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XOMOX® & PACIFIC VALVES®
Hydrofluoric Alkylation Valves

CRANE
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Energy Flow Solutions

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Tuflite® Sleeved Plug Valves Design Features & Benefits



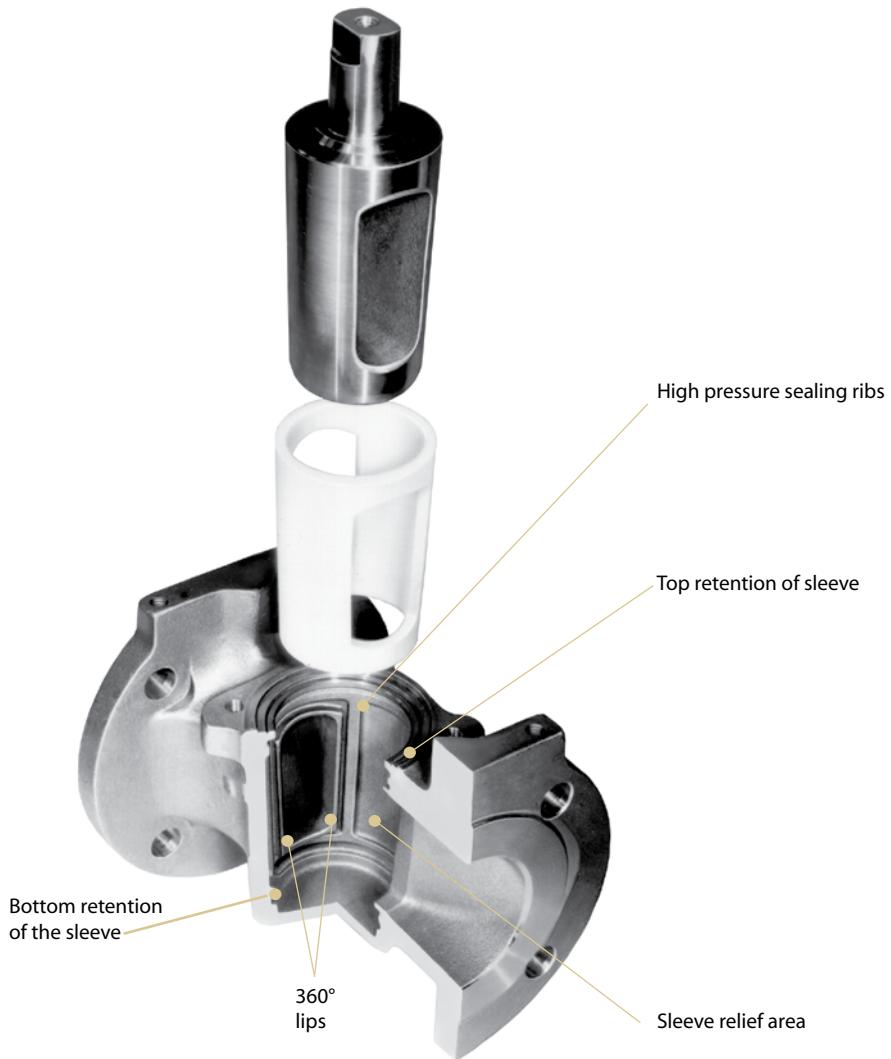
HF Flanged End Sleeved Plug Valve

Features & Benefits

- ① Superior, longer lasting in-line sealing
- ② Secure sealing with no cold-flow, deformation, or rotation of the sleeve due to iron fluoride buildup
- ④ No cavities, reduced risk of contamination



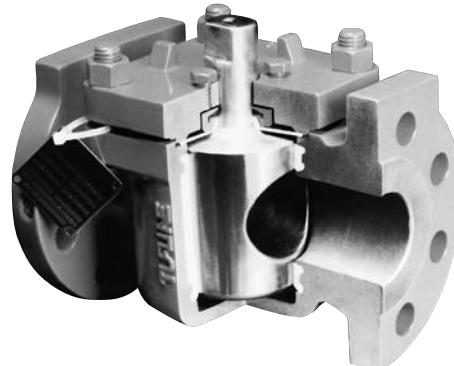
HF Screwed End Sleeved Plug Valve



Tuflite® Sleeved Plug Valves Applications & Full Port Options



Two-Way Full Port Sleeved Plug Valves



Approved for the most demanding HF requirements

The UOP & ConocoPhillips Petroleum HF Alkylation Process Specifications provide the standards for valves being installed in most new alkylation systems, worldwide. Tuflite valves manufactured for the UOP & ConocoPhillips HF processes are listed by UOP & ConocoPhillips Petroleum for use in their licensed systems. You can specify Tuflite HF valves that meet these special UOP & ConocoPhillips Petroleum design and material requirements and testing criteria for your application.

Tuflite valves for other HF applications and processes

Tuflite HF valves are available to meet a variety of alternate design specifications. You can also choose from a number of optional features. These valves are designed to meet the requirements for commercial HF Alkylation processes and hydrofluoric acid applications.

Full port design advantages

With the full-area round port there is no diminished or constricted flow. Ideal wherever low pressure-drop and high-flow efficiency are important such as rapid evac systems. This is a true pipe bore full port. The CV values on average is 3-4 times that of a full area type design plug.

Self cleaning

Metal lips completely surround the valve ports. With each rotation of the valve, any scale which may have collected on the plug seal surface is broken up and wiped away.

UOP
Approved!

Tuflite® Sleeved Plug Valves for Petroleum Alkylation Processes

Tuflite HF Valves are listed in UOP & ConocoPhillips Petroleum Company's HF Alkylation Process Design Specification Manual and meet UOP specifications.

Tuflite valves ordered for the UOP & ConocoPhillips Petroleum HF Alkylation process are manufactured in strict accordance with the approved assembly and testing procedures; with no deviation from material and design specifications.

Finish requirements

All finished valve assemblies, excluding actuator fasteners and actuator mounting hardware, are painted with one coat of HF acid detection paint.

Testing requirements

All valve body castings are subjected to 100% radiography of all critical areas of each casting. Each valve body is shell tested with Helium at 400 psig. Completed valve assemblies are hydrostatically shell tested with kerosene at 1 ½ times their rated working pressure, and seat tested at 80 psig air.

Ordering procedures

UOP & ConocoPhillips Valves must be ordered by drawing number. There can be no deviations from specifications and no other options are available. The following table references conventional sizes and figure numbers with the UOP & ConocoPhillips listed drawing numbers.

