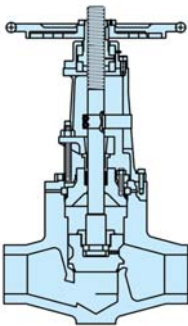
### FLEXIBLE WEDGE GATE VALVES

TYPE	ASME 150 (PN 20)	ASME 300 (PN 50)	ASME 600 (PN 100)	ASME 900 (PN 150)	ASME 1500 (PN 250)	ASME 2500 (PN 420)	ASME 4500 (PN 760)
Pressure Seal - pg. 18	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2½-8" (65-200 mm)
Bolted Bonnet - pg. 20	2½-24" (65-600 mm)	2½-24" (65-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2-16" (50-400 mm)	-	-



### PARALLEL SLIDE GATE VALVES

TYPE	ASME 150 (PN 20)	ASME 300 (PN 50)	ASME 600 (PN 100)	ASME 900 (PN 150)	ASME 1500 (PN 250)	ASME 2500 (PN 420)	ASME 4500 (PN 760)
Pressure Seal - pg. 24	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	-
Bolted Bonnet - pg. 26	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-16" (50-400 mm)	-	-

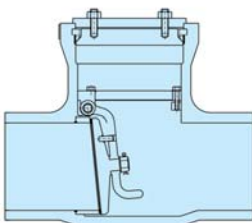


### GLOBE VALVES

TYPE	ASME 150 (PN 20)	ASME 300 (PN 50)	ASME 600 (PN 100)	ASME 900 (PN 150)	ASME 1500 (PN 250)	ASME 2500 (PN 420)	ASME 4500 (PN 760)
Pressure Seal - pg. 30	-	-	2-16" (50-400 mm)	2-14" (50-350 mm)	2-14" (50-350 mm)	2-10" (50-250 mm)	2½-6" (65-150 mm)
Bolted Bonnet - pg. 32	2½-14" (65-350 mm)	2½-14" (65-350 mm)	2½-14" (65-350 mm)	2½-14" (65-350 mm)	2½-14" (65-350 mm)	-	-
Pressure Seal - pg. 34 Y-Pattern	-	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-20" (50-500 mm)	-

Inclined globe valve design available (but not shown).

### CHECK VALVES



TYPE	ASME 150 (PN 20)	ASME 300 (PN 50)	ASME 600 (PN 100)	ASME 900 (PN 150)	ASME 1500 (PN 250)	ASME 2500 (PN 420)	ASME 4500 (PN 760)
Pressure Seal - pg. 38 Swing Check	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	-
Bolted Cover - pg. 39 Swing Check	2½-24" (65-600 mm)	2½-24" (65-600 mm)	2½-24" (65-600 mm)	2½-24" (65-600 mm)	2½-16" (65-400 mm)	-	-
Pressure Seal - pg. 40 Tilting Disc Check	-	-	2-24" (50-600 mm)	2-24" (50-600 mm)	2-24" (50-600 mm)	2-20" (50-500 mm)	-
Pressure Seal - pg. 41 Piston Check	-	-	2-10" (50-250 mm)	2-14" (50-350 mm)	2-14" (50-350 mm)	2-10" (50-250 mm)	-
Bolted Cover - pg. 42 Piston Check	2½-10" (65-250 mm)	2½-10" (65-250 mm)	2½-10" (65-250 mm)	2½-14" (65-350 mm)	2½-14" (65-350 mm)	-	-
Pressure Seal - pg. 43 Y-Pattern Piston Check	-	-	-	2½-24" (65-600 mm)	2½-24" (65-600 mm)	2½-20" (65-500 mm)	-

# APPLICATIONS IN MAJOR INDUSTRIES

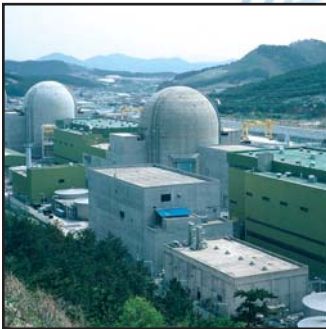
All over the world, Velan valves are used by the world's leading industrial companies to help keep their operating facilities running smoothly. In fact, Velan valves have a long history of proving themselves in many of the industrial world's toughest applications.



## Thermal & Cogeneration Power

Velan has supplied complete valving in sizes ½ to 60" to over 2500 thermal power stations around the world, for low and HP/HT service of up to 4500 psi and 1200°F.

Velan pioneered many innovations such as forged valves to 24" (versus castings) to resolve external and internal leakage, extend service life and reduce maintenance.



## Nuclear Power

Velan's leadership in the power field extends to the nuclear industry. Velan has supplied valves for over 300 nuclear stations in 27 countries, including 90% of stations in the U.S.A. and 100% of stations in Canada, France, Korea, China and Taiwan. Velan has held ASME 'N' and 'NPT'

certificates of authorization for our North American production facilities since 1971.

We pioneered many innovations such as bellows seal valves (1954), emission-free packing chambers and live-loading (1968) which became industry standards.



## Chemical, Petrochemical & Other Process Applications

Velan HP/HT Pressure Seal & Bolted Bonnet Valves are used in a broad range of industrial process applications, including:

- Coal Liquefaction & Gasification,
- Catalytic and Fluidized Catalytic Crackers,
- Catalytic Reformers
- Catalyst Slurries
- Heavy Oil Steam Injection
- Hot Gases
- Hydrogen
- Olefin Plants
- Coker Plants



## Marine & Navy

For over 50 years, Velan has supplied low and HP/HT valves to the US Navy and other NATO fleets.

In all, Velan valves are installed on over 900 Navy ships, including all US Navy nuclear aircraft carriers and many US Navy nuclear submarines and destroyers.



# PERFORMANCE UNDER PRESSURE

**VELAN HIGH PRESSURE/HIGH TEMPERATURE  
PRESSURE SEAL & BOLTED BONNET VALVES DELIVER HIGH  
PERFORMANCE IN A VARIETY OF SEVERE APPLICATIONS**



*10" (250 mm) Pressure seal valve installed at Profertil's plant in Bahia Blanca, Argentina.*



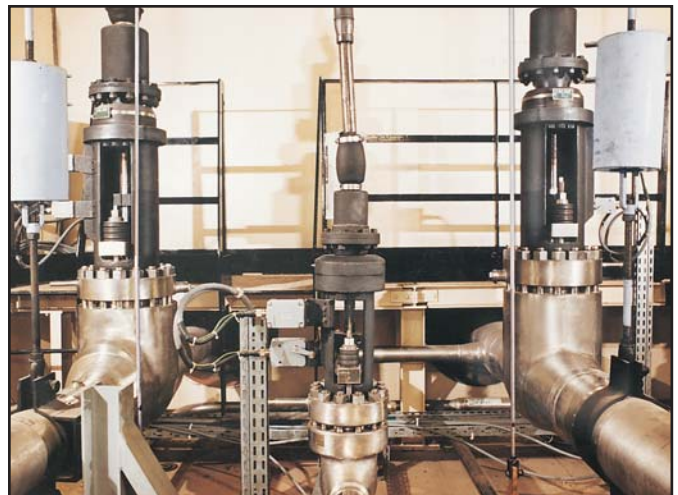
*Pressure seal check valves installed in a nuclear power facility.*



*Pressure seal valve in a cogeneration power plant.*



*Pressure seal valves used in oil and gas applications.*

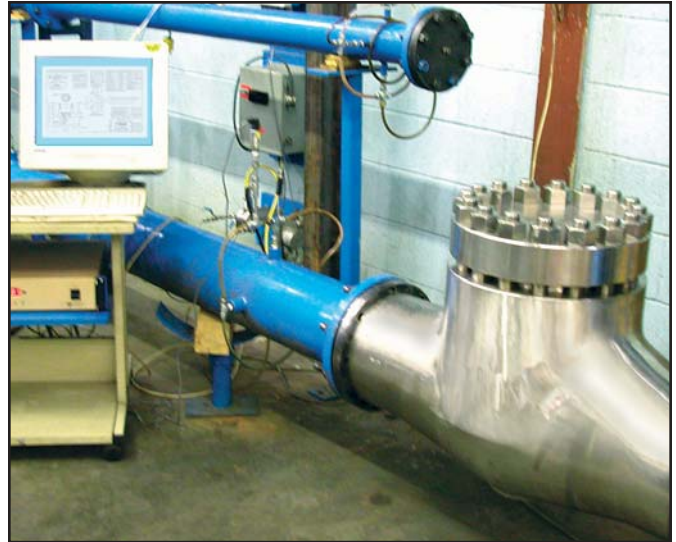


*Velan qualification testing program with Électricité de France.*

# ENGINEERED SOLUTIONS DESIGNING HIGH PRESSURE VALVES

Velan's Engineering Design and Applications Group is comprised of approximately 50 professional engineers with extensive experience in critical applications across a broad range of industries. Using advanced software tools, including finite element analysis (FEA), computational fluid dynamics (CFD) and 3D solid modeling, Velan engineers design superior quality valves that meet the most demanding performance requirements. Velan's R&D facilities, equipped with steam boilers and superheaters, flow loops and cryogenic test stands, provide the company with extensive testing capabilities.

Whether we are refining the design of our standard valves, or engineering valves to meet the demands of a specific application, Velan's vast engineering resources can handle the task. In fact, Velan has a long history of partnering with major architect/engineers, electric utilities and other end users to develop innovative solutions for their valving needs.



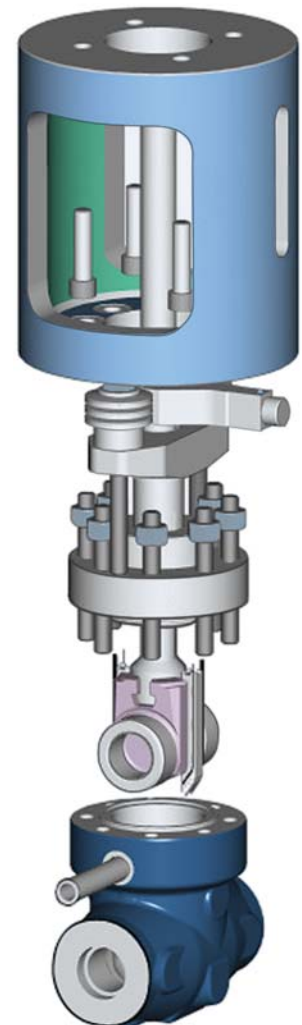
*Flow testing on a 10" (250 mm) Class 1500 forged bolted cover swing check valve.*



*Velan used Computational Fluid Dynamics to improve the flow characteristics of this 4" (100 mm) globe valve.*

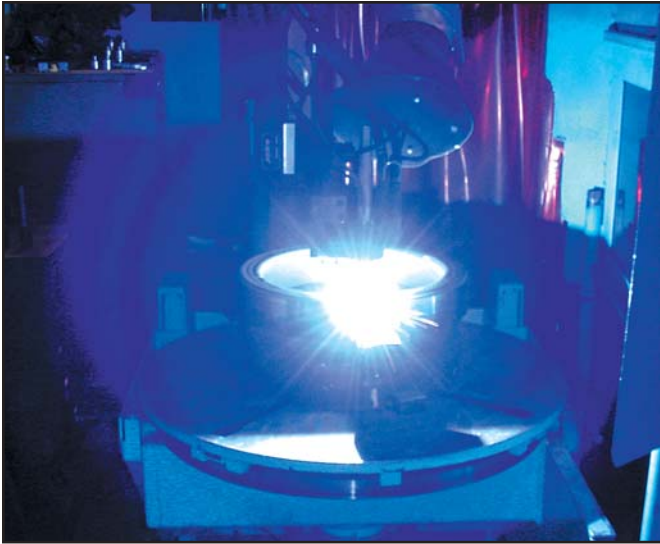
*Right: A second generation gate valve developed by Velan to meet the requirements of a major North American Nuclear Utility in compliance with US NRC GL89-10 and EPRI PPM sizing requirements.*

*Left: Velan's QC Department tests an automated valve solution designed specifically for a leading international architect/engineering firm, for turbine bypass inlet isolation.*





# MACHINERY AND EQUIPMENT FOR LARGE DIAMETER VALVE PRODUCTION



*Automatic PTAW (Plasma Transfer Arc Welding).*

Velan's production machinery and equipment are specially engineered to meet the requirements of advanced large valve manufacturing. This includes large CNC horizontal and vertical boring mills with tool changers, NC lathes and NC machining centers for valve bodies and parts. Over 150 CNC machines are in operation in Velan's North American plants.

Velan has qualified procedures, welders and welding operators for all of the major processes, including SMAW, GTAW, GMAW, PTAW and SAW. Specialized welding equipment includes automatic PTAW and GTAW hardfacing equipment. A typical set up of PTAW hardfacing equipment is shown at the left.

Production testing equipment is designed to safely and efficiently test high pressure valves in strict accordance with industry codes and standards, as well as customer imposed criteria.

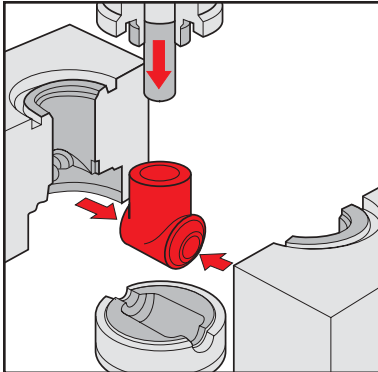
Large valves to 28" (700 mm) are manufactured in Plant 2 (Canada), in Plant 3 (USA) and in Lyon (France).



*A large CNC horizontal boring mill (with tool changers) machining forged pressure seal bodies.*



# UNIQUE SOURCE FOR ONE-PIECE FORGED VALVES UP TO 24" (600 mm)



## WHY FORGINGS?

When compared with castings, forged valve bodies offer the advantages of more uniform structure, greater density, higher strength integrity, enhanced dimensional characteristics and closer dimensional tolerances.

The directional structure (flowlines) is superior from an overall strength and stress standpoint against castings. (see Figure 1 below)

## HIGH STRENGTH

Hot forgings promote recrystallization and grain refinement allowing the material to develop maximum possible strength and uniformity with a minimum variation from piece to piece. The grain flow closely follows the outline of the body and continuous flow lines decrease the susceptibility for fatigue or common failures.

## STRUCTURAL INTEGRITY

Forging eliminates internal flaws and produces a coherent and uniform metallurgical structure assuring optimum performance. Where stress and intergranular corrosion are a problem, a forging will significantly increase the probability of longer life and trouble-free service.

## DIMENSIONAL & METALLURGICAL UNIFORMITY

Dimensional uniformity of closed-die forgings results in positive control of critical wall thickness, eliminating deficiencies caused by shifted cores in castings.

A uniform metallurgical structure without internal flaws is assured by (a) quality, segregation-free billet and (b) high impact forces achieved on 10,000–30,000 ton presses.

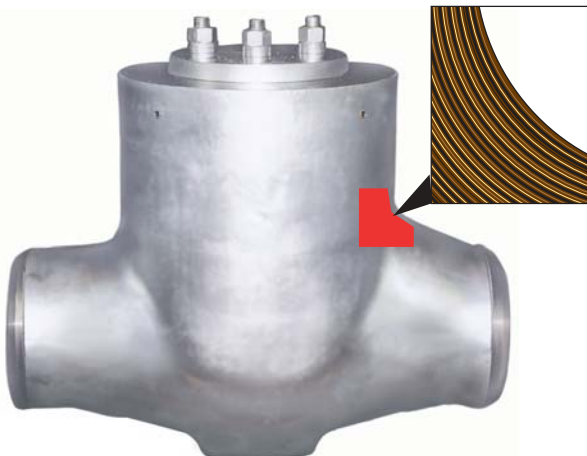


Figure 1: Continuous flow lines in highly stressed crotch area.

## RELIABILITY

The ability of forgings to meet design requirements consistently is one of the most important advantages and takes into account all the preceding characteristics to some degree.

## QUALITY ASSURANCE OF FORGINGS

Through the use of forgings, with their uniformity and high quality, the radiographic requirement for comparable Class 1 cast components is eliminated. Recognizing this, the United States Navy regularly specifies forgings for valves and other components for nuclear submarines and aircraft carriers.

All that is required by the ASME Code for forgings is ultrasonic examination and magnetic particle or liquid penetrant testing in the finished condition. Rejections of forgings for inherent deficiencies found by U.T., M.T., or P.T. methods are rare.

## FORGING PROCESS FOR VELAN BODY FORGINGS 12-24" (300-600 mm)



## QUALITY OF FORGINGS BEGINS WITH THE SEGREGATION-FREE, UNIFORM AND PURE INGOT

Special alloys and stainless steels are manufactured in vacuum induction melt furnaces. Electrodes produced in these furnaces are remelted in vacuum with electrodes pressed directly from chemical powders, resulting in further purification. Solidification is controlled by electronic circuits making possible segregation-free ingots – a task that is difficult to achieve with castings.

Alloy steel heats are vacuum-treated on degassing units to reduce hydrogen content to less than two parts per million and reduce metallic oxides. Teeming (pouring) of ingots is done usually under argon gas shielding. All processes proceed under the watchful eyes of the laboratories using sophisticated monitoring equipment.

# CONTINUOUS CASTING QUALITY IMPROVEMENT AND COMPUTERIZED CASTING PROCESS SIMULATION

Velan introduced our large diameter forged valves for high/pressure temperature applications over 40 years ago. Since then, we have become the market leader in forged pressure seal and bolted bonnet gate, globe and check valves in sizes up to 24" and 4500 ASME pressure rating. The inherent properties of forgings result in performance advantages over comparable casting grades in strength, resistance to creep attack and over-all reliability and service life. We are proud to provide these unique products to the market and commit to continue to do so.

However, significant changes in raw material costs, availability and global forging sources have dictated that we offer an alternative to our forged line. Please note in this catalog the alternative of cast, large diameter pressure seal and bolted bonnet gate, globe and check valves. As with all our products, we are committed to providing these cast valves to the industry quality standards that you have come to expect from Velan, while we continue to recommend forged valves for high pressure/temperature service.

## VELAN'S VEL-QCI-955 PROGRAM

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. This program includes:

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

## SAMPLE CASTINGS

Before castings are released for production at the foundry, Velan evaluates and approves the submitted pilot casting x-ray films (100% coverage) as per B16.34 acceptance standard.

## X-RAY MONITORING

Every 6 months, castings from each foundry (random selection) are X-rayed per B16.34 requirements. If casting fails to meet the x-ray requirements of B16.34, Velan's foundry expert will issue a corrective action request to the vendor, including recommendations for detailed methoding change, corrective action and re-x-ray.

## CASTING MONITORING

Data on ejected castings due to defects such as hydro-test leakage, porosity, inclusions and/or shrinkage indication discovered by x-ray or machining, is recorded and evaluated as part of the statistical control program for each foundry.

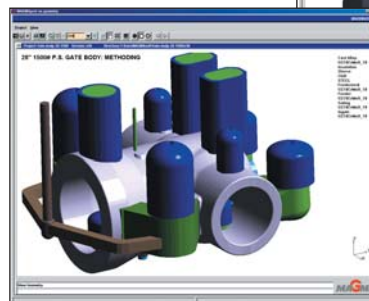
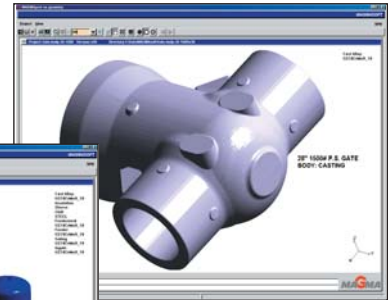
## 3-D SOLIDIFICATION SIMULATION

Velan is one of the first valve manufacturers in the world to have the Magmasoft® computer casting simulation program and employs a dedicated staff for casting simulation work. Our valve designers, together with foundry engineers are continuing to work to improve the

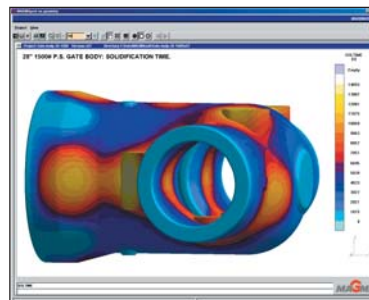
overall integrity of castings (to X-Ray Level II or better as a general standard). Note that high pressure castings (>900°F/482°C) follow a far more stringent protocol (100% x-ray coverage and higher acceptance criteria.)

An example of the successful cooperation of Engineering, our Casting Simulation Technologist and the foundry, using the Magmasoft® simulation, is shown below.

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

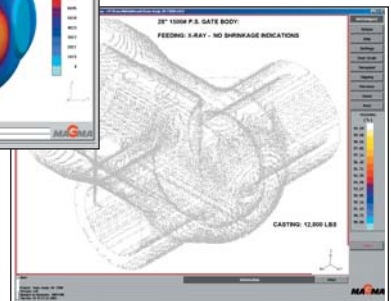


*Riser and gating simulation on a 28" (700 mm) Class 1500 pressure seal gate body.*



*Simulation shows the solidification time on a 28" (700 mm) Class 1500 pressure seal gate body.*

*No shrinkage on a 28" (700 mm) Class 1500 pressure seal gate body simulation.*

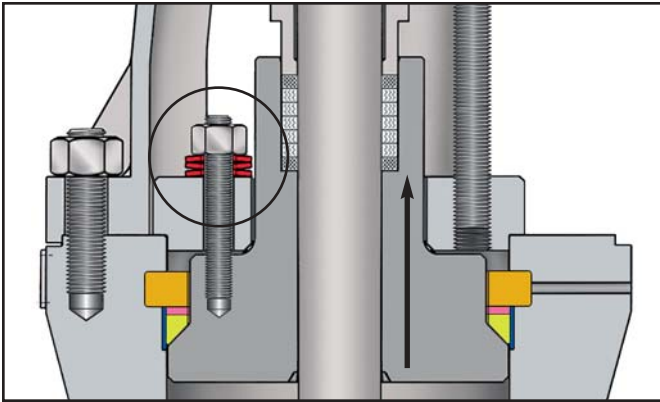


## BENEFITS OF VELAN'S CASTING QUALITY IMPROVEMENT PROGRAM TO CUSTOMERS AND TO THE FOUNDRIES

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

*Please note that high performance cast and forged valve internal components are fully interchangeable.*

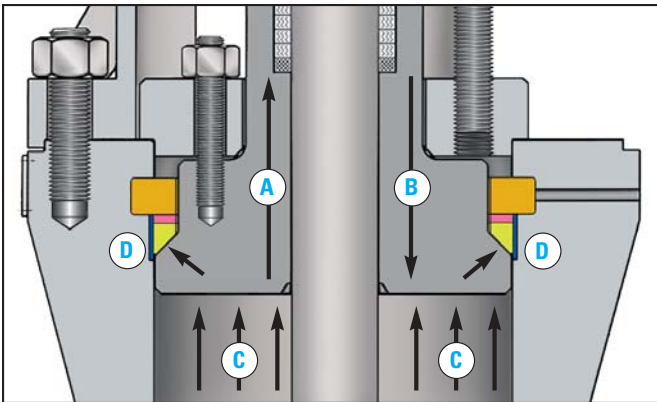
# VELAN, INNOVATIVE PRESSURE SEAL DESIGN



## GENERAL FEATURES OF THE VELAN PRESSURE SEAL DESIGN

- **Bonnet take-up bolts** establish the initial seal of the pressure seal joint (body to gasket to bonnet) (see below right).
- **Segmental thrust ring** absorbs all the thrust applied by internal pressure.
- **Drilled knock-out holes** for ejecting out thrust rings, using pins.
- **Outer row of studs** secures the yoke to the body.
- **Spacer ring** provides bearing surface and prevents deformation of the gasket.
- **Graphite gasket standard** (see right).

## BASIC PRINCIPLES OF OPERATION - HOW PRESSURE SEAL VALVES WORK



- A/B.** Bonnet tendency to move up or down as pressure changes.
- C.** System pressure.
- D.** Sealing forces due to pressure.

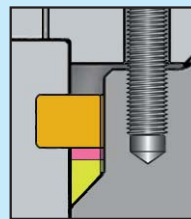
The higher the internal pressure, the greater the sealing force. Easy dismantling is made possible by dropping the bonnet assembly into the body cavity and driving out the four-segmental thrust rings by means of a push pin.

## OPTIMIZED FOR CRITICAL POWER PLANT APPLICATIONS

Velan's pressure seal design has been optimized for and successfully field tested in tough power applications, including "peaking" type cogeneration plants or daily start & stop (DSS) / weekend start & stop (WSS) plants where valves are subject to frequent start-ups and shut-downs.

## GRAPHITE GASKETS

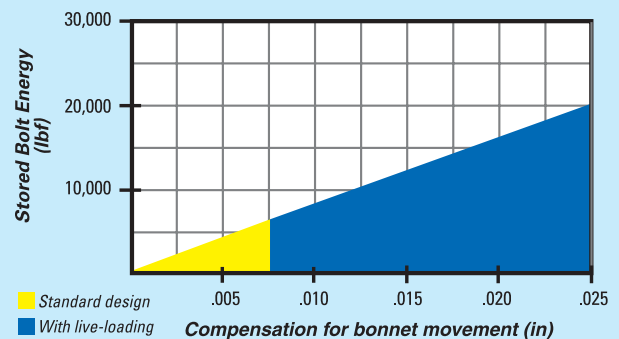
*standard, valves up to ASME Class 2500*



Velan offers graphite pressure seal gaskets as standard, instead of soft iron gaskets, providing a more flexible seal for applications with fluctuating conditions. (Silver-plated soft iron gaskets are available on request.)

## LIVE-LOADING OF BONNET BOLTING

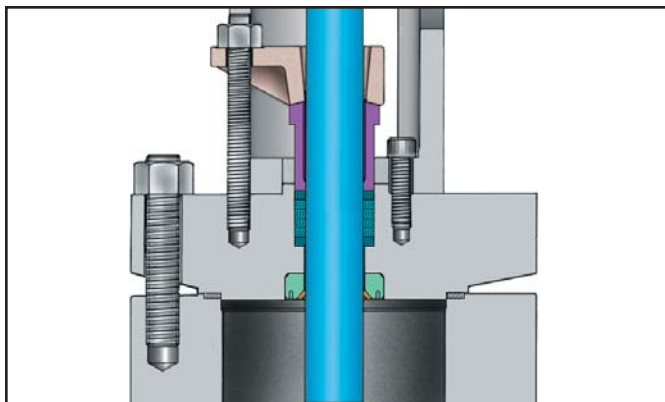
*standard, valves 8" (200 mm) and greater*



Live-loading maintains bonnet seal regardless of pressure-temperature fluctuations.

1. **Live-loading of bonnet bolting** stores the required sealing load during a pressure or temperature induced transient.
2. **Live-loading** automatically compensates for the transient loads which cause bonnet movement by maintaining a positive load on the pressure seal gasket as the pressure reduces.

# VELAN'S RELIABLE BOLTED BONNET DESIGN



Velan's High Pressure Bolted Bonnet Body Joint designs are available with forged steel bodies, and designed to ASME B16.34. Bolted bonnet valves are generally recommended over pressure seal valves for any applications with pressure below 500 psi (34.5 bar).

## STRONGER BOLTING ENSURES JOINT TIGHTNESS

Simple stress versus deflection tests conducted in our laboratory in 1972 on spiral wound gaskets confirmed that control of leakage is highly dependent on gasket seating stress and that ASME Section III Code data at the time, namely the seating factor  $m = 3$  and seating stress  $\gamma = 4,500$  psi, were inadequate. Gasket seating stress of  $\gamma = 16,000$  psi was found to be essential for a leakproof joint. The ASME later changed  $\gamma$  to 10,000 psi but the seating factor  $m$  remains unchanged.

### Velan Recommended Values

GASKET OD	ASME m	VELAN m	ASME $\gamma$	VELAN $\gamma$
2 - 5.5"	3	7	10,000	16,000 - 28,000
6 - 11"	3	6	10,000	16,000 - 25,000
12 - 20"	3	6	10,000	16,000 - 20,000

## HIGHER BOLTING TORQUES

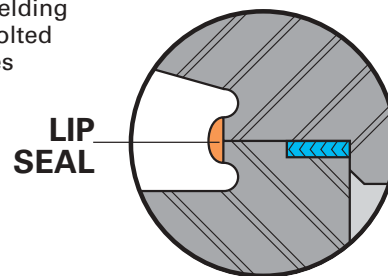
Tests also revealed that bolts are more resistant to fatigue and creep if pre-loaded to as high as 70% of yield at room temperature. SA-193-B7 or SA-564-630 bolts are torqued to 45,000 psi.

## MODERN TORQUING PROCEDURE

Since it is important to control gasket seating stress, the method of applying gasket load must be accurate. The first torquing of bolts is performed at 10-20% higher than recommended values. In the second round, each nut is removed and lubricated, and the bolts are retorqued at maximum values (standard for forged valves 2-24", (50-600 mm)).

## SEAL WELDING PROVISION

Provision for seal welding is available for all bolted bonnet forged valves sizes 2½-24" (65 - 600 mm).

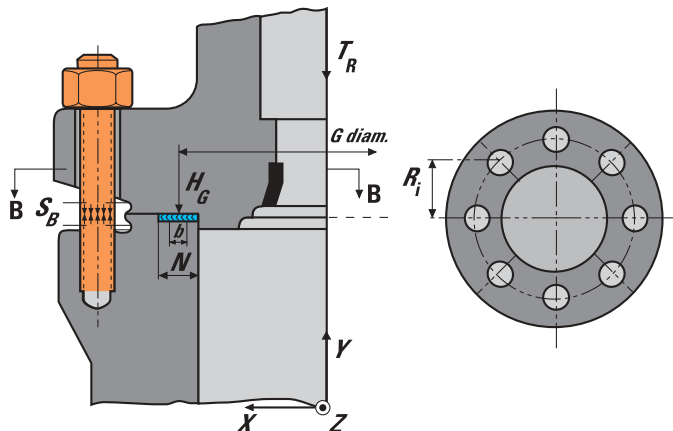


## FULLY-ENCASED SPIRAL WOUND GASKET

The design of gasketed joints is critical for low-emission applications. For better control and elimination of unwinding of spiral wound gaskets, a fully-enclosed gasket cavity is provided as a standard.

