

WKM DynaSeal 210 and 310 Floating Ball Valves

Industry-recognized flanged and threaded end floating ball valves
for oilfield and industrial applications

TECHNOLOGY



FLOCONX[®]
— USA FLOW CONTROL COMPANY —

FLOCONX LLC
USA FLOW CONTROL COMPANY

SALES | INFORMATION
SALES@FLOCONX.COM
VENTAS@FLOCONX.COM

FLOW CONTROL, OUR PASSION.™

WWW.FLOCONX.COM

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WKM DynaSeal 210 Floating Ball Valves

HOW TO ORDER

| J0XXXXX | - | 2 | 1 | X | X | X | 0 | X | | | | | | | | | | | |
|--|-------------|-----------------------|---------------|-----------|---------------|---------------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|------------------|-------|---|---|---|--|
| Base Part Number | | Pressure Rating (CWP) | Body Material | Seat Trim | Seal Material | Ball and Stem | | Handle | | | | | | | | | | | |
| Female Threaded Ends 750/1000# MOP <table border="1"> <thead> <tr> <th>Size</th> <th>Base Number</th> </tr> <tr> <th>in. (mm)</th> <th></th> </tr> </thead> <tbody> <tr><td>2 x 1-1/2 (50 x 40)</td><td>24925</td></tr> <tr><td>2 x 2 (50 x 50)</td><td>25144</td></tr> <tr><td>3 x 2 (80 x 50)</td><td>24926</td></tr> <tr><td>3 x 3 (80 x 80)</td><td>25145</td></tr> <tr><td>4 x 3 (100 x 80)</td><td>25154</td></tr> </tbody> </table> | | Size | Base Number | in. (mm) | | 2 x 1-1/2 (50 x 40) | 24925 | 2 x 2 (50 x 50) | 25144 | 3 x 2 (80 x 50) | 24926 | 3 x 3 (80 x 80) | 25145 | 4 x 3 (100 x 80) | 25154 | Ductile Iron 1 750 psi 1 1000 psi 2 1500 psi 3 2000 psi 4 | Acetal Plastic (43) 3 Filled Teflon (42) 5 | Buna 1 FKM 2 Carbon Steel 1 Stainless Steel 2 Carbon Steel Unidirectional 3 Stainless Steel Unidirectional 4 | No Handle 0 Handle 1 No Handle with Seal Pin 2 Handle with Seal Pin 3 |
| Size | Base Number | | | | | | | | | | | | | | | | | | |
| in. (mm) | | | | | | | | | | | | | | | | | | | |
| 2 x 1-1/2 (50 x 40) | 24925 | | | | | | | | | | | | | | | | | | |
| 2 x 2 (50 x 50) | 25144 | | | | | | | | | | | | | | | | | | |
| 3 x 2 (80 x 50) | 24926 | | | | | | | | | | | | | | | | | | |
| 3 x 3 (80 x 80) | 25145 | | | | | | | | | | | | | | | | | | |
| 4 x 3 (100 x 80) | 25154 | | | | | | | | | | | | | | | | | | |

* See page 4 for details.

1500/2000# MOP

| | |
|---------------------|--------|
| 1 x 1 (25 x 25) | 24190 |
| 2 x 1-1/2 (50 x 40) | 24132 |
| 2 x 2 (50 x 50) | 24056 |
| 2-1/2 x 2 (65 x 50) | 24059 |
| 3 x 2 (80 x 50) | 24063 |
| 3 x 3 (80 x 80) | 24178* |
| 4 x 3 (100 x 80) | 24211* |

* Maximum pressure rating of 1500 psi for 4" x 3" (100 mm x 80 mm) and 3" x 3" (80 mm x 80 mm).

Grooved Ends 750# MOP

| | |
|---------------------|-------|
| 2 x 1-1/2 (50 x 40) | 25111 |
| 3 x 2 (80 x 50) | 25112 |
| 4 x 3 (100 x 80) | 25113 |

Examples: Standard Trim 2" (50 mm) J024925-2131100
 H₂S, NACE Trim Suffix Code = standard -213220X
 = unidirectional -213240X

NACE MR0175/ISO 15156 Compliance – Materials of construction shall be in compliance with the pre-qualified material requirements specified by NACE MR0175/ISO 15156. According to NACE MR0175/ISO 15156, it is the manufacturer's responsibility for meeting metallurgical requirements and the customer/user responsibility to ensure that a material will be satisfactory in the intended environment. When given the application requirements (environment) by the customer/user, Cameron can make technical recommendations in accordance with NACE MR0175/ISO 15156, but that in no way certifies or warrants the product or materials for the application.

FEATURES AND BENEFITS

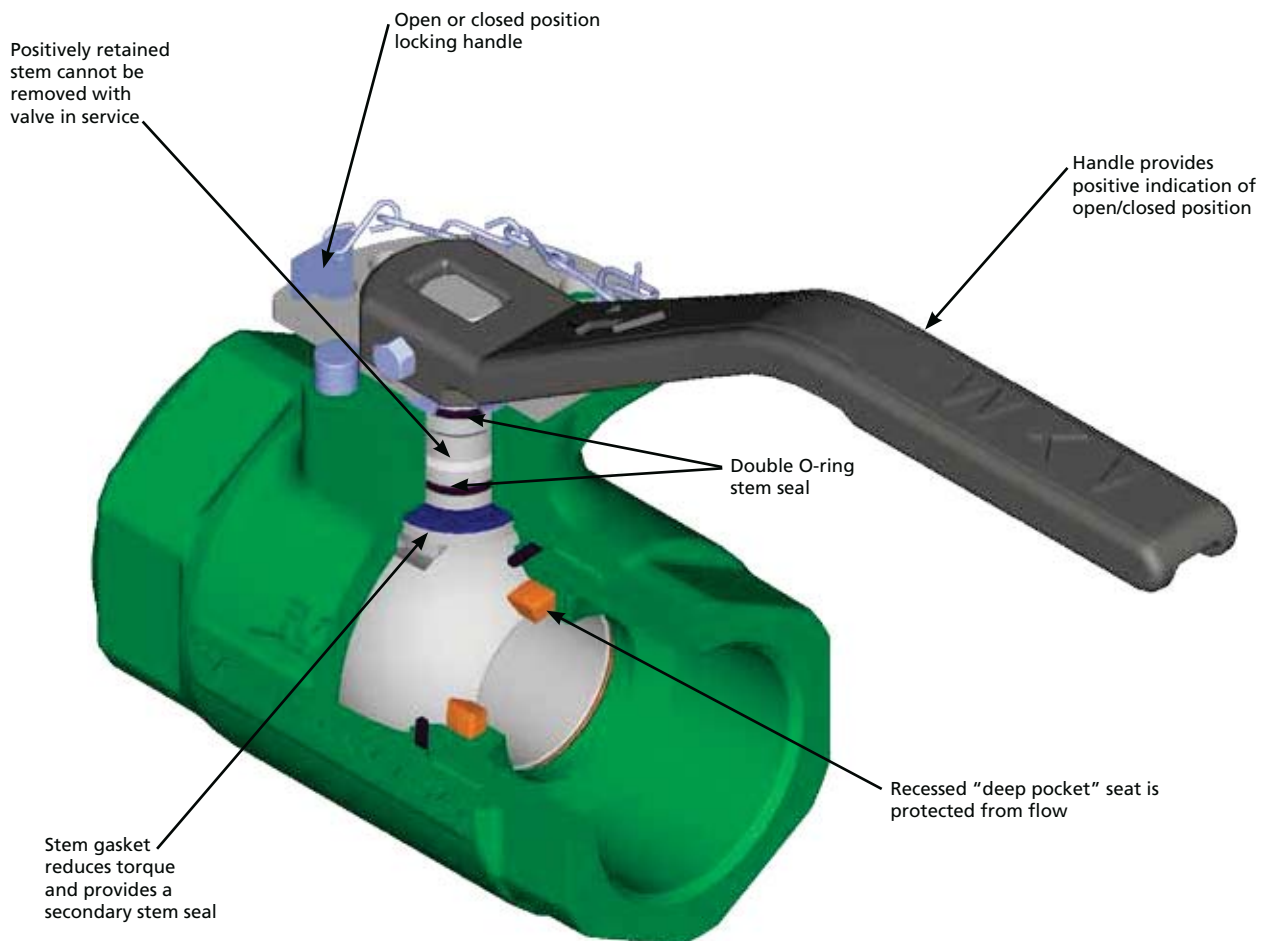
This rugged yet economical ductile iron ball valve is ideal for threaded end oilfield applications where carbon steel body material is not a requirement.

Cameron's WKM® DynaSeal™ 210 ball valve is a two-piece design with a ductile iron body and tailpiece. This valve is economical and includes many of the premium design features found in the WKM DynaSeal 310 carbon steel ball valve.

It is available in 1" to 4" x 3" (25 mm to 100 mm x 80 mm) sizes. Working pressures offered are 750, 1000, 1500 and 2000 psi. (See size/pressure table on page 5.)

This valve is used primarily in the oilfield market for the following applications:

- Production wing valves on low-pressure gas wells
- Production flowlines
- Production gathering systems for water, oil and gas
- Gas blowdown service
- Tank batteries for storage or production
- Frac water tanks



Locking Capability is Standard

- The valve can be locked in the open or closed position.

Positively Retained Stem

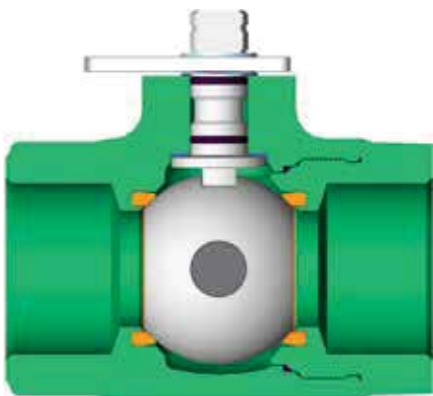
- The stem is positively retained. It is designed to prevent stem blowout while the valve is in service.