ASME Class 300

Size (inches)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
½	0366HF	FP0694-E	FP1238-E
¾	0366HF	FP0695-E	FP1238-E
1	0366HF	FP0696-E	FP1238-E
1½	0366HF	FP0697-E	FP1238-E
2	0367HF	FP0703-E	FP1243
3	0367HF	FP0704-E	FP1243
4	0367HF	FP0705-E	FP1243
4	0367EG-HF	FP0706-E	FP1244
6	0367EG-HF	FP0707-E	FP1244
8	0367EG-HF	FP0708-E	FP1244-E
10	0367EG-HF	FP0709-E	FP1244-E
12	0367EG-HF	FP0710-E	FP1244-E
14x12x14	0367EG-HF	FP1956-E	FP3709*
14x16x14	0367EG-HF	FP0711-E	FP1244-E
16x16x16	0367EG-HF	FP0712-E	FP1244-E
18x16x18	0367EG-HF	FP0713-E	FP1244-E
20x24x20	0367EG-HF	FP2110-E	FP3708*

ASME Class 600 DR

Size (inches)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
2	0667DR-HF	FP1091-E	FP3705*
3	0667DR-HF	FP1092-E	FP3706*
4	0667DR-HF	FP1093-E	FP3707*

ASME Class 300 Full Port

Size (inches)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
1	20367HF	FP1703	FP1912
1½	20367HF	FP1704	FP1912
2	20367HF	FP1705	FP1912
3	20367HF	FP1707	FP1913
4	20367HF	FP1708	FP1913
6	20367HF	FP1709	FP1913
8	20367HF	FP1710	FP1913
10	20367HF	FP1711	FP1913
12	20367HF	FP1712	FP1914

*At time of printing, drawing submitted for review but not currently approved or listed by UOP.

Tuflne® Sleeved Plug Valves for Every HF Application

Valve Components

Adjusting bolts



Cover nut



Cover



Cover stud

Fire tested cartridge



Formed PTFE diaphragm



PTFE wedge ring



Cover seal ring



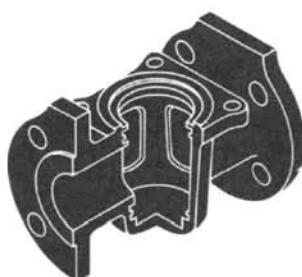
Plug



PTFE Sleeve



Body



For other HF acid processing applications, Tuflne offers choices of body materials and design options. Tuflne HF valves can be ordered in the same sizes, end connections, and pressure classes that are available in standard Tuflne plug valves.

Monel® or carbon steel bodies are available. (All carbon steel bodies are sprayed with fluorocarbon behind the sleeve to protect against the build-up of iron fluoride scale.)

UOP & ConocoPhillips HF Valves Materials of Construction

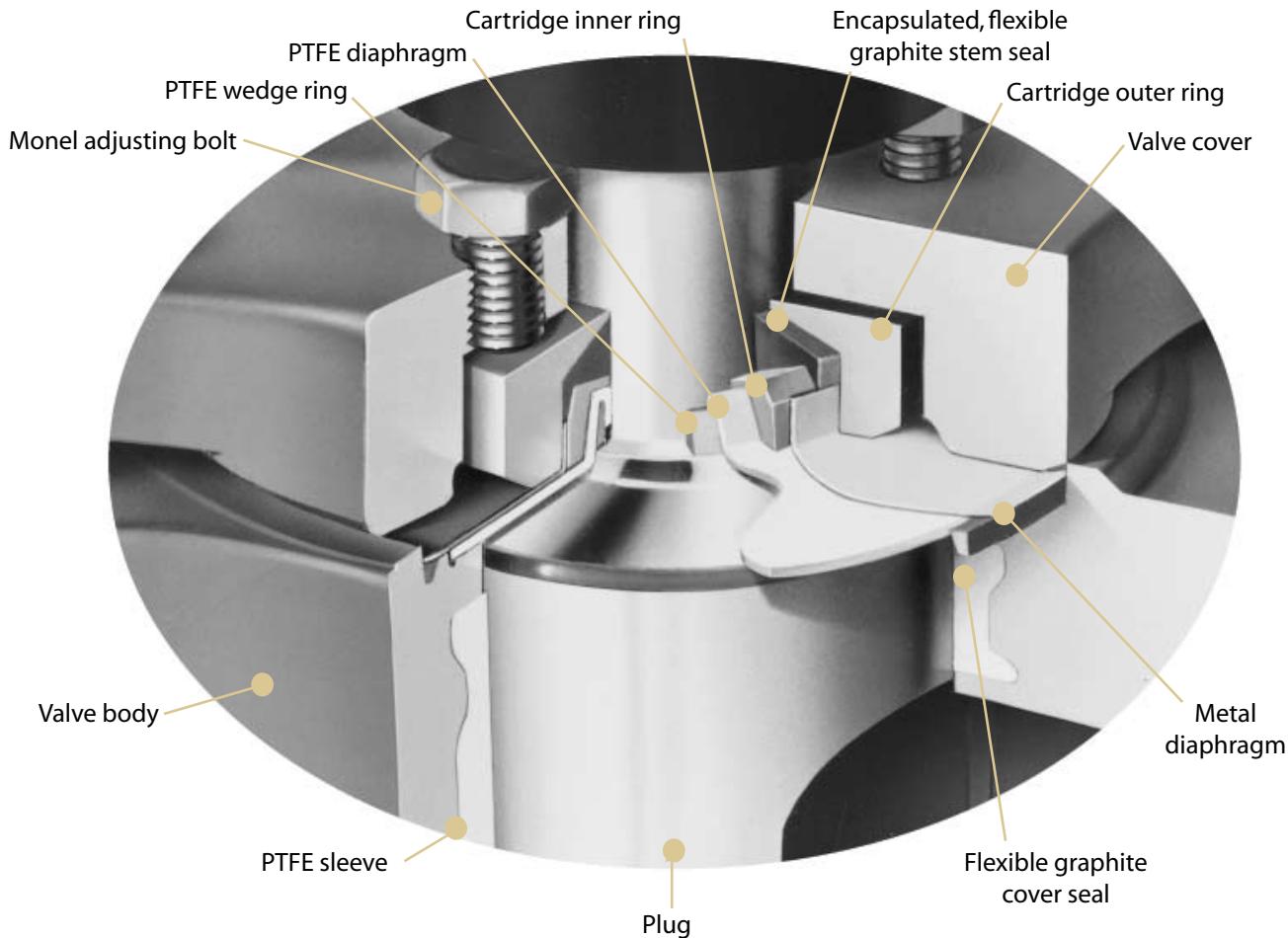
Adjusting Bolts	ASTM B164. Monel
Cover	ASTM A216, Grade WCB Carbon Steel
Cover Nut	ASTM A194, Grade 2HM Carbon Steel
Cover Stud	ASTM A193. Grade B7M Carbon Steel
Fire Tested Cartridges	ASTM B127, Monel
Stem Seal Ring	Flexible Graphite
Formed Diaphragm	Virgin PTFE
Wedge Ring	Virgin PTFE
Cover Seal Ring	Flexible Graphite
Plug	ASTM A494, Grade M-35-1
Sleeve	Virgin PTFE
Body	ASTM A494, Grade M-35-1
Paint	HF Acid Detection Paint
Tag	304 Stainless Steel
Plastic Cable Tie	Plastic

During the assembly process the plug is coated with HF lubricant.