## CALCULATIONS

The bolt load is calculated to meet the operating load  $Wm_1$  or the gasket seating load  $Wm_2$ , whichever is greater. In low pressure applications the seating load is larger.



Notation for calculation of gasket load.

$$Wm_1 = H_G + H_P + T_R$$

$$Wm_2 = 3.14 b G y$$

- where
- $H_G$  = hydrostatic end force =  $0.785 G^2 P$
  - $H_P$  = minimum gasket compression  
=  $2b \times 3.14 G m P$
  - $T_R$  = stem thrust
  - $b$  =  $\frac{1}{2}$  gasket width
  - $m$  = gasket seating factor
  - $P$  = inlet pressure
  - $y$  = seating stress
  - $G$  = mean gasket diameter

# VELAN STEM SEAL DESIGN

**EVOLVED FROM EXTENSIVE TESTING, OFFERS A TIGHT SEAL WITH LITTLE OR NO MAINTENANCE OVER LONG PERIODS OF TIME**

## NON-ROTATING STEM

has tight roundness and straightness tolerances and is burnished for a superior surface finish.

## LIVE-LOADING (OPTIONAL)

Two sets of Belleville springs maintain a minimum permanent packing stress of 4,000 psi (275 bar).

Live-loading keeps the stem tight for long periods of time without maintenance.

Bolt torques control total spring load.

## SHORT & NARROW PACKING CHAMBER

Sealing effectiveness improves as over-all packing length shortens. Chamber wall is burnished for superior finish.

## PACKING BLOWOUT (OPTIONAL)

ensures fast removal of old packing rings when time-consuming conventional packing removal methods are unacceptable (nuclear service, for example).

A pneumatic source is normally used for this purpose.

## PRECOMPRESSED RINGS

Each braided graphite ring is preformed and compressed to 4,000 psi (275 bar) at installation to ensure optimal sealing.

## LOWER OPERATING TORQUE

due to non-rotating stem. Torque arm prevents rotation, indicates position and may also actuate limit switches.

## HEAVY TWO-PIECE GLAND/FLANGE

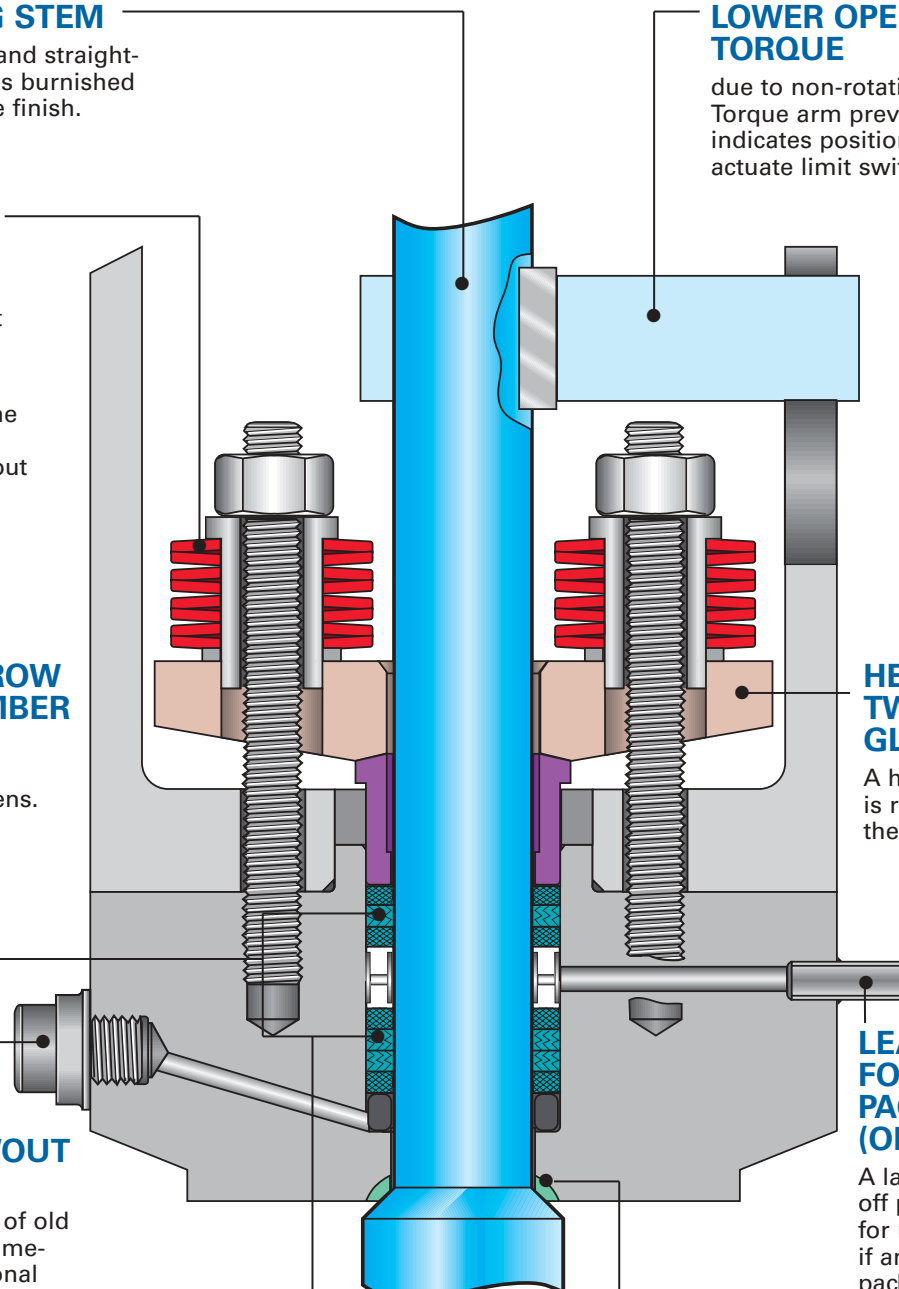
A heavy gland flange is required to carry the high stress load.

## LEAK-OFF FOR DOUBLE PACKING (OPTIONAL)

A lantern ring and leak-off pipe are provided for removal of leakage, if any, from lower packing set.

## EFFICIENT BACKSEAT

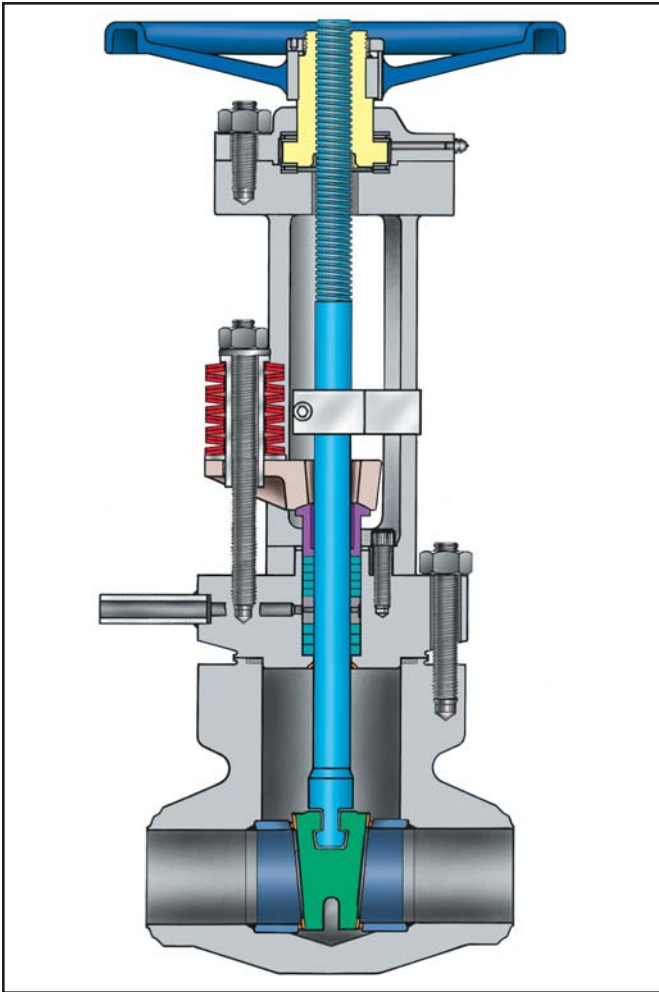
Cone-in-cone design eliminates problems with over-torquing.



# ZERO FUGITIVE EMISSIONS STEM SEAL

## LIVE-LOADED DESIGN

Velan has extensive experience in valve live-loading. The original concept was developed by Velan in 1972 in a research project for Atomic Energy of Canada Limited (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.



### LIVE-LOADING

Live-loading extends low emission service life especially in service with large pressure/temperature transients or frequent cycling. Two sets of Belleville springs keep stem tight for long periods of time without maintenance.

### SINGLE PACKING OR DOUBLE PACKING WITH LEAK-OFF

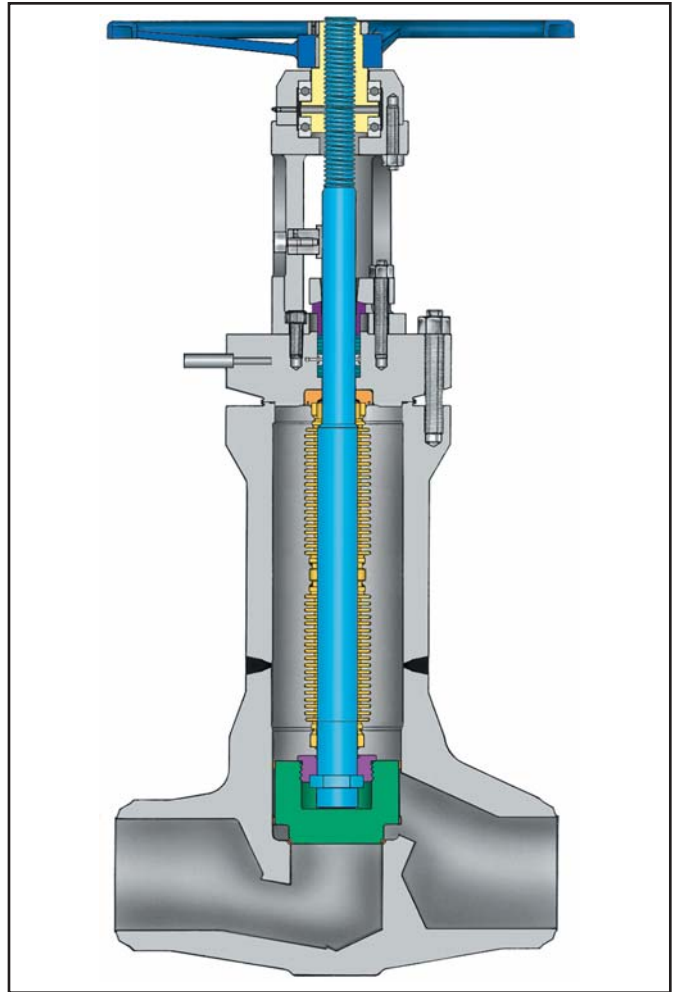
**Double packing:** two sets of graphite packing rings precompressed to 4000 psi (275 bar).

A lantern ring and leak-off provide option for removal of leakage, if any, from lower packing set.

**Single packing:** three or four graphite rings between braided rings, 90 –105 lb/ft<sup>3</sup> (1.44 –1.68 g/cm<sup>3</sup>) density.

## BELLOWS SEAL DESIGN

Velan valves feature a formed multi-ply bellows welded to the stem and to the bottom of the bonnet, creating a hermetic seal or impermeable barrier. Bellows are available in stainless steel, Inconel, Hastelloy C and Monel for virtually all corrosive chemical applications.



### LONG CYCLE LIFE BELLOWS (3000 cycles)

in Gr. 321 (stainless) or Inconel. Designed and successfully tested in high pressure/temperature conditions.

### NON-ROTATING STEM

prevents torsion of bellows.

### BELLOWS MONITORING PORT (optional)

A plug can be connected to the space above the bellows to monitor performance.

### HERMETICALLY SEALED

Body-bonnet welds provide a hermetically-enclosed vessel in most designs.

For more information on bellows seal gate and globe valves, 2 1/2 –12" (65–300 mm), see catalog **VEL-BS**.

# OVER PRESSURIZATION, PRESSURE LOCKING

The potential for failure to open of wedge gate and parallel slide valves, under certain process conditions may be attributed to an increase in the required unwedging thrust to open the valve due to the following phenomena:

## Over Pressurization (Diagram A)

may result when liquid, entrapped in the center cavity of valves, is heated.

- The trapped fluid expands and the resultant increase in pressure may render the valve inoperable. In extreme cases, a breach of the pressure boundary may occur.
- Each 1°F rise in temperature may result in a pressure increase of 150 psi.
- Over pressurization may occur in both pressure seal and bolted bonnet type valves, and is not restricted to valve size.
- A length of pipe isolated at both ends by a valve may also suffer from overpressurization.

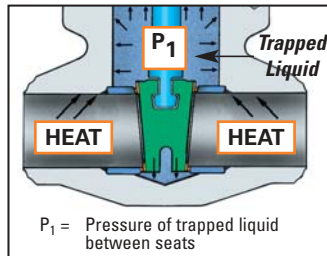


Diagram A

## Pressure Locking (Diagram B)

occurs when  $P_1$  is significantly higher than  $P_{1a}$  or  $P_{1b}$ .

- The potential for pressure locking is greater in parallel slide valves (double disc drag) due to the effective area on which the entrapped pressure acts.

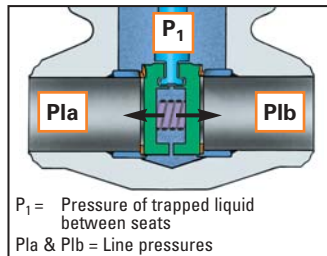


Diagram B

## Over Pressurization & Pressure Locking Solutions (Diagrams C-G)

After evaluating and determining that the potential for problems exist, the solution for over pressurization and pressure locking is to provide pressure relief from the body cavity.

**THIS CAN BE DONE IN SEVERAL WAYS:**

- An internal hole in the wedge face (Diagram C), connecting the body cavity to the high pressure side of the valve\*.
- An equalizing pipe (Diagram D), connecting the body cavity to the high pressure side of the valves\*.

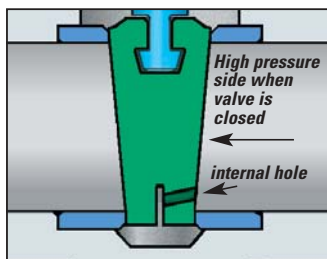


Diagram C\*

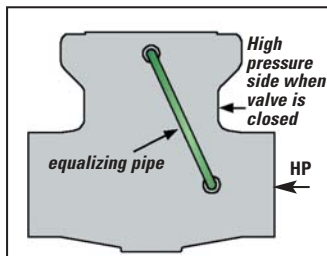


Diagram D\*

- An equalizing pipe and equalizing valve (Diagram E), the valve must be open to provide relief.
- Relief valve (Diagram F & G), connecting the body cavity to the atmosphere, is another way to provide pressure relief, however the exhaust from the self-activating type relief valve must be piped to a safe location.

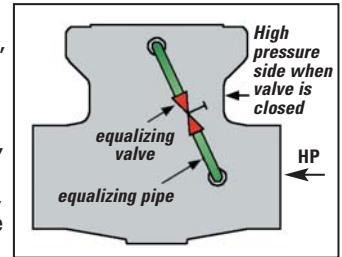


Diagram E

**NOTE:** Caution must be used when opening the drain type relief valve.

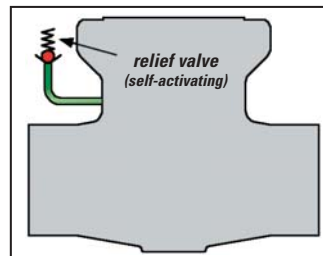


Diagram F

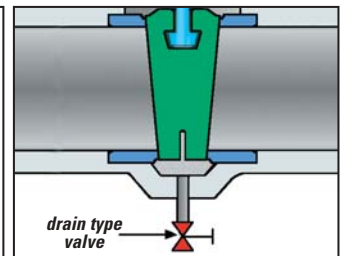


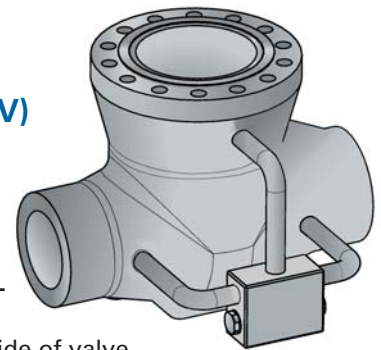
Diagram G

## Velan 3-way Centre-Cavity Balance Valve (CCBV)

We offer a self-actuating pressure-relief device, connected to the body cavity and the inlet/outlet of the valve.

**Description of Operation - "CCBV" Piping:**

- A:** Is connected to one side of valve.
- B:** Is connected to the body centre cavity.
- C:** Is connected to the other side of valve.



### HP (High Pressure) on the "A" Port Side: (Diagram H)

- The shuttle is pushed to seat on the LP (low pressure) side.
- The pressure is then equalized between the HP side "A" and the body cavity "B".

### HP (High Pressure) on the "B" Port (Body Cavity):

- The pressure will escape to "A" port, preventing over pressure build-up in the body cavity.

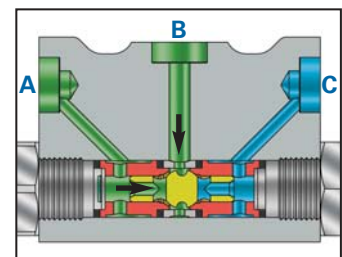


Diagram H: Cut showing the check valve operation.

\* **Note:** The valve, however, will seal only in one direction.



# AND THERMAL BINDING PROCESS CONDITIONS

## Reverse Pressure

(Diagram I)

- The shuttle is pushed to seat on the LP side.
- The pressure is then equalized between the HP side "C" and the body cavity "B".

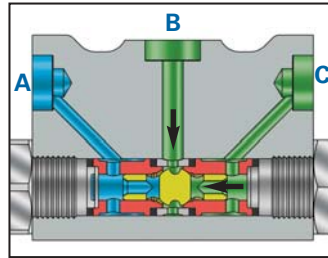


Diagram I: Cut showing the check valve operation.

HP (High Pressure) on the "B" Port (Body Cavity):

- The pressure will escape to the "C" port, preventing over pressure build-up in the body cavity.

## Thermal Binding (Diagram J)

may occur in wedge type (solid or flexible) gate valves between the wedge and seats due to temperature differential between inlet and outlet of the valve, when the valve was closed hot and the system cools down.

- It may render the valve inoperable.
- Stem expansion and other stresses, mechanical or thermal, may also contribute as valve bodies are not rigid.
- Thermal binding is more common in high temperature applications.
- While wedge type gate valves are susceptible to thermal binding, **parallel slide valves are not.**

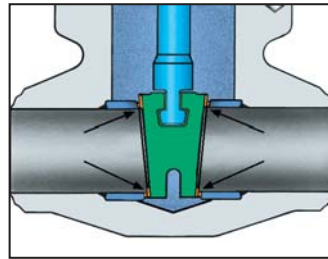


Diagram J

## Thermal Equalization (Diagram L)

Bypass pipes, in addition to equalizing pressure differential across the wedge, will allow warm up of both sides of the wedge. (Warm-up lines located far away from the valve do not have a significant impact on thermal equalization.)

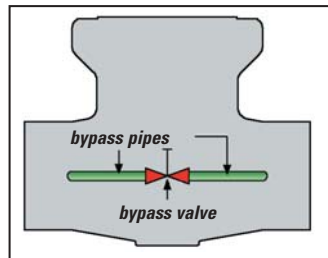


Diagram L

## Combined Effects of Over-Pressurization, Pressure Locking & Thermal Binding (Diagram M-P)

When evaluation determines that thermal binding may exist in combination with over-pressurization and/or pressure locking, the solution will require a combination of both equalizing and bypass pipes and valves.

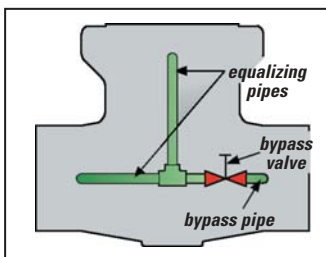


Diagram M \*

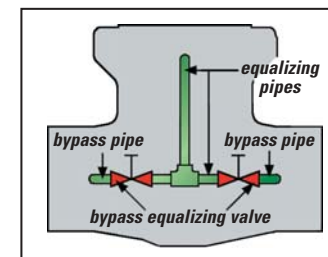


Diagram N

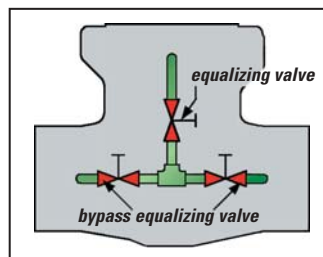


Diagram O

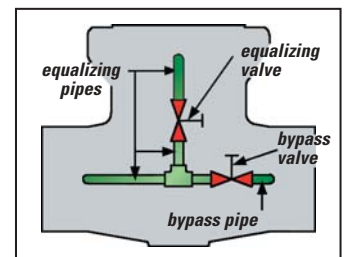
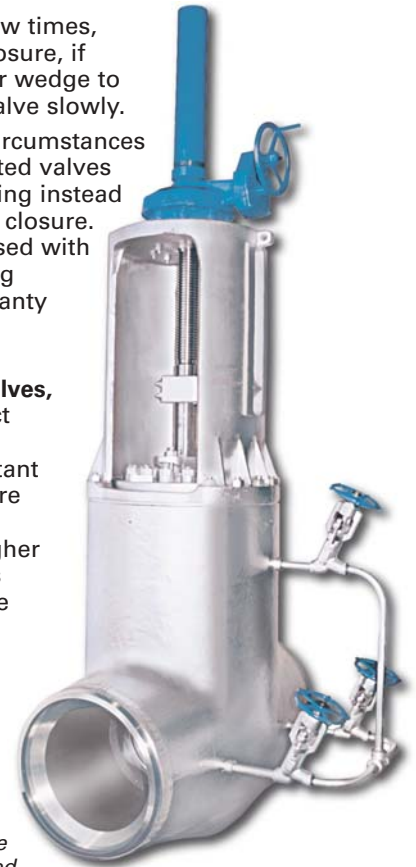


Diagram P

## Other Recommendations

- Verify the process to see if  $\Delta T$  between closing and opening can be reduced (recommended  $\Delta T \leq 150^\circ F$ ). Closing hot and opening cold is a prescription for thermal binding.
- After closing a wedge type gate valve, back up the stem ( $1/8$  to  $1/4$ " turn) to allow room for stem expansion. This is only practical in manual valves or electronically controlled motor operated valves.
- Maintain system temperature at  $500^\circ F$  at all times.
- Adequate pipe supports can reduce piping stresses.
- Stroke the valve a few times, immediately after closure, if practical, to allow for wedge to warm up, or close valve slowly.
- Under exceptional circumstances for electrically actuated valves opt for position seating instead of torque seating on closure. This must be discussed with the Velan Engineering Department for warranty considerations.
- **Consider the use of parallel slide gate valves**, which are not subject to thermal binding. It is, however important to realize that they are more susceptible to pressure locking, higher seat wear, as well as difficulties in positive sealing at low pressures.
- Contact the Velan Engineering Dept. for specific design solutions.



24" (600mm) Class 1500 Velan forged parallel slide valve with piping required for release of cavity over pressure, elimination of pressure locking and thermal binding.

# VELAN SUPERIOR FLEXIBLE WEDGE GATE VALVE FOR

## COMPLETE RANGE OF AUTOMATION CAPABILITIES

Gear actuators are standard from 6" (150 mm), depending on size and pressure class (See page 52). Complete range of options including: electric, hydraulic and pneumatic actuators; preinstallation of switches, positioners, thrust and torque sensors; overrides, limit stops and most standard accessories. *(More on pages 45 & 52.)*

## NON-ROTATING STEM

Valves require lower operating torque due to a non-rotating stem. *(More on page 12.)*

## UNIQUE SOURCE FOR FORGED VALVES UP TO 24" (600 mm)

Compared to castings, forged valve bodies offer the advantages of more uniform structure, greater density and higher strength integrity. *(More on page 8.)*

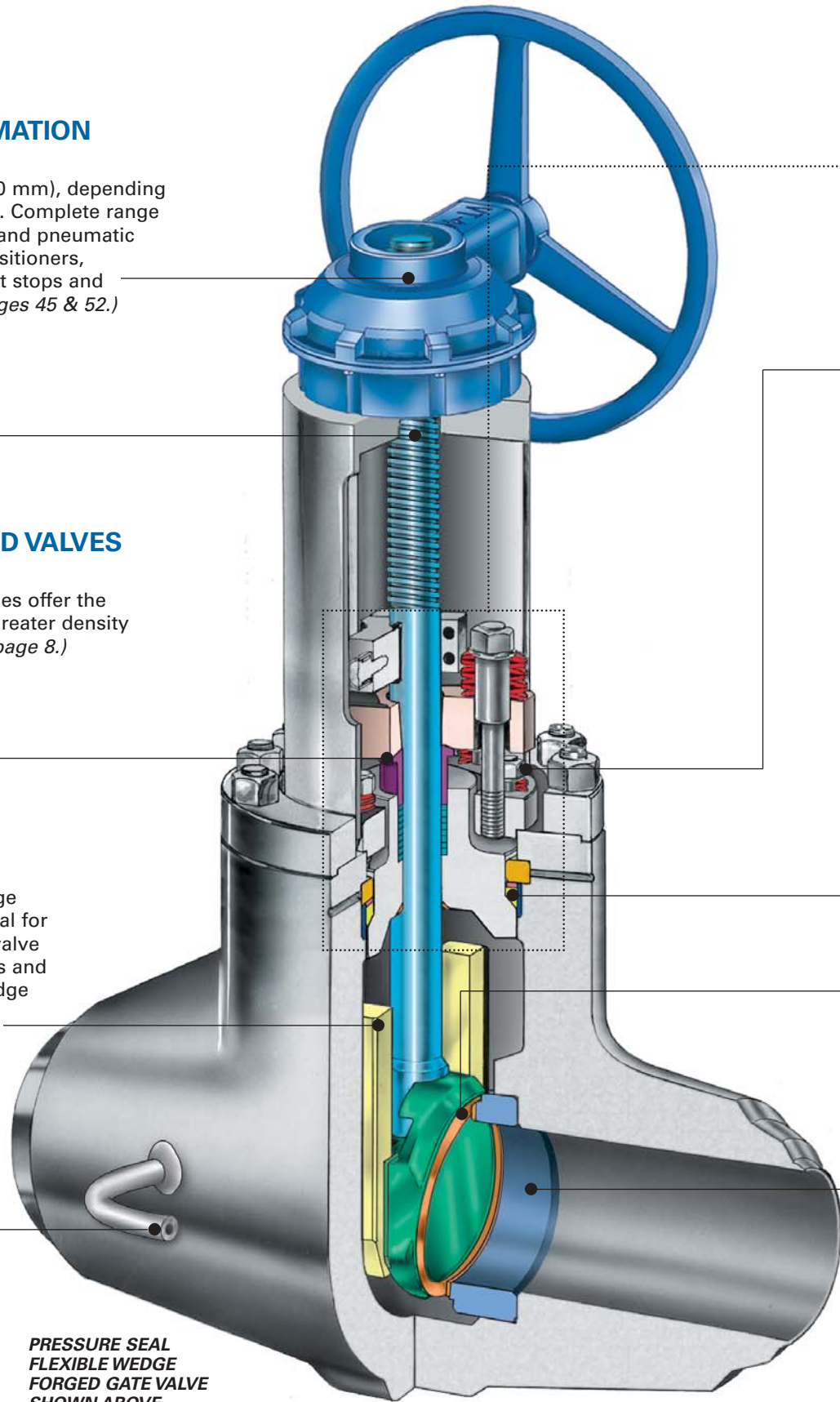
## HEAVY TWO-PIECE GLAND/FLANGE

## TIGHT GUIDING SYSTEM

Close attention is paid to body and wedge guide tolerances to minimize the potential for galling, binding and/or gouging during valve opening and closing. For stainless valves and high temperature service, hardfaced wedge grooves are precision-guided within welded-in machined guides.

## PREVENTING OVER PRESSURIZATION, PRESSURE LOCKING & THERMAL BINDING

Velan offers equalizing and bypass pipes and valves in many different configurations to help ensure the valve will open under any operating conditions. *(More on page 14-15.)*



**PRESSURE SEAL  
FLEXIBLE WEDGE  
FORGED GATE VALVE  
SHOWN ABOVE**

# RELIABLE HIGH PRESSURE/TEMPERATURE SERVICE

## VELAN STEM SEAL DESIGN

Developed from extensive testing, the Velan stem seal offers a tight seal with little or no maintenance over long periods of time. *(More on page 12.)*

- **OPTIONAL LIVE-LOADING**  
Live-loading extends low emission service life especially in service with large pressure/temperature transients or frequent cycling.

## LIVE-LOADED BONNET BOLTING

Maintains a constant load on the pressure seal gasket during a pressure or temperature induced transient which cause bonnet movement.  
*(See page 10 for details.)*

## GRAPHITE GASKETS

Standard in valves to ASME Class 2500.  
*(See page 10 for details.)*

## HARDFACED SEATING

Stellite 6 (or customer-specified alternative) hardfaced seating is erosion and abrasion resistant for long service life.



**NOTE:**  
*Stellite-faced guides available for high temperature service.*

**Seating faces are hardfaced, ground and lapped.**

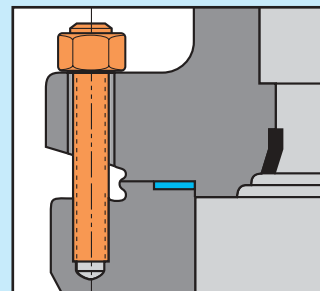
## LONG, SEAL WELDED SEAT RINGS

Compensate for temperature fluctuations and ensure tight shutoff.