Color-coded Working Pressures

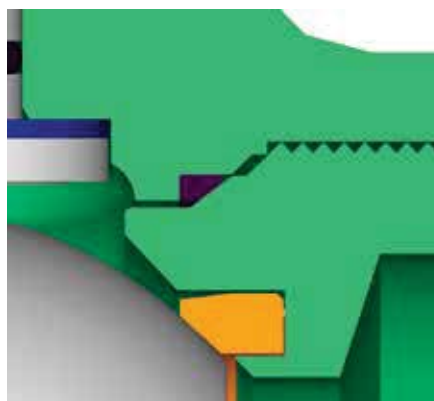
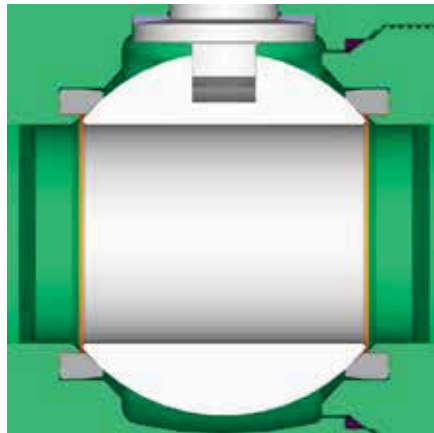
The lock plates are color-coded so pressure ratings are quickly identified.

- 750/1000 psi: green
- 1500 psi: blue
- 2000 psi: red

Unidirectional Ball (Option)



The WKM DynaSeal 210 unidirectional valve option provides relief to valves that might have water trapped in the body cavity and then are exposed to a temporary freeze. Since this option relies on a relief hole in the ball to relieve the excess pressure, the valve is stamped with a directional flow arrow to be sure the side of the ball with the hole is installed upstream.



Fire-tested Design

The WKM DynaSeal 210 ball valves are qualified under API Standard 607.

The deep-pocketed seat, locked in stem and body/tailpiece designs give this valve excellent fire-tested characteristics.

Superior Stem Journal Design Prevents Stem Seizure

The stem is designed with two internal O-ring grooves located on either side of a shallow grease groove.

The top O-ring is a weather seal while the bottom one seals the stem bore against the line media. The stem gasket provides a backup seal.

The shallow groove between the O-rings provides three benefits:

- Prevents stem seizure
- Reduces torque
- Provides a space for lubricating grease applied at the factory during assembly

TFE Body Seal

A TFE body seal is positioned between the line bore and tailpiece threads, isolating the threads from the line media.

Deep Recessed Seats

The seat is recessed into a deep machined pocket, which serves to surround and protect the seat on all sides. This design eliminates cold flow into the valve conduit where it can be damaged by the action of the ball or the flow medium. The result is long and extended service life.

Seal Pin Device Provided as Standard on 750 and 1000 psi; 2", 3" and 4" (50 mm, 80 mm and 100 mm) Reduced Port Valves

A secondary seal pin device for applying tamper detection is provided on these valves. They are a popular choice for production tank batteries where tamper detection often is required.

SPECIFICATIONS

1" Full Port through 4" x 3" Reduced Port

Standards and Specifications

WKM DynaSeal 210 ball valves conform to the following design and testing standards:

Standard Materials

- API line pipe threads
- Body: Ductile iron
- Ball and Stem: Carbon steel or stainless steel
- Seat and Seals: Acetal plastic/Buna-N

Optional Materials

- Ball and Stem: Stainless steel
- Seat and Seals: TFE/FKM

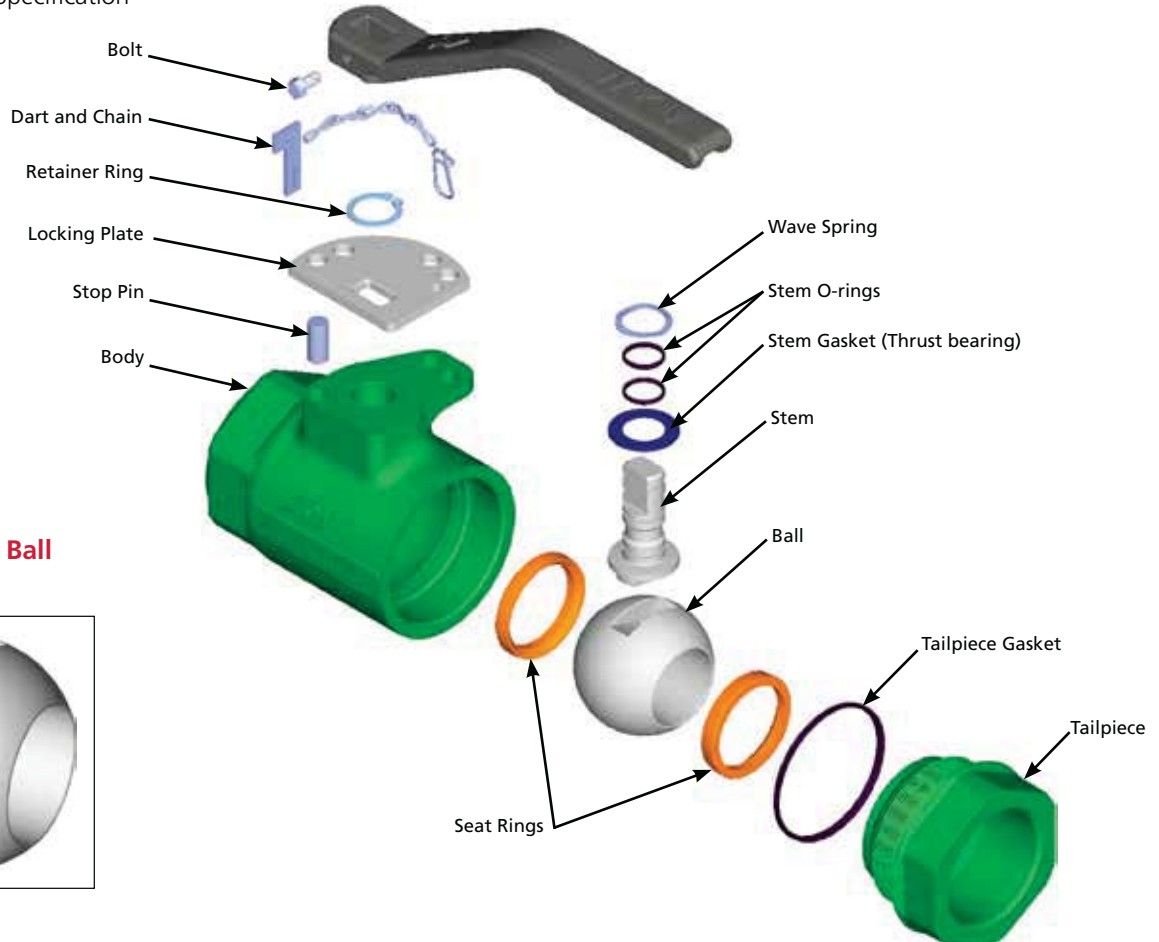
Compliances

- ASME B16.5
- MSS-SP-6, 25, 55, 72 and 61
- NACE MR0175/ISO 15156
- API 607 Fire-test Specification

ASME Pressure Classes

| Size | | | Classes | | | |
|-----------|------------|----|---------|------|------|------|
| in. | (mm) | | 750 | 1000 | 1500 | 2000 |
| 1 | (25) | FP | | | • | • |
| 2 x 1-1/2 | (50 x 40) | RP | • | • | • | • |
| 2 | (50) | FP | • | | • | • |
| 2-1/2 x 2 | (65 x 50) | RP | | | • | • |
| 3 x 2 | (80 x 50) | RP | • | • | • | • |
| 3 | (80) | FP | • | • | • | |
| 4 x 3 | (100 x 80) | RP | • | • | • | |

Unidirectional Ball (Optional)



MATERIALS LIST

1" Full Port through 4" x 3" Reduced Port

750, 1000, 1500 and 2000 psig Working Pressure

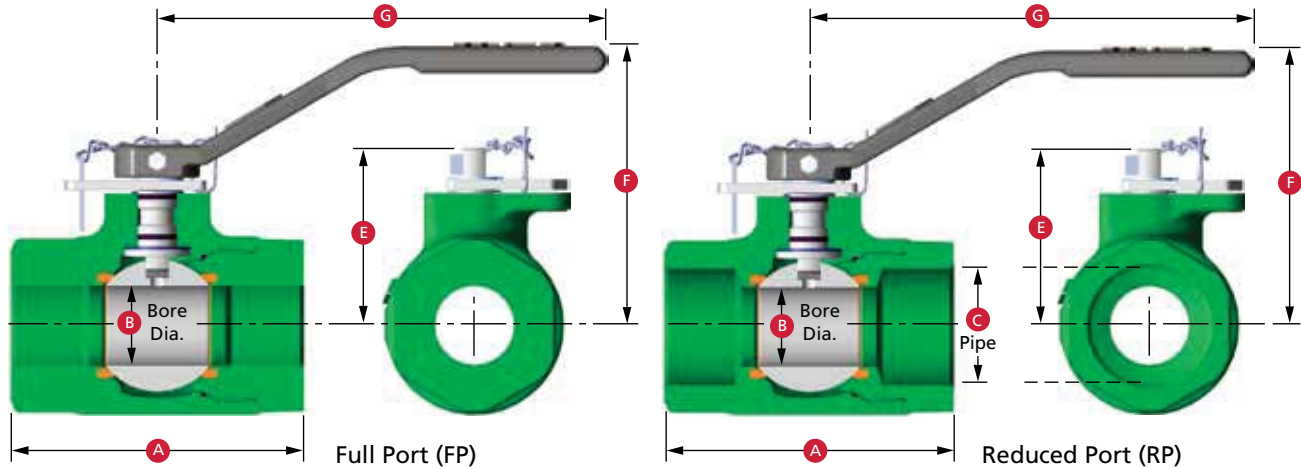
Standard Materials

| Qty. | Description | Material |
|------|------------------------------|--|
| 1 | Body | ASTM A395 Ductile Iron |
| 1 | Tailpiece | ASTM A395 Ductile Iron |
| 1 | Ball | Carbon Steel Chrome-plated 316 SS |
| 1 | Stem | AISI 1213/1215, Steel, Zinc-plated 316 SS (Type 630 on 2" x 1-1/2" (50 mm x 40 mm)) |
| 2 | Seat Ring | Acetal Plastic (43) Filled TFE (42) |
| 1 | Tailpiece Gasket | PTFE |
| 2 | Stem O-ring | Buna-N FKM |
| 1 | Stem Gasket (Thrust Bearing) | Filled TFE |
| 1 | Locking Plate | Steel 1018/26 |
| 1 | Locking Plate Retaining Ring | Spring Steel |
| 1 | Wave Spring | Spring Steel |
| 1 | Stop Pin | Spring Steel |
| 1 | Handle | ASTM A395 Ductile Iron |
| 1 | Seal Pin/Dart | Brass or Aluminum |

NOTE: For H₂S service, use Trim Code -X13220X. Meets NACE MR0175/ISO 15156 (see "How to Order" on page 2).