Quick reference of available configurations

Size Inches	ASME Class	Figure Number	Screwed End	Flanged End
1/2 to 2	150	066HF	X	
1/2 to 2	300	0366HF	X	
1/2 to 4	150	067HF		X
1/2 to 4	300	0367HF		X
4 to 24	150	067EG-HF		X
4 to 20	300	0367EG-HF		X
1/2 to 16	600DR	0667/DR-HF		X

Tuflite® Sleeved Plug Valves Isolate HF Processes



Control fugitive emissions

This top seal package provides exceptional control of fugitive emissions. It meets or exceeds the most stringent current regulatory requirements EPA Method 21.

Triple sealed for extra protection

Under normal conditions, there are three active seals between the flow media and the atmosphere. Primary sealing is provided by the interaction of the plug, sleeve, and body. Secondary sealing is provided by the PTFE and metal diaphragms. Tertiary sealing is provided at the stem by the encapsulated, flexible graphite stem seal and at the body/cover joint by the graphite cover seal ring.

This Simple system assures stem sealing

This simple, compact, design harnesses complex dynamic forces to assure effective sealing to atmosphere. The metallic cartridge totally encapsulates the flexible graphite tertiary dynamic stem seal. At its outer edge, the metal diaphragm overlaps the graphite static seal ring to reinforce the tertiary seal at the body-to-cover joint. The PTFE wedge ring concentrates the sealing force of the PTFE diaphragm radially against the valve stem for more reliable prevention of external leakage at this secondary seal.

API-607 Standards

The Tuflite Tertiary Top Seal Sleeved Plug valve exceeds API-607 - Third Edition Section 4.2 - Specifications for External Leakage. It is available in a broader range of sizes than the standard fire tested model.

Tuflite®-475 & XeniTh® High Temperature Sleeved Plug Valves

Tuflite-475 and XeniTh High Temperature Sleeved Plug Valves provide a higher performance alternative to traditional PTFE sleeves.

Tuflite-475 High Temperature Sleeved Plug Valve greatly extends the pressure/temperature range of sleeved plug valves. It even exceeds the operating range of glass-filled PTFE. This greater pressure/temperature operating range is the result of improved thermo-mechanical properties, improved cold-flow properties and improved toughness.

The XeniTh High Temperature Sleeved Plug Valve offers bi-directional flow, simple actuation, and lightweight and compact design in a variety of 2-way and multi-port configurations. This versatility expands the range of possibilities when designing a new processing system or improving an existing system.

Tuflite-475 & XeniTh Features & Benefits

- ① A greater range of operating pressures and temperatures enables use of the more reliable and preferred sleeved plug valve in more applications
 - Tuflite-475 up to 475°F
 - XeniTh up to 600°F
- ② Reduced cold-flow at elevated temperatures
- ③ Greater stability helps reduce down-time
- ④ A smoother surface means better sealing
- ⑤ Lower porosity and greater density assure sleeve integrity
- ⑥ Enhanced strength and resistance to abrasion and wear



XeniTh Sleeved Plug Valve

Difficulties with other alternative sleeve materials

There are other resins which also work well at elevated temperatures, but they sacrifice sealing capability.

Alternative sleeve materials also dramatically increase torque.

They do not offer the exceptional sealing characteristics and low torque ratings of Tuflite-475.

Pacific Valves® Overview

Pacific Valves, The Leading Source for Hydrofluoric (HF) Gates, Globes and Checks



Experience

Pacific Valves has been manufacturing valves for this very difficult service for over 50 years. Pacific Valves manufactures API 600 and 602 for the Hydrofluoric (HF) industry. Our valves are superior in "Total Cost of Ownership" and wall thickness to keep the HF process in the valve for safety considerations.

Monel® parts assembled into a hydrofluoric acid valve are acid-tested to assure that it is Monel®. Another important aspect in the manufacture of these valves is the clearances at the critical metal interfaces (wedge/body guides, stem/back seat bushing, etc.). Hydrofluoric acid will react with carbon steel and Monel® producing a fluoride buildup on the metal surfaces which can render the valve inoperable. These clearances, developed over years of manufacturing experience, testing and research, must be precisely controlled to allow for this buildup.

Our experience has enabled us to consistently produce valves that give the best performance for this stringent service. Pacific Valves does not use commodity hydrocarbon valves and trim for HF service, thus our internal tolerances are designed for this unique process.

Certified Quality

Pacific Valves' internal testing procedures exceed UOP and ConocoPhillips requirements.

Monel® is a registered trademark of Special Metals Corporation.

Features & Benefits

- ① One stop solution for HF Acid gates, globes, checks and sleeved plug valves
- ② High Integrity Shutoff (HIS) design for tighter shutoff while remaining fire-safe
- ③ Originally approved by all the major hydrofluoric acid licensors in all sizes and pressure ranges

Every Valve is Tested

Pacific Valves conducts a total of 7 tests on our valves before releasing for shipment. Testing specifications are available upon request. Pacific Valves tested per authorized API testing facility and passed the new API 622 fugitive emission specification on rising stem API 600 products. Pacific Valves also tests per EPA Method 21 upon request.