## VELAN FLEXIBLE WEDGE GATE VALVES

The Velan flexible wedge, with round geometry and stem low in the cavity, was pioneered by Velan in 1960. It has a large flexibility index (up to 0.035" or 0.89 mm) within normal closing torques and allowable stresses to compensate for seat distortions caused by piping loads, thermal and pressure fluctuations, seal-welding of seats and cooling down of a valve closed hot.

The major difference between a Velan flexible wedge valve and a parallel slide valve is the high wedging force acting on the seats, which adds to the primary fluid pressure force, resulting in superior tightness of seats and freedom from sticking. In addition, the wedge guiding minimizes seat rubbing and scuffing as seats are contacted only at the last 5% of total travel, resulting in long cycle life.



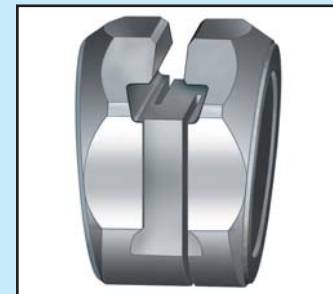
## BOLTED BODY DESIGN ALSO AVAILABLE

Stronger, leakproof bolted body bonnet joint ensures joint tightness.  
*(See page 11 for details.)*

## ULTRA FLEX WEDGE

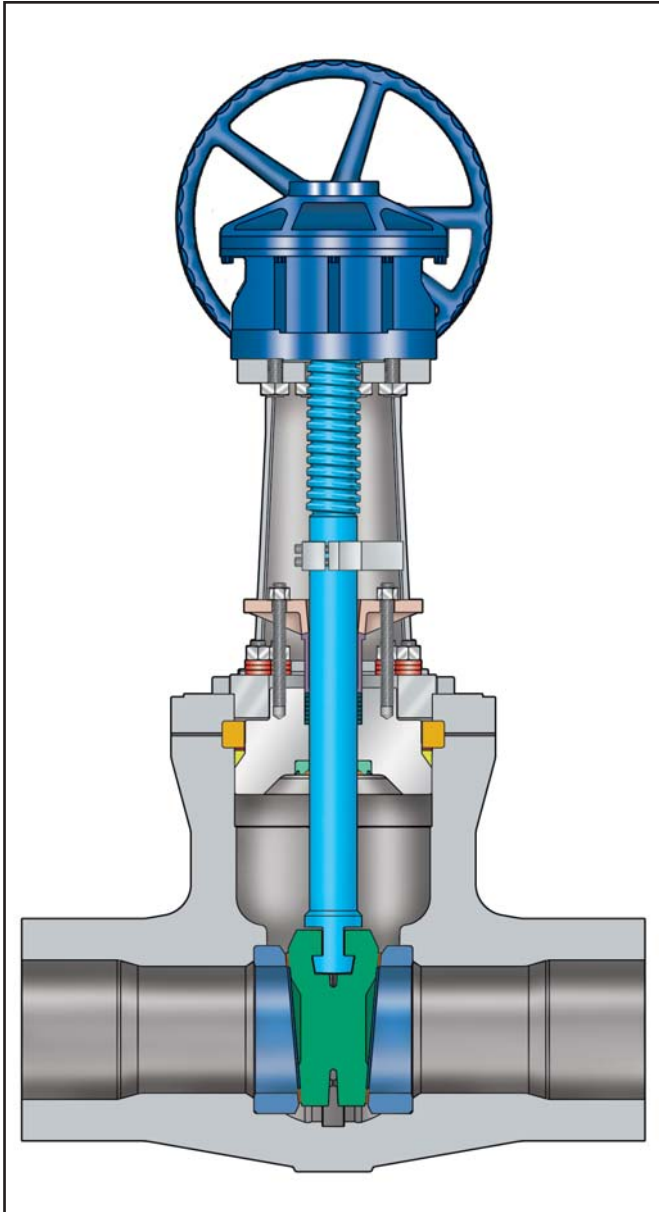
Velan has developed a patented new form of flexible wedge which is highly resistant to thermal binding. A novel geometry, which departs from the conventional "hub and plate" paradigm, is employed to maximize flexibility without sacrificing strength.

The product is ideal for high pressure, high temperature cyclic service where large temperature swings can cause a valve with a stiff conventional wedge to jam in the closed position.





**PRESSURE SEAL  
FLEXIBLE WEDGE GATE VALVES  
CARBON, ALLOY OR STAINLESS STEEL**  
ASME CLASSES 600–2500, 2 –24" (50–600 mm)  
ASME CLASS 4500, 2 –8" (50–200 mm)

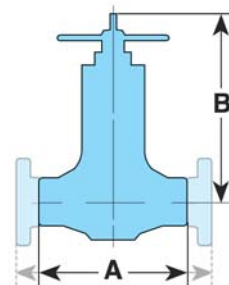


Velan pressure seal flexible wedge gate valves are ideal for high pressure steam (main steam isolation), liquid (feedwater isolation), catalytic reformers, hydrocrackers and other tough services.

**DESIGN FEATURES:**

- **Velan pressure seal design.**  
*(See page 10 for details.)*
- **Velan flexible wedge offers** superior tightness of seats and freedom from sticking.
- **Wedge guiding** minimizes seat rubbing and scuffing resulting in long cycle life.
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Optional** live-loading of packing.
- **Non-rotating** stem.
- **Hardfaced** seating faces resist erosion.
- Other sizes and pressure classes available. Contact the company for specifications.

CLASS	FIGURE NUMBER	
	FORGED	CAST
600	2054P	2064K
900	7054P	7064K/7054K
1500	3054P	3064K/3054K
2500	4054P	4054K
4500	5054P	–



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

**FLOW COEFFICIENT CV\***

SIZE in mm	CLASS					
	600		900		1500	2500
	FORGED 2054P	CAST 2064K	FORGED 7054P	CAST 7054K	FORGED 3054P	FORGED 4054P
2 50	260	260	260	—	260	140
2½ 65	260	420	260	—	260	200
3 80	460	625	460	—	460	300
4 10	825	1150	825	—	825	460
6 150	1950	2650	1950	—	1950	1300
8 200	3150	4850	3150	—	3150	2100
10 250	5400	7750	5400	5500	4700	3150
12 300	7300	11500	7300	7750	7300	4850
14 350	8200	13000	8200	9450	8200	4850
16 400	14000	17500	13500	12500	11000	7750
18 450	16500	22000	16500	16000	14000	8600
20 500	20000	27000	20000	20000	17500	11500
24 600	30000	33000	30000	30000	26000	14250

\* Kv = Cv x 0.85

**STANDARD MATERIALS**

PART	MATERIAL <sup>(5)</sup>				
	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22	A 182 Gr. F91	A 182 Gr. F316
Body <sup>(1)(4)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22	A 182 Gr. F91	A 182 Gr. F316
Bonnet <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Wedge <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 616 or Gr.660	Gr. 630 or Gr. 660
Yoke	Carbon steel				
Gasket <sup>(1)</sup>	Graphite / SS 316 or Soft carbon steel—silver plated				
Gasket retainer	A 182 Gr. F6a Cl. 4			Gr. 616 or Gr.660	Gr. 630 or Gr. 660
Spacer ring	Gr. 4140 option Ni or Cad plated or SS				
Packing ring <sup>(1)</sup>	Graphite				
Packing flange	Carbon steel				Stainless
Gland	Carbon steel	Stainless			
Gland stud	Gr. B7				
Gland nut	Gr. 2H				
Bonnet retainer	Carbon steel	Alloy Steel			Stainless
Torque arm	Carbon steel				
Yoke bolting	Gr. B7				
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C				
Thrust bearing	Steel				
Handwheel <sup>(1)</sup>	Malleable iron or steel				

(1) Other materials available. (2) Stellite. (3) Hardened. (4) 600 Class is Cast, alternative Forged. Note: Consult Velan Engineering for cast equivalents in Class 1500 & 2500 for sizes above 8" (200 mm). (5) Velan reserves the right to make substitution of materials equal to or better than those listed in the Standard Materials Table.

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)			ASME 4500 (PN 760)		
	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg
2 50	7.00 178	15.63 397	50 23	8.50 216	15.63 397	55 25	8.50 216	15.63 397	55 25	11.00 279	15.44 392	100 45	— —	— —	— —
2½ 65	8.50 216	15.63 397	60 27	10.00 254	15.63 397	60 27	10.00 254	15.63 397	60 27	13.00 330	24.69 627	200 91	10 254	23 584	240 109
3 80	10.00 254	25.00 635	200 91	12.00 305	25.00 635	200 91	12.00 305	25.00 635	200 91	14.50 368	24.72 628	225 102	12 305	23 584	240 109
4 100	12.00 305	26.63 676	250 113	14.00 355	26.63 676	250 113	16.00 406	26.63 676	250 113	18.00 457	26.81 681	300 136	18 457	24 610	300 136
6 150	18.00 457	42.63 1083	800 363	20.00 508	42.63 1083	800 363	22.00 559	42.63 1083	800 363	24.00 610	41.06 1043	850 386	20 508	40 1016	850 386
8 200	23.00 584	47.13 1197	1300 590	26.00 660	47.13 1197	1300 590	28.00 711	47.13 1197	1300 590	30.00 762	48.13 1222	1500 680	30 762	47 1194	1750 794
10 250	28.00 711	53.81 1367	1500 680	31.00 787	53.81 1367	1500 680	34.00 864	53.81 1367	1500 680	36.00 914	52.50 1334	1750 795	— —	— —	— —
12 300	32.00 813	66.19 1681	3300 1497	36.00 914	66.19 1681	3300 1497	39.00 991	66.19 1681	3300 1497	41.00 1041	61.62 1565	3500 1587	— —	— —	— —
14 350	35.00 889	66.31 1684	3300 1497	39.00 990	66.31 1634	3300 1497	42.00 1067	66.31 1684	3300 1497	44.00 1118	61.62 1565	3700 1680	— —	— —	— —
16 400	39.00 991	84.56 2148	3900 1769	43.00 1092	86.56 2148	3900 1769	47.00 1194	78.88 2003	4000 1814	49.00 <sup>(7)</sup> 1245	74.31 1887	4400 2000	— —	— —	— —
18 450	43.00 1092	86.44 2196	5000 2268	43.00 <sup>(7)</sup> 1092	86.44 2196	5000 2268	43.00 <sup>(7)</sup> 1092	89.13 2264	5000 2268	44.00 <sup>(7)</sup> 1118	85.75 2178	7500 3402	— —	— —	— —
20 500	47.00 1194	95.44 2424	7500 3402	47.00 <sup>(7)</sup> 1194	95.44 2424	7500 3402	47.00 <sup>(7)</sup> 1194	94.56 2402	7500 3402	48.00 1219	89.18 2265	8500 3856	— —	— —	— —
24 600	55.00 1397	112.50 2858	10000 4536	55.00 <sup>(7)</sup> 1397	112.50 2858	10000 4536	55.00 <sup>(7)</sup> 1397	113.38 2880	10000 4536	55.00 1397	104.00 2642	14000 6350	— —	— —	— —

(5) Dimension is center to top in open position.

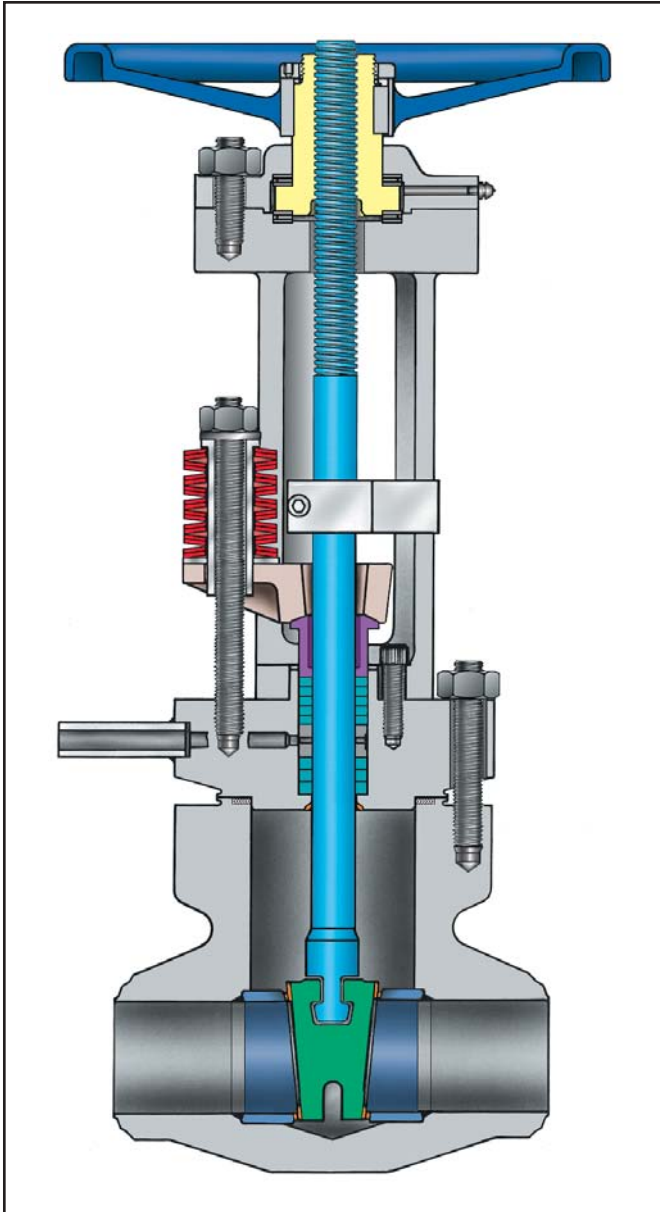
(6) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.

(7) The following valves do not meet the ASME B16.10 end to end dimensions.



# BOLTED BONNET FLEXIBLE WEDGE GATE VALVES CARBON, ALLOY OR STAINLESS STEEL

ASME CLASSES 150–900, 2 –24" (50–600 mm)  
ASME CLASS 1500, 2½ –16" (65–400 mm)

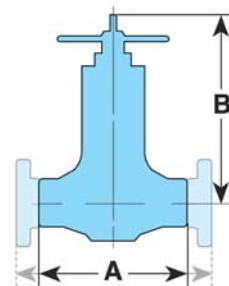


Velan bolted bonnet flexible wedge gate valves are ideal for high pressure steam, catalytic reformers, hydrocrackers and other tough services.

## DESIGN FEATURES:

- **Stronger, leakproof bolted body bonnet joint** ensures joint tightness with a higher bolting torque. *(See page 11 for details.)*
- **Wedge guiding** minimizes seat rubbing and scuffing resulting in long cycle life.
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Forged cage unit design.**
- **Optional live-loading of packing and leakoff** (shown).
- **Non-rotating stem.**
- **Hardfaced** seating faces resist erosion.
- Available with provision for seal weld.
- Other sizes and pressure classes available. Contact the company for specifications.

CLASS	FIGURE NUMBER
150	0054B
300	1054B
600	2054B
900	7054B
1500	3054B



Flange dimensions are in accordance with ASME B16.5.  
Flanges are welded on.

**FLOW COEFFICIENT CV\***

SIZE in mm	CLASS			
	150/300	600	900	1500
2½ 65	260	260	260	260
3 80	460	460	460	460
4 100	825	825	825	825
6 150	2300	2300	1950	1950
8 200	4150	4150	3150	3150
10 250	6700	6700	4700	4700
12 300	9700	9700	7300	7300
14 350	12000	12000	8600	8600
16 400	17500	15000	13500	11000
18 450	19000	19000	16500	—
20 500	24000	24000	20000	—
24 600	34000	33000	30000	—

\*  $K_v = C_v \times 0.85$

**STANDARD MATERIALS**

PART	MATERIAL			
Body <sup>(1)</sup>	A 105	A 182 Gr. F11	A 182 Gr. F22	A 182 Gr. F316
Bonnet <sup>(1)</sup>	A 105	A 182 Gr. F11	A 182 Gr. F22	A 182 Gr. F316
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F316 or A 351 Gr. CF8M
Wedge <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F316 or A 351 Gr. CF8M
Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 630 or Gr. 660
Yoke	Carbon steel			
Gasket <sup>(1)</sup>	Spiral wound stainless and graphite			
Body/bonnet stud	Gr. B7	Gr. B16		Gr. B8M or Gr. 630
Body/bonnet nut	Gr. 2H	Gr. 4 <sup>(4)</sup>		Gr. 8M
Packing ring <sup>(1)</sup>	Graphite			
Packing flange	Carbon steel			Stainless
Gland	Carbon steel			Stainless
Gland stud	Gr. B7			Gr. B8M or Gr. 630
Gland nut	Gr. 2H			Gr. 8M
Torque arm	Carbon steel			
Yoke bolting	Gr. B7 or A 574			
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C			
Thrust bearing	Steel			
Handwheel <sup>(1)</sup>	Malleable iron or steel			

(1) Other materials available. (2) Stellite. (3) Hardened. (4) Grade 7 is alternate.

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 150 (PN 20)			ASME 300 (PN 50)			ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)		
	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg
2 50	— —	— —	— —	— —	— —	— —	7.00 178	22.13 562	60 27	8.50 216	22.13 562	60 27	8.50 216	22.13 562	60 27
2½ 65	9.50 241	21.12 536	100 45	9.50 241	21.12 536	100 45	8.50 216	21.12 536	100 45	10.00 254	21.12 536	100 45	10.00 254	21.12 536	100 45
3 80	11.13 283	29.00 737	200 91	11.13 283	29.00 737	200 91	10.00 254	29.00 737	200 91	12.00 305	29.25 743	200 91	12.00 305	29.25 743	200 91
4 100	12.00 305	31.75 807	250 113	12.00 305	31.75 807	250 113	12.00 305	31.75 807	250 113	14.00 356	32.00 813	250 113	16.00 406	32.00 813	250 113
6 150	15.88 403	40.38 1026	580 263	15.88 403	40.38 1026	580 263	18.00 457	40.38 1026	580 263	20.00 508	47.75 1213	800 363	22.00 559	47.75 1213	800 363
8 200	16.50 419	50.00 1270	1000 454	16.50 419	50.00 1270	1000 454	23.00 584	50.00 1270	1000 454	26.00 660	58.63 1489	1300 590	28.00 711	58.63 1489	1300 590
10 250	18.00 457	61.19 1554	1400 635	18.00 457	61.19 1554	1400 635	28.00 711	61.19 1554	1400 635	31.00 787	63.00 1600	1900 862	34.00 864	63.00 1600	1900 862
12 300	19.75 502	68.00 1727	1800 816	19.75 502	68.00 1727	1800 816	32.00 813	68.00 1727	1800 816	36.00 914	65.88 1673	3300 1497	39.00 991	65.88 1673	3300 1497
14 350	22.50 572	79.50 2019	2200 998	30.00 762	79.50 2019	2200 998	35.00 889	79.50 2019	2200 998	39.00 991	74.00 1880	3500 1588	42.00 1067	79.25 2013	3500 1588
16 400	24.00 610	85.75 2178	3700 1678	33.00 838	85.75 2178	3700 1678	39.00 991	84.50 2146	3700 1678	43.00 1092	85.19 2164	3900 1769	47.00 1194	90.50 2299	4000 1814
18 450	36.00 914	82.81 2103	4500 2041	36.00 914	82.81 2103	4500 2041	43.00 1092	83.75 2127	4500 2041	43.00 <sup>(6)</sup> 1092	88.06 2237	5000 2268	— —	— —	— —
20 500	39.00 991	90.00 2286	5500 2495	39.00 991	90.00 2286	5500 2495	47.00 1194	97.00 2464	5500 2495	47.00 <sup>(6)</sup> 1194	97.00 2464	7500 3402	— —	— —	— —
24 600	45.00 1143	103.50 2629	8000 3629	45.00 1143	103.50 2629	8000 3629	55.00 1397	103.50 2629	8000 3629	55.00 <sup>(6)</sup> 1397	103.75 2635	10000 4536	— —	— —	— —

(5) Dimension is center to top in open position.

(6) The following valves do not meet the ASME B16.10 end to end dimensions.

# VELAN PARALLEL SLIDE GATE VALVE

## COMPLETE RANGE OF AUTOMATION CAPABILITIES

Gear actuators are standard from 6" (150 mm), depending on size and pressure class (See page 52). Complete range of options including: electric, hydraulic and pneumatic actuators; preinstallation of switches, positioners, thrust and torque sensors; overrides, limit stops and most standard accessories. (More on pages 45 & 52.)

## NON-ROTATING STEM

Valves require lower operating torque due to a non-rotating stem. (More on page 12.)

## UNIQUE SOURCE FOR FORGED VALVES UP TO 24" (600 mm)

Compared to castings, forged valve bodies offer the advantages of more uniform structure, greater density and higher strength integrity. (More on page 8.)

## HEAVY TWO-PIECE GLAND /GLAND FLANGE

## GRAPHITE GASKETS

Standard in valves to ASME Class 2500. (See page 10 for details.)

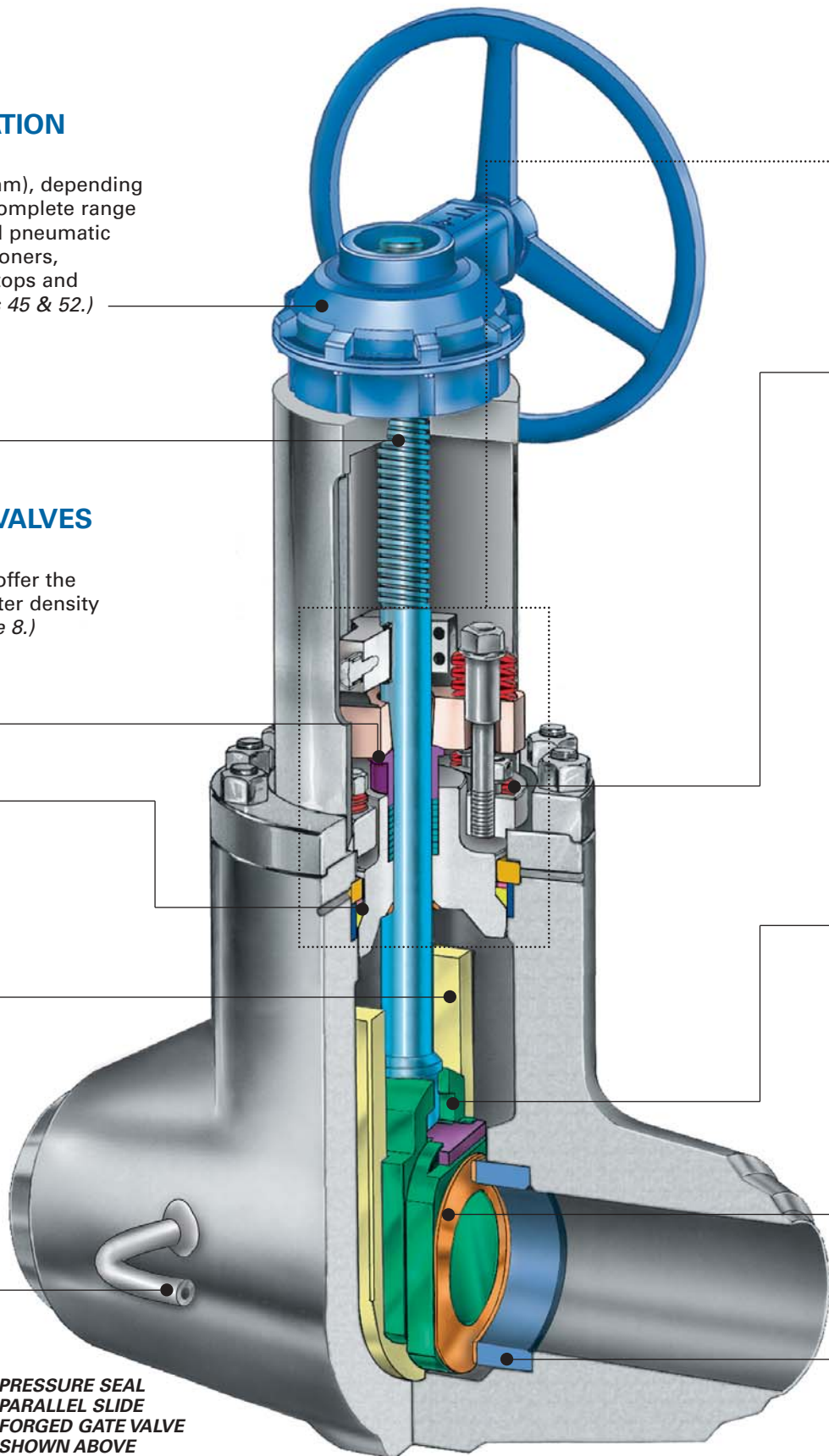
## GUIDING SYSTEM

Close attention is paid to body and disc guide tolerances to minimize the potential for galling, binding and/or gouging during valve opening and closing. For stainless valves and high temperature service, hardfaced grooves are precision-guided within welded-in machined guides.

## PREVENTING OVER PRESSURIZATION

Velan offers equalizing and bypass pipes and valves in many different configurations to help ensure the valve will open under any operating conditions. (More on page 14-15.)

**PRESSURE SEAL  
PARALLEL SLIDE  
FORGED GATE VALVE  
SHOWN ABOVE**





# WITH UNIQUE CONSTRUCTION

## VELAN STEM SEAL DESIGN

Developed from extensive testing, the Velan stem seal offers a tight seal with little or no maintenance over long periods of time. *(More on page 12.)*

- **OPTIONAL LIVE-LOADING**

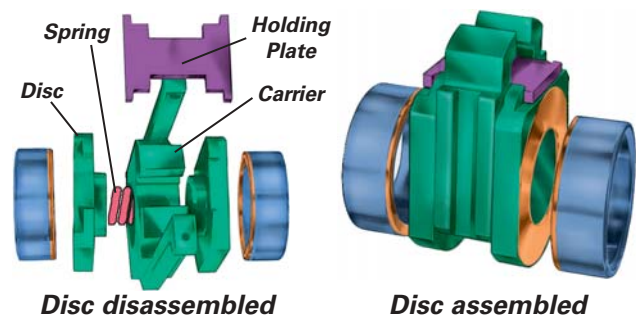
Live-loading extends low emission service life especially in service with large pressure/temperature transients or frequent cycling.

## LIVE-LOADED BONNET BOLTING

Stores the required sealing load during a pressure or temperature induced transient which cause bonnet movement. *(See page 10 for details.)*

## FORGED CAGE UNIT

Two slide discs with large hardfaced seating faces are contained in the disc carrier and are in contact with a cantilevered Inconel spring. A plate holds all parts together forming the cage unit. A precision machined guide fits into the carrier slot and provides close guiding during the entire travel. The use of the cage construction considerably reduces the weight and size of the Velan design compared to commonly used parallel slide valves with the "kangaroo pocket" in the bottom of the valves.



## HARDFACED SEATING

Stellite 6 (or customer-specified alternative) hardfaced seating is erosion and abrasion resistant for long service life.

## LONG, SEAL WELDED SEAT RINGS

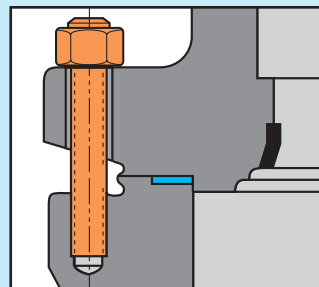
Compensate for temperature fluctuations and ensure tight shutoff.

## PARALLEL SLIDE GATE VALVES

Velan manufactures one of the world's most advanced forged parallel slide valves. Our unique cage unit comprises all of the operating parts of the slide discs. The parallel slide valve design relies on the primary system pressure acting on the downstream disc for seat integrity. There is no wedging action or extra loading on the seats. As a result, closing torques are comparatively lower, requiring less manual operating effort or smaller power actuators.

Due to its inherent design, the parallel slide valve is not subject to thermal binding concerns, resulting in a distinct safety advantage in high temperature service. Thermal binding may result in some applications utilizing wedge type gate valves when operating conditions begin to approach 900°F (482°C). In these instances, a compression load (due to thermal expansion) in addition to that initially applied for closure results. This additional load may cause the valve to bind, even to the point of restricting opening.

The inherent disadvantage to parallel slide valves is seat wear due to seat loading throughout the entire travel. This effect has been minimized in the Velan design by using wide Stellite 6 hardfaced seating surfaces, a centralized Inconel spring (which distributes part of the load on both seats as well as compensating for seat wear), and a precision guiding system which eliminates vibration. Bypass valves are recommended to equalize pressure across the disc before opening if the valve is exposed to very high differential pressure.



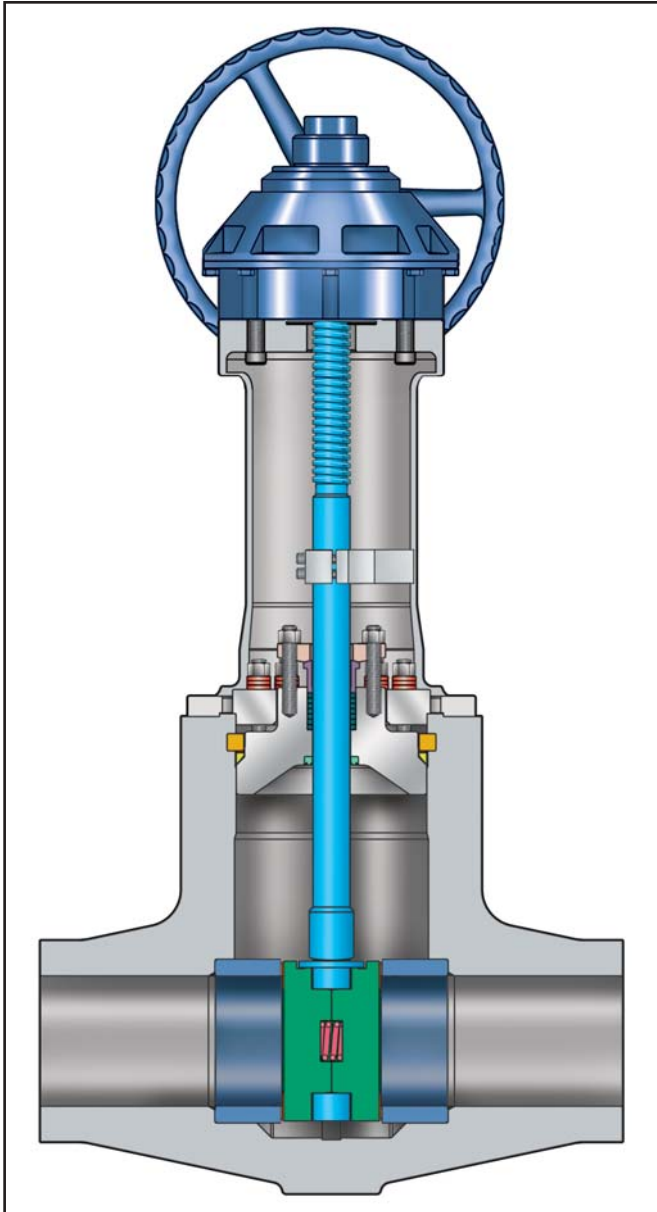
## BOLTED BODY DESIGN ALSO AVAILABLE

Stronger, leakproof bolted body bonnet joint ensures joint tightness.