DIMENSIONS AND WEIGHTS

1" Full Port through 4" x 3" Reduced Port



Dimensions

| Size in. (mm) | Dimension A | | B | C | E | F | G |
|------------------|-------------|---------|------|-------|-------|-------|-------|
| | Threaded | Grooved | | | | | |
| 1 FP | 4.00 | – | 1.00 | 1.00 | 2.77 | 4.0 | 7.1 |
| (25 FP) | (102) | – | (25) | (25) | (70) | (102) | (180) |
| 2 RP | 5.55 | 5.25 | 1.50 | 2.00 | 3.56 | 4.9 | 7.1 |
| (50 RP) | (141) | (133) | (38) | (50) | (90) | (124) | (180) |
| 2 FP | 6.00 | – | 2.00 | 2.00 | 4.50 | 4.9 | 15.0 |
| (50 FP) | (152) | – | (51) | (50) | (114) | (124) | (381) |
| 2-1/2 RP | 7.00 | – | 2.00 | 2.50 | 4.50 | 4.9 | 15.0 |
| (65 RP) | (178) | – | (51) | (65) | (114) | (124) | (381) |
| 3 RP | 7.25 | 7.25 | 2.00 | 3.00 | 4.50 | 4.9 | 15.0 |
| (80 RP) | (184) | (184) | (51) | (80) | (114) | (124) | (381) |
| 3 FP | 8.75 | – | 3.00 | 3.00 | 5.66 | 6.0 | 15.0 |
| (80 FP) | (222) | – | (76) | (80) | (144) | (152) | (381) |
| 4 RP | 8.75 | 8.88 | 3.00 | 4.00 | 5.66 | 6.0 | 15.0 |
| (100 RP) | (222) | (226) | (76) | (100) | (144) | (152) | (381) |

NOTE: The dimensions are approximated.

Weights – Full Port

| Operation | Valve Size (in.) and Weight (lb) | | |
|----------------|----------------------------------|---------|---------|
| | 1 x 1 | 2 x 2 | 3 x 3 |
| Without Handle | 4.0 | 14.4 | 42.8 |
| With Handle | 4.5 | 17.6 | 46.0 |
| Operation | Valve Size (mm) and Weight (kg) | | |
| | 25 x 25 | 50 x 50 | 80 x 80 |
| Without Handle | 1.8 | 6.5 | 19.4 |
| With Handle | 2.0 | 8.0 | 20.9 |

Weights – Reduced Port

| Operation | Valve Size (in.) and Weight (lb) | | | |
|----------------|----------------------------------|-----------|---------|----------|
| | 2 x 1-1/2 | 2-1/2 x 2 | 3 x 2 | 4 x 3 |
| Without Handle | 9.4 | 15.5 | 16.6 | 35.5 |
| With Handle | 9.9 | 18.0 | 19.8 | 38.7 |
| Operation | Valve Size (mm) and Weight (kg) | | | |
| | 50 x 40 | 65 x 50 | 80 x 50 | 100 x 80 |
| Without Handle | 4.3 | 7.0 | 7.5 | 16.1 |
| With Handle | 4.5 | 8.2 | 9.0 | 17.6 |

WKM DynaSeal 310 Floating Ball Valves

TRIM GUIDELINES FOR ALL DYNASEAL 310 VALVES

This chart is an abbreviated guide to the chemical resistance and pressure/temperature limitations of the seal materials used in the WKM DynaSeal 310 floating ball valve. Consult Cameron regarding questions about trim selections.

| Seal Code | Seat Material | Tailpiece Gasket | Service Application |
|-----------|----------------------------|------------------|---|
| 01 | TFE | TFE | Seat and tailpiece gaskets are of virgin TFE. Use where lading contamination from glass or other fillers is not desirable, such as in food service. Recommended for low-temperature service to -50° F (-46° C). Also recommended for vacuum service. |
| 42 | Filled TFE | TFE | Seat material is TFE filled with inert materials for use at elevated temperatures and pressures. Same chemical resistance as virgin TFE except slightly affected by hot concentrated alkaline solutions. Some chlorinated compounds can cause swelling. Good for vacuum service. Also recommended for low-temperature service -50° F (-46° C). |
| 43 | Homopolymer Acetal Plastic | TFE | For general use at high pressures to a temperature of 220° F (104° C). |
| 48 | Homopolymer Acetal Plastic | Filled TFE | For general use at high pressures to a temperature of 220° F (104° C). Used on socket weld end valves 3" (80 mm) bore size and smaller. High- and low-pressure block-and-bleed. |
| 07 | *FKM/SS | TFE | General use for low-pressure and abrasion resistance. Not suitable for steam. Good for vacuum service. Available in bore sizes to 3" (80 mm). |
| 18 | HPT-2 | Filled TFE | HPT-2 is a special TFE formulation for use at temperatures above trim 42 capability. Best suited for constant temperature or constant pressure applications. Proven service in steam, hot oil, heat transfer fluids, hot resins and boiler feed water. Same chemical resistance as TFE. Slightly affected by hot, concentrated alkaline solutions. Some fluorinated compounds cause swelling. |
| 23 | Celcon | TFE | For use in high-pressure applications. Temperature limited to 225° F (107° C) (1/4" to 3/4" (8 mm to 20 mm) bores only). |
| 28 | Filled TFE | Filled TFE | Same as 42, except tailpiece gasket is filled TFE. Used on weld end valves 4" (100 mm) and larger. |
| 60S | Nickel Alloy HVOF/316 | Graphite | Metal-to-metal QPQ ball and seat made of nickel alloy over 316 SS. |
| 92H | Chrome Carbide/316 | Graphite | Metal-to-metal ball and seat made of chrome carbide over 316 SS. |

NOTE 1: Trim 07 and 18 should be tested for each application by actual use.

NOTE 2: All seal codes, with the exception of 07, have been fire-tested (and qualified) to API 607 4th edition requirements.

* Trim sizes smaller than 1-1/2" (40 mm) in trim 07 are 100% elastomeric. Sizes 1-1/2" (40 mm) and larger are elastomeric with a metal insert.

HOW TO ORDER

| | | | | | | | | | | | | | |
|------------|---|-------------|---|---|---|---------------------|-----------|---|---|--------------------|---------------|---|---|
| 2 | R | B | 1 | X | X | C | S | 4 | 3 | S | 2 | W | R |
| Size (in.) | Port Reduced Port = R Full Port = F | Valve Type* | | | | Body Tailpiece Code | Seal Code | | | Ball and Stem Code | Actuator Code | | |

* See chart below.

† Not all trim combinations are possible.

Consult factory for availability and for materials not listed.

| Material | Codes |
|--|-------|
| Carbon steel | CS |
| Controlled hardness carbon steel for H ₂ S service | CS2* |
| Same as CS2, but special for -50° F (-46° C) service | CS3* |
| 316 stainless steel for wetted parts | S1 |
| 316 stainless steel with stainless steel external trim; good for -50° F (-46° C) | S8* |

* Meets NACE *MR0175/ISO 15156.

| Material | Code |
|---------------------|------|
| Carbon steel | CS |
| 316 Stainless steel | S1 |
| Type 630 | S2* |

* NACE 4" (100 mm) RP and smaller.

Type 630 stem, 316 stainless steel ball.

| Seal Number | Seal Material | Tailpiece Gasket Material |
|-------------|----------------------------|---------------------------|
| 01 | PTFE | PTFE |
| 42 | Filled PTFE | PTFE |
| 43 | Homopolymer Acetal Plastic | PTFE |
| 07 | FKM | PTFE |
| 18 | HPT-2 | Filled PTFE |
| 23 | Celcon | PTFE |
| 28 | Filled PTFE | Filled PTFE |
| 60S | 316 w/Nickel Alloy HVOF | Graphite |
| 92H | 316 w/Chrome Carbide | Graphite |

| Actuator Code | |
|----------------|----|
| Wrench* | WR |
| Oval Handwheel | OH |
| Worm Gear | WG |
| Bare Stem | BS |
| Less Gear | LG |
| Less Wrench | LW |

* Wrenches are part of the valve assembly on 4R bore and smaller valves.

In 4" F through 8" x 6" (100 mm F through 200 x 150 mm), they are sold separately.