Pacific Valves shell tests all API 600 and API 602 valves:

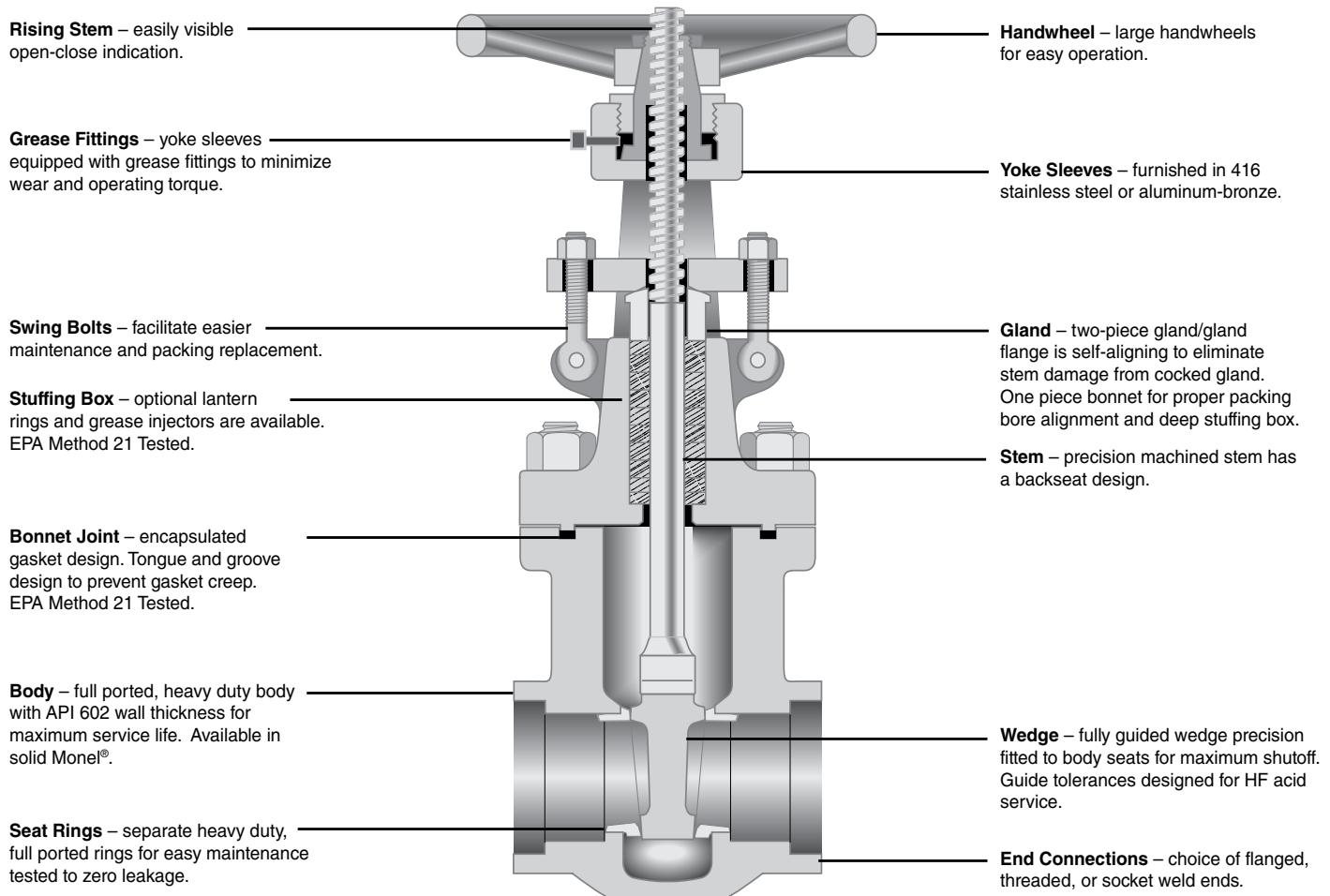
- ASME 150; 450 PSI
- ASME 300; 500 PSI for ten minutes

Through our HF experience Pacific Valves has found that Helium tests are the most effective testing criteria to determine casting defects. Thus we monitor percent defect on this test as our primary quality process on defects per testing lot. Our goal is to be at 98% defect-free rate.

Pacific Valves tests our hydrofluoric acid valves at extended time periods to further assure the quality of the valve performance. In addition, we test our HF Acid valves with Helium at 300 PSI to insure the casting integrity.

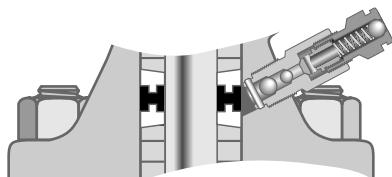
Pacific Valves has the best repairability and "Mean Time Between Repair" of all approved HF suppliers. Pacific Valves still has valves in HF process performing after 40 years. The repairability of our valves are double that of our competition due to robust casting design. Thus, our customer receives the best Total Cost of Ownership.

Pacific Valves® API 602 Compact Gate Valve Features

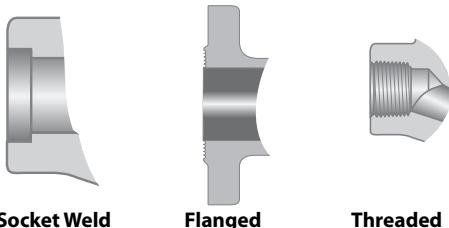


Options

Grease Injector & Lantern Ring

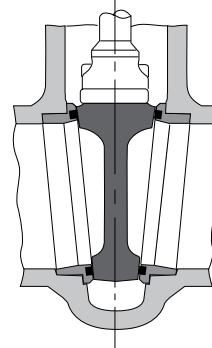


End Connections



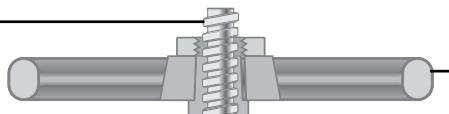
Soft Seated "T" Trim Seat Ring

All gate valves are available with optional PTFE seat rings. The molded PTFE ring is bonded into a seat ring groove in the face for maximum service life. This design is excellent for lower temperature service where tight shutoff is required.



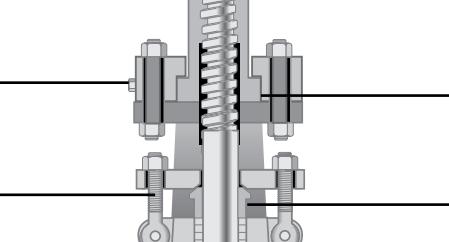
Pacific Valves® API 600 Bolted Bonnet Gate Valve Features

Rising Stem – easily visible open-close indication.



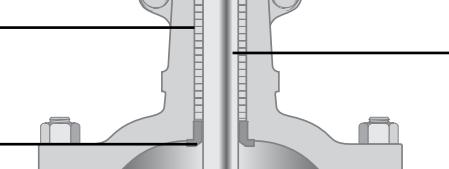
Handwheel – large handwheels for easy operation. Also available with gearing, motor actuators or cylinder actuators for more difficult services.