*(See page 11 for details.)*



**PRESSURE SEAL  
PARALLEL SLIDE GATE VALVES  
CARBON, ALLOY OR STAINLESS STEEL  
ASME CLASSES 600–2500, 2 –24" (50–600 mm)**

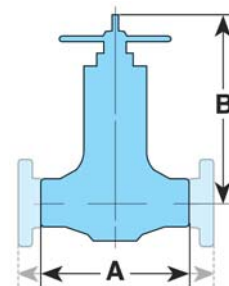


Velan pressure seal parallel slide gate valves are ideal for clean service and steam.

**DESIGN FEATURES:**

- **Velan pressure seal design.**  
*(See page 10 for details.)*
- **Unique Parallel Slide Forged Cage Unit Design**  
comprises all operating parts of the slide discs.  
*(See page 23 for details.)*
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Optional** live-loading of packing.
- **Non-rotating** stem.
- **Hardfaced** seating faces resist erosion.

CLASS	FIGURE NUMBER	
	FORGED	CAST
600	2144P	2144K
900	7144P	7144K
1500	3144P	3144K
2500	4144P	4144K



Flange dimensions are in accordance with ASME B16.5.  
Flanges are welded on.

**FLOW COEFFICIENT CV\***

SIZE in mm	CLASS							
	600		900		1500		2500	
	FORGED 2144P	FORGED 7144P	CAST 7144K	FORGED 3144P	CAST 3144K	FORGED 4144P	CAST 4144K	
2 50	260	260	230	260	230	230	-	
2½ 65	260	260	-	260	-	230	-	
3 80	440	440	-	440	-	230	-	
4 10	725	725	-	725	-	350	-	
6 150	1600	1600	-	1600	-	850	-	
8 200	2650	2650	-	2650	-	1550	-	
10 250	3650	3650	5500	3650	-	2500	-	
12 300	5900	5900	7000	5900	5900	3650	3650	
14 350	8200	8200	8600	5900	7200	3650	4400	
16 400	9500	9500	12500	9500	9500	6600	6600	
18 450	12500	12500	16000	12500	12500	8600	8600	
20 500	16600	16600	20000	16600	16600	10400	10400	
24 600	23000	23000	30000	23000	23000	14000	14000	

\*  $K_v = C_v \times 0.85$

**STANDARD MATERIALS**

PART	MATERIAL					
Body <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22	A 182 Gr. F91 >1000°F (538°C)	A 182 Gr. F316	
Bonnet <sup>(1)</sup>	A 105 or A 216 Gr. WCB					
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91 A 182 Gr. F316	A 182 Gr. F316 or A 351 Gr. CF8M	
Disc <sup>(1)(2)</sup>	Gr. 410			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660	
Stem <sup>(1)(3)</sup>	Gr. 410					
Yoke	Carbon steel					
Gasket <sup>(1)</sup>	Soft carbon steel–silver plated or Graphite/SS 316					
Gasket retainer	A 182 Gr. F6a Cl. 4			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660	
Spacer ring	Gr. 4140 option Ni or Cad plated or SS					
Packing ring <sup>(1)</sup>	Graphite					
Packing flange	Carbon steel				Stainless	
Gland	Carbon steel	Stainless				
Gland stud	Gr. B7					
Gland nut	Gr. 2H					
Bonnet retainer	Carbon steel	Alloy Steel	Stainless			
Torque arm	Carbon steel					
Yoke bolting	Gr. B7					
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C					
Thrust bearing	Steel					
Handwheel <sup>(1)</sup>	Malleable iron or steel					

(1) Other materials available. 2) Stellite. 3) Hardened.

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)		
	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg	A	B <sup>(5)</sup>	lb <sup>(6)</sup> kg
2 50	7.00 178	18.50 470	60 27	8.50 216	18.50 470	60 27	8.50 216	18.50 470	60 27	11.00 279	25.25 641	215 98
2½ 65	8.50 216	18.50 470	60 27	10.00 254	18.50 470	60 27	10.00 254	18.50 470	60 27	13.00 330	25.25 641	220 100
3 80	10.00 254	25.63 651	200 91	12.00 305	25.63 631	200 91	12.00 305	25.63 651	200 91	14.50 368	27.06 687	225 102
4 100	12.00 305	27.94 710	250 113	14.00 356	27.94 710	250 113	16.00 406	27.94 710	250 113	18.00 457	27.06 687	300 136
6 150	18.00 457	43.50 1105	800 363	20.00 508	43.50 1105	800 363	22.00 559	43.50 1105	800 363	24.00 610	40.94 1040	850 386
8 200	23.00 584	48.31 1227	1300 590	26.00 660	48.31 1227	1300 590	28.00 711	48.31 1227	1300 590	30.00 762	49.38 1254	1500 680
10 250	28.00 711	51.87 1318	1980 900	31.00 787	51.87 1318	1980 900	34.00 864	51.87 1318	1980 900	36.00 914	51.84 1317	2000 909
12 300	32.00 813	68.56 1741	3300 1497	36.00 914	68.56 1741	3300 1497	39.00 991	68.56 1741	3300 1497	41.00 1041	62.75 1594	3500 1587
14 350	35.00 889	68.56 1741	3300 1497	39.00 991	68.56 1741	3300 1497	42.00 991	68.56 1741	3300 1497	44.00 <sup>(7)</sup> 1118	62.75 1594	3500 1588
16 400	39.00 991	74.21 1885	3900 1769	43.00 1092	74.21 1995	3900 1769	47.00 1194	71.50 1816	3900 1769	49.00 <sup>(7)</sup> 1245	76.19 1935	4400 2000
18 450	43.00 1092	88.38 2245	5000 2268	43.00 <sup>(7)</sup> 1092	89.44 2272	5000 2268	43.00 <sup>(7)</sup> 1092	89.44 2272	5000 2268	44.00 <sup>(7)</sup> 1118	90.25 2292	5500 2495
20 500	47.00 1194	97.25 2470	7600 3447	47.00 <sup>(7)</sup> 1194	97.25 2470	7600 3447	47.00 <sup>(7)</sup> 1194	97.75 2483	7600 3447	48.00 1219	95.12 2416	8500 3856
24 600	55.00 1397	117.44 2983	10000 4536	55.00 <sup>(7)</sup> 1397	117.44 2983	10000 4536	55.00 <sup>(7)</sup> 1397	117.44 2983	10000 4536	55.00 1397	107.81 2738	14000 6350

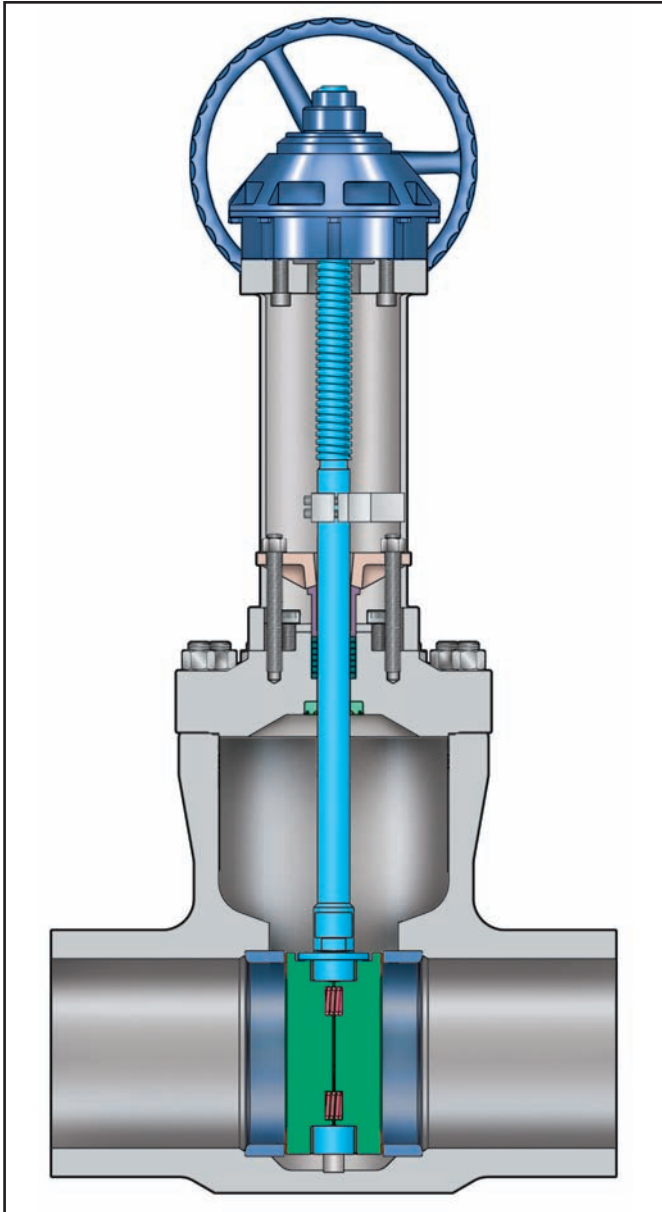
(5) Dimension is center to top in open position.

(6) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.

(7) The following valves do not meet the ASME B16.10 end to end dimensions.



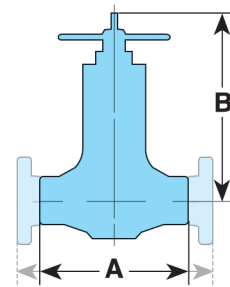
**BOLTED BONNET  
PARALLEL SLIDE GATE VALVES  
CARBON, ALLOY OR STAINLESS STEEL**  
ASME CLASSES 600–900, 2–24" (50–600 mm)  
ASME CLASS 1500, 2–16" (50–400 mm)



Velan pressure seal parallel slide gate valves are ideal for clean service and high temperature steam.

**DESIGN FEATURES:**

- **Stronger, leakproof bolted body bonnet joint** ensures joint tightness with a higher bolting torque. *(See page 11 for details.)*
- **Unique Parallel Slide Forged Cage Unit Design** comprises all operating parts of the slide discs *(See page 23 for details.)*
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Forged cage unit design.**
- **Optional** live-loading of packing.
- **Non-rotating** stem.
- **Hardfaced** seating faces resist erosion.
- Available with provision for seal weld
- Other sizes and pressure classes available. Contact the company for specifications
- Certain design configurations are available in cast steel. In these cases the last digit of the figure number shown would change from B to C.
- Contact the company for details.



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

CLASS	FIGURE NUMBER
600	2144B
900	7144B
1500	3144B

**FLOW COEFFICIENT CV\***

SIZE in mm	CLASS		
	600	900	1500
2 50	260	260	260
2½ 65	260	260	260
3 80	440	440	440
4 100	725	725	725
6 150	1700	1600	1600
8 200	3250	2650	2650
10 250	3650	3650	3650
12 300	7300	7300	7300
14 350	7300	7300	7300
16 400	9500	9500	9500
18 450	16500	16500	—
20 500	23500	20000	—
24 600	30000	30000	—

\*  $K_v = C_v \times 0.85$

**STANDARD MATERIALS**

PART	MATERIAL			
Body <sup>(1)</sup>	A 105	A 182 Gr. F11	A 182 Gr. F22	A 182 Gr. F316
Bonnet <sup>(1)</sup>				
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F316 or A 351 Gr. CF8M
Disc <sup>(1)(2)</sup>				
Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 630 or Gr. 660
Yoke	Carbon steel			
Gasket <sup>(1)</sup>	Spiral wound stainless and graphite			
Body/bonnet stud	Gr. B7	Gr. B16		Gr. B8M or Gr. 630
Body/bonnet nut	Gr. 2H	Gr. 4 <sup>(4)</sup>		Gr. 8M
Packing ring <sup>(1)</sup>	Graphite			
Packing flange	Carbon steel			Stainless
Gland				
Gland stud	Gr. B7			Gr. B8M or 630
Gland nut	Gr. 2H			Gr. 8M
Torque arm	Carbon steel			
Yoke bolting	Gr. B7 or A 574			
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C			
Thrust bearing	Steel			
Handwheel <sup>(1)</sup>	Malleable iron or steel			

(1) Other materials available. (2) Stellite. (3) Hardened. (4) Grade 7 is alternate.

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)		
	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg	A	B <sup>(5)</sup>	lb kg
2 50	7.00 178	22.13 562	100 45	8.50 216	22.13 562	100 45	8.50 216	22.13 562	100 45
2½ 65	8.50 216	22.13 562	100 45	10.00 254	22.13 562	100 45	8.50 216	22.13 562	100 45
3 80	10.00 254	29.75 756	200 91	12.00 305	29.75 756	200 91	12.00 305	29.75 756	200 91
4 100	12.00 305	32.44 824	250 113	12.00 305	32.44 824	250 113	16.00 406	32.44 824	250 113
6 150	18.00 457	36.22 920	580 263	20.00 508	36.22 920	580 263	22.00 559	49.00 1245	800 363
8 200	23.00 584	47.25 1200	1000 454	26.00 660	47.25 1200	1000 454	28.00 711	47.25 1200	1000 454
10 250	28.00 711	61.19 1554	1400 635	31.00 787	61.19 1554	1900 862	34.00 864	61.19 1554	1900 862
12 300	32.00 813	77.63 1972	1800 816	38.00 965	77.63 1972	3300 1497	39.00 991	78.13 1985	3300 1497
14 350	35.00 889	79.50 2019	2200 998	39.00 991	79.25 2013	3500 1588	42.00 991	79.25 2013	3500 1588
16 400	39.00 991	84.50 2146	3700 1678	43.00 1092	85.19 2164	3900 1769	43.00 1092	90.00 2286	4000 1814
18 450	43.00 1092	83.38 2118	4500 2041	43.00 <sup>(6)</sup> 1092	88.06 2237	5000 2268	— —	— —	— —
20 500	47.00 1194	96.50 2451	5500 2495	47.00 <sup>(6)</sup> 1194	96.50 2451	7500 3402	— —	— —	— —
24 600	55.00 1397	103.50 2629	8000 3629	55.00 <sup>(6)</sup> 1397	103.75 2635	10000 4536	— —	— —	— —

(5) Dimension is center to top in **open position**.

(6) The following valves do not meet the ASME B16.10 end to end dimensions.

# VELAN SUPERIOR GLOBE VALVES

## IMPACTOR HANDWHEEL

Impactor handwheel gives 3 –10 times more closing force than a standard handwheel. All this resulting in smooth, easy operation and tight shutoff under extreme pressures.

## COMPLETE RANGE OF AUTOMATION CAPABILITIES

Gear actuators are standard from 6" (150 mm), depending on size and pressure class (See page 52). Complete range of options including: electric, hydraulic and pneumatic actuators; preinstallation of switches, positioners, thrust and torque sensors; overrides, limit stops and most standard accessories. (More on pages 45 & 52.)

## NON-ROTATING STEM

Valves require lower operating torque due to a non-rotating stem. (More on page 12.)

## HEAVY TWO-PIECE GLAND/GLAND FLANGE

## UNIQUE SOURCE FOR FORGED VALVES UP TO 24" (600 mm)

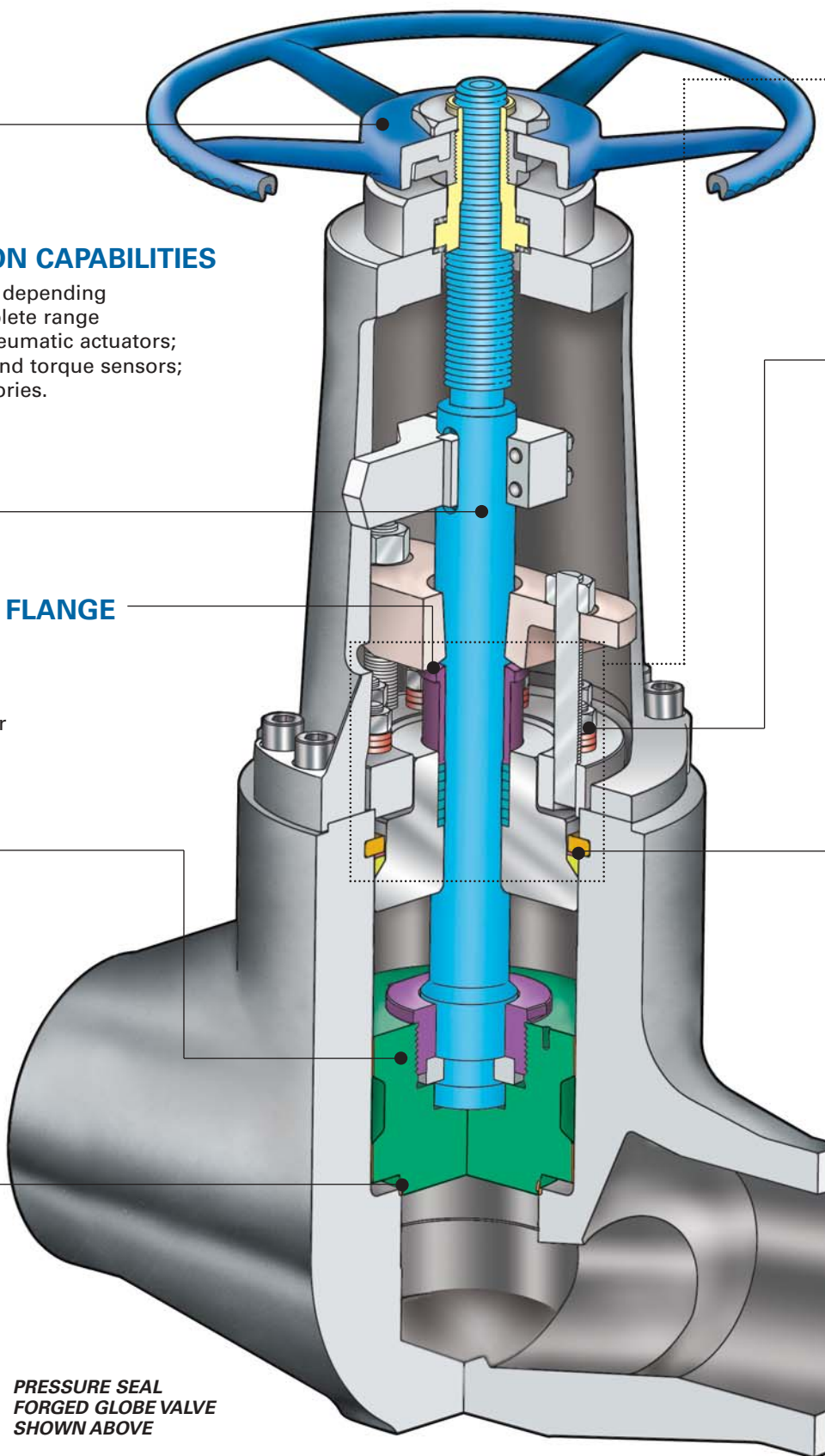
Compared to castings, forged valve bodies offer the advantages of more uniform structure, greater density and higher strength integrity. (More on page 8.)

## BODY GUIDED DISC

Body guided disc eliminates the effects of side thrust. The forged disc has an integral Stellite hardfaced seat and guide surface. It is fully guided at the top and bottom. This assures perfect seat and disc alignment in spite of the side thrust caused by high flow velocities and pressure differentials. This protects the stem from bending, scoring and galling and provides longer disc, seat and body life.

## INTEGRAL STELLITE SEAT

The integral Stellite hardfaced seat provides maximum resistance to erosion and wear under high flow velocities and distortion due to extreme temperature changes and piping loads.



PRESSURE SEAL  
FORGED GLOBE VALVE  
SHOWN ABOVE

# WITH UNIQUE CONSTRUCTION

## VELAN STEM SEAL DESIGN

Developed from extensive testing, the Velan stem seal offer a tight seal with little or no maintenance over long periods of time. *(More on page 12.)*

- **OPTIONAL LIVE-LOADING**

Live-loading extends low emission service life especially in service with large pressure/temperature transients or frequent cycling.

## LIVE-LOADED BONNET BOLTING

Stores the required sealing load during a pressure or temperature induced transient which cause bonnet movement. *(See page 10 for details.)*

## GRAPHITE GASKETS

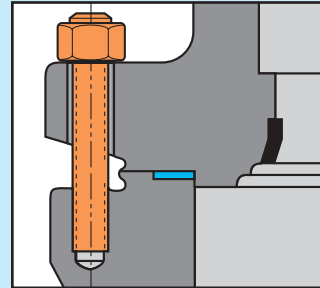
Standard in valves to ASME Class 2500. *(See page 10 for details.)*

## EASY REPAIRS IN-LINE

The entire seat area is visible, so quick repairs in-line can be made after removal of the bonnet assembly. Minor seat damage can be removed by lapping, and major damage can be repaired with portable boring tools. The pressure seal area can also be refinished with a simple honing tool.

## VELAN GLOBE VALVES

Velan globe valve's top and bottom-guided disc assures stem operation without side thrust caused by high pressure flow. The non-rotating stem results in lower friction of all moving parts and longer stem packing life. All this resulting in smooth, easy operation and tight shutoff under extreme pressures.

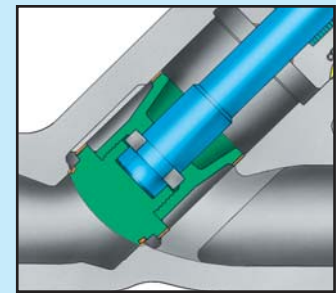


### BOLTED BODY DESIGN ALSO AVAILABLE

Stronger, leakproof bolted body bonnet joint ensures joint tightness. *(See page 11 for details.)*

### Y-PATTERN VALVES

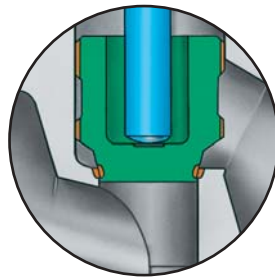
Offer lower pressure drop and higher  $C_v$ s. *(More on pages 34 & 35.)*



## OPTIONAL DISC DESIGNS

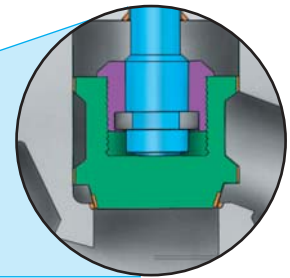
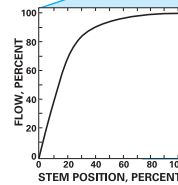
### GLOBE STOP-CHECK VALVE

Available with equalizer pipe for steam service or with equalizer pipe and piston rings for very low flow applications.



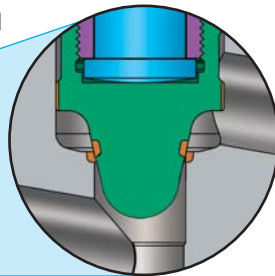
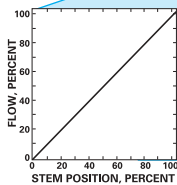
### QUICK OPENING

Standard disc design.



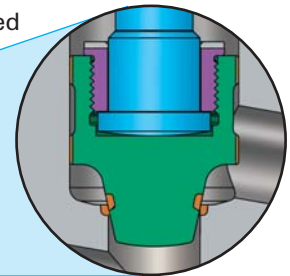
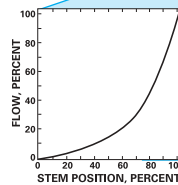
### LINEAR

Needle disc profile engineered to achieve desired flow characteristics



### EQUAL PERCENTAGE

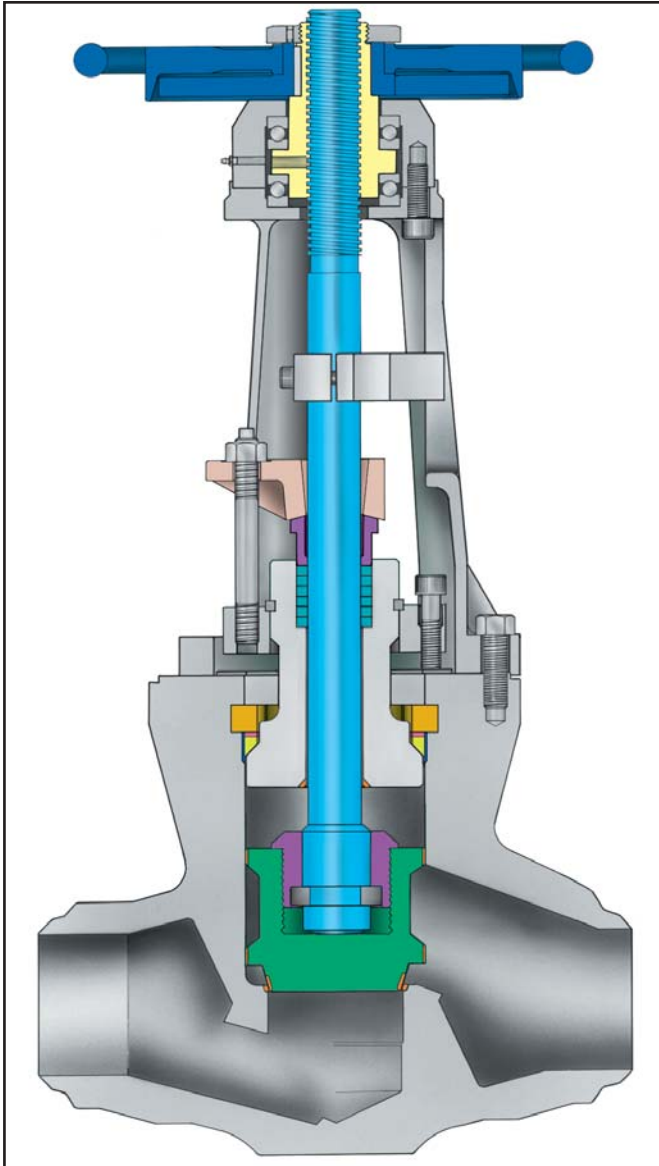
Needle disc profile engineered to achieve desired flow characteristics





# PRESSURE SEAL GLOBE VALVES CARBON, ALLOY OR STAINLESS STEEL

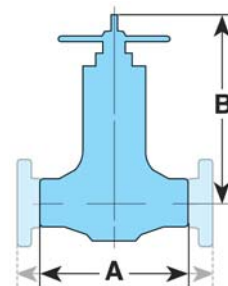
ASME CLASSES 600–2500, 2 – 16" (50–400 mm)  
 ASME CLASS 4500, 2½ – 6" (65–150 mm)  
 FORGED: 2 – 10" (50–250 mm), CAST: 12 – 16" (300–400 mm)



## DESIGN FEATURES:

- **Velan pressure seal design.**  
(See page 10 for details.)
- **Body guided disc eliminates side thrust**  
and provides longer disc, seat and body life.  
(See page 28 for details.)
- **Impactor Handwheel** for tight shutoff.
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Optional live-loading** of packing.
- **Non-rotating stem.**
- **Hardfaced** seating faces resist erosion.

CLASS	FIGURE NUMBERS			
	STOP		STOP CHECK	
	FORGED	CAST	FORGED	CAST
600	2074P	2074K	2084P	2084K
900	7074P	7074K	7084P	7084K
1500	3074P	3074K	3084P	3084K
2500	4074P	–	4084P	–
4500	5074P	–	5084P	–



Flange dimensions are in accordance with ASME B16.5.  
 Flanges are welded on.



**FLOW COEFFICIENT CV\* STANDARD MATERIALS**

SIZE in mm	CLASS				PART	MATERIAL					
	600	900	1500	2500							
2 50	45	45	45	20	Body <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91 or A 217 C12A	A 182 Gr. F316 or A 351 Gr. CF8M	
2½ 65	65	65	65	35	Bonnet <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M	
3 80	100	100	100	35	Disc <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M	
4 100	170	170	170	60	Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660	
6 150	350	350	350	200	Yoke	Carbon steel					
8 200	640	425	425	350	Gasket <sup>(1)</sup>	Soft carbon steel–silver plated or Graphite / SS 316					
10 250	875	875	710	490	Gasket retainer	A 182 Gr. F6a Cl. 4			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660	
12 300	1875	1400	960	–	Spacer ring	Gr. 4140 option Ni or Cad plated or SS					
14 350	2175	–	960	–	Packing ring <sup>(1)</sup>	Graphite					
16 400	2925	–	–	–	Packing flange	Carbon steel			Stainless		
					Gland	Carbon steel	Stainless				
					Gland stud	Gr. B7					
					Gland nut	Gr. 2H					
					Bonnet retainer	Carbon steel	Alloy Steel			Stainless	
					Torque arm	Carbon steel					
					Yoke bolting	Gr. B7					
					Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C					
					Thrust bearing	Steel					
					Handwheel <sup>(1)</sup>	Malleable iron or steel					

\*Kv = Cv x 0.85

(1) Other materials available, including Graphite. (2) Stellite. (3) Hardened. **SEAT INTEGRAL STELLITE 6.**

Note: 2–10" (50–250 mm) are forged, 12–16" (300–400 mm) are cast.