310 Two-piece Valve Type

| Size in. (mm) | 150 RF | | 300 RF | | 600 RF | 600 RJ |
|------------------|--------|------|--------|------|--------|-----------------|
| | LP | SP | LP | SP | | |
| 1 (25) | FP | B110 | - | B128 | - | B182 B172 |
| 1-1/2 (40) | FP | B110 | - | B128 | - | B182 B172 |
| 2 (50) | RP | B100 | - | B120 | - | B114 B170 |
| 2 (50) | FP | B110 | - | B128 | - | B182 B172 |
| 3 x 2 (80 x 50) | RP | B100 | - | B120 | - | B114 B170 |
| 3 (80) | FP | B110 | - | B128 | - | B182 B172 |
| 4 (100) | RP | B100 | - | B120 | - | B114 B170 |
| 4 (100) | FP | B110 | - | B128 | - | B182*** B172*** |
| 6 (150) | RP | - | B102 | B120 | - | B114*** B170*** |
| 6 (150) | FP | B110 | B113 | B128 | - | B182*** B172*** |
| 8 (200) | RP | B100 | B102 | - | B122 | B114*** B170*** |

*** The 4" (100 mm) and larger sizes are available in trim CS2-43-S2-WGA (worm gear-operated) only.

310 Two-piece Valve Type

| Size in. (mm) | Female Thread | Male X Female |
|------------------|---------------|---------------------|
| 1/4 (8) | FP | B138 - |
| 3/8 (10) | FP | B138 - |
| 1/2 (15) | RP | B136 - |
| 1/2 (15) | FP | B138 - |
| 3/4 (20) | FP | B138 B138 (M x F)** |
| 1 (25) | RP | B136 B136 (M x F)** |
| 1 (25) | FP | B138 - |
| 1-1/2 (40) | FP | B138 - |
| 2 (50) | RP | B136 - |
| 2 (50) | FP | B138 - |
| 3 (80) | RP | B138 - |
| 3 (80) | FP | B138 - |
| 4 (100) | RP | B136 - |

** Available in body tailpiece code S8 only.

NOTE: Threaded end valves have NPT internal pipe thread in full conformance with ASME B2.1 and Federal Thread Handbook H-28.

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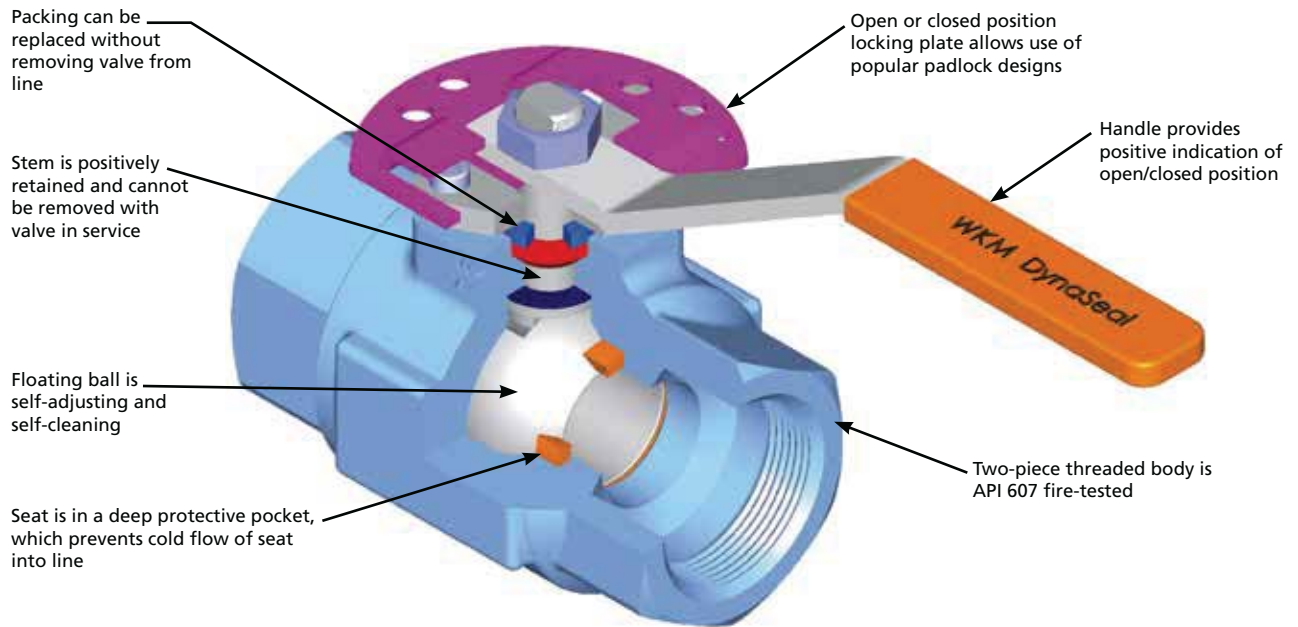
310 Three-piece Valve Type

| Size in. (mm) | Socket Weld |
|------------------|-------------|
| 1/4 (8) | FP B103 |
| 3/8 (10) | FP - |
| 3/4 (20) | FP B103 |
| 1 (25) | RP B106 |
| 1-1/2 (40) | FP B103 |
| 2 (50) | RP B106 |

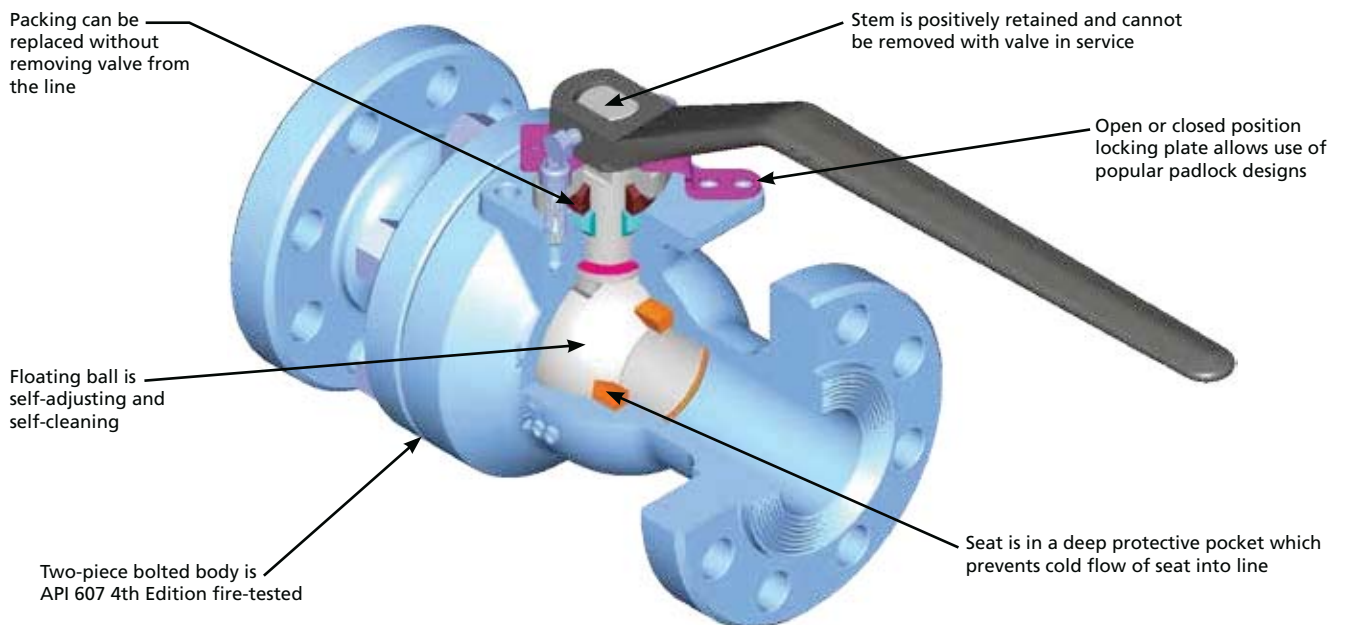
FEATURES AND BENEFITS

A premium quality floating ball valve that has proven itself in a wide variety of oilfield, chemical, petrochemical and hydrocarbon processing applications.

Threaded Valve Assembly 1/4" Full Port through 4" x 3" Reduced Port



Flanged Valve Assembly 1" Full Port through 4" x 3" Reduced Port



FEATURES AND BENEFITS (CONTINUED)

WKM DynaSeal 310 floating ball valves satisfy a wide range of applications and are available in a variety of standard and optional materials, in sizes from 1/4" (8 mm) to 4" x 3" (100 mm x 80 mm) and working pressures to 5000 psi. Engineered for heavy-duty, maintenance-free performance, the DynaSeal 310 ball valve is preferred for use in critical applications.

Sour Oil and Gas Service

WKM DynaSeal ball valves are suited to applications within gathering lines, manifolds and field processing units in sour oil and gas fields. They can be trimmed to conform with NACE MR0175/ISO 15156.

Deep-recessed Seats

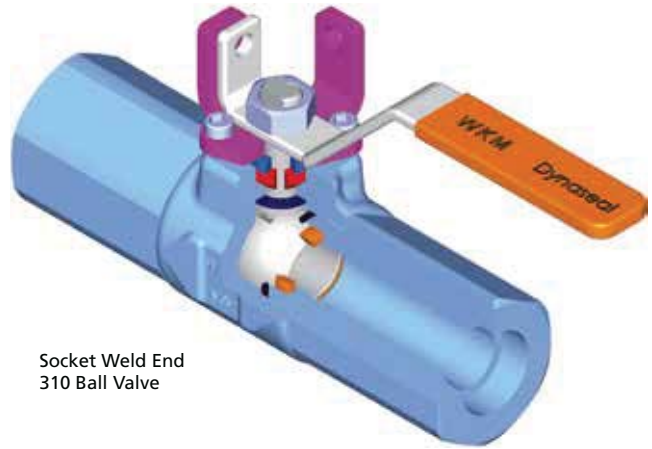
The WKM DynaSeal 310 seat is protected in a machined recess or deep pocket that surrounds and protects the seat. This design eliminates cold flow into the valve conduit and avoids potential seat damage from ball movement or flow media.