Grease Fittings – yoke sleeves equipped with fittings to minimize wear and operating torque.



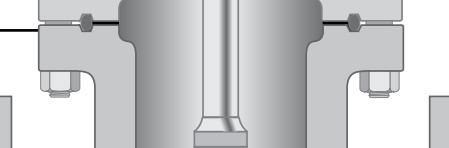
Yoke Sleeves – furnished in ductile Ni-resist or aluminum-bronze to reduce operating torque.

Swing Bolts – facilitate easier maintenance and packing replacement.



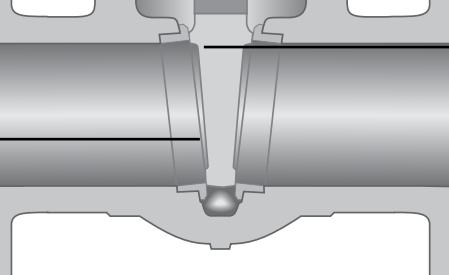
Gland – two-piece gland/gland flange is self-aligning to eliminate stem damage from cocked gland.

Stuffing Box – optional lantern rings and grease injectors are available. Tested per API 622 and EPA Method 21 Fugitive Emissions.



Stem – all Pacific wedge gate valves are provided with upset forged T-head stems. By forging the T-head, the stem at the stem-wedge connection is strengthened. This design also allows the wedge to self-align, eliminating the possibility of a bent stem jamming the wedge.

Backseat – machined bonnet stem bushing provides back-up stem seal.



Wedge – heavy pattern, fully guided wedge precision fitted to body seats for maximum shutoff. True fire-safe High Integrity Shutoff design available. See page 11. Wedge fitted to seat for zero leakage on high and low pressure testing.

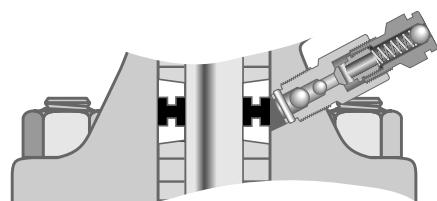
Bonnet Joint – joint design varies with ASME class rating.

End Connections – flanged end options are raised face smooth finish or ring type joint.

Options

Grease Injector and Lantern Ring

Per UOP Specifications.



High Integrity Shutoff Wedge

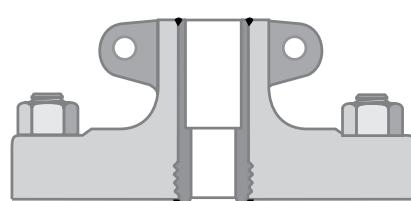
This wedge has two sealing elements:

- PTFE Primary
- Metal-to-Metal back up

This design provides a zero leakage barrier for both upstream and downstream. This technology offers excellent long term isolation capabilities with true fire-safe functionality. A detailed description can be found on page 11.

Monel® Sleeved Stuffing Box

All Monel® stuff box provides superior stem sealing and eliminates iron fluoride buildup.