**DIMENSIONS – BUTT WELD END<sup>(6)</sup>**

SIZE in mm	ASME 600 (PN100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)			ASME 4500 (PN760)		
	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg
2 50	10.00 <sup>(5)</sup> 254	17.13 435	100 45	10.00 <sup>(5)</sup> 254	17.13 435	100 45	10.00 <sup>(5)</sup> 254	17.13 435	100 45	11.00 279	23.69 602	228 103	— —	— —	— —
2½ 65	8.50 216	17.13 435	100 45	10.00 254	17.13 435	100 45	10.00 254	17.13 435	100 45	13.00 330	23.44 595	226 103	18.00 457	23.68 601	245 111
3 80	10.00 254	23.56 598	225 102	12.00 305	23.56 598	225 102	12.00 305	23.56 598	225 102	14.50 368	23.44 595	250 113	14.00 356	23.50 597	245 111
4 100	12.00 305	25.43 646	300 136	14.00 356	25.43 646	300 136	16.00 406	25.43 646	300 136	18.00 457	25.00 635	350 159	18.00 457	23.68 601	325 147
6 150	18.00 457	39.80 1011	800 363	20.00 508	39.80 1011	800 363	22.00 559	39.80 1011	800 363	24.00 610	39.80 1011	850 386	24.00 610	39.80 1011	850 386
8 200	26.00 660	42.88 1089	1500 680	26.00 660	42.88 1089	1500 680	28.00 711	42.88 1089	1500 680	30.00 762	43.00 1092	1750 795	— —	— —	— —
10 250	31.00 787	50.75 1289	1750 795	31.00 787	50.75 1289	1750 795	34.00 864	47.57 1208	1750 795	34.00 <sup>(5)</sup> 864	45.50 1156	2000 907	— —	— —	— —
12 300	33.00 838	62.88 1597	2000 907	38.00 965	62.88 1597	2800 1270	44.50 1130	67.25 1708	3200 1452	— —	— —	— —	— —	— —	— —
14 350	35.00 889	62.88 1597	2100 953	40.50 1029	62.88 1597	2900 1315	44.50 1130	67.25 1708	3200 1452	— —	— —	— —	— —	— —	— —
16 400	39.00 990	63.00 1600	2500 1134	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —

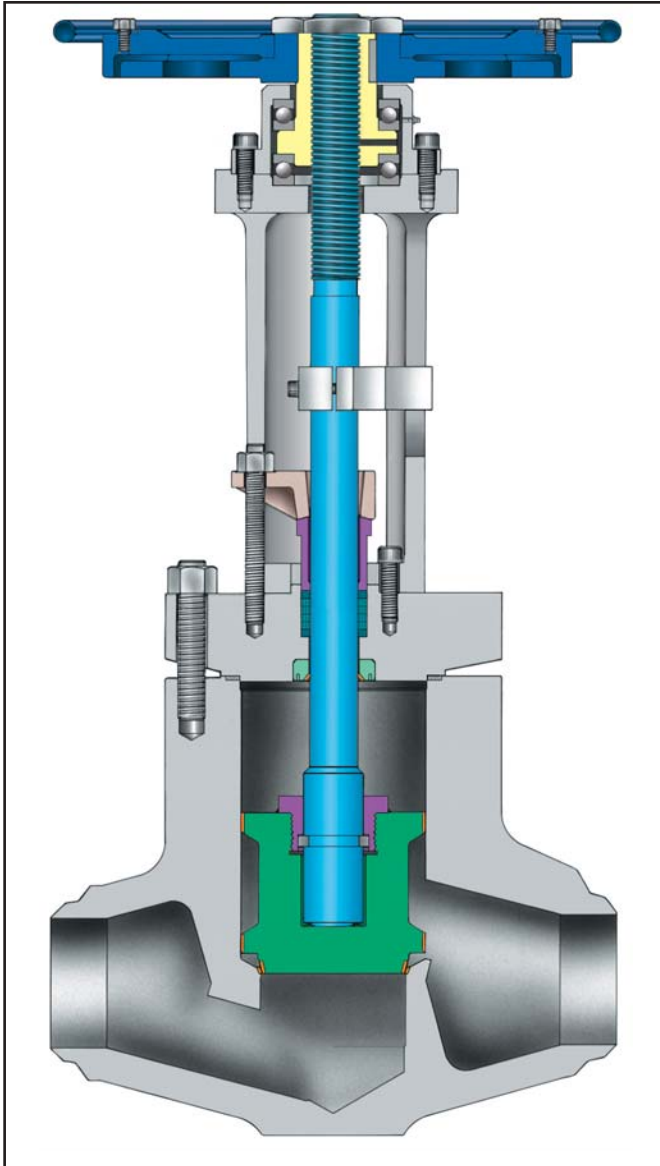
(4) Dimension is center to top in open position. (5) The following valves do not meet the ASME B16.10 end to end dimensions.

(6) For cast valve dimensions contact the factory.



## BOLTED BONNET GLOBE VALVES CARBON, ALLOY OR STAINLESS STEEL

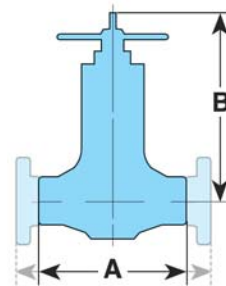
ASME CLASSES 150–1500,  
FORGED: 2½–10" (65–250 mm)  
CAST: 12–14" (300–350 mm)



### DESIGN FEATURES:

- **Stronger, leakproof bolted body bonnet joint** ensures joint tightness with a higher bolting torque. *(See page 11 for details.)*
- **Body guided disc eliminates side thrust** and provides longer disc, seat and body life. *(See page 28 for details.)*
- **Impactor Handwheel** for tight shutoff.
- **Designed to ASME B16.34.**
- **Body** made of superior strength forgings and optional cast steel.
- **Velan stem seal** offers tight seal with little to no maintenance over long periods of time.
- **Optional** live-loading of packing.
- **Non-rotating** stem.
- **Hardfaced** seating faces resist erosion.
- Available with provision for seal weld
- Other sizes and pressure classes available. Contact the company for specifications.

CLASS	FIGURE NUMBERS	
	STOP	STOP CHECK
150	0074B	0084B
300	1074B	1084B
600	2074B	2084B
900	7074B	7084B
1500	3074B	3084B



Flange dimensions are in accordance with ASME B16.5.  
Flanges are welded on.

**FLOW COEFFICIENT CV\***

SIZE in mm	CLASS			
	150/300	600	900	1500
2½ 65	65	65	45	45
3 80	100	100	65	65
4 100	170	170	110	110
6 150	375	375	350	350
8 200	710	710	640	425
10 250	1000	1000	710	710
12 300	1550	1550	1050	960
14 350	2175	2175	1475	960

\*  $K_v = C_v \times 0.85$

**STANDARD MATERIALS**

PART	MATERIAL			
Body <sup>(1)(2)</sup>	A 105	A 182 Gr. F11	A 182 Gr. F22	A 182 Gr. F316
Bonnet <sup>(1)</sup>				
Disc <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F316 or A 351 Gr. CF8M
Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 630 or Gr. 660
Yoke	Carbon steel			
Gasket <sup>(1)</sup>	Spiral wound stainless and graphite			
Body/bonnet stud	Gr. B7	Gr. B16		Gr. B8M or Gr. 630
Body/bonnet nut	Gr. 2H	Gr. 4		Gr. 8M
Packing ring <sup>(1)</sup>	Graphite			
Packing flange	Carbon steel			Stainless
Gland				
Gland stud	Gr. B7			Gr. B8M or Gr. 630
Gland nut	Gr. 2H			Gr. 8M
Torque arm	Carbon steel			
Yoke bolting	Gr. B7 or A 574			
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C			
Thrust bearing	Steel			
Handwheel <sup>(1)</sup>	Malleable iron or steel			

(1) Other materials available. (2) Stellite. (3) Hardened. **SEAT INTEGRAL STELLITE 6**

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 150 (PN 20)			ASME 300 (PN 50)			ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)		
	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg	A	B <sup>(4)</sup>	lb kg
2½ 65	8.50	20.38	100	9.50	20.38	100	8.50	20.38	100	10.00	20.32	100	10.00	20.32	100
	216	518	45	241	518	45	216	518	45	254	516	45	254	516	45
3 80	9.50	27.88	200	12.50	27.88	200	10.00	27.88	200	12.00	28.00	200	12.00	28.00	200
	241	708	91	318	708	91	254	708	91	305	711	91	305	711	91
4 100	11.50	29.88	250	14.00	29.88	250	12.00	29.88	250	14.00	29.25	250	16.00	29.25	250
	292	759	113	356	759	113	305	759	113	356	743	113	406	743	113
6 150	16.00	44.50	600	17.50	44.50	600	18.00	44.50	600	20.00	50.38	850	22.00	44.88	850
	406	1130	272	445	1130	272	475	1130	272	508	1280	386	559	1140	386
8 200	19.50	47.63	1000	22.00	47.63	1000	26.00	47.63	1000	26.00	47.63	1500	28.00	47.63	1500
	495	1210	454	559	1210	454	660	1210	454	660	1210	680	711	1210	680
10 250	24.50	57.75	1500	24.50	57.75	1500	31.00	57.75	1500	31.00	53.00	1750	34.00	53.00	1750
	622	1467	680	622	1467	680	787	1467	680	787	1346	794	864	1346	794
12 300	27.50	72.25	2300	28.00	72.25	2300	33.00	72.25	2300	38.00	72.25	3200	44.50	77.25	3700
	699	1835	1043	711	1835	1043	838	1835	1043	965	1835	1452	1130	1962	1678
14 350	31.00	72.25	2300	33.00	72.25	2300	35.00	72.25	2300	40.50	72.25	3200	44.50	77.25	3700
	787	1835	1043	838	1835	1043	889	1835	1043	1029	1835	1452	1130	1962	1678

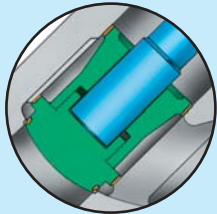
(4) Dimension is center to top in open position.



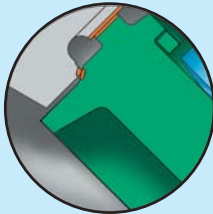
# PRESSURE SEAL Y-PATTERN GLOBE VALVES CARBON, ALLOY OR STAINLESS STEEL

ASME CLASSES 900–2500

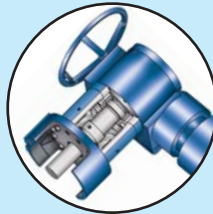
FORGED: 2½–4" (65–100 mm), CAST: 6–24" (150–600 mm)



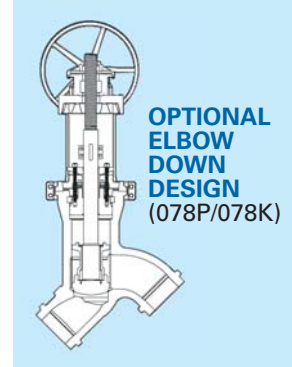
**STOP-CHECK VALVE**  
086P (forged)  
or 086K (cast)



**OPTIONAL SKIRTED DISC**  
for improved  
turndown.

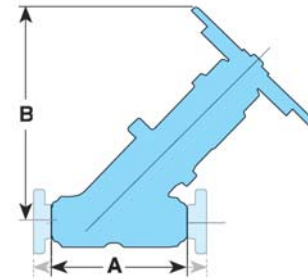
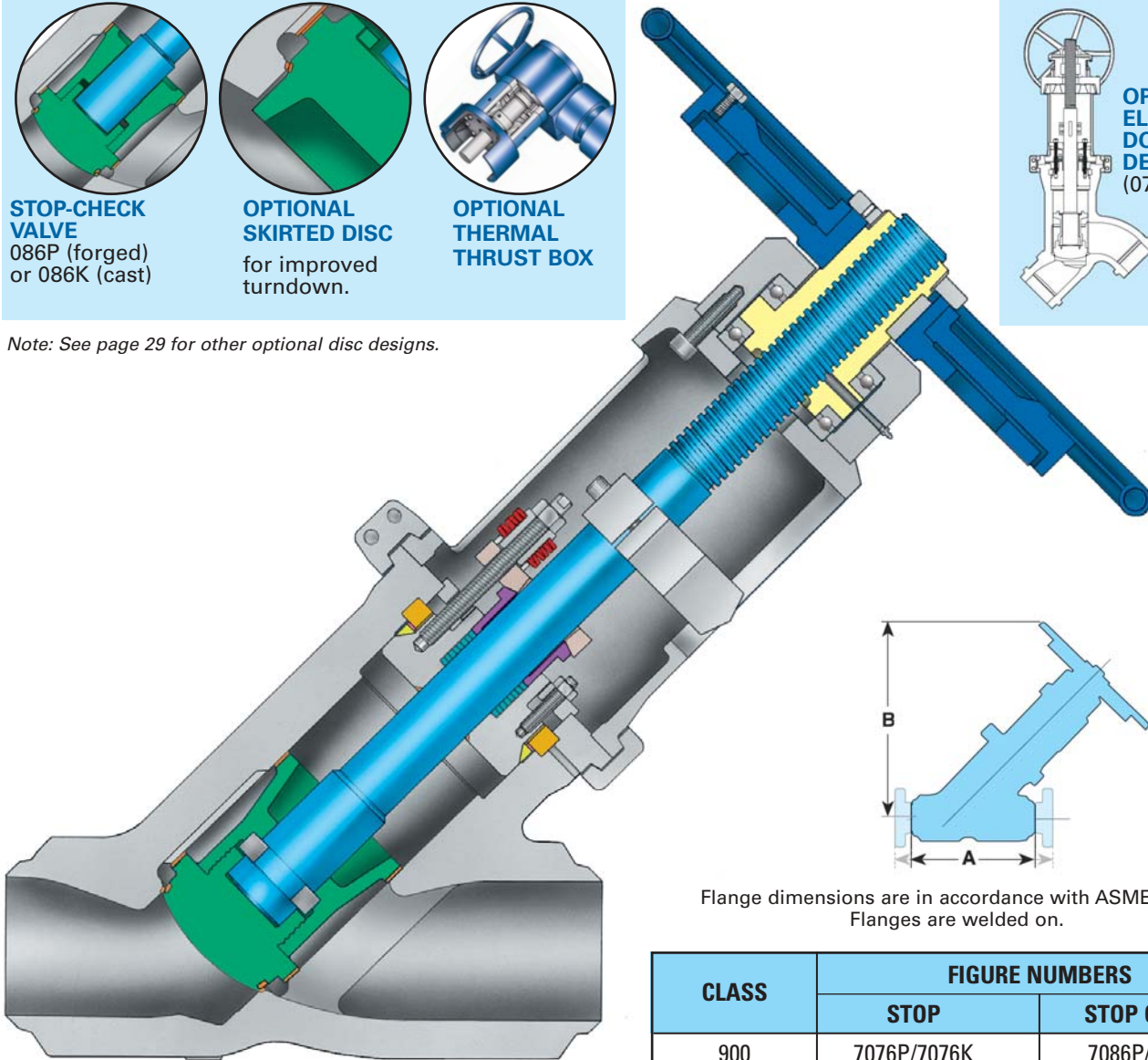


**OPTIONAL THERMAL THRUST BOX**



**OPTIONAL ELBOW DOWN DESIGN**  
(078P/078K)

Note: See page 29 for other optional disc designs.



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

**STOP VALVE** 076P (forged), 076K (cast)

CLASS	FIGURE NUMBERS	
	STOP	STOP CHECK
900	7076P/7076K	7086P/7086K
1500	3076P/3076K	3086P/3086K
2500	4076P/4076K	4086P/4086K

Note: Standard valves are reduced bore. For full bore valves, please specify at time of order

## DESIGN FEATURES:

- **Velan pressure seal design.** (See page 10 for details.)
- **Low pressure drop** compared to vertical globe valves.
- **Excellent resistance** to the effects of thermal cycling.
- **Low torque stroking** due to:
  - 1) radial thrust bearings, 2) non-rotating stem,
  - 3) impactor handwheel (3–10 times more effective than standard handwheel).
- **Quick and easy repair** in line.
- **Seat integrally Stellite.**
- **Disc fully guided** with Stellite seating and guiding surfaces.
- **Tight shutoff.**
- **Stem expansion/contraction** thrust unit for high temperature application (optional).
- **Other sizes** available on request.
- **Live-loading** of packing optional.

## STANDARD MATERIALS

PART	MATERIAL				
Body <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91 A 217 C12A	A 182 Gr. F316 or A 351 Gr. CF8M
Bonnet <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91 A 217 C12A	A 182 Gr. F316 or A 351 Gr. CF8M
Disc <sup>(1)(2)</sup>		A 217 Gr. WC6			
Stem <sup>(1)(3)</sup>	Gr. 410			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660
Yoke	Carbon steel				
Gasket <sup>(1)</sup>	Soft carbon steel–silver plated or Graphite / SS 316				
Gasket retainer	A 182 Gr. F6a Cl. 4			Gr. 616 or Gr. 660	Gr. 630 or Gr. 660
Packing ring <sup>(1)</sup>	Graphite				
Spacer ring <sup>(1)</sup>	Gr. 4140 option Ni or Cad plated or SS				
Packing flange	Carbon steel			Stainless	
Gland	Carbon steel	Stainless			
Gland stud	Gr. B7				
Gland nut	Gr. 2H				
Bonnet retainer	Carbon steel	Alloy Steel		Stainless	
Torque arm	Carbon steel				
Yoke bolting	Gr. B7				
Yoke nut	Manganese bronze or Austenitic Ductile Iron A 439 Gr. D-2C				
Thrust bearing	Steel				
Handwheel <sup>(1)</sup>	Malleable iron or steel				

(1) Other materials available, including Graphite. (2) Stellite. (3) Hardened.

Note: 2½–4" (50–100 mm) are forged. 6" (150 mm) and up are cast.

## CV FLOW COEFFICIENTS\*

SIZE in mm	REDUCED BORE			FULL BORE		
	Class 900	Class 1500	Class 2500	Class 900 <sup>(4)</sup>	Class 1500 <sup>(4)</sup>	Class 2500 <sup>(4)</sup>
2½ 65	–	–	–	95	95	95
3 80	120	120	–	–	–	120
4 100	120	120	120	–	–	–
6 150	550	550	350	650	650	500
8 200	870	870	–	1300	1300	870
10 250	1400	1400	–	2050	2050	1400
12 300	1900	1900	1750	2800	2800	2050
14 350	2300	2300	2050	3000 <sup>(5)</sup>	3000	2250
16 400	3000	3000	–	4850	4850	3000
18 450	4100	4100	–	4850 <sup>(5)</sup>	4850 <sup>(5)</sup>	3250 <sup>(5)</sup>
20 500	4850	4850	3100	6350 <sup>(5)</sup>	6350	4850
24 600	–	–	4850	9000 <sup>(5)</sup>	7000 <sup>(5)</sup>	6350

\*  $K_v = C_v \times 0.85$

(4) 90% or more of ASME B16.34 - Table A1 inside diameter

(5) Less than 90% of ASME B16.34 - Table A1 inside diameter

## DIMENSIONS – BUTT WELD END

SIZE in mm	ASME 900/1500 (PN 150/250)			ASME 2500 (PN 420)		
	A	B	lb kg	A	B	lb kg
2½ 65	14.50 368	25.25 641	225 102	14.50 368	25.25 641	225 102
3 80	14.50 368	25.25 641	225 102	14.50 368	25.25 641	225 102
4 100	16.00 406	25.25 641	275 125	18.00 457	25.25 641	275 125
6 150	27.75 705	37.00 940	800 363	24.00 610	39.00 991	935 425
8 200	30.00 762	46.00 1168	1750 794	30.00 762	45.00 1143	1800 816
10 250	36.25 921	50.00 1270	2375 1077	36.00 914	50.00 1270	3000 1361
12 300	43.00 1092	60.00 1524	3375 1531	41.00 1041	55.00 1397	5100 2313
14 350	43.00 1092	60.00 1524	3375 1531	48.75 1238	55.00 1397	5100 2313
16 400	54.00 1372	74.00 1880	7500 3402	48.75 1238	61.00 1549	7000 3175
18 450	58.00 1473	74.00 1880	7500 3402	58.00 1473	78.00 1981	12000 5443
20 500	55.00 1397	78.00 1981	10000 4536	58.00 1473	78.00 1981	12000 5443
24 600	59.50 1511	95.00 2413	13600 6169	–	–	–

## SWING CHECK VALVES

Velan advanced design swing check valves provide efficient protection of equipment against backflow. The valves feature a unique compact cage unit design comprised of all moving parts easily accessible for service. The light-weight pressure seal cover remains tight regardless of pressure-temperature fluctuations.

## UNIQUE SOURCE FOR FORGED VALVES UP TO 24" (600 mm)

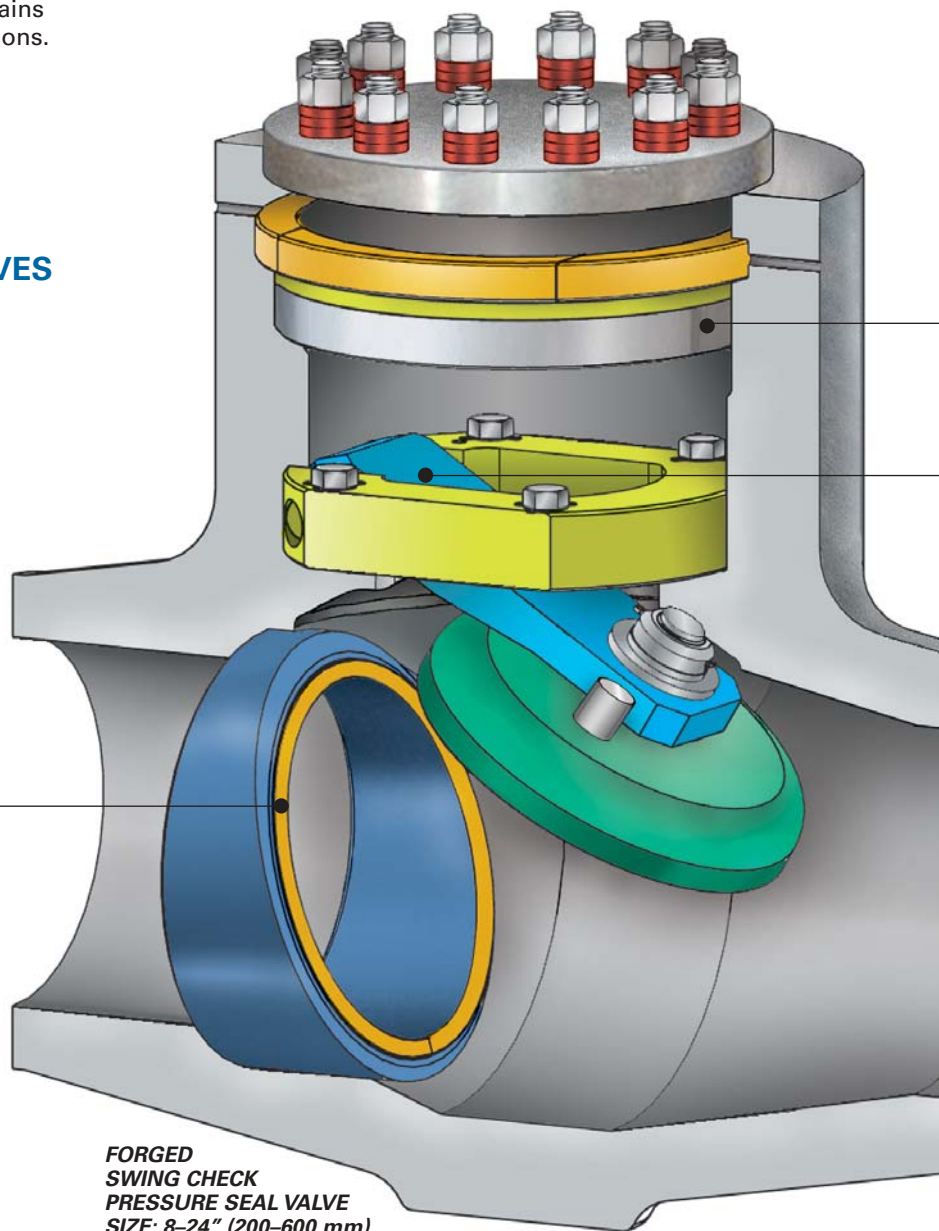
Compared to castings, forged valve bodies offer the advantages of more uniform structure, greater density and higher strength integrity. *(More on page 8.)*

## FORGED SEAT

Forged disc/seat are Stellite, ground and lapped to a mirror finish for maximum erosion resistance and long service life. Seat rings are seal-welded to the body.

## EASY IN-LINE SERVICE

Once the covers are removed, all parts are easily accessible for maintenance. Seating faces can be re-lapped.



**FORGED  
SWING CHECK  
PRESSURE SEAL VALVE  
SIZE: 8-24" (200-600 mm).**

# DESIGNED FOR PERFORMANCE

## UNIQUE, COMPACT CAGE UNIT

All moving parts are attached to the carrier and can be removed easily for service. The entire seat-hinge-pin-disc assembly can be tested outside the valve before placing into the body and seal welding.

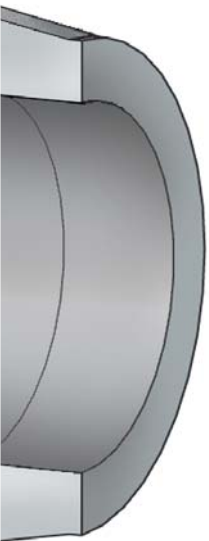
## GRAPHITE GASKETS

Standard in valves to ASME Class 2500.  
(See page 10 for details.)

## NO PENETRATION OF HINGE PIN TO OUTSIDE – A UNIQUE VELAN FEATURE

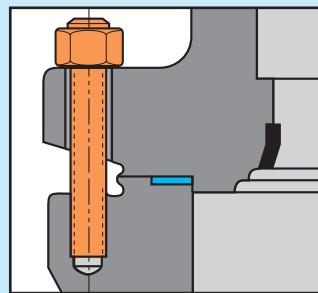
Eliminates pin seal leakage and provides in-line service.

A sturdy disc hinge moves on four Stellite bearings, supporting the hinge pin and preventing binding.



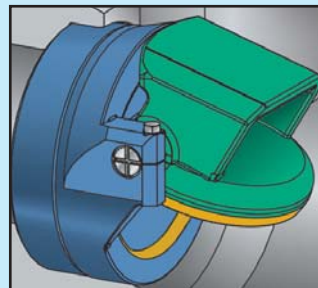
## VELAN CHECK VALVES

Check valves are installed to allow flow in one direction only and they protect systems that can be affected by reverse flow, such as a system shutdown. They are operated entirely by reaction to the direction of flow and therefore do not require any external actuation. Velan manufactures pressure seal and bolted bonnet swing, tilting disc and piston check valves for use in a wide range of applications.



### BOLTED BODY DESIGN ALSO AVAILABLE

Stronger, leakproof bolted body bonnet joint ensures joint tightness.  
(See page 11 for details.)



### TILTING DISC CHECK VALVES

The tilting disc check valve is designed for high piping velocities, turbulent flow, quick and quiet closing preventing "water hammer".

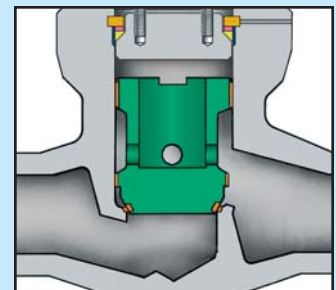
The valves feature a unique cage unit that allows the entire seat-hinge-pin-disc assembly to be tested outside the valve before placing into the body and seal welding. The internally supported hinge pin eliminates pin seal leakage. The hinge pin is located near the center of gravity, which allows the conical seating face of the disc to move out and into the seat rapidly without sliding or wear.

### VELAN'S PISTON CHECK DESIGN

Features a body guided piston disc that ensures maximum lift and low pressure drop for a tight shutoff.

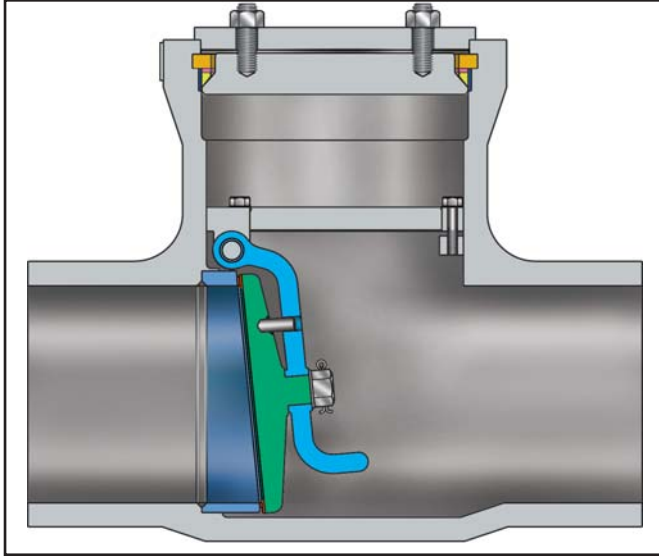
The **Y-pattern Piston Check** offers lower pressure drop and higher Cvs.

(See page 43 for details.)



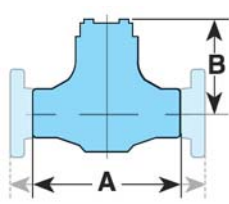


**PRESSURE SEAL  
SWING CHECK VALVES  
CARBON, ALLOY OR STAINLESS STEEL  
ASME CLASSES 600–2500, 2–24" (50–600 mm)**



**CAUTION:** For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
600	2114P/2114K
900	7114P/7114K
1500	3114P/3114K
2500	4114P/4114K



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

**STANDARD MATERIALS**

PART	MATERIAL				
Body <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217Gr. WCB	A 182 Gr. F22	A 182 Gr. F91	A 182 Gr. F316
Cover <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WCB	A 182 Gr. F22 or A 217 Gr. WCB	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WCB	A 182 Gr. F22 or A 217 Gr. WCB	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Disc <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WCB	A 182 Gr. F22 or A 217 Gr. WCB	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Hanger	Stainless				
Hex head bolt	Alloy steel				Stainless
Lock washer	Stainless				
Hinge pin	Gr. 410				Gr. 630 or Gr. 660
Bushing	Stellite 6				
Gasket <sup>(1)</sup>	Soft carbon steel - silver plated or Graphite/SS 316				
Gasket retainer	A 182 Gr. F6a Cl.4				
Spacer ring	Gr. 4140 option Ni or Cad plated or SS				
Cover plate	Carbon steel				
Cover stud	Gr. B7				
Cover nut	Gr. 2H				

(1) Other materials available, including Graphite. (2) Stellite.