Trim 42 Seats

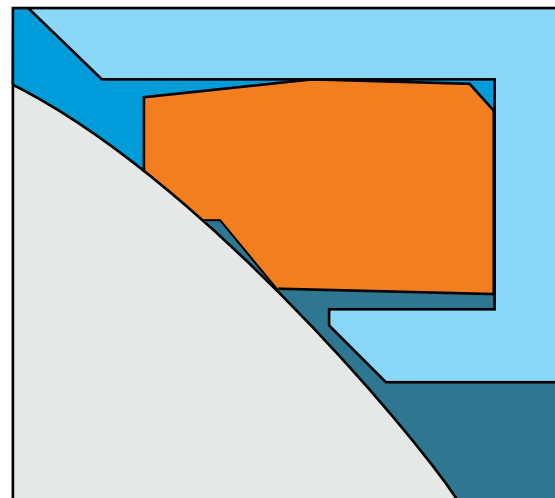
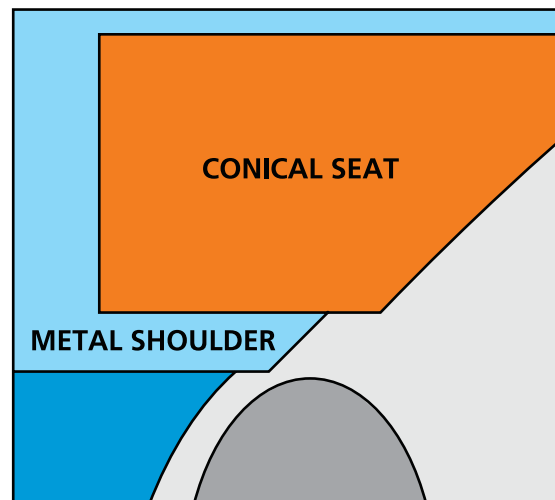
Seats are manufactured of filled TFE and rated to 1500 psi MOP. With working temperatures to 500° F (260° C) and low-torque operation, these seats satisfy even the most difficult of processing requirements.

Trim 43 Seats

Seats are manufactured of acetal plastic and are rated to 3000 psi MOP and working temperatures to 220° F (104° C). These seats are designed to handle the most demanding applications. They can flex under pressure and provide a consistent range of low-torque operations. They also provide a full face seal against the ball and multiple seals against the top and back of the pocket to provide a positive seal.



Socket Weld End
310 Ball Valve



Adjustable, Replaceable Packing

The in-line valve stem packing consists of PTFE impregnated graphite with an impervious metal barrier and a secondary tapered metal backup. The packing is field-adjustable and never requires lubrication. The packing and the stainless steel cap can be replaced without removing the valve from the line.

Positively Retained Stem

The stem is positively retained with a shoulder. It cannot be removed with the valve in service. There are no O-rings used in this design.

Floating Ball Design Delivers Tight Seal

The ground and polished ball is free to float and mates perfectly with the conical seats for a positive, leakproof seal. Self-cleaning and self-adjusting, the ball also is pressure activated – the higher the line pressure, the tighter the seal.

Fire-tested for Safety

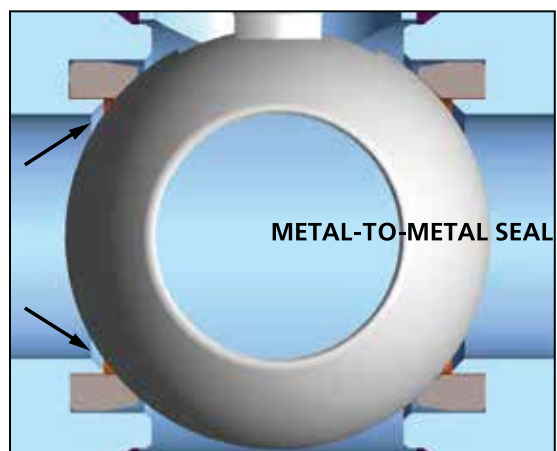
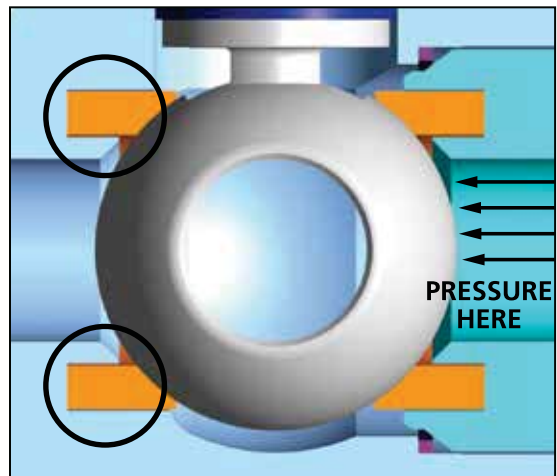
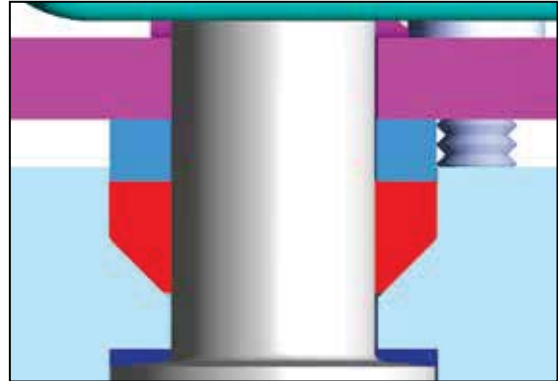
All WKM DynaSeal 310 ball valves are qualified under API Standard 607. The pocketed seat and locked-in stem design contributes to its fire-tested characteristics. Should the soft seats be destroyed by fire, the ball floats down stream, providing a tight metal-to-metal seal against the lip of the seat pocket. If the tailpiece seals are destroyed, the metal-to-metal tailpiece-to-body connection retards external leakage.

Indicator Handle

The design of the handle permits installation on the stem in the correct position only, in alignment with the ball port. When the handle is aligned with the pipe, the valve is open. When the handle is perpendicular to the pipe, the valve is closed.

Locking Devices

Locking devices are standard on all 4" x 3" (100 mm x 80 mm) and smaller manually operated valves and permit locking in either the open or closed positions.



SPECIFICATIONS

Socket Weld Ends

Standards and Specifications

Sizes

- 1/4" (8 mm) full port
- 3/4" (20 mm) full port
- 1" (25 mm) reduced port
- 1-1/2" (40 mm) full port
- 2" (50 mm) reduced port

Working Pressure

- 3000 psi with trim 48

Operating Temperatures

- From -20° F to 220° F (-29° C to 104° C)

End Connections

- Socket weld ends

Standard Material

Body

- Carbon steel and carbon steel NACE MR0175/ISO 15156

Ball/Stem

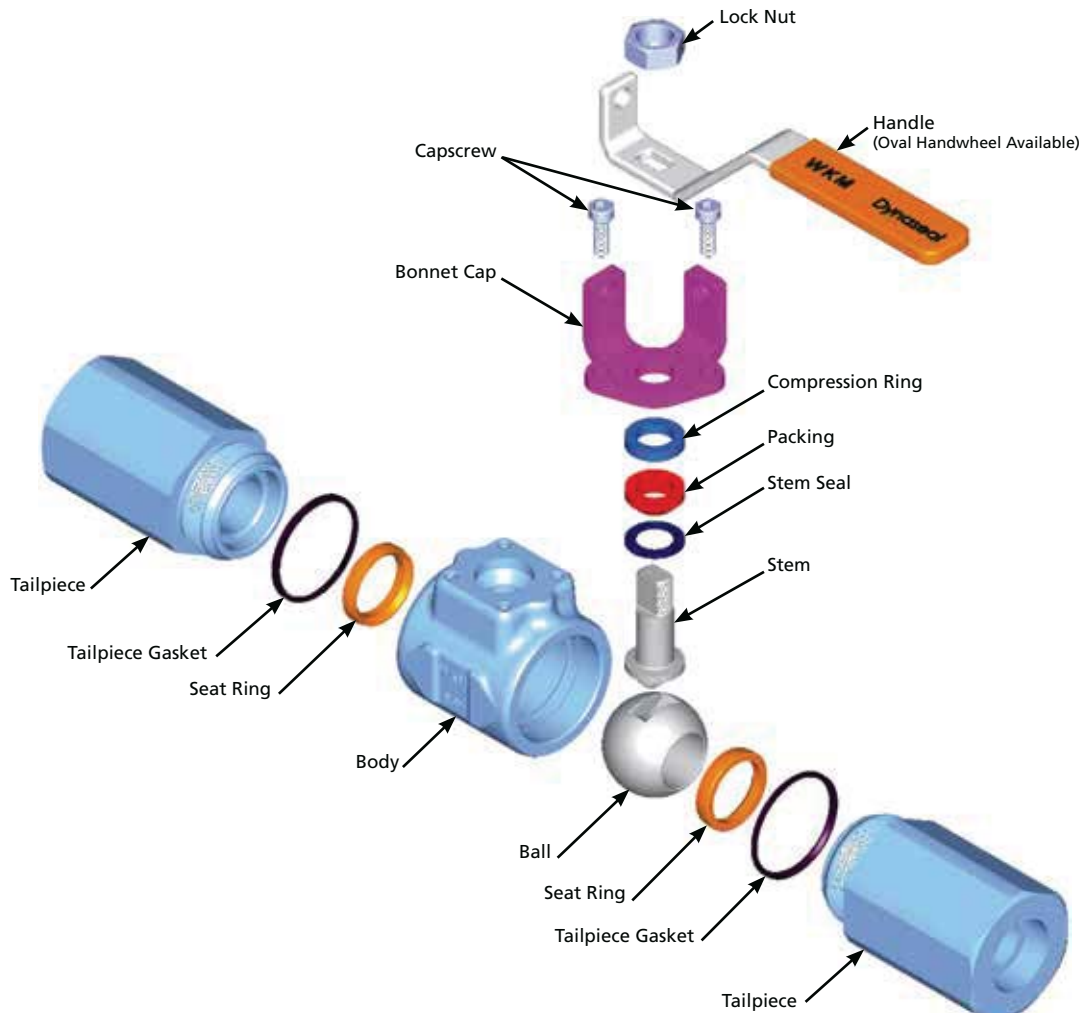
- Carbon steel or stainless steel

Seats

- Trim 48 (acetal plastic seats)

Industry Standards Compliance

- ASME B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification



Threaded Connections

Standards and Specifications

- To 5000 psi in small sizes
- Trim 43 pressure range to 3000 psi in 1/4" (8 mm) to 3" x 2" (80 mm x 50 mm) threaded end valves