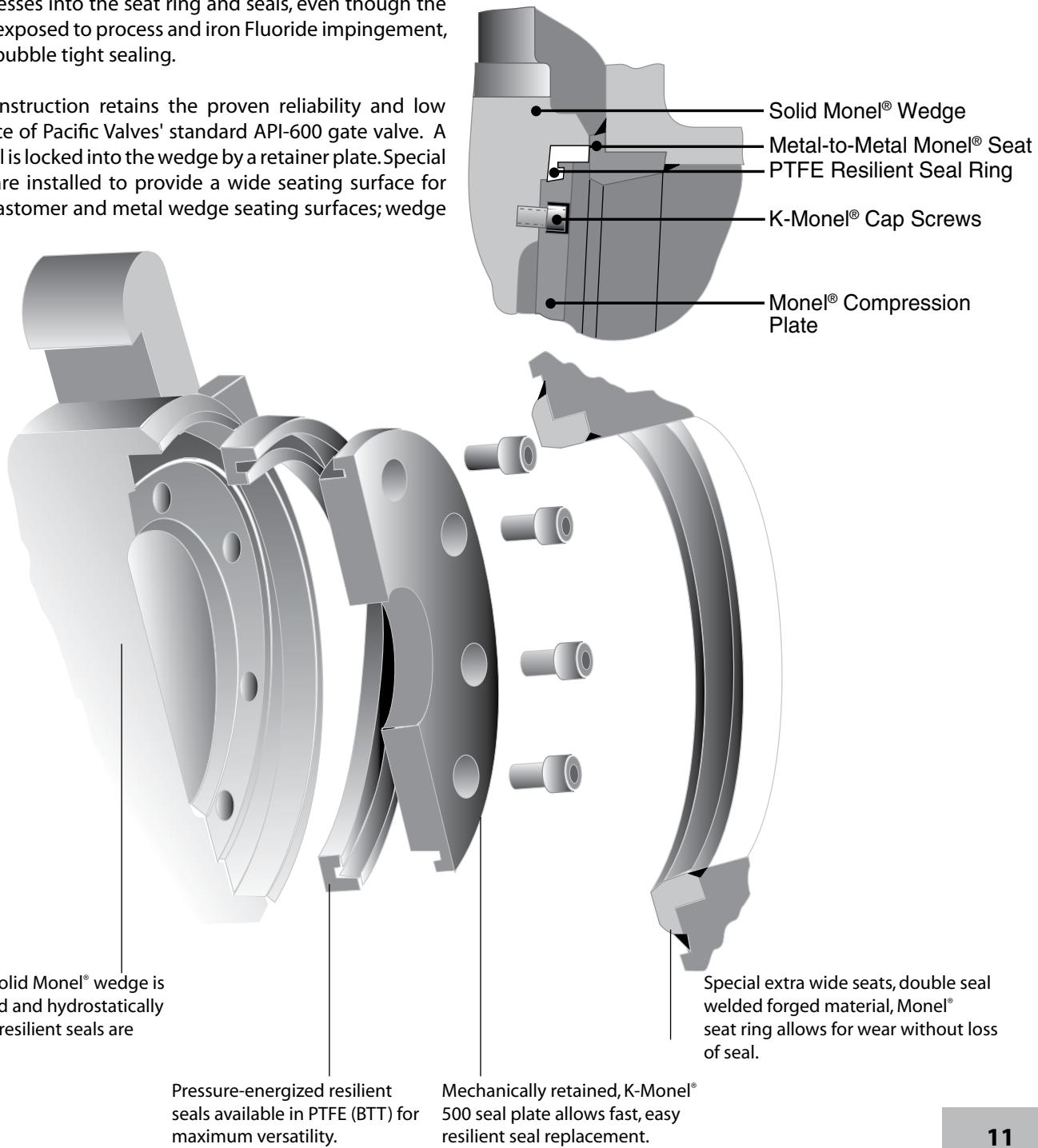


Pacific Valves® High Integrity Shutoff (HIS) Design

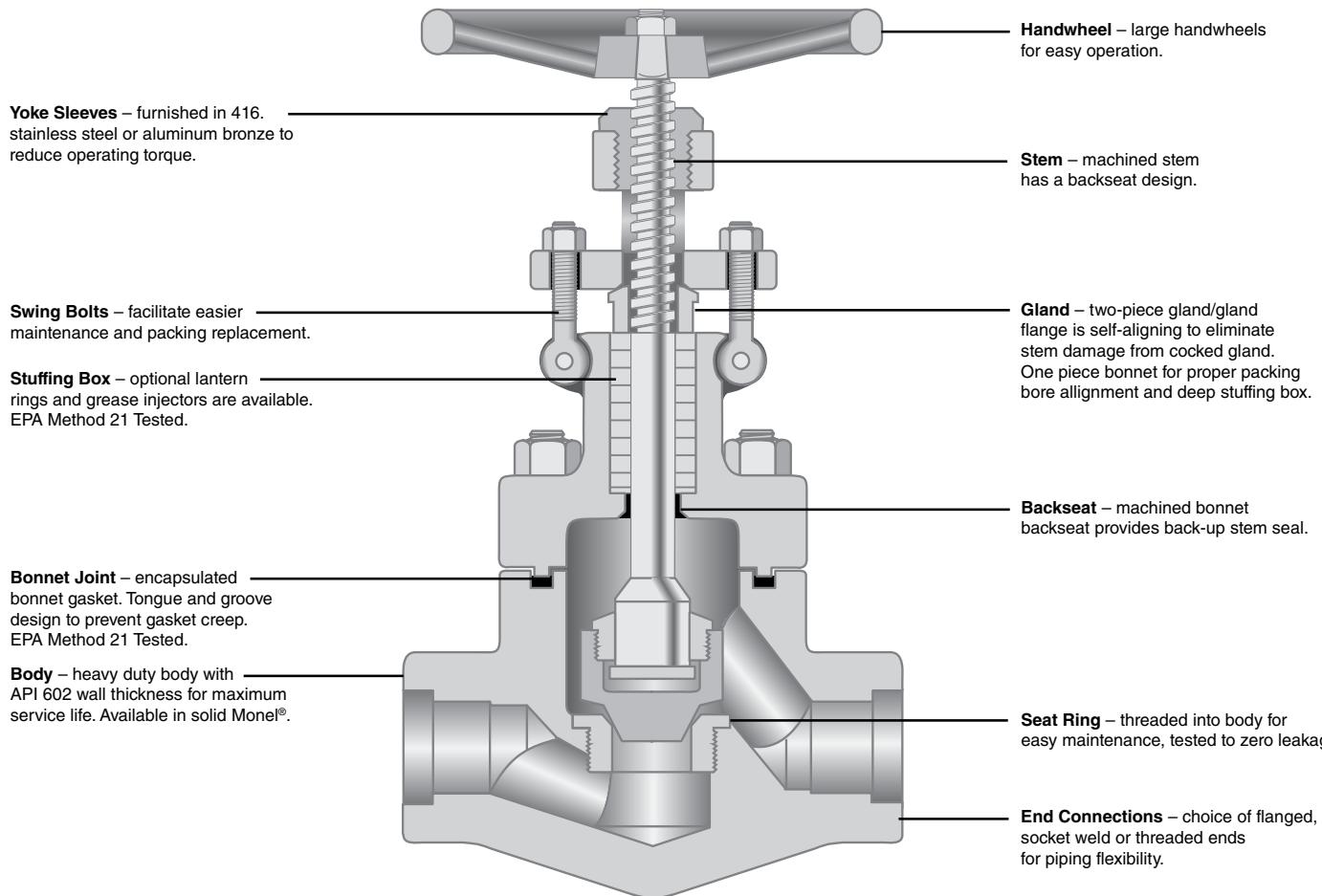
For services that require bubble tight shutoff, specify Pacific Valves' High Integrity Shutoff gate valves. These fire-safe valves provide a bubble tight barrier on both upstream and downstream seats and eliminate possible product contamination or loss of fluids due to valve leakage. This design has been tested to 18,000 cycles and still tested to bubble tight shutoff. The Teflon resilient seat compresses into the seat ring and seals, even though the seat ring is exposed to process and iron Fluoride impingement, to provide bubble tight sealing.

The HIS construction retains the proven reliability and low maintenance of Pacific Valves' standard API-600 gate valve. A resilient seal is locked into the wedge by a retainer plate. Special seat rings are installed to provide a wide seating surface for both the elastomer and metal wedge seating surfaces; wedge

is fitted to metal seat rings for zero leakage. Teflon seat and retainer is assembled then tested for bubble zero leakage. This results in dual tight sealing for total isolation for HF processes. A full range of trim and shell materials, end connections, piping and actuator options are available for corrosive services and temperatures up to 450°F.