**FLOW COEFFICIENT CV\***

SIZE in (mm)	CLASS				SIZE in (mm)	CLASS			
	600	900	1500	2500		600	900	1500	2500
2 (50)	65	65	65	65	12 (300)	3650	3000	3000	1650
2½ (65)	95	95	95	65	14 (350)	5500	3000	3000	1700
3 (80)	170	170	170	95	16 (400)	6000	4850	4850	3300
4 (100)	295	295	295	170	18 (450)	6250	6250	6250	4200
6 (150)	700	700	700	400	20 (500)	9000	9000	7700	5100
8 (200)	1125	1125	1125	750	24 (600)	13500	13500	11500	6400
10 (250)	1700	1700	1700	1125					

Note: for cast valve Cv values, contact Velan.

\* Kv = Cv x 0.85

**DESIGN FEATURES:**

- **Advanced pressure seal design.**  
(See page 10 for details.)
- **No penetration of hinge pin to outside.**  
Eliminates pin seal leakage and provides in-line service.
- **Compact cage unit.**  
All moving parts are attached to the carrier and can be removed easily for service.
- **Forged seat/disc is Stellite,** ground and lapped to a mirror finish for maximum erosion resistance and long service life. It is seal-welded to the body.
- **Disc can partially rotate for tight shutoff.**  
In the fully open position, it rests against a stop.
- **Stellite bearings for hinge pin.**
- **Easy in-line service.**  
All parts are easily accessible for maintenance. Seating faces can be re-lapped.
- **Forged bonnet.**

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)		
	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg
2 50	8.50 <sup>(3)</sup> 216	7.75 197	75 34	10.00 <sup>(3)</sup> 254	7.75 197	75 34	8.50 216	5.75 146	75 34	11.00 279	5.63 143	100 45
2½ 65	8.50 216	7.75 197	75 34	10.00 254	7.75 197	75 34	10.00 254	7.75 197	75 34	10.00 <sup>(3)</sup> 254	5.75 146	100 45
3 80	10.00 254	7.75 197	100 45	12.00 305	7.75 197	100 45	12.00 305	7.75 197	100 45	14.50 368	7.81 198	125 57
4 100	12.00 305	9.50 241	150 68	14.00 356	9.50 241	150 68	16.00 406	9.50 241	150 68	18.00 457	9.38 238	175 79
6 150	18.00 457	14.75 375	500 227	20.00 508	14.75 375	500 227	22.00 559	14.75 375	500 227	24.00 610	15.50 394	575 261
8 200	23.00 584	17.50 445	800 363	26.00 660	17.50 445	800 363	28.00 711	17.50 445	800 363	30.00 762	18.00 457	1000 454
10 250	28.00 711	19.88 505	1300 590	31.00 787	19.88 505	1300 590	34.00 864	19.88 505	1300 590	36.00 914	19.25 489	1500 680
12 300	32.00 813	23.88 607	3000 1361	36.00 914	23.88 607	3000 1361	39.00 991	23.88 607	3000 1361	41.00 1041	23.75 603	3300 1497
14 350	35.00 889	23.88 607	3000 1361	39.00 991	23.88 607	3000 1361	42.00 1067	23.88 607	3000 1361	44.00 1118	23.13 588	3300 1497
16 400	39.00 991	28.62 727	3700 1678	43.00 1092	28.62 727	3850 1746	47.00 1194	28.62 727	4000 1814	49.00 1245	30.00 762	4500 2041
18 450	43.00 1092	31.53 801	4200 1905	43.00 <sup>(3)</sup> 1092	31.53 801	4200 1905	43.00 <sup>(3)</sup> 1092	31.53 801	4200 1905	44.00 1118	31.66 804	5800 2631
20 500	47.00 1194	28.32 719	5300 2404	47.00 <sup>(3)</sup> 1194	28.32 719	5300 2404	47.00 <sup>(3)</sup> 1194	28.32 719	5300 2404	48.00 1219	31.42 798	6500 2962
24 600	55.00 1397	29.25 743	7200 3266	55.00 <sup>(3)</sup> 1397	29.25 743	7200 3266	55.00 <sup>(3)</sup> 1397	29.25 743	7200 3266	55.00 1397	34.81 884	9900 4491

(3) The following valves do not meet the ASME B16.10 end to end dimensions.

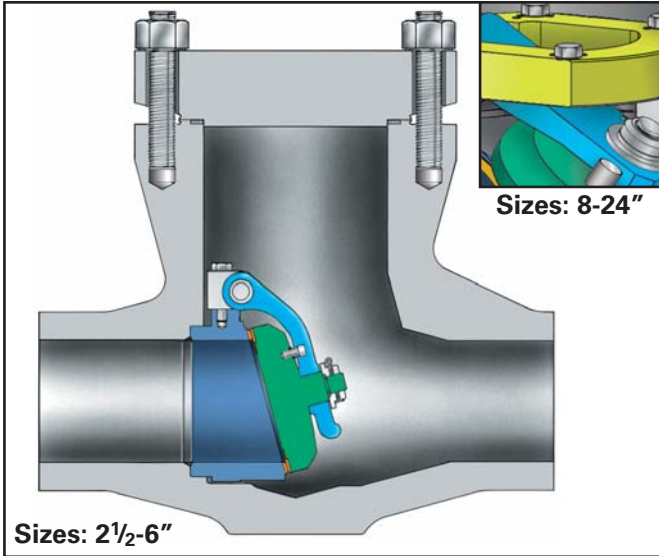
(4) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.





# BOLTED COVER SWING CHECK VALVES CARBON, ALLOY OR STAINLESS STEEL

ASME CLASSES 150–900, 2½–24" (65–600 mm)  
ASME CLASS 1500, 2½–16" (65–400 mm)



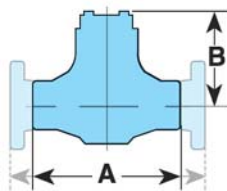
## STANDARD MATERIALS

PART	MATERIAL			
Body <sup>(1)</sup>	A105	A182 Gr. F11	A182 Gr. F22	A182 Gr. F316
Cover <sup>(1)</sup>				
Seat <sup>(1)(2)</sup>	A105	A 182 Gr. F11	A 182 Gr. F22	A 182 Gr. F316
Disc <sup>(1)(2)</sup>	A 216 Gr. WCB or	A 217 Gr. WC6	A 217 Gr. WC9	A 351 Gr. CF8M or
Hanger	Carbon steel			Stainless
Hex head bolt	Alloy steel			
Lock washer	Stainless			
Hinge pin	Gr. 410			Gr.630 or Gr.660
Bushing	Stellite 6			
Gasket <sup>(1)</sup>	Spiral wound stainless and graphite			
Body/cover stud	Gr. B7	Gr. B16		Gr. B8M or Gr.630
Body/cover nut	Gr. 2H	Gr. 4		Gr. 8M

(1) Other materials available. (2) Stellite.

**CAUTION:** For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
150	0114B
300	1114B
600	2114B
900	7114B
1500	3114B



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

## FLOW COEFFICIENTS Cv \*

SIZE in (mm)	CLASS				SIZE in (mm)	CLASS			
	150/300	600	900	1500		150/300	600	900	1500
2½ (65)	170	170	170	170	12 (300)	3500	3500	2800	2800
3 (80)	170	170	170	170	14 (350)	5300	5300	3650	3650
4 (100)	295	295	295	295	16 (400)	7000	7000	6000	4850
6 (150)	830	830	700	700	18 (450)	8400	8400	7300	—
8 (200)	1525	1525	1125	1125	20 (500)	10,500	10,500	9000	—
10 (250)	2400	2400	1700	1700	24 (600)	15,000	15,000	13,500	—

\* Kv = Cv x 0.85

## DESIGN FEATURES:

- **Stronger, leakproof bolted body bonnet joint.** (See page 11.)
- **No penetration of hinge pin to outside** eliminates pin seal leakage and provides in-line service.
- **Compact cage unit.** All moving parts are attached to the carrier and can be removed easily for service.
- **Forged seat/disc\* is Stellite,** ground and lapped to a mirror finish for maximum erosion resistance and long service life. It is seal-welded to the body.
- **Disc** can partially rotate for tight shutoff. In the fully open position, it rests against a stop.
- **Stellite bearings for hinge pin.**
- **Easy in-line service.** Seating faces can be re-lapped.
- **Forged Bonnet**

\* Cast option available

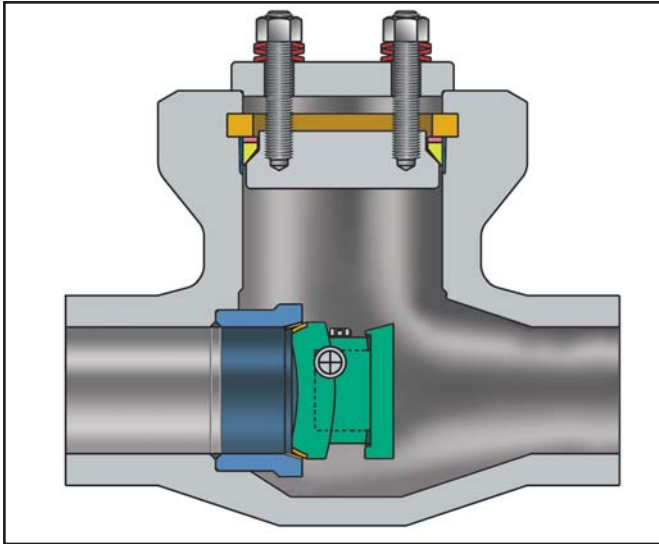
## DIMENSIONS – BUTT WELD END

SIZE in mm	ASME 150 (PN 20)			ASME 300 (PN 50)			ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)		
	A	B	lb kg	A	B	lb kg	A	B	lb kg	A	B	lb kg	A	B	lb kg
2½ 65	8.50 216	7.00 178	50 23	11.50 292	7.00 178	50 23	13.00 330	7.00 178	50 23	10.00 254	7.00 178	50 23	10.00 254	7.00 178	50 23
3 80	9.50 241	9.00 229	100 45	12.50 318	9.00 229	100 45	10.00 254	9.00 229	100 45	12.00 305	9.50 241	100 45	12.00 305	9.50 241	100 45
4 100	11.50 292	10.56 268	150 68	14.00 356	10.56 268	150 68	12.00 305	10.56 268	150 68	14.00 356	10.75 273	150 68	16.00 406	10.75 273	150 68
6 150	14.00 356	13.13 333	300 136	17.50 445	13.13 333	300 136	18.00 457	13.13 333	300 136	20.00 508	16.25 413	450 204	22.00 559	16.50 419	450 204
8 200	19.50 495	16.19 411	700 318	21.00 533	16.19 411	700 318	23.00 584	16.19 411	700 318	26.00 660	19.50 495	850 386	28.00 711	19.50 495	850 386
10 250	24.50 622	19.50 495	800 363	24.50 622	19.50 495	800 363	28.00 711	19.50 495	800 363	31.00 787	21.75 552	1000 454	34.00 864	21.75 552	1000 454
12 300	27.50 699	22.69 576	1200 544	28.00 711	22.69 576	1200 544	32.00 813	22.69 576	1200 544	36.00 914	28.13 715	3000 1361	39.00 991	28.13 715	3000 1361
14 350	31.00 787	23.88 606	1400 635	33.00 838	23.88 606	1400 635	35.00 889	23.88 606	1400 635	39.00 991	26.50 673	3000 1361	39.00 991	27.50 699	3000 1361
16 400	34.00 864	29.00 737	2000 907	34.00 864	29.00 737	2500 1134	39.00 991	30.00 762	2500 1134	43.00 1092	31.00 787	3350 1520	47.00 1194	31.00 787	3350 1520
18 450	38.50 978	22.88 581	2300 1043	38.50 978	22.88 581	3000 1360	43.00 1092	24.38 619	3000 1360	48.00 <sup>(3)</sup> 1219	24.38 619	4000 1814	—	—	—
20 500	38.50 978	26.00 660	3000 1360	40.00 1016	26.00 660	3600 1633	47.00 1194	27.00 686	3600 1633	47.00 <sup>(3)</sup> 1194	27.00 686	5000 2268	—	—	—
24 600	51.00 1295	31.00 787	5000 2268	53.00 1346	31.00 787	5500 2495	55.00 1397	31.00 787	5500 2495	55.00 <sup>(3)</sup> 1397	31.00 787	7000 3175	—	—	—

(3) The following valves do not meet the ASME B16.10 end to end dimensions.

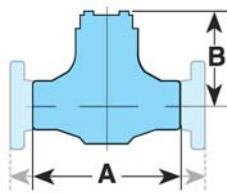


# PRESSURE SEAL TILTING DISC CHECK VALVES CARBON, ALLOY OR STAINLESS STEEL ASME CLASSES 600–2500, 2 –24" (50–600 mm)



**CAUTION:** Tilting disc check valves can be installed horizontally or vertically according to the design specifications. For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
600	2344P/2344K
900	7344P/7344K
1500	3344P/3344K
2500	4344P/4344K



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

## STANDARD MATERIALS

PART	MATERIAL				
Body <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217Gr. WC6	A 182 Gr. F22	A 182 Gr. F91	A 182 Gr. F316
Cover <sup>(1)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Seat <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Disc <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Hanger	Stainless				
Hex head bolt	Alloy steel				Stainless
Lock washer	Stainless				
Hinge pin	Gr. 410				Gr. 630 or Gr. 660
Bushing	Stellite 6				
Gasket <sup>(1)</sup>	Soft carbon steel - silver plated or Graphite/SS 316				
Gasket retainer	A 182 Gr. F6a Cl.4				
Spacer ring	Gr. 4140 option Ni or Cad plated or SS				
Cover plate	Carbon steel				
Cover stud	Gr. B7				
Cover nut	Gr. 2H				

(1) Other materials available, including Graphite. (2) Stellite.

## FLOW COEFFICIENT CV\*

SIZE in (mm)	CLASS			
	600	900	1500	2500
2 (50)	55	55	55	55
2½ (65)	130	130	130	55
3 (80)	200	200	200	200
4 (100)	235	235	235	200
6 (150)	700	700	700	430
8 (200)	1100	1100	1100	700
10 (250)	1600	1600	1600	1100

SIZE in (mm)	CLASS			
	600	900	1500	2500
12 (300)	2650	2650	2650	1600
14 (350)	2650	2650	2650	1600
16 (400)	4150	4150	4150	2650
18 (450)	5350	5350	5350	3600
20 (500)	6000	6000	6000	3600
24 (600)	8750	8750	8750	5800

\*  $K_v = C_v \times 0.85$  Note: for cast valve  $C_v$  values, contact Velan.

## DESIGN FEATURES:

- **Advanced pressure seal design.**  
(See page 10 for details.)
- **Unique cage unit.**  
Entire seat-hinge-pin-disc assembly can be tested outside the valve before seal welding into the body. Eliminates pin seal leakage.
- **Easy in-line service.**
- **Efficient operation.**  
The hinge pin located near the center of gravity allows the conical seating face of the disc to move out and into the seat rapidly without sliding or wear. The disc pivots through a small arc preventing back flow and "water hammer".
- **Superior tightness**  
Conical, lapped-in hardfaced seating is self-aligning. Valve can be used even in vertical piping with flow up.

## DIMENSIONS – BUTT WELD END

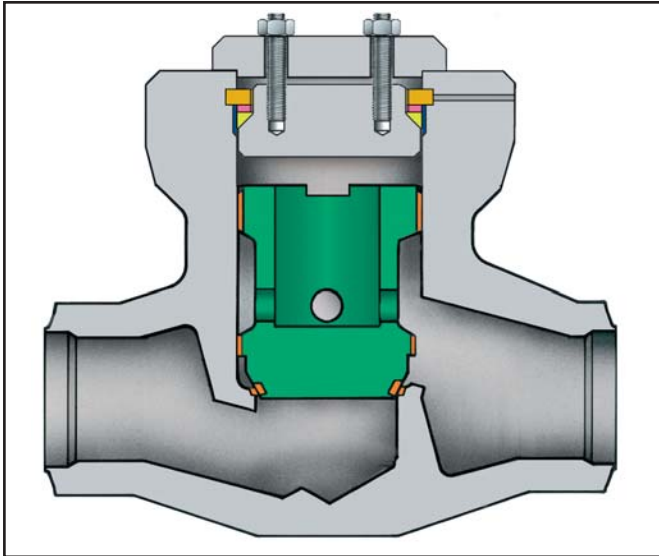
SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)		
	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg
2	8.50 <sup>(3)</sup>	7.75	75	10.00 <sup>(3)</sup>	7.75	75	8.50	5.75	75	11.00	5.63	100
50	216	197	34	254	197	34	216	146	34	279	143	45
2½	8.50	7.75	75	10.00	7.75	75	10.00	7.75	75	10.00 <sup>(3)</sup>	5.75	100
65	216	197	34	254	197	34	254	197	34	254	146	45
3	10.00	7.75	100	12.00	7.75	100	12.00	7.75	100	14.50	7.81	125
80	254	197	45	305	197	45	305	197	45	368	198	57
4	12.00	9.50	150	14.00	9.50	150	16.00	9.50	150	18.00	9.38	175
100	305	241	68	356	241	68	406	241	68	457	238	79
6	18.00	14.75	500	20.00	14.75	500	22.00	14.75	500	24.00	15.50	575
150	457	375	227	508	375	227	559	375	227	610	394	261
8	23.00	17.50	800	26.00	17.50	800	28.00	17.50	800	30.00	18.00	1000
200	584	445	363	660	445	363	711	445	363	762	457	454
10	28.00	19.88	1300	31.00	19.88	1300	34.00	19.88	1300	36.00	19.25	1500
250	711	505	590	787	505	590	864	505	612	914	489	680
12	32.00	23.88	3000	36.00	23.88	3000	39.00	23.88	3000	41.00	23.75	3300
300	813	607	1361	914	607	1361	991	607	1361	1041	603	1497
14	35.00	23.88	3000	39.00	23.88	3000	42.00	23.88	3000	41.00	23.13	3300
350	889	607	1361	991	607	1361	1067	607	1361	1041	588	1497
16	39.00	23.50	3500	43.00	23.50	3500	47.00	23.50	4000	49.00	30.00	4500
400	991	597	1588	1092	597	1588	1194	597	1814	1245	762	2041
18	43.00	22.18	4000	43.00 <sup>(3)</sup>	23.00	4000	43.00 <sup>(3)</sup>	23.00	4500	44.00	25.68	4900
450	1092	563	1814	1092	584	1814	1092	584	2041	1118	652	2223
20	47.00	23.25	5000	47.00 <sup>(3)</sup>	23.25	5000	47.00 <sup>(3)</sup>	23.25	5300	48.00	28.38	7500
500	1194	591	2268	1194	591	2268	1194	591	2404	1219	721	3402
24	55.00	29.25	7200	55.00 <sup>(3)</sup>	29.25	7200	55.00 <sup>(3)</sup>	29.25	7200	—	—	—
600	1397	743	3266	1397	743	3266	1397	743	3266	—	—	—

(3) The following valves do not meet the ASME B16.10 end to end dimensions.

(4) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.

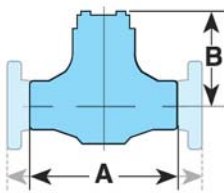


# PRESSURE SEAL PISTON CHECK VALVES CARBON, ALLOY OR STAINLESS STEEL ASME CLASSES 600–2500, 2–14" (50–350 mm)



**CAUTION:** For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
600	2034P/2034K
900	7034P/7034K
1500	3034P/3034K
2500	4034P/4034K



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

## DESIGN FEATURES:

- **Advanced pressure seal design.** (See page 10 for details.)
- **Quick and easy repair** in the line.
- **Seat integrally Stellite.**
- **Disc-piston fully guided** with Stellite seating and guiding surfaces. The light disc-piston ensures maximum lift and low pressure drop.
- **Tight shutoff.**
- **Other sizes available** on request.

## STANDARD MATERIALS

PART	MATERIAL				
Body <sup>(1)(2)</sup>	A 105	A 182	A 182	A 182	A 182
Cover <sup>(2)</sup>		Gr. F11	Gr. F22	Gr. F91	Gr. F316
Disc <sup>(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WCB	A 182 Gr. F22 or A 217 Gr. WCB	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Gasket	Soft carbon steel - silver plated or Graphite/SS 316				
Gasket retainer	A 182 Gr. F6a Cl.4				
Spacer ring	Gr. 4140 option Ni or Cad plated or SS				
Cover plate	Carbon steel				
Cover stud	Gr. B7				
Cover nut	Gr. 2H				

(1) Other materials available, including Graphite. (2) Stellite.

## FLOW COEFFICIENT CV\*

SIZE in (mm)	CLASS			
	600	900	1500	2500
2 (50)	45	45	45	20
2½ (65)	45	45	45	35
3 (80)	100	100	100	35
4 (100)	170	170	170	60
6 (150)	350	350	350	200
8 (200)	640	640	425	350
10 (250)	875	875	710	490
12 (300)	—	—	960	—
14 (350)	—	—	960	—

Note: 2–10" (50–100 mm) are forged.  
12–14" (300–350 mm) are cast.

\*  $K_v = C_v \times 0.85$

## DIMENSIONS – BUTT WELD END

SIZE in mm	ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)			ASME 2500 (PN 420)		
	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(4)</sup> kg	A	B	lb <sup>(5)</sup> kg	A	B	lb <sup>(4)</sup> kg
2	10.00 <sup>(3)</sup>	6.50	100	10.00 <sup>(3)</sup>	6.50	100	10.00 <sup>(3)</sup>	6.50	100	11.00	9.13	110
50	254	165	45	254	165	45	254	165	45	279	232	50
2½	10.00 <sup>(3)</sup>	6.50	100	10.00	6.50	100	10.00	6.50	100	13.00	8.63	120
65	254	165	45	254	165	45	254	165	45	330	219	54
3	10.00	8.50	100	12.00	8.50	100	12.00	8.50	100	14.50	8.63	125
80	254	216	45	305	216	45	305	216	45	368	219	56
4	12.00	10.25	150	14.00	10.25	150	16.00	10.25	150	18.00	10.25	160
100	305	260	68	356	260	68	406	260	68	457	260	72
6	18.00	14.62	450	20.00	14.62	450	22.00	14.62	450	24.00	14.62	500
150	457	371	204	508	371	204	559	371	204	610	371	227
8	26.00	17.6	700	26.00	17.60	700	28.00	17.81	700	30.00	17.31	750
200	660	447	318	660	447	318	711	452	318	762	440	340
10	28.00	19.13	900	31.00	19.13	900	34.00	19.13	900	34.00 <sup>(3)</sup>	19.10	1000
250	711	486	408	787	486	408	864	486	408	864	485	454
12	—	—	—	—	—	—	44.50	17.50	2050	—	—	—
300	—	—	—	—	—	—	1130	445	929	—	—	—
14	—	—	—	—	—	—	44.50 <sup>(3)</sup>	17.50	2050	—	—	—
350	—	—	—	—	—	—	1130	445	929	—	—	—

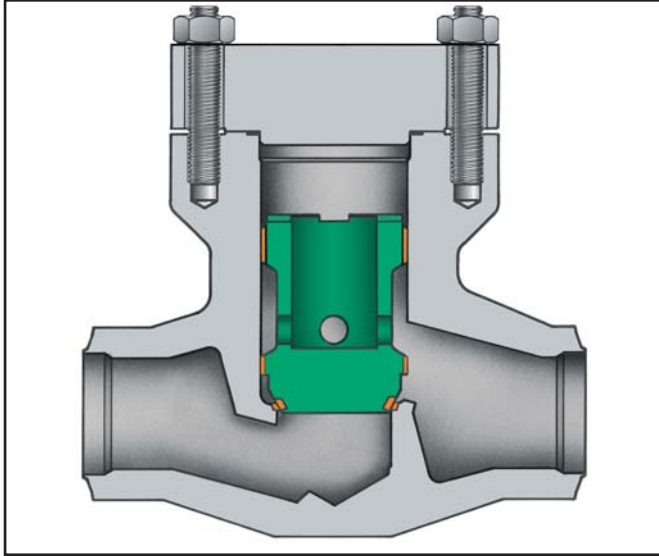
(3) The following valves do not meet the ASME B16.10 end to end dimensions.

(4) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.



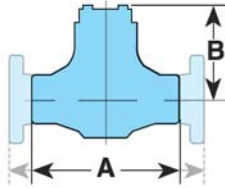
# BOLTED COVER PISTON CHECK VALVES CARBON, ALLOY OR STAINLESS STEEL

ASME CLASSES 150–1500, 2½–14" (65–350 mm)



**CAUTION:** For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
150	0034B
300	1034B
600	2034B
900	7034B
1500	3034B



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

## STANDARD MATERIALS

PART	MATERIAL			
Body <sup>(1)(2)</sup>	A 105	A 182	A 182	A 182
Cover <sup>(1)</sup>	A 105	Gr. F11	Gr. F22	Gr. F316
Disc <sup>(1)(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F316 or A 351 Gr. CF8M
Gasket <sup>(1)</sup>	Spiral wound stainless and graphite			
Cover stud	Gr. B7			Gr. B8M or 630
Cover nut	Gr. 2H	Gr. 24		Gr. 8M

(1) Other materials available.

(2) Stellite. Seat integral Stellite 6 on 12" and 14" cast.

## FLOW COEFFICIENT CV\*

SIZE in (mm)	CLASS			
	150/300	600	900	1500
2½ (65)	65	65	45	45
3 (80)	100	100	65	65
4 (100)	170	170	110	110
6 (150)	375	375	350	350
8 (200)	710	710	640	425
10 (250)	1000	1000	710	710
12 (300)	1550	1550	1050	960
14 (350)	2175	2175	1475	960

\*  $K_v = C_v \times 0.85$

## DESIGN FEATURES:

- Stronger, leakproof bolted body bonnet joint. (See page 11.)
- Low pressure drop compared to vertical globe valves.
- Excellent resistance to thermal changes.
- Forged bonnet ring is centered by the body bore and provides perfect sealing surface for the pressure seal gasket.
- Quick and easy repair in the line.
- Seat integrally Stellite  
Gives maximum resistance to wear, erosion and distortion due to high temperature changes and piping loads.
- Equalizer piping for safe operation.

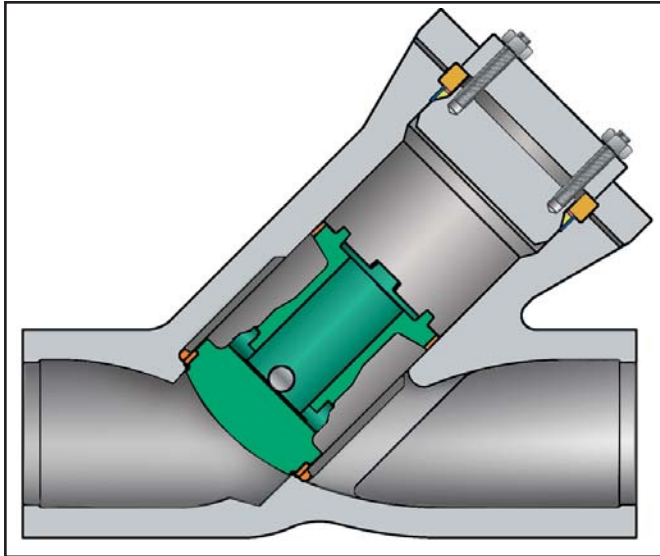
## DIMENSIONS – BUTT WELD END

SIZE	ASME 150 (PN 20)			ASME 300 (PN 50)			ASME 600 (PN 100)			ASME 900 (PN 150)			ASME 1500 (PN 250)		
	in mm	A	B	lb <sup>(3)</sup> kg	A	B	lb <sup>(3)</sup> kg	A	B	lb <sup>(3)</sup> kg	A	B	lb <sup>(3)</sup> kg	A	B
2½ 65	8.50 216	6.62 168	50 23	11.50 292	6.62 168	50 23	8.50 216	6.62 168	50 23	10.00 254	6.62 168	55 25	10.00 254	6.62 168	55 25
3 80	9.50 241	9.31 236	100 45	12.50 318	9.31 236	100 45	10.00 254	9.31 236	100 45	12.00 305	9.75 248	105 48	12.00 305	9.75 248	105 48
4 100	11.50 292	10.38 264	140 64	14.00 356	10.38 264	150 68	14.00 356	10.38 264	150 68	14.00 356	10.38 264	150 68	16.00 406	11.69 297	160 73
6 150	14.00 356	16.75 425	300 136	17.50 445	16.75 425	330 150	18.00 457	16.75 425	340 154	20.00 508	16.75 425	200 90	22.00 559	16.75 425	450 204
8 200	19.50 495	17.38 441	700 318	21.00 533	17.38 441	740 336	26.00 660	17.38 441	800 363	26.00 660	17.38 441	850 386	28.00 711	17.38 441	900 408
10 250	24.50 622	21.68 551	800 363	24.50 622	21.68 551	800 363	28.00 711	21.68 551	900 408	31.00 787	21.68 551	1000 454	34.00 839	21.68 551	1100 499
12 300	–	–	–	–	–	–	–	–	–	38.00 965	17.00 432	1850 839	44.50 1130	18.00 457	2250 1020
14 350	–	–	–	–	–	–	–	–	–	40.50 1029	17.00 432	1850 839	44.50 1130	18.00 457	2250 1020

(3) Weights shown are for forged valves. For weights of cast steel valves, please contact Velan's Engineering Dept.