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

- Carbon steel and stainless steel

Seat/Seal Trims

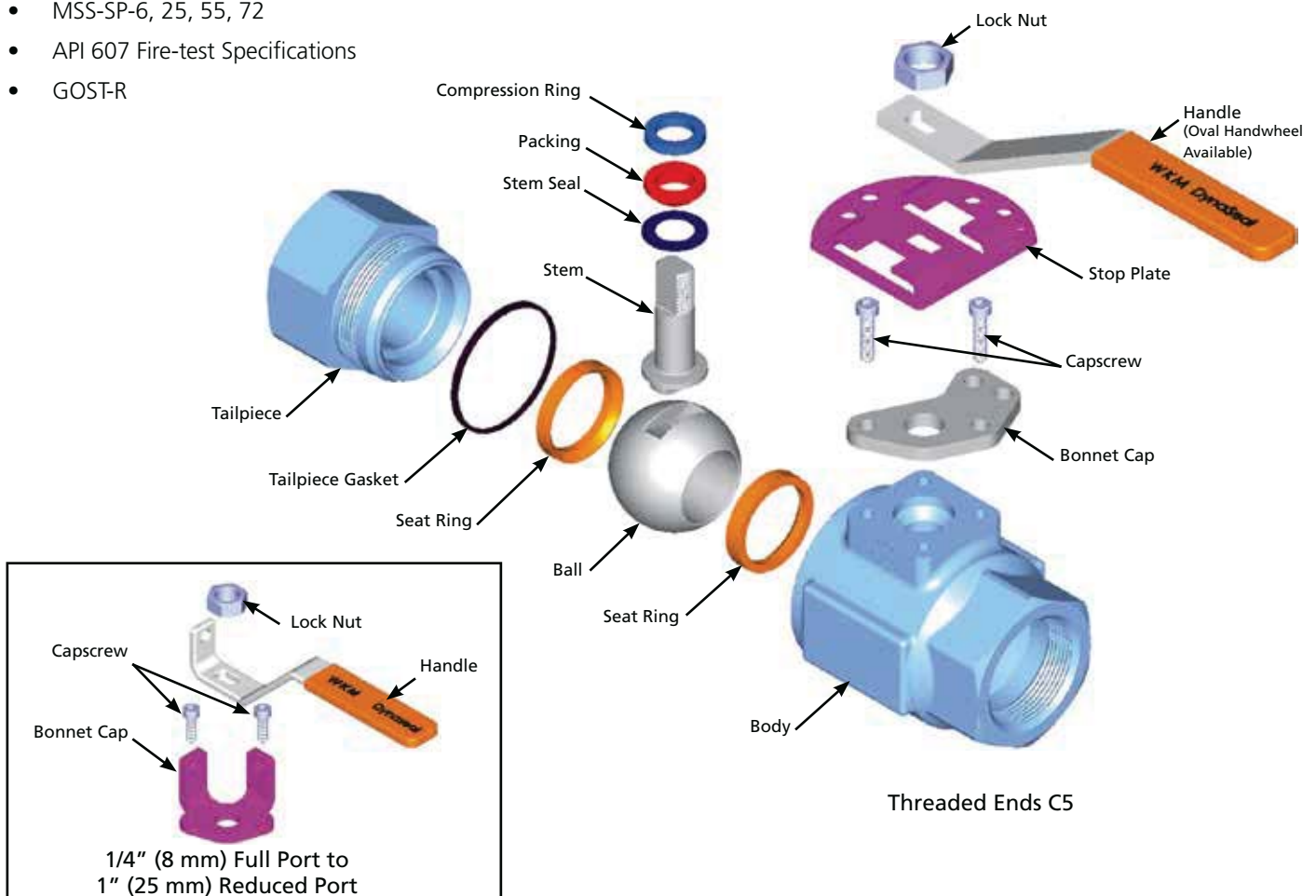
- TFE, filled TFE, acetal plastic, HPT-2 and 316 stainless steel with chromium carbide and FKM

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-6, 25, 55, 72
- API 607 Fire-test Specifications
- GOST-R

Threaded Connections

| Full Port Size | | Reduced Port Size | |
|----------------|------|-------------------|-------|
| in. | (mm) | in. | (mm) |
| 1/4 | (8) | 1/2 | (15) |
| 3/8 | (10) | 1 | (25) |
| 1/2 | (15) | 2 | (50) |
| 3/4 | (20) | 3 | (80) |
| 1 | (25) | 4 | (100) |
| 1-1/2 | (40) | | |
| 2 | (50) | | |
| 3 | (80) | | |



SPECIFICATIONS

Flanged Connections

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

- Carbon steel and stainless steel

Seat/Seal Trims

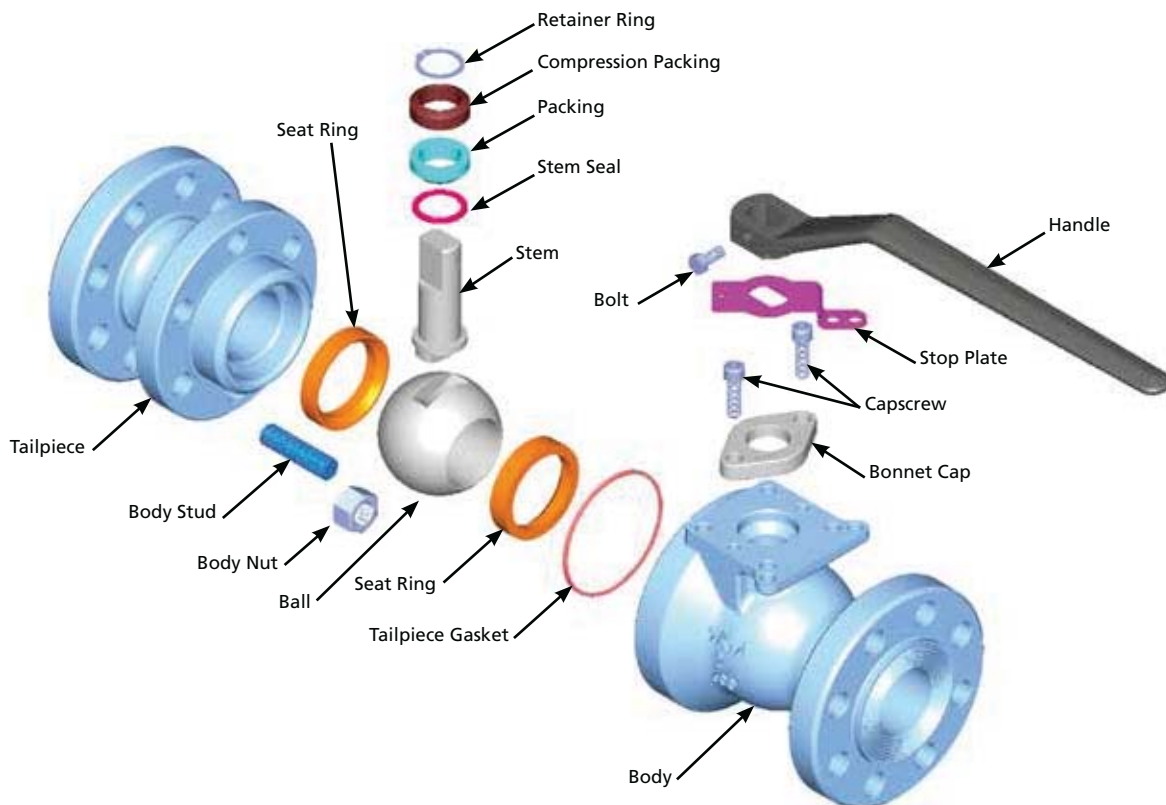
- TFE, filled TFE, acetal plastic, HPT-2 and 316 stainless steel with chromium carbide and FKM

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-6, 25, 55, 72
- API 607 Fire-test Specifications
- GOST-R

Flanged Connections ASME Pressure Class

| Size | | | Class | | |
|-----------|------------|----|-------|-----|-----|
| in. | (mm) | | 150 | 300 | 600 |
| 1 | (25) | FP | • | • | • |
| 1-1/2 | (40) | FP | • | • | • |
| 2 x 1-1/2 | (50 x 40) | RP | • | • | • |
| 2 | (50) | FP | • | • | • |
| 3 x 2 | (80 x 50) | RP | • | • | • |
| 3 | (80) | FP | • | • | • |
| 4 x 3 | (100 x 80) | RP | • | • | • |



Flanged Ends 310F

MATERIALS LIST – THREADED AND FLANGED ENDS

1/4" Full Port through 4" Reduced Port

Body / Tailpiece Material Code

| Part | CS | CS2* | CS3* | S8* |
|--------------------------|------------------------|------------------------|-----------------|------------------|
| Body | ASTM A105/A216 Gr. WCC | ASTM A105/A216 Gr. WCC | ASTM A350 LF2 | 316 SS/A351 CF8M |
| Studs | A193 Gr. B7 | A193 Gr. B7M | A320 Gr. L7M | A193 Gr. B8 |
| Nuts | A194 Gr. 2H | A194 Gr. 2HM | A194 Gr. 7ML | A194 Gr. 8 |
| Body plug** | Carbon Steel | Carbon Steel | Carbon Steel | Stainless Steel |
| Tailpiece | ASTM A105/A216 Gr. WCC | ASTM A105/A216 Gr. WCC | ASTM A350 LF2 | 316 SS/A351 CF8M |
| Nameplate | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |
| Bonnet cap | Carbon Steel | Carbon Steel | Carbon Steel | Stainless Steel |
| Packing adjusting screws | Alloy Steel-plated | 18-8 SS | 18-8 SS | 18-8 SS |

* CS2/CS3/S8 to be used for H₂S service with S2 internal trim only. Meets NACE MR0175/ISO 15156.