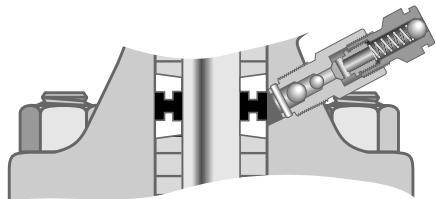


Pacific Valves® API 602 Compact Globe Valve Features

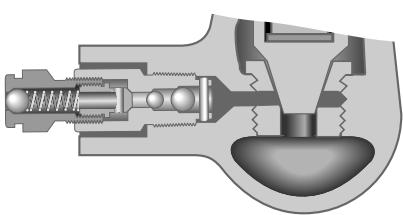


Options

Grease Injector and Lantern Ring

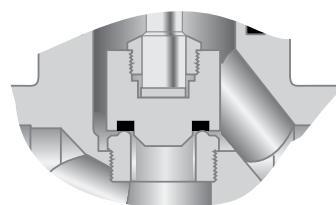


Grease Injector in Seat

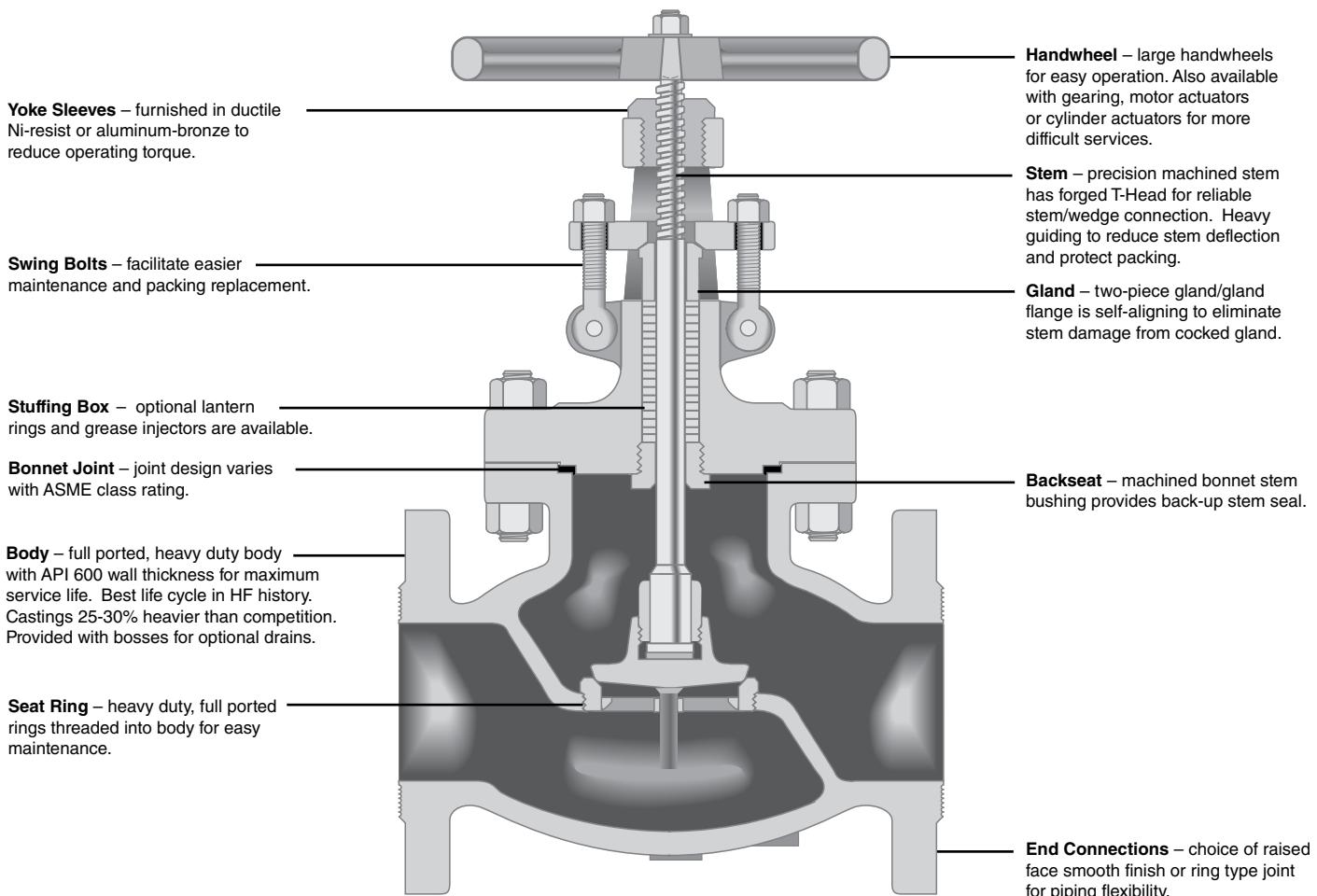


Soft Seated "T" Trim

All valves are available with optional soft seated PTFE trim. The molded PTFE ring is bonded into a groove in the disc face for maximum service life. This design is excellent for lower temperature service where tight shutoff is required.