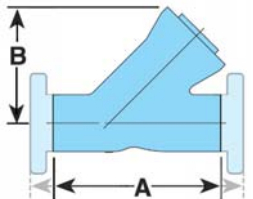


**PRESSURE SEAL  
Y-PATTERN PISTON CHECK VALVES  
CARBON, ALLOY OR STAINLESS STEEL  
ASME CLASSES 600–900, 2½–24" (65–600 mm)**



**CAUTION:** For other than horizontal line orientations see pgs. 50-51, or contact Velan Engineering.

CLASS	FIG. NO.
900	7036P/7036K
1500	3036P/3036K
2500	4036P/4036K



Flange dimensions are in accordance with ASME B16.5. Flanges are welded on.

**DESIGN FEATURES:**

- **Advanced pressure seal design.**  
(See page 10 for details.)
- **Low pressure drop.**
- **Excellent resistance to thermal changes.**
- **Forged bonnet ring** is centered by the body bore and provides perfect sealing surface for the pressure seal gasket.
- **Quick and easy repair** in the line.
- **Seat integrally Stellite**  
Gives maximum resistance to wear, erosion and distortion due to high temperature changes and piping loads.
- **Equalizer piping for safe operation.**

**STANDARD MATERIALS**

PART	MATERIAL				
Body <sup>(1)(2)</sup>	A 105	A 182	A 182	A 182	A 182
Cover <sup>(2)</sup>	A 105	Gr. F11	Gr. F22	Gr. F91	Gr. F316
Disc <sup>(2)</sup>	A 105 or A 216 Gr. WCB	A 182 Gr. F11 or A 217 Gr. WC6	A 182 Gr. F22 or A 217 Gr. WC9	A 182 Gr. F91	A 182 Gr. F316 or A 351 Gr. CF8M
Gasket	Soft carbon steel - silver plated or Graphite/SS 316				
Gasket retainer	A 182 Gr. F6a Cl.4				
Spacer ring	Gr. 4140 option Ni or Cad plated or SS				
Cover plate	Carbon steel				
Cover stud	Gr. B7				
Cover nut	Gr. 2H				

(1) Other materials available, including Graphite. (2) Stellite.

**FLOW COEFFICIENT CV\***

SIZE in (mm)	CLASS	
	900-1500	2500
2 (50)	80	80
2½ (65)	90	90
3 (80)	110	110
4 (100)	120	110
6 (150)	650	490
8 (200)	1300	870

SIZE in (mm)	CLASS	
	900-1500	2500
10 (250)	2050	1425
12 (300)	2300	2050
14 (350)	2800	2250
16 (400)	4850	3000
18 (450)	4850	3250
20 (500)	6300	4850
24 (600)	9000	6300

\*  $K_v = C_v \times 0.85$

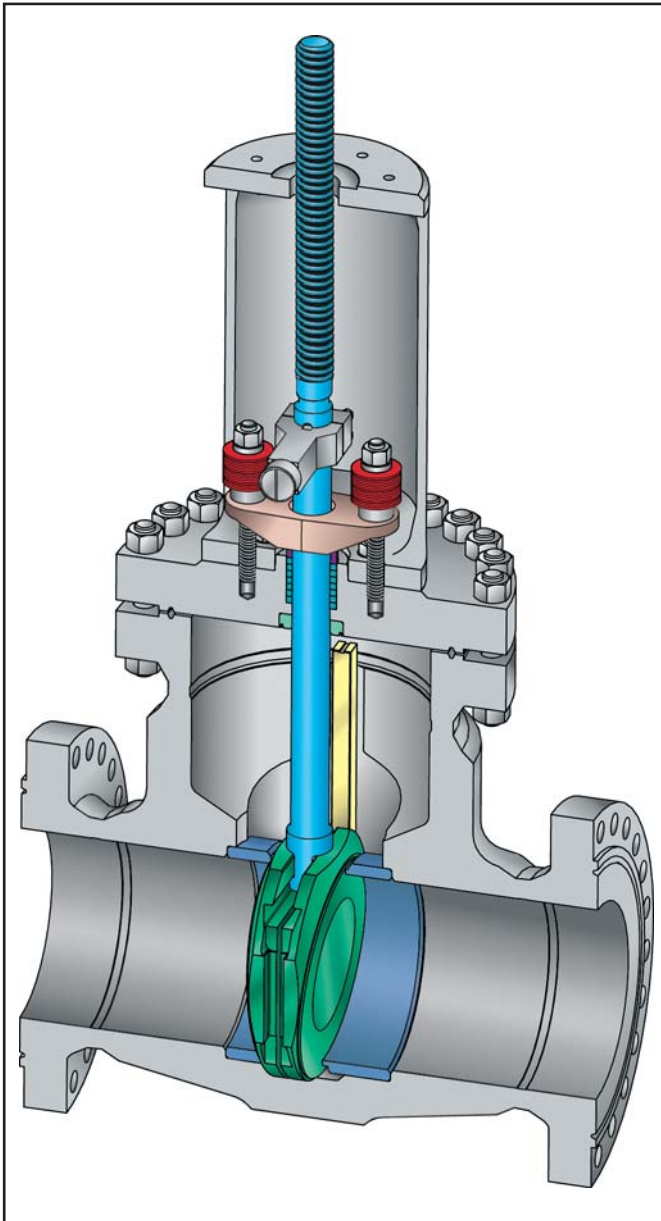
Note: 2–4" (50–100 mm) are forged.  
6" (150 mm) and larger are cast.

**DIMENSIONS – BUTT WELD END**

SIZE in mm	ASME 900 (PN150) & 1500 (PN 250)			ASME 2500 (PN 420)		
	A	B	lb kg	A	B	lb kg
2½ 65	14.50 368	10.50 267	160 73	14.50 368	10.50 267	160 73
3 80	14.50 368	10.50 267	160 73	14.50 368	10.50 267	160 73
4 100	16.00 406	10.50 267	190 86	18.00 457	10.50 267	200 91
6 150	27.75 705	16.00 406	540 245	24.00 610	16.00 406	650 295
8 200	30.00 762	20.75 527	1240 564	30.00 762	20.75 527	1300 591
10 250	36.25 921	25.50 648	1700 773	36.00 914	25.50 648	2100 955
12 300	43.00 1092	29.75 756	2400 1091	41.00 1041	29.75 756	3300 1500
14 350	43.00 1041	39.75 1010	2400 1091	48.75 1238	34.75 883	3500 1591
16 400	54.00 1372	40.25 1022	5300 2409	48.75 1238	34.50 876	4850 2205
18 450	58.00 1473	43.00 1092	5500 2500	58.00 1473	43.00 1092	8400 3819
20 500	55.00 1397	43.25 1099	7200 3273	58.00 1473	37.38 949	8700 3955
24 600	59.50 1511	48.00 1219	9750 4432	—	—	—

# FORGED POWER REFORMER VALVES

## FOR CATALYTIC REFORMING



### EXCLUSIVE FEATURES:

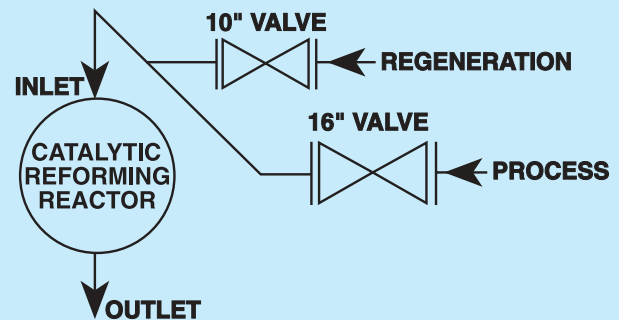
- Resists high temperature fluctuations which damage cast steel valves.
- All seating & sliding surfaces hardfaced with Stellite 6.
- Non-rotating stem.
- Bolted bonnet with seal weld.
- Flexible wedge which remains operable in 900–400°F (482–204°C) transients.

### THE CATALYTIC REFORMING VALVE CHALLENGE

Frequent temperature fluctuations expose the valve to excessive stresses which cause surface cracks in the body bores of **cast** steel valves. Leakage to the atmosphere in the presence of hydrogen could lead to an explosion. The valves must have tight closure. Parallel slide or double disc valves tend to leak after a short period in this service. The flexible wedges must be properly designed to resist the excessive piping forces during the cool down operation when the cooler body squeezes against the hotter wedge.

### CATALYTIC REFORMING OPERATING MODES

1. **Normal Operation.** The 10" (250 mm) regeneration valve is closed. The process stream at 275–300 psig (19–20.6 bar), 910–950°F (487–510°C), flows through the 16" (400 mm) gate valve and the reactor for one to two weeks.
2. **Regeneration.** The 16" (400 mm) valve is closed and the reactor is depressurized. The 10" (250 mm) valve is opened for the regeneration process at 190 psig (13 bar), 725–900°F (385 – 482°C). The regeneration cycle lasts 21 to 24 hours. During this period, the closed valve body cools down by nearly 400°F (204°C).
3. **Re-streaming.** The 10" (250) valve is closed and the 16" (400 mm) valve opens for normal operation.



### THE VELAN SOLUTION

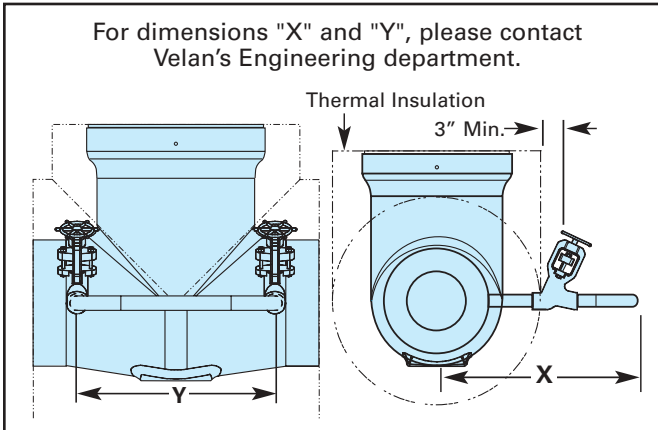
Velan supplies forged gate valves with specially designed wedges. The valves have Stellite seating and guiding surfaces and flexible wedges designed to resist the effects of temperature fluctuations. Forged bodies used in Velan valves show more than three times better resistance to creep than cast bodies.

The pressure boundary is secured by a seal-welded body-bonnet joint and a live-loaded packing chamber. Live-loaded packing chambers, which use Belleville washers to maintain minimum permanent packing stress, were developed by Velan in 1970.

# ACCESSORIES

## BYPASSES

Bypasses are available on all valves. The table below can be used as a guide for bypass size selection. There are a number of applications where the utilization of bypasses is required to optimize system and/or valve performance. Detailed recommendations are shown on pages 14–15.



## IN ACCORDANCE WITH MSS-SP45 GATE AND GLOBE: 2½ – 24" (65–600) CLASSES 600 – 2500

MAIN VALVE NOMINAL PIPE SIZE in (mm)	BYPASS NOMINAL PIPE SIZE in (mm)		MAIN VALVE NOMINAL PIPE SIZE in (mm)	BYPASS NOMINAL PIPE SIZE in (mm)	
	Series A <sup>(1)</sup>	Series B <sup>(2)</sup>		Series A <sup>(1)</sup>	Series B <sup>(2)</sup>
2½ (65)	½ (15)	½ (15)	12 (300)	1 (25)	2 (50)
3 (50)	½ (15)	½ (15)	14 (350)	1 (25)	2 (50)
4 (100)	½ (15)	1 (25)	16 (400)	1 (25)	3 (80)
5 (125)	¾ (20)	1¼ (32)	18 (450)	1 (25)	3 (80)
6 (150)	¾ (20)	1¼ (32)	20 (500)	1 (25)	3 (80)
8 (200)	¾ (20)	1½ (40)	24 (600)	1 (25)	4 (100)
10 (250)	1 (25)	1½ (40)			

(1) Series A includes steam service for warming up before the main line is opened, and for balancing pressures where the lines are of limited volume.  
(2) Series B includes lines conveying gases or liquids where bypassing may facilitate the operation of the main valve through balancing the pressure on both sides of the disc (or discs).

## FLOOR STANDS

Velan floor stands are made of cast steel with bronze or steel parts where necessary. They are divided into two main classes: one class with handwheels but no gearing, and the other class with cranking actuators and worm gearing or worm and spur gearing combined.

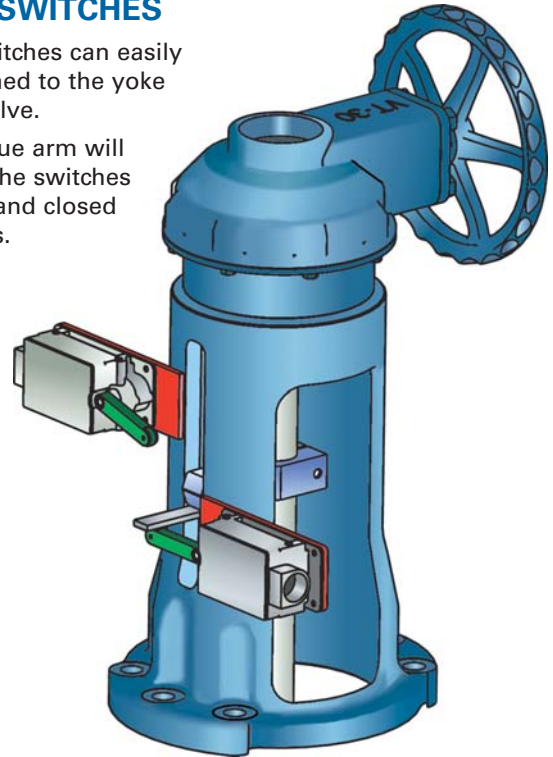
The floor stands are available in a number of sizes, and the size to be used depends on the stem size and stem load of the valve. Universal joints are available when required.



## LIMIT SWITCHES

Limit switches can easily be attached to the yoke of the valve.

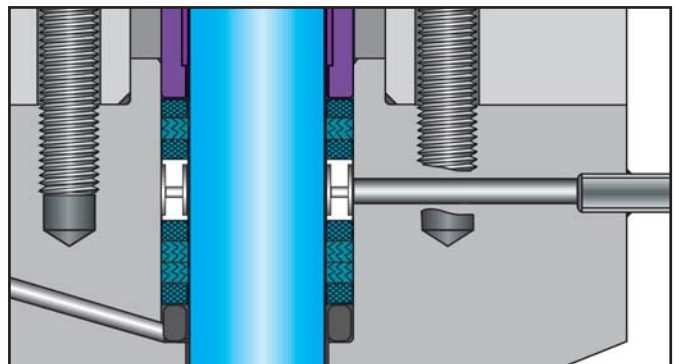
The torque arm will actuate the switches in open and closed positions.



## LEAK-OFFS

Optional leak-off pipe or ¼" NPT threaded plug available on all Velan Class 150–4500 gate and globe valves.

All valves supplied with a leak-off are furnished with a high quality lantern ring.



## INTERLOCKS

Valves can be supplied with an interlock system. This system is used for safety reasons when one valve must not be opened without a second valve first being closed. This is accomplished by having two locks with only one key.

- Valve "A" is open and the key in its lock cannot be removed until the valve is closed.
- Valve "B" is closed and cannot be opened until the key from valve "A" is used on its lock.
- Now valve "A" cannot be opened until valve "B" is closed.

# ENGINEERING DATA

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

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

FORGED (AND CAST)

ASTM MATERIAL SPECIFICATION (ASME B16.34 - 2004)

PSIG / °F, CLASSES 150 – 4500, (BAR / °C, PN20–760)

### A 105 (A 216 Gr. WCB)

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 100	285	740	1480	2220	3705	6170	11110
200	260	680	1360	2035	3395	5655	10185
300	230	655	1310	1965	3270	5450	9815
400	200	635	1265	1900	3170	5280	9505
500	170	605	1205	1810	3015	5025	9040
600	140	570	1135	1705	2840	4730	8515
650	125	550	1100	1650	2745	4575	8240
700	110	530	1060	1590	2665	4425	7960
750	95	505	1015	1520	2535	4230	7610
800 <sup>(1)</sup>	80	410	825	1235	2055	3430	6170
850 <sup>(1)</sup>	65	320	640	955	1595	2655	4785
900 <sup>(1)</sup>	50	230	460	690	1150	1915	3455
950 <sup>(1)</sup>	35	135	275	410	685	1145	2055
1000 <sup>(1)</sup>	20	85	170	255	430	715	1285

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

### A 182 Gr. F11 CL.2 (A 217 Gr. WC6)

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 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 <sup>(2)</sup>	20 <sup>(1)</sup>	95	190	290	480	800	1440
1150 <sup>(2)</sup>	20 <sup>(1)</sup>	65	130	195	325	545	975
1200 <sup>(2)</sup>	15 <sup>(1)</sup>	40	80	125	205	345	615

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

(2) F11: permissible, but not recommended for prolonged usage above 1100°F (593°C).  
WC6: Not to be used over 1100°F (593°C).

### A 182 Gr. F22 CL.3 (A 217 Gr. WC9)

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 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	385	755	1160	1930	3220	5795
1000	20	265	535	800	1335	2230	4010
1050	20 <sup>(1)</sup>	175	350	525	875	1455	2625
1100 <sup>(2)</sup>	20 <sup>(1)</sup>	110	220	330	550	915	1645
1150 <sup>(2)</sup>	20 <sup>(1)</sup>	70	135	205	345	570	1030
1200 <sup>(2)</sup>	15 <sup>(1)</sup>	40	80	125	205	345	615

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

(2) F22: permissible, but not recommended for prolonged usage above 1100°F (593°C).  
WC9: Not to be used over 1100°F (593°C).

TEMP. °C	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	19.6	51.1	102.1	153.2	255.3	425.5	765.9
50	19.2	50.1	100.2	150.4	250.6	417.7	751.9
100	17.7	46.6	93.2	139.8	233.0	388.3	699.0
150	15.8	45.1	90.2	135.2	225.4	375.6	676.1
200	13.8	43.8	87.6	131.4	219.0	365.0	657.0
250	12.1	41.9	83.9	125.8	209.7	349.5	629.1
300	10.2	39.8	79.6	119.5	199.1	331.8	597.3
325	9.3	38.7	77.4	116.1	193.6	322.6	580.7
350	8.4	37.6	75.1	112.7	187.8	313.0	563.5
375	7.4	36.4	72.7	109.1	181.8	303.1	545.5
400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
425 <sup>(1)</sup>	5.5	28.8	57.5	86.3	143.8	239.7	431.5
450 <sup>(1)</sup>	4.6	23.0	46.0	69.0	115.0	191.7	345.1
475 <sup>(1)</sup>	3.7	17.4	34.9	52.3	87.2	145.3	261.5
500 <sup>(1)</sup>	2.8	11.8	23.5	35.3	58.8	97.9	176.3
538 <sup>(1)</sup>	1.4	5.9	11.8	17.7	29.5	49.2	88.6

TEMP. °C	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.4	257.4	429.0	772.2
150	15.8	49.7	99.5	149.2	248.7	414.5	746.2
200	13.8	48.0	96.9	143.9	239.8	399.6	719.4
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	25.7	51.5	77.2	128.6	214.4	385.9
538	1.4	14.9	29.8	44.7	74.5	124.1	223.4
550	1.4 <sup>(1)</sup>	12.7	25.4	38.1	63.5	105.9	190.6
575	1.4 <sup>(1)</sup>	8.8	17.6	26.4	44.0	73.4	132.0
600 <sup>(2)</sup>	1.4 <sup>(1)</sup>	6.1	12.2	18.3	30.5	50.9	91.6

TEMP. °C	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	19.8	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	18.4	36.9	55.3	92.2	153.7	276.6
550	1.4 <sup>(1)</sup>	15.6	31.3	46.9	78.2	130.3	234.5
575	1.4 <sup>(1)</sup>	10.5	21.1	31.6	52.6	87.7	157.9
600 <sup>(2)</sup>	1.4 <sup>(1)</sup>	6.9	13.8	20.7	34.4	57.4	103.3



**A 182 Gr. F5a (A 217 Gr. C5)** *Note: A 182 Gr. F5 ratings have changed, please contact Velan.*

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1500	2250	3750	6250	11250
200	260	750	1500	2255	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	375	745	1120	1870	3115	5605
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).

**A 182 Gr. F91 (A 217 Gr. C12A)**

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 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	385	775	1160	1930	3220	5795
1000	20	365	725	1090	1820	3030	5450
1050	20 <sup>(1)</sup>	360	720	1080	1800	3000	5400
1100	20 <sup>(1)</sup>	300	605	905	1510	2515	4525
1150	20 <sup>(1)</sup>	225	445	670	1115	1855	3345
1200	20 <sup>(1)</sup>	145	290	430	720	1200	2160

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

**A 182 Gr. F316<sup>(3)</sup> (A 351 Gr. CF8M<sup>(3)</sup>, A 351 Gr. CF3M<sup>(2)</sup>)**

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 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	440	885	1325	2210	3680	6625
700	110	435	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	365	725	1090	1820	3030	5450
1050	20 <sup>(1)</sup>	350	720	1080	1800	3000	5400
1100	20 <sup>(1)</sup>	305	610	915	1525	2545	4575
1150	20 <sup>(1)</sup>	235	475	710	1185	1970	3550
1200	20 <sup>(1)</sup>	185	370	555	925	1545	2775
1250	20 <sup>(1)</sup>	145	295	440	735	1230	2210
1300	20 <sup>(1)</sup>	115	235	350	585	970	1750
1350	20 <sup>(1)</sup>	95	190	290	480	800	1440
1400	20 <sup>(1)</sup>	75	150	225	380	630	1130
1450	20 <sup>(1)</sup>	60	115	175	290	485	875
1500	15 <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, use only when the carbon content is 0.04% or higher, (material code 10).

**A 182 Gr. F316L**

TEMP. °F	WORKING PRESSURE IN PSIG CLASSES						
	150	300	600	900	1500	2500	4500
-20 to 100	230	600	1200	1800	3000	5000	9000
200	195	510	1020	1535	2555	4260	7670
300	175	455	910	1370	2280	3800	6840
400	160	420	840	1260	2100	3500	6300
500	150	395	785	1180	1970	3280	5905
600	140	370	745	1115	1860	3100	5580
650	125	365	730	1095	1825	3040	5470
700	110	360	720	1080	1800	3000	5400
750	95	355	705	1060	1765	2940	5290
800	80	345	690	1035	1730	2880	5185
850	65	340	675	1015	1690	2820	5075

TEMP. °F	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	27.9	55.7	83.6	139.3	232.1	417.8
500	2.8	21.4	42.8	64.1	106.9	178.2	320.7
538	1.4	13.7	27.4	41.1	68.6	114.3	205.7
550	1.4 <sup>(1)</sup>	12.0	24.1	36.1	60.2	100.4	180.7
575	1.4 <sup>(1)</sup>	8.9	17.8	26.7	44.4	74.0	133.3
600	1.4 <sup>(1)</sup>	6.2	12.5	18.7	31.2	51.9	93.5
625	1.4 <sup>(1)</sup>	4.0	8.0	12.0	20.0	33.3	59.9
650	0.9 <sup>(1)</sup>	2.4	4.7	7.1	11.8	19.7	35.5

TEMP. °C	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
50	19.5	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
300	10.2	42.9	85.7	128.6	214.4	357.1	642.6
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
550	1.4 <sup>(1)</sup>	25.0	49.8	74.8	124.9	208.0	374.2
575	1.4 <sup>(1)</sup>	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4 <sup>(1)</sup>	19.5	39.0	58.5	97.5	162.5	292.5
625	1.4 <sup>(1)</sup>	14.6	29.0	43.8	73.0	121.7	219.1
650	1.4 <sup>(1)</sup>	9.9	19.9	29.8	49.6	82.7	148.9

TEMP. °C	GAGE WORKING PRESSURE BY RATING NUMBER, BAR						
	PN 20	PN 50	PN 100	PN 150	PN 250	PN 420	PN 760
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
50	18.4	48.1	96.2	144.3	240.6	400.9	721.7
100	16.2	42.2	84.4	126.6	211.0	351.6	632.9
150	14.8	38.5	77.0	115.5	192.5	320.8	577.4
200	13.7	35.7	71.3	107.0	178.3	297.2	534.9
250	12.1	33.4	66.8	100.1	166.9	278.1	500.6
300	10.2	31.6	63.2	94.9	158.1	263.5	474.3
325	9.3	30.9	61.8	92.7	154.4	257.4	463.3
350	8.4	30.3	60.7	91.0	151.6	252.7	454.9
375	7.4	29.9	59.8	89.6	149.4	249.0	448

# BUTT WELD END STANDARD DIMENSIONS

## CONFORMING TO REQUIREMENTS ASME B16.25

**ALL DIMENSIONS GIVEN IN INCHES.**  
 STD = Standard Wall Thickness.  
 XS = Extra Strong Wall Thickness.  
 XXS = Double Extra Strong Wall Thickness.

NOMINAL PIPE SIZE in	PIPE SCHEDULE NO.	VALVE <sup>(1)</sup> PRESSURE CLASS						A NOMINAL PIPE O.D.	VALVE OUTSIDE DIAMETER	B INSIDE DIAMETER OF PIPE	C BORE OF WELDING LIP	WALL THICKNESS OF PIPE	
		150	300	600	900	1500	2500						
2½	40	X	X	X	X	X	X	2.875	2.96	2.469	2.479	0.203	
	80	X	X	X	X	X	X			2.323	2.35	0.276	
	160									2.125	2.178	0.375	
	XXS									1.771	1.868	0.552	
3	40	X	X	X	X	X	X	3.500	3.59	3.068	3.081	0.216	
	80	X	X	X	X	X	X			2.900	2.934	0.300	
	160									2.624	2.692	0.438	
	XXS									2.300	2.409	0.600	
4	40	X	X	X	X	X	X	4.500	4.62	4.026	4.044	0.237	
	80	X	X	X	X	X	X			3.826	3.869	0.337	
	120									3.624	3.692	0.438	
	160									3.438	3.530	0.531	
XXS							3.152	3.279	0.674				
5	40	X	X	X	X	X	X	5.563	5.69	5.047	5.070	0.258	
	80	X	X	X	X	X	X			4.813	4.866	0.375	
	120									4.563	4.647	0.500	
	160									4.313	4.428	0.625	
XXS							4.063	4.209	0.750				
6	40	X	X	X	X	X	X	6.625	6.78	6.065	6.094	0.280	
	80	X	X	X	X	X	X			5.761	5.828	0.432	
	120									5.501	5.600	0.562	
	160									5.187	5.326	0.719	
XXS							4.897	5.072	0.864				
8	40	X	X	X	X	X	X	8.625	8.78	7.981	8.020	0.322	
	60	X	X	X	X	X	X			7.813	7.873	0.406	
	80	X	X	X	X	X	X			7.625	7.709	0.500	
	100	X	X	X	X	X	X			7.437	7.544	0.594	
	120									7.187	7.326	0.719	
	140									7.001	7.163	0.812	
	160									6.875	7.053	0.875	
	XXS									6.813	6.998	0.906	
10	40	X	X	X	X	X	X	10.750	10.94	10.020	10.070	0.365	
	60	X	X	X	X	X	X			9.750	9.834	0.500	
	80	X	X	X	X	X	X			9.562	9.670	0.594	
	100	X	X	X	X	X	X			9.312	9.451	0.719	
	120									9.062	9.232	0.844	
	140									8.750	8.959	1.000	
	160									8.500	8.740	1.125	
	XXS												
12	STD	X	X	X	X	X	X	12.750	12.97	12.000	12.053	0.375	
	40	X	X	X	X	X	X			11.938	11.999	0.406	
	XS	X	X	X	X	X	X			11.750	11.834	0.500	
	60	X	X	X	X	X	X			11.626	11.725	0.562	
	80	X	X	X	X	X	X			11.374	11.505	0.688	
	100	X	X	X	X	X	X			11.062	11.232	0.844	
	120									10.750	10.959	1.000	
	140									10.500	10.740	1.125	
	160									10.126	10.413	1.312	
	XXS												
14	STD	X	X	X	X	X	X	14.000	14.25	13.250	13.303	0.375	
	40	X	X	X	X	X	X			13.124	13.192	0.438	
	XS	X	X	X	X	X	X			13.000	13.084	0.500	
	60	X	X	X	X	X	X			12.812	12.920	0.594	
	80	X	X	X	X	X	X			12.500	12.646	0.750	
	100	X	X	X	X	X	X			12.124	12.318	0.938	
	120									11.812	12.044	1.094	
	140									11.500	11.771	1.250	
	160									11.188	11.498	1.406	
	XXS												
16	STD	X	X	X	X	X	X	16.000	16.25	15.250	15.303	0.375	
	40, XS	X	X	X	X	X	X			15.000	15.084	0.500	
	60	X	X	X	X	X	X			14.688	14.811	0.656	
	80	X	X	X	X	X	X			14.312	14.482	0.844	
	100	X	X	X	X	X	X			13.988	14.155	1.031	
	120									13.562	13.826	1.219	
	140									13.124	13.442	1.438	
	160									12.812	13.170	1.594	
	XXS												
	18	STD	X	X	X	X	X			X	18.000	18.28	17.250
XS		X	X	X	X	X	X	17.000	17.084	0.500			
40		X	X	X	X	X	X	16.876	16.975	0.562			
60		X	X	X	X	X	X	16.500	16.646	0.750			
80		X	X	X	X	X	X	16.124	16.318	0.938			
100		X	X	X	X	X	X	15.688	15.936	1.156			
120								15.250	15.553	1.375			
140								14.876	15.225	1.562			
160								14.438	14.842	1.781			
XXS													
20	STD	X	X	X	X	X	X	20.000	20.31	19.250	19.303	0.375	
	XS	X	X	X	X	X	X			19.000	19.084	0.500	
	40	X	X	X	X	X	X			18.812	18.920	0.594	
	60	X	X	X	X	X	X			18.376	18.538	0.812	
	80	X	X	X	X	X	X			17.938	18.155	1.031	
	100	X	X	X	X	X	X			17.438	17.717	1.281	
	120									17.000	17.334	1.500	
	140									16.500	16.896	1.750	
	160									16.062	16.513	1.969	
	XXS												
24	STD	X	X	X	X	X	X	24.000	24.38	23.250	23.303	0.375	
	XS	X	X	X	X	X	X			23.000	23.084	0.500	
	30	X	X	X	X	X	X			22.876	22.975	0.562	
	40	X	X	X	X	X	X			22.624	22.755	0.688	
	60	X	X	X	X	X	X			22.062	22.263	0.969	
	80	X	X	X	X	X	X			21.562	21.826	1.219	
	100	X	X	X	X	X	X			20.938	21.280	1.531	
	120									20.376	20.788	1.812	
	140									19.876	20.350	2.062	
	160									19.312	19.857	2.344	
	XXS												

(1) The ends of valve bodies do not contain enough extra material to match the wall thickness of all pipe schedules. The cross marks show the schedules which can be supplied for each size and pressure class of valve bodies.