** When body drain is specified.

Seat Seal Material Code

| Part | 01 | 42 | 43 | 48*** | 07 | 18 | 60S |
|------------------|-----------------------|------------|-------------------|-------------------|------------|-----------------------|----------------------|
| Seat | TFE | Filled TFE | Acetal Plastic | Acetal Plastic | FKM | Special Filled TFE | 316/HVOF Nickel - |
| Tailpiece gasket | TFE | TFE | TFE | Filled TFE | TFE | Filled TFE | Graphite |
| Stem Seal | TFE | Filled TFE | Filled TFE | Filled TFE | Filled TFE | Filled TFE | Graphite |
| Packing | Graphite/TFE w/SS Cap | | | | | | |

*** Socket weld end valves only.

Ball / Stem Material Code

| Part | CS | S1 | S2* | 60S |
|------------------|---------------------------|---------------------|---------------------|---------------------|
| Ball | AISI 1213 CS Chrome Plate | 316 Stainless Steel | 316 Stainless Steel | 316 QPQ Nitride |
| Stem | AISI 1213 Zinc Plate | 316 Stainless Steel | Type 630 | Type 630 |
| Compression Ring | 304 Stainless Steel | 304 Stainless Steel | 304 Stainless Steel | 304 Stainless Steel |

* S2 trim (Type 630 stem and 316 SS ball) is required for H₂S service per NACE MR0175/ISO 15156 to be used with body/tailpiece codes CS2/CS3/S8.

Actuator Code

| Part (Body) | CS | CS2 | CS3 | S1 | S8 |
|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Lock Nut* | Alloy Steel | Alloy Steel | Alloy Steel | Alloy Steel | Stainless Steel |
| Handle* | CS Zinc Plated | CS Zinc Plated | CS Zinc Plated | CS Zinc Plated | Stainless Steel |
| Handle Grip* | Vinyl | Vinyl | Vinyl | Vinyl | Vinyl |
| Wrench Handle** | Ductile Iron | Ductile Iron | Ductile Iron | Ductile Iron | Ductile Iron |
| Wrench Head Bolt and Nut** | Alloy Steel | Alloy Steel | Alloy Steel | Alloy Steel | Alloy Steel |
| Stop Plate | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |

* 2" (50 mm) reduced port and smaller.