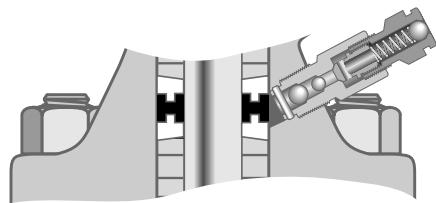


Pacific Valves® API 600 Bolted Bonnet Globe Valve Features

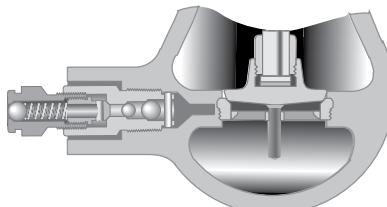


Options

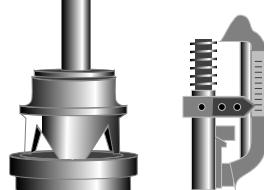
Grease Injector & Lantern Ring



Grease Injector in Seat

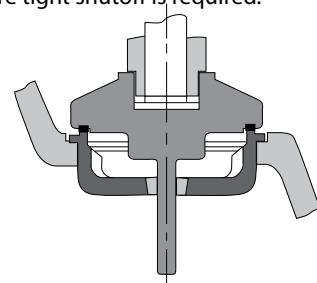


V-Port Trim



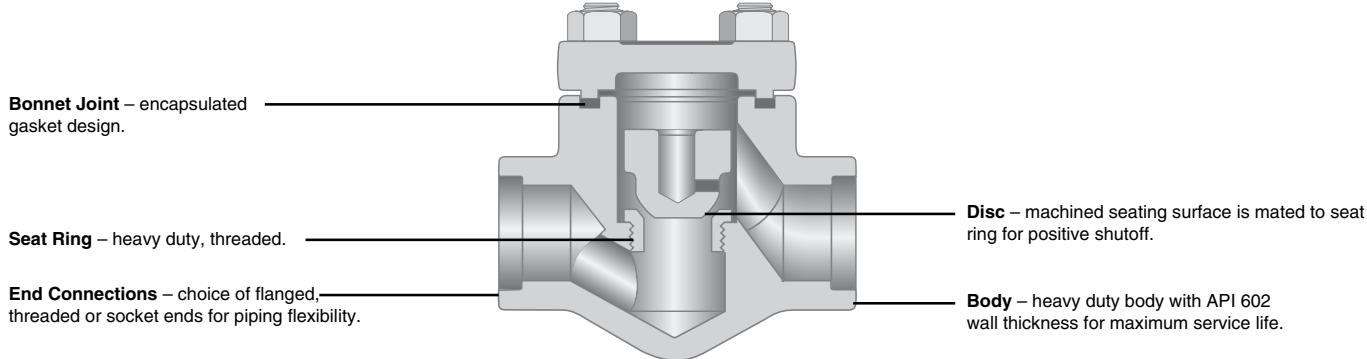
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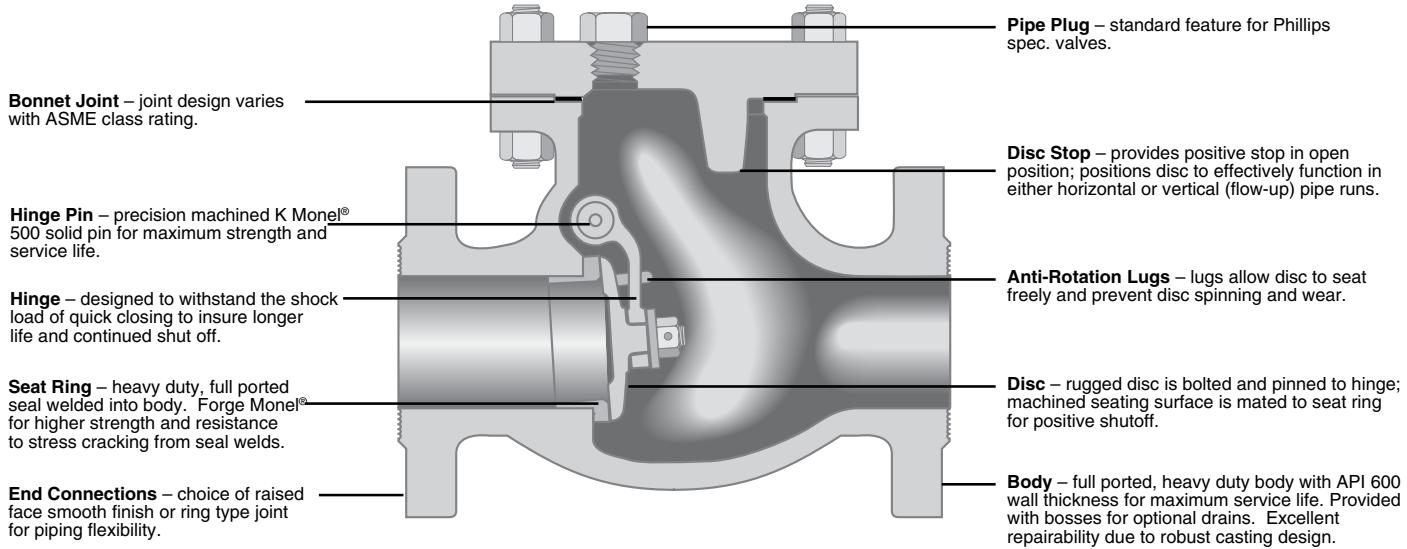


Pacific Valves® API 602 and 600 Check Valve Features

API 602



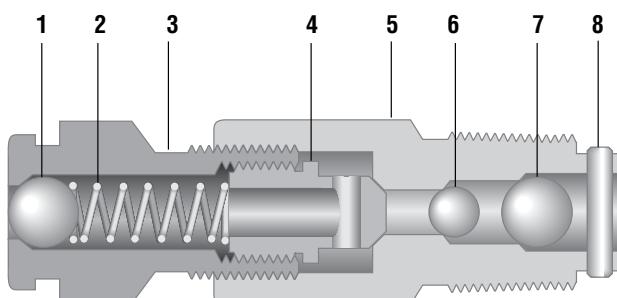
API 600



Pacific Valves® Grease Injectors

Double Ball Grease Injector

Pacific Valves' unique injector has a double ball check protection against leakage and a positive shut-off internal valve. The injector button head must be unscrewed one half turn to open the internal valve before injecting grease. While unscrewing the injector button head, a second wrench must be used to assure that the injector body is not loosened from the main valve. After grease injection the head is then retightened to maintain positive shut-off.



Parts List Carbon Steel

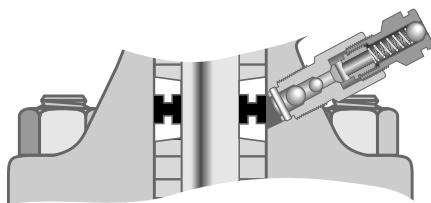
ITEM	DESCRIPTION	MATERIAL
1	Ball Check	302 S.S.
2	Spring	Music Wire
3	Head Housing	ASTM A108 GR 1018
4	Needle	ASTM A108 GR 1018
5	Valve Housing	ASTM A108 GR 1018
6	Ball Check	Monel®
7	Ball Check	Monel®
8	Pin	ASTM A108 GR 1018

Parts List Monel®

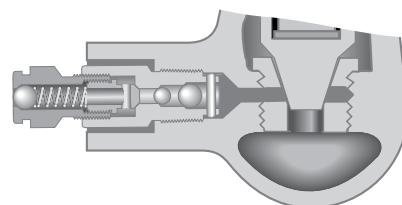
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Dimensions

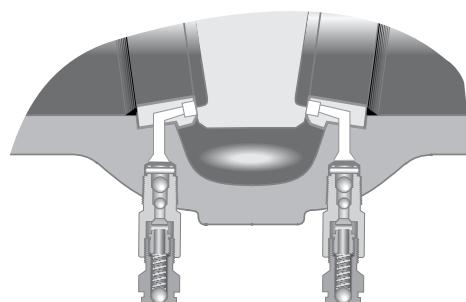
NPT PIPE SIZE	LENGTH
1/4"	3 ¹ / ₁₆ "
3/8"	3 ¹ / ₁₆ "



Grease Injector and Lantern Ring in Gate or Globe Stuffing box.



Grease Injector at Seat Ring and Disc of Globe Valve.



Dual Grease Injector at Seat Ring and Wedge of Gate Valve.

XOMOX® & PACIFIC VALVES® - Hydrofluoric Alkylation Valves

CRANE Energy Flow Solutions™

CRANE Energy Global Headquarters
4526 Research Forest Drive, Suite 400
The Woodlands, Texas 77381 U.S.A.
Tel.: (1) 936-271-6500
Fax.: (1) 936-271-6510

CRANE ChemPharma Global Headquarters
4444 Cooper Road
Cincinnati, OH 45242 U.S.A.
Tel.: (1) 513-745-6000
Fax.: (1) 513-745-6086

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NUCLEAR

VALVE SERVICES

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