## SOUR SERVICE VALVES

### TO MEET NACE STANDARD MR0175 or MR0103

As an option Velan manufactures the complete range of valves shown in this catalog in compliance with NACE Standard MR0175 or MR0103. Trim materials must be selected by customers from table shown based on experience in corrosion resistance against sulphides (sour gas) found in processing crude oil. Please consult Velan Engineering Department regarding applications limitations of various materials

TYPE OF TRIM	STEM	DISC	SEAT	BOLTING
13% Cr Half Stellite	410, (13% Cr) Rc 22 Max.	Body Mat. HF/13% Cr.	Body Mat. HF/ST6	B7M/2HM Rc 22 Max.
316 Half Stellite	316	316	Body Mat. HF/ST6	B7M/2HM or B8M/8M
Monel	Monel K	Body Mat. HF/Monel	Body Mat. HF/ST6	B7M/2HM or B8M/8M

## BODY-BONNET GASKETS

TYPE	USED ON VALVES	REMARK
Spiral wound SS 316 + Graphite	Forged Bolted Bonnet valves	Asbestos-free Max. 1400°F
Spiral wound SS 316 + Teflon	Forged Bolted Bonnet valves for chemical industry	Asbestos-free Max. 600°F
Spiral wound Monel + Teflon	Forged Bolted Bonnet valves for chemical industry	Asbestos-free Max. 600°F
Soft carbon steel - silver plated	Pressure Seal valves	Max. 1000°F See page 10
SS silver plated	Pressure Seal valves	Max. 1400°F
Graphite/SS316	Pressure Seal valves	See page 10

## STEM PACKING

TYPE	USED ON VALVES FOR:	SERVICE TEMP. °F
End rings: Braided Graphite Inconel wire reinforced	Steam, air, water, liquified petroleum	to 1400
Middle Rings: Preformed Flexible Graphite		

## VALVE ORIENTATION

Velan advises that valves may be installed in a random orientation, but the preferred orientation is with the stem vertically above the valve. Any deviation from this is a compromise. If the end user has specific questions about orientation, they may contact Velan Engineering Department for recommendations.

## DATA FOR CALCULATION OF FLOW

The coefficient of flow  $C_v$  expresses the rate of flow in gallons per minute at 60°F water with a pressure drop of 1 psi across the valve. The  $C_v$  coefficients for the various types and sizes, shown in the tables, have been determined from actual flow tests.

**NOTE:**  $K_v$  is the metric equivalent of  $C_v$ .

$$K_v = C_v \times 0.85$$

### FOR LIQUIDS:

$$(1) \quad Q_L = C_v \sqrt{\frac{\Delta P}{G_L}}$$

$$(2) \quad \Delta P = G_L \left( \frac{Q_L}{C_v} \right)^2$$

WHERE:  $Q_L$  = Flow in U.S. gallons per minute.  
 $\Delta P$  =  $(P_1 - P_2)$  Pressure drop in psi  
 $G_L$  = Specific gravity of liquid (water = 1 at 60°F)

### FOR GASES:

$$(3) \quad Q_g = 1360 C_v \sqrt{\frac{\Delta P}{G_g T}} \cdot \sqrt{\frac{P_1 + P_2}{2}}$$

$$(4) \quad \Delta P = P_1 - \sqrt{P_1^2 - 2 G_g T \left( \frac{Q_g}{1360 C_v} \right)^2}$$

WHERE:  $Q_g$  = Volumetric flow of gas (SCFH)  
 $G_g$  = Specific gravity of gas at standard conditions (air at atmosphere and 60°F = 1)  
 $T$  = Absolute temperature of gas (°F + 460)

### FOR STEAM:

$$(5) \quad W = \frac{2.1}{1 + 0.0007 T_S} C_v \sqrt{\Delta P (P_1 + P_2)}$$

$$(6) \quad \Delta P = P_1 - \sqrt{P_1^2 - K^2}$$

WHERE:  $K = \left( \frac{1 + 0.0007 T_S}{2.1 C_v} \right) \cdot W$

$W$  = Pounds per hour of steam  
 $\Delta P$  =  $(P_1 - P_2)$  Pressure drop in psi  
 $T_S$  = Degree of superheat (°F)  
 $P_1$  = inlet pressure  
 $P_2$  = outlet pressure

**NOTE:** For saturated steam  $T_S = 0$

**NOTE:** For gas and steam, max.  $\Delta P = \frac{1}{2} P_1$ , and min.  $P_2 = \frac{1}{2} P_1$ , and  $P_1, P_2$  are absolute pressures (psia)

# INSTALLATION/SERVICE RECOMMENDATIONS

## GATE VALVES

The flow through gate valves may be bi-directional. There may be exceptions to this if bypass or equalizing piping is welded to the valve body or if a pressure relief hole is drilled in one side of the wedge. Check your piping layout drawing to ensure correct position and direction of flow.

Gate valves should be installed and welded into the pipeline with the wedge or disc in the fully closed position. If the valve is left open or partially open, it could distort and leak during operation. Leaving the valve in a fully closed position helps prevent weld spatter from falling directly onto the mating faces of the seats and wedge.

The preferred orientation of a gate valve is stem vertical. The valve may be installed in other orientations, but any deviation from vertical is a compromise. Installation upside down is not recommended because of possible dirt build-up in the bonnet. Consult the Velan Engineering Department during the quotation review process. Hard-facing of guides may be required when valves over 12" (300 mm) are tilted beyond 45° from the vertical position.

### NOTE:

Gate valves should not be used for throttling to control the flow, they are normally fully open or fully closed. If left in partially open position, severe damage to body seats, wedge, stem AND guide rails may result.

For both the fully back seated and fully closed position, it is recommended that the stem be backed off 1/8 to 1/4 turn to prevent the stem from "growing", bending or causing thermal binding. Taking this action will not affect valve shut off.

## PRESSURE SEAL GASKET TORQUES

### Pressure seal design without live-loaded bonnet (no spring washers):

The pressure seal bonnet bolt tightness must be rechecked after operating test pressure and temperature has been achieved. Without live-loading, bolt tightness will be lost when the system loses pressure.

### Pressure seal design with live-loaded bonnet:

A live-loaded bonnet bolt may also lose some bolt load, due to vibration in transit or bolt creep. It is advisable that live-loaded bonnets be checked for bolt torque at operating pressure and temperature. Once torqued at operating pressure, no future tightening of bonnet bolting will be necessary, unless the valve has been dismantled, in which case, the bolts must be

## GLOBE VALVES

Globe valves are usually installed with the inlet below the valve seat. This must be checked carefully to prevent incorrect installation. If throttling service is particularly severe, Velan recommends that the valve be installed so that the flow enters over the top of the seat and goes down through it. This maintains the valve in a more stable condition, the amount of wear is minimized and there is less external noise. Valve operation also becomes easier because less torque is required to close the valve.

However, it should be noted that the packing is under constant load. Regular style globe valves are suitable for moderate throttling applications. As a general rule, an adequately sized globe valve (i.e. with pipe velocity between 15 to 25 ft/sec (4.5 to 7.5 m/s) for water and 200 to 300 ft/sec (60 to 90 m/s) for steam) should not be throttled down below 35% of its maximum full open  $C_v$  capacity (approximately 20% of full stroke).

Harsh throttling, below 35% of full  $C_v$  capacity, will require analysis by Velan Engineering to determine suitability under possible cavitation, flashing, noise and vibration.

Globe valves should be installed and welded with the disc in a fully closed position to prevent damage to the valve during installation. Leaving the disc in a fully closed position firmly closed also prevents weld spatter from falling directly onto the mating faces of the seat and disc.

### PRECAUTION:

Allow time for welding to cool before stroking the valve for the first time.

When required, it is recommended that local P.W.H.T. be performed with the valve in the closed position.

torqued to appropriate values and bolt tightness, rechecked after operating test pressure and temperature has been achieved.

### CAUTION:

If the pressure seal gasket is not pulled up concentric to the body/bonnet top-bore axis, under lower pressure, the gasket may not be properly seated. Consequently, leakage may occur.

Moreover, non-uniform contact may be the source of leaks in the future. Therefore, when possible, backseat the valve fully when tightening up the pressure seal gasket bolts.

# INSTALLATION/SERVICE RECOMMENDATIONS

## CHECK VALVES

Check valves must be installed with the inlet in direction of arrow. This must be checked carefully before installing the valve. Placing a check valve in the opposite direction to the flow will prevent the disc from swinging free and will therefore prevent normal operation of the valve.

Seat bores, minimum flows and pump coast down characteristics are crucial in check valve selection. Without proper sizing, extreme damage may occur in check valve internals. Pulsed flow reversals can also cause damage.

### NOTE:

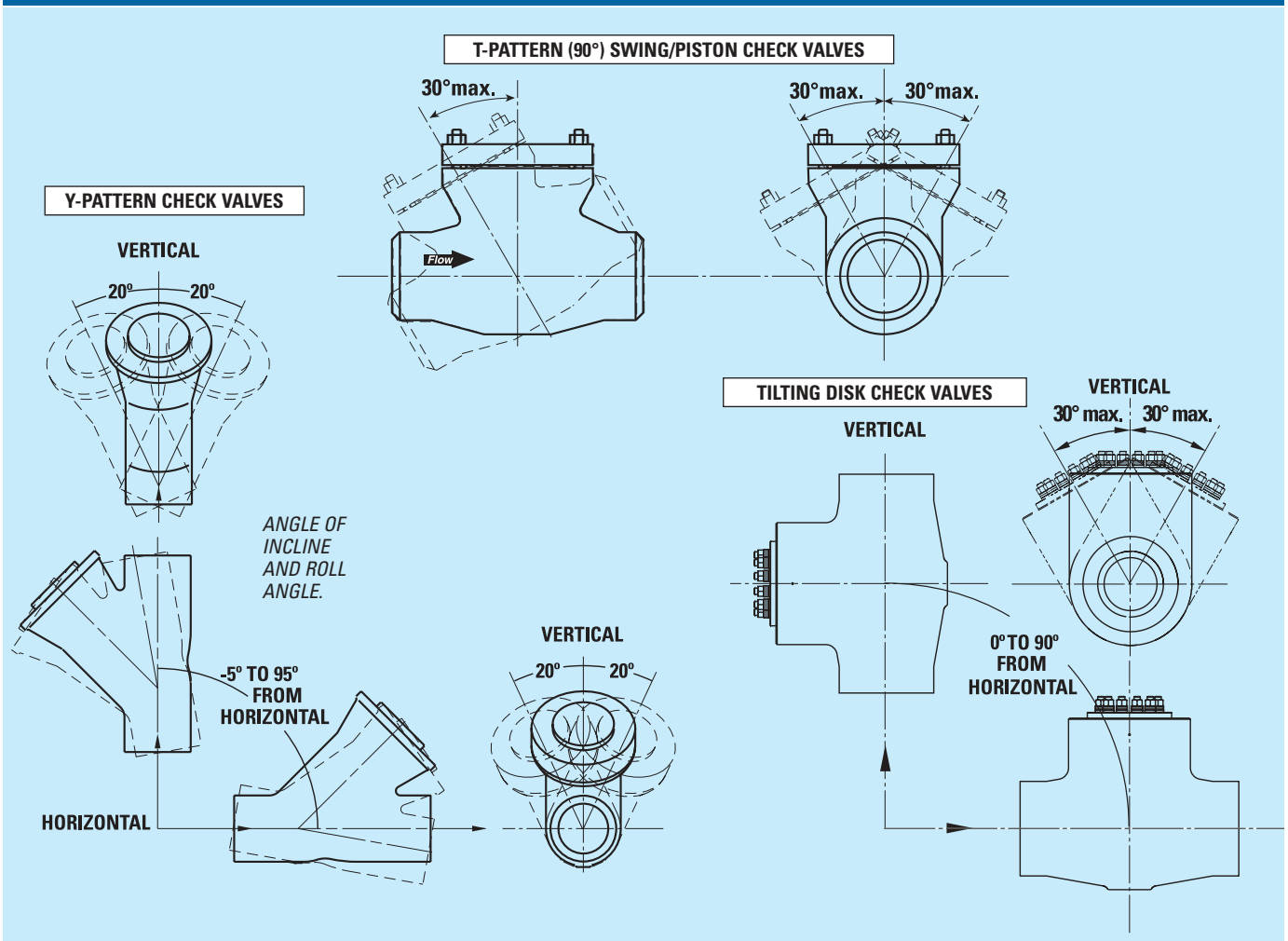
All check valves should preferably be installed at least ten pipe diameters away from upstream pumps, elbows, fittings or equipment. If closer installation is required, please consult the Velan Field Engineering Services Manager.

### CAUTION:

Velan swing check valves and T-pattern (90°) piston check valves without springs should be installed with the cover up, and the angle of incline of the line should be no more than 30° from horizontal. Also, the roll angle of the valve bonnet should be no more than 30° from side to side. Swing check valves are often installed in both horizontal and vertical positions (flow up). However, it should be noted that in non-clean services, vertically installed swing checks collect dirt, grit, sludge and eventually jam. It is also not a convenient installation mode for service and maintenance. Before installing swing check valves in vertical pipe, verify media cleanliness or consult Velan Engineering Department.

Tilt check valves may be installed in a vertical pipe with the flow going up, only when ordered as such.

## ACCEPTABLE INSTALLATION ORIENTATIONS



For further information please consult Velan's FPSM or FBBM installation and operation manual.

# VALVE AUTOMATION

## GEAR ACTUATORS

Velan valves are equipped with gear actuators, as required, for satisfactory mechanical advantage. Gears could be of the spur, bevel or worm type. Velan gear actuators are engineered to offer a superior combination of features for reliable and dependable service in all environmental and precision applications. All gearbox housings are produced from high strength ductile iron for service in applications where they are subject to accidental blows. Shafts and gears are all supported by anti-friction bearings. The gear sets are produced from high-grade alloy steel and hardened. All units are permanently lubricated and are weather-proof for outdoor service.

Velan's V, VT and VTS series of actuators can be attached with simple bolt-on adapters. Optional spur gear attachments are available to reduce manual operating torque.

(See Table below).



MODEL	CLASS	OPTIONAL in (mm)	STANDARD in (mm)
<b>Forged BB Gate</b> (054B)	150	4-14 (100-350)	16 (400) & up
	300	4-10 (100-250)	12 (300) & up
	600	4-8 (100-200)	10 (250) & up
	900	4-6 (100-150)	8 (200) & up
	1500	4 (100)	6 (150) & up
<b>Forged BB Globe</b> (074B)	150	4-8 (100-200)	10 (250) & up
	300	4-6 (100-150)	8 (200) & up
	600		
	900	4 (100)	6 (150) & up
	1500		
<b>Forged BB Parallel Slide</b> (144B)	600	8 (200)	10 (250) & up
	900	4-6 (100-150)	8 (200) & up
	1500	4 (100)	6 (150) & up
<b>Forged PS Gate</b> (054P)	600	4-6 (100-150)	8 (200) & up
	900		
	1500		
	2500	4 (100)	6 (150) & up
	4500		
<b>Forged PS Globe</b> (074P)	600		
	900	4 (100)	6 (150) & up
	1500		
	2500		
<b>Forged PS Parallel Slide</b> (144P)	600	4-6 (100-150)	8 (200) & up
	900		
	1500	4 (100)	6 (150) & up
	2500		
<b>Cast PS Y-Pattern</b> (076K)	900		
	1500	4 (100)	6 (150) & up
	2500		

## 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 and explosion-proof (optional). Various sizes and styles are available for different applications and systems, and can be varied to fit special requirements.

## VALVE ACTUATOR SIZING

The Velan philosophy for selecting an actuator is to calculate the required torque and thrust 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 (CLOSED)	DIFFERENTIAL PRESSURE	POWER SUPPLY
<b>ELECTRIC</b> customer	Specified by customer	Specified by customer	Voltage, type, phase and frequency specified
<b>PNEUMATIC</b> customer	Specified by customer	Specified by customer	Air pressure
<b>HYDRAULIC</b> customer	Specified by customer	Specified by customer	Hydraulic pressure
<b>HANDWHEEL/GEAR</b> <b>ACTUATED</b>	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	70% of CWP <sup>(1)</sup> unless otherwise advised by customer	200 lb (90 kg) rimpull <sup>(2)</sup> unless otherwise specified by customer

(1) CWP = Cold working pressure per ASME Class B16.34 at 100°F (38°C) - eg.: Class 150, CWP = 285 psig (19.6 bar), 70% of CWP = 200 psig (13.8 bar).

(2) Rimpull is defined as the total tangential force acting on the handwheel - eg.: 200 lb (90 kg) rimpull requires 100 lb (45 kg) 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 further details contact the company.

## CYLINDER ACTUATORS

Various types of cylinders are available for Velan valves. 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



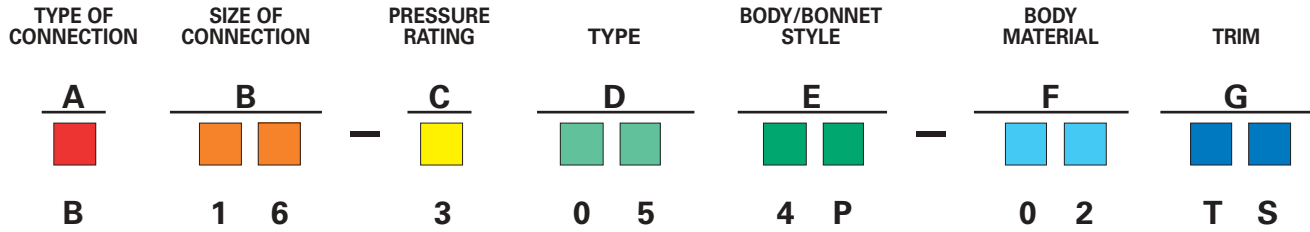
rod with disc fastened directly to them. Tail rods are also supplied as standard equipment to serve as position indicators and as an emergency means of opening. Handwheels and gear heads can be mounted on top of cylinders for operation in an emergency which may arise due to the loss of operating medium 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.

# HOW TO ORDER PRESSURE SEAL VALVES

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.



**Example:** 10" butt weld, 1500 class, carbon steel, forged pressure seal gate valve with standard trim.

<b>A TYPE OF CONNECTION</b>			
<b>B</b> - Butt weld	<b>R</b> - Flanged ring joint		
<b>C</b> - Combination	<b>U</b> - Undrilled flanges		
<b>E</b> - Welded stubs butt weld	<b>W</b> - Socket weld		
<b>F</b> - Flanged B16.5 (B16.47 series A)	<b>X</b> - Butt weld (intermediate class)		
<b>B SIZE OF CONNECTION</b>			
Customers have the choice of specifying valve size as part of the valve figure number ( <b>B</b> ) using the numbers below, or indicating valve size separately.			
<b>EXAMPLES:</b>			
B16-3054P-02TS (valve size is part of figure number)			
10"B-3054P-02TS (valve size is shown separately)			
08 - 2" (50 mm)	12 - 4" (100 mm)	16 - 10" (250 mm)	21 - 18" (450 mm)
09 - 2½" (65 mm)	13 - 5" (125 mm)	18 - 12" (300 mm)	22 - 20" (500 mm)
10 - 3" (80 mm)	14 - 6" (150 mm)	19 - 14" (350 mm)	23 - 22" (550 mm)
11 - 3½" (90 mm)	15 - 8" (200 mm)	20 - 16" (400 mm)	24 - 24" (600 mm)
<b>C PRESSURE RATING</b>			
0 - 150	2 - 600	4 - 2500	7 - 900
1 - 300	3 - 1500	5 - 4500	
<b>D VALVE TYPE</b>			
01 - Flow control	06 - Full port gate	08 - Stop check	14 - Parallel slide
03 - Piston check	07 - Stop (globe)	09 - Needle	23 - Double disc gate
05 - Conventional port gate	11 - Swing check	34 - Tilting disc check	
<b>E BODY/BONNET STYLE</b>			
4 - Vertical	<b>B</b> - Bolted bonnet (forged)		
5 - Angle	<b>E</b> - Extended bonnet (cryogenic)		
6 - Inclined	<b>K</b> - Pressure seal (cast)		
8 - Elbow down	<b>P</b> - Pressure seal (forged)		
<b>F BODY MATERIAL</b>			
02 - A105, WCB	19 - Monel M35 (400)	35 - F44, 254SMO	49 - CN3MN
03 - F1, WVC1	20 - Inconel 625	36 - F321H	50 - 940L
04 - F5, C5	21 - Hastelloy C	37 - Incoloy 825	
05 - F11, WC6	22 - Titanium Gr. 5	38 - LC1	
06 - F22, WC9	23 - Alloy 20	39 - LC2	
09 - F9, C12	24 - LF1	40 - Titanium Gr.2/Gr. 3	
10 - F316H/F316 <sup>(1)</sup>	25 - LCB	41 - Titanium Gr. 7	
11 - F304, CF8	26 - LF2	42 - Titanium Gr. 12	
12 - F304L, CF3	27 - LF3/LC3	43 - Titanium Niobium	
13 - F316 <sup>(1)</sup> , CF8M	28 - F317, CG8M	44 - Ferralium 255	
14 - F316L, CF3M	29 - F317L, CG3M	45 - F55	
15 - F347, CF8C	31 - LCC	46 - GS-C25N	
16 - F304H	32 - F51	47 - F347H	
18 - F321	34 - F91, C12A	48 - F53	

<b>G TRIM (standard trims)</b>				If applicable <b>BELLOWS<sup>(3)</sup></b>	<b>API Number</b>
<b>CODE</b>	<b>WEDGE/DISC SURFACE<sup>(2)</sup></b>	<b>SEAT SURFACE<sup>(2)</sup></b>	<b>STEM</b>		
<b>MS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	316/316L	321	
<b>MY</b>	CF8M or 316	Stellite 6 <sup>(4)</sup>	316	321	12
<b>TS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	13 CR (410) <sup>(5)</sup>	321	5
<b>ND</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	630 (H1150M)		
<b>NE</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	13 CR (410) HRC 22 max.		5 <sup>(7)</sup>
<b>NF</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	Same as Body		
<b>NL</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	321		
<b>NM</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	347		
<b>NR</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	IN 625		
<b>NT</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	254SMO		
<b>NX</b>	Monel	Monel	Monel		
<b>NY</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	XM-19		
<b>AS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	321	321	
<b>BS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	Duplex		
<b>CK</b>	Alloy 40/50	Alloy 40/50	660		
<b>CL</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	660		
<b>CP</b>	Alloy 40/50	Alloy 40/50	Alloy 20		
<b>ES</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	347		
<b>FS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	Same as Body		
<b>HC</b>	Hastelloy C	Stellite 6 <sup>(4)</sup>	Hastelloy C	Hastelloy C	
<b>MK</b>	Alloy 40/50	Alloy 40/50	316 or 630		
<b>MP</b>	NOREM	NOREM	316B	312	
<b>MY</b>	CF8M or 316	Stellite 6 <sup>(4)</sup>	316		
<b>PA</b>	NOREM	NOREM	630	IN 625	
<b>PC</b>	Monel	Monel	630		
<b>PS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	630		
<b>QS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	XM-19		
<b>RM</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	IN 625		
<b>RP</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	IN 825		
<b>RS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	IN 718		
<b>RT</b>	NOREM	NOREM	IN 625		
<b>US</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	616H		
<b>XS</b>	Stellite 6 <sup>(4)</sup>	Stellite 6 <sup>(4)</sup>	Monel		
<b>XX</b>	Monel	Monel	Monel		9
<b>XY</b>	Monel	Stellite 6 <sup>(4)</sup>	Monel		11

(1) Material code "10" F316H/F316 (CF8M) has a minimum carbon content of 0.04 and is to be used if temperatures are over 1000°F (538°C). Material code "13" forged F316, is not suitable for temperatures over 1000°F (538°C) as it is dual certified (F316/F316L).

(2) Base material is either the same as the body or solid trim at manufacturer's option.

(3) 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.

(4) Stellite 6 or Stellite 21 based on material or application at manufacturer's option.

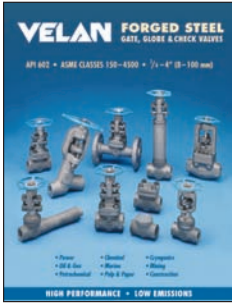
(5) 616HT Manufacturer's Std. (F91 and C12A only).

(6) Inserts may be in seat or wedge at manufacturer's option. If insert is in seat surface same as wedge seating face.

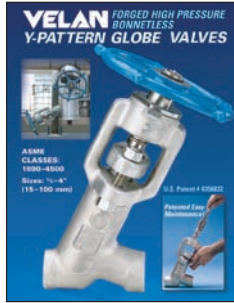
(7) Velan can supply NACE valves conforming to MR0103 and/or MR0175/ISO 15156. The trim materials shown above are only some of the potential NACE configurations available. However, not all trim configurations conform to NACE MR0175/ISO 15156 and under certain design conditions some trims may not conform to this standard. Please note that determining the appropriate configuration for any particular NACE service condition is the responsibility of the end user as stated by NACE.

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

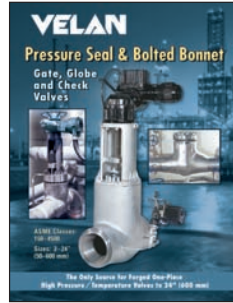
**ASME pressure classes 150–4500 in carbon, alloy, and stainless steel**



**VEL-SFV**



**VEL-BG**



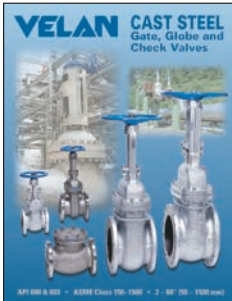
**VEL-PS**



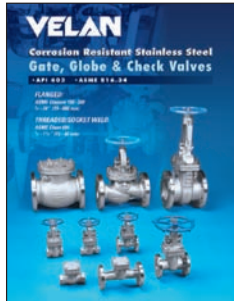
**VEL-BS**



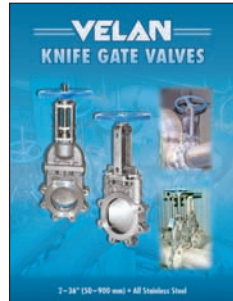
**VEL-CRYO**



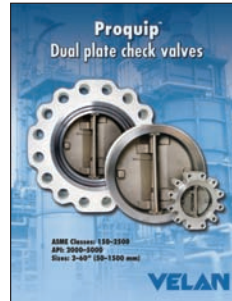
**VEL-CSV**



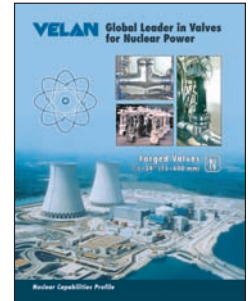
**VEL-API-603**



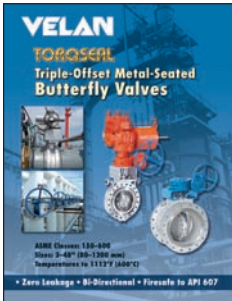
**VEL-KGV**



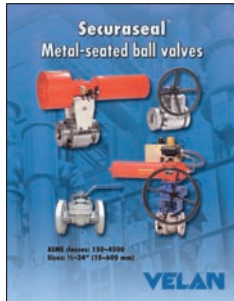
**VEL-PQCV**



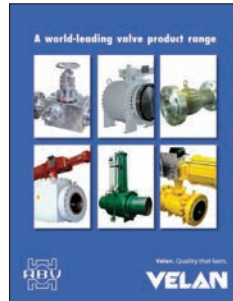
**VEL-NCP**



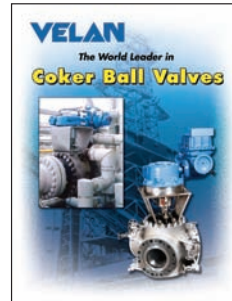
**VEL-BF**



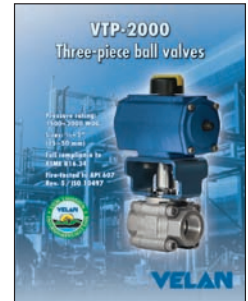
**VEL-MS**



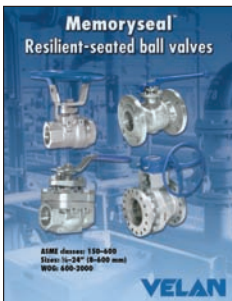
**BRO-ABV**



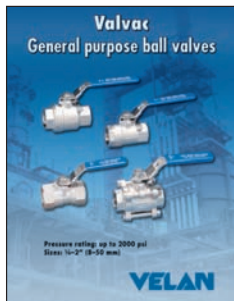
**VEL-CBV**



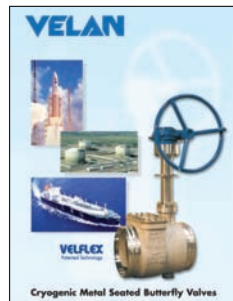
**CAT-VTP**



**VEL-BV**



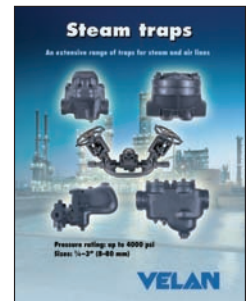
**CAT-GPBV**



**CAT-SAS-CFLEX**



**CAT-SAS-CCON**



**CAT-ST**

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