** 2" (50 mm) full port and larger.

DIMENSIONAL DATA – 4" REDUCED PORT AND SMALLER

1/4" Full Port through 4" Reduced Port: Flanged, Threaded and Socket Weld

B136/B138 Threaded

B100/B110 Class 150 Raised-face Flanges

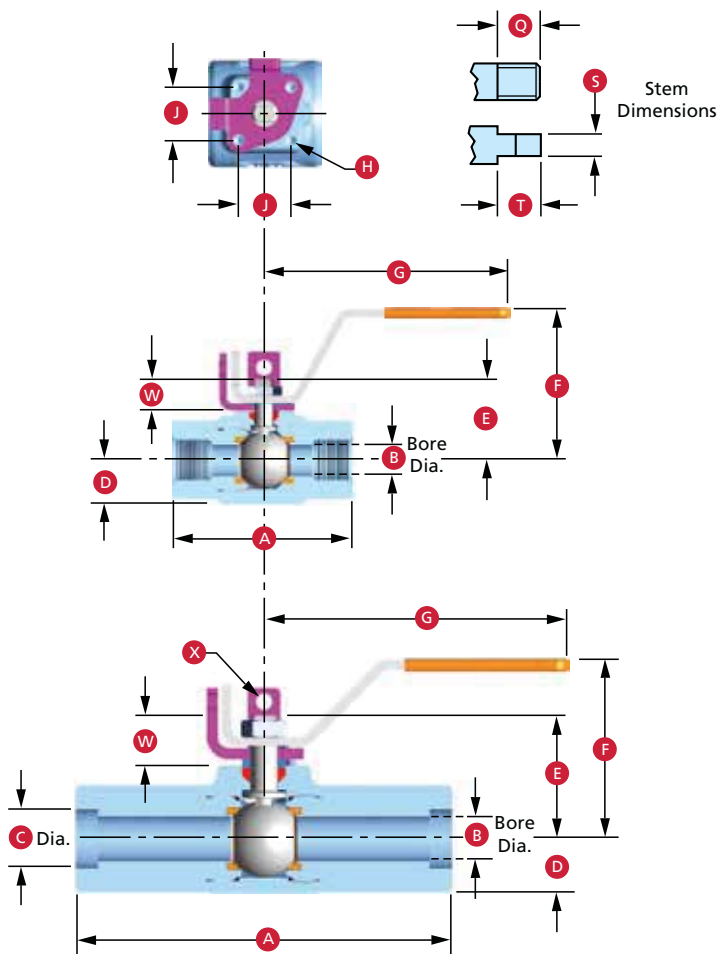
B120/B128 Class 300 Raised-face Flanges

B114/B182 Class 600 Raised-face Flanges

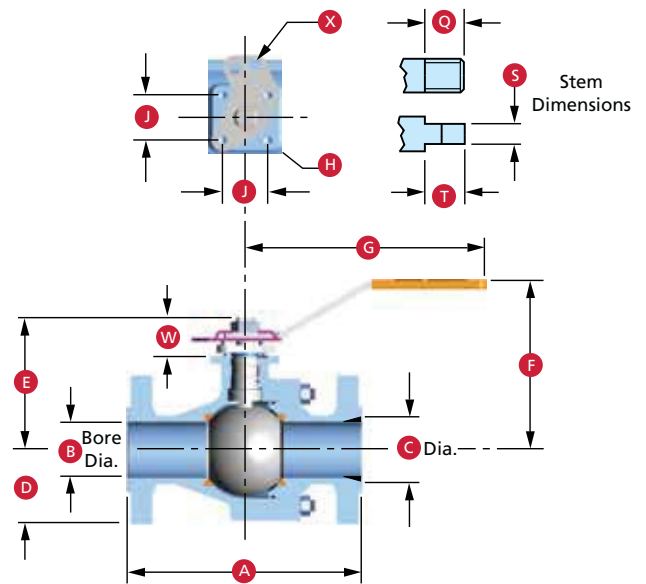
B170/B172 Class 600 Ring joint Flanges

B106/B103 Socket Weld

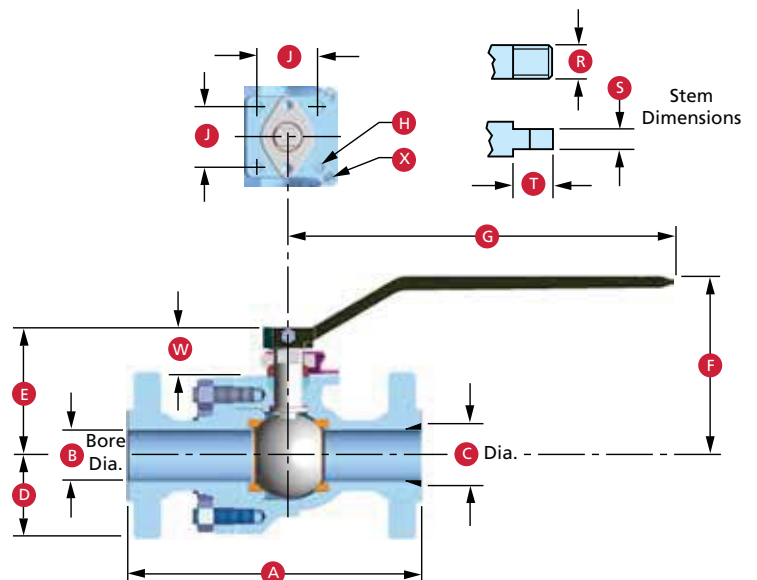
1" (25 mm) Reduced Port and Smaller



1" (25 mm) Full Port through 2" (50 mm) Reduced Port



2" (50 mm) Full Port through 4" (100 mm) Reduced Port



Threaded and Flanged Ends

| Size in. | A | | | | | B | C | D | | | | E | F | G | H* | J | Q* | R | S | T | W | X |
|-------------|-------|-----|-------|------|-------|------|-----|------|------|------|------|-----|-----|------|-----------------|------|---------|------|------|------|------|------|
| | THD | 150 | 300 | 600 | 600RJ | | | THD | 150 | 300 | 600 | | | | | | | | | | | |
| 1/4 FP | 3.00 | - | - | - | - | 0.38 | - | 0.69 | - | - | - | 1.4 | 2.8 | 4.3 | #8-32 .26 DP | 0.88 | 5/16-24 | - | 0.18 | 0.25 | 0.55 | 0.38 |
| 3/8 FP | 3.25 | - | - | - | - | 0.38 | - | 0.69 | - | - | - | 1.4 | 2.8 | 4.3 | #8-32 .26 DP | 0.88 | 5/16-24 | - | 0.18 | 0.25 | 0.55 | 0.38 |
| 1/2 RP | 3.75 | - | - | - | - | 0.38 | - | 0.69 | - | - | - | 1.4 | 2.8 | 4.3 | #8-32 .26 DP | 0.88 | 5/16-24 | - | 0.18 | 0.25 | 0.55 | 0.38 |
| 1/2 FP | 4.00 | - | - | - | - | 0.50 | - | 0.81 | - | - | - | 1.8 | 3.5 | 5.7 | #10-24 .26 DP | 1.00 | 7/16-20 | - | 0.26 | 0.34 | 0.72 | 0.38 |
| 3/4 FP | 4.25 | - | - | - | - | 0.75 | - | 1.06 | - | - | - | 1.9 | 3.5 | 5.7 | #10-24 .26 DP | 1.00 | 7/16-20 | - | 0.26 | 0.34 | 0.72 | 0.38 |
| 1 RP | 4.50 | - | - | - | - | 0.75 | - | 1.06 | - | - | - | 1.9 | 3.5 | 5.4 | #10-24 .26 DP | 1.00 | 7/16-20 | - | 0.26 | 0.34 | 0.72 | 0.38 |
| 1 FP | 4.50 | 5.0 | 6.50 | 8.5 | 8.50 | 1.00 | - | 1.32 | 2.12 | 2.44 | 2.44 | 2.8 | 4.1 | 7.0 | 1/4-20 .39 DP | 1.25 | 5/8-18 | - | 0.36 | 0.63 | 1.25 | 0.38 |
| 1-1/2 FP | 5.25 | 6.5 | 7.50 | 9.5 | 9.50 | 1.50 | - | 1.81 | 2.50 | 3.06 | 3.06 | 3.7 | 5.0 | 9.5 | 5/16-18 .45 DP | 1.50 | 3/4-16 | - | 0.45 | 0.81 | 1.50 | 0.38 |
| 2 RP | 6.25 | 7.0 | 8.50 | 11.5 | 11.62 | 1.50 | 2.0 | 1.81 | 3.00 | 3.25 | 3.25 | 3.7 | 5.0 | 9.5 | 5/16-18 .45 DP | 1.50 | 3/4-16 | - | 0.45 | 0.81 | 1.50 | 0.38 |
| 2 FP | 6.25 | 7.0 | 8.50 | 11.5 | 11.62 | 2.00 | - | 2.38 | 3.00 | 3.25 | 3.25 | 5.0 | 5.4 | 15.0 | 1/2-13 .50 DP | 2.44 | - | 1.12 | 0.69 | 1.37 | 1.88 | 0.38 |
| 3 x 2 RP | 9.00 | 8.0 | 11.12 | 14.0 | 14.12 | 2.00 | 3.0 | 2.38 | 3.75 | 4.12 | 4.12 | 5.0 | 5.4 | 15.0 | 1/2-13 .50 DP | 2.44 | - | 1.12 | 0.69 | 1.37 | 1.88 | 0.38 |
| 3 FP | 10.00 | 8.0 | 11.12 | 14.0 | 14.12 | 3.00 | - | 3.28 | 3.75 | 4.12 | 4.12 | 6.4 | 7.1 | 15.0 | 1/2-13 .50 DP | 3.00 | - | 1.12 | 0.74 | 1.75 | 2.31 | 0.38 |
| 4 RP | 10.25 | 9.0 | 12.00 | 17.0 | 17.12 | 3.00 | 4.0 | 3.28 | 4.50 | 5.00 | 5.38 | 6.4 | 7.1 | 15.0 | 1/2-13 .50 DP | 3.00 | - | 1.12 | 0.74 | 1.75 | 2.31 | 0.38 |
| Size mm | | | | | | | | | | | | | | | | | | | | | | |
| 6 FP | 76 | - | - | - | - | 10 | - | 18 | - | - | - | 35 | 70 | 108 | #8-32 6.6 DP | 22 | 5/16-24 | - | 5 | 6 | 14 | 10 |
| 10 FP | 83 | - | - | - | - | 10 | - | 18 | - | - | - | 35 | 70 | 108 | #8-32 6.6 DP | 22 | 5-16-24 | - | 5 | 6 | 14 | 10 |
| 15 RP | 95 | - | - | - | - | 10 | 13 | 18 | - | - | - | 35 | 70 | 108 | #8-32 6.6 DP | 22 | 5/16-24 | - | 5 | 6 | 14 | 10 |
| 15 FP | 102 | - | - | - | - | 13 | - | 20 | - | - | - | 45 | 89 | 145 | #10-24 6.6 DP | 25 | 7/16-20 | - | 7 | 9 | 18 | 10 |
| 20 FP | 108 | - | - | - | - | 19 | - | 27 | - | - | - | 48 | 89 | 145 | #10-24 6.6 DP | 25 | 7/16-20 | - | 7 | 9 | 18 | 10 |
| 25 RP | 114 | - | - | - | - | 19 | 25 | 27 | - | - | - | 48 | 89 | 137 | #10-24 6.6 DP | 25 | 7/16-20 | - | 7 | 9 | 18 | 10 |
| 25 FP | 114 | 127 | 165 | 216 | 216 | 25 | - | 34 | 54 | 62 | 62 | 71 | 107 | 178 | 1/4-20 9.9 DP | 32 | 5/8-18 | - | 9 | 16 | 31 | 10 |
| 40 FP | 133 | 165 | 190 | 241 | 241 | 38 | - | 46 | 64 | 78 | 78 | 94 | 127 | 241 | 5/16-18 11.4 DP | 38 | 3/4-16 | - | 11 | 21 | 38 | 10 |
| 50 RP | 159 | 178 | 216 | 292 | 295 | 38 | 51 | 46 | 76 | 83 | 83 | 94 | 127 | 241 | 5/16-18 11.4 DP | 38 | 3/4-16 | - | 11 | 21 | 38 | 10 |
| 50 FP | 159 | 178 | 216 | 292 | 295 | 51 | - | 60 | 76 | 83 | 83 | 127 | 137 | 381 | 1/2-13 12.7 DP | 62 | - | 28 | 18 | 35 | 48 | 10 |
| 80 x 50 RP | 229 | 203 | 283 | 356 | 359 | 51 | 76 | 60 | 95 | 105 | 105 | 127 | 137 | 381 | 1/2-13 12.7 DP | 62 | - | 28 | 18 | 35 | 48 | 10 |
| 80 FP | 254 | 203 | 283 | 356 | 359 | 76 | - | 83 | 95 | 105 | 105 | 163 | 180 | 381 | 1/2-13 12.7 DP | 76 | - | 28 | 19 | 44 | 59 | 10 |
| 100 RP | 260 | 229 | 305 | 432 | 435 | 76 | 102 | 83 | 114 | 127 | 137 | 164 | 180 | 381 | 1/2-13 12.7 DP | 76 | - | 28 | 19 | 44 | 59 | 10 |

Socket Weld End

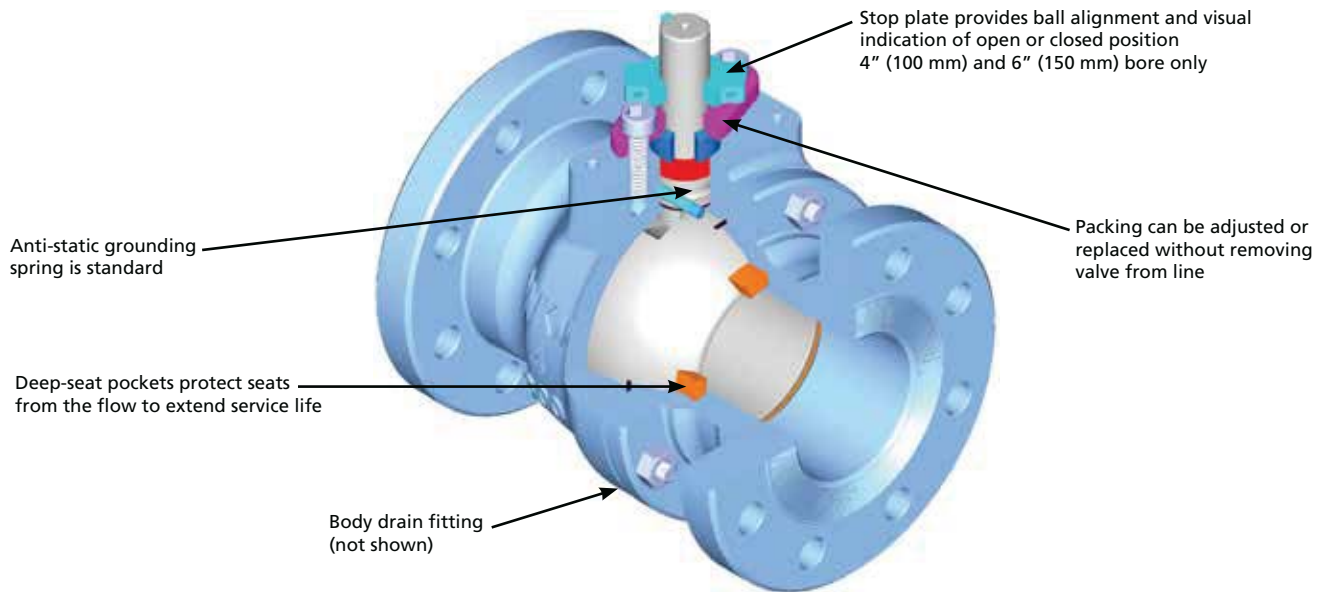
| Size in. | A | B | C | D | E | F | G | H | J | Q* | S | T | W | X | |
|----------|------|--------|-------|-------|-------|-------|--------|--------|-----------------|-------|---------|-------|-------|-------|------|
| 1/4 FP | B103 | 7.00 | 0.38 | 1.41 | 0.62 | 1.41 | 2.84 | 4.25 | #8-32 .25 DP | 0.88 | 5/16-24 | 0.18 | 0.25 | 0.56 | 0.38 |
| 3/4 FP | B103 | 8.25 | 0.75 | 1.94 | 1.00 | 1.94 | 3.75 | 5.75 | #10-24 .25 DP | 1.00 | 7/16-20 | 0.26 | 0.34 | 0.75 | 0.38 |
| 1 RP | B106 | 8.25 | 0.75 | 1.94 | 1.00 | 1.94 | 3.75 | 5.75 | #10-24 .25 DP | 1.00 | 7/16-20 | 0.26 | 0.34 | 1.14 | 0.38 |
| 1-1/2 FP | B103 | 9.25 | 1.50 | 3.56 | 1.75 | 3.56 | 5.00 | 9.50 | 5/16-18 .44 DP | 1.50 | 3/4-16 | 0.45 | 0.81 | 1.34 | 0.38 |
| 2 RP | B106 | 10.25 | 1.50 | 3.56 | 1.75 | 3.56 | 5.00 | 9.50 | 5/16-18 .44 DP | 1.50 | 3/4-16 | 0.45 | 0.81 | 1.34 | 0.38 |
| Size mm | | | | | | | | | | | | | | | |
| 8 FP | B103 | 177.80 | 9.65 | 35.81 | 15.75 | 35.81 | 72.14 | 107.95 | #8-32 6.4 DP | 22.35 | 5/16-24 | 4.57 | 6.35 | 14.22 | 9.65 |
| 20 FP | B103 | 209.55 | 19.05 | 49.28 | 25.40 | 49.28 | 95.25 | 146.05 | #10-24 6.4 DP | 25.40 | 7/16-20 | 6.60 | 8.64 | 19.05 | 9.65 |
| 25 RP | B106 | 209.55 | 19.05 | 49.28 | 25.40 | 49.28 | 95.25 | 146.05 | #10-24 6.4 DP | 25.40 | 7/16-20 | 6.60 | 8.64 | 28.96 | 9.65 |
| 40 FP | B103 | 234.95 | 38.10 | 90.42 | 44.45 | 90.42 | 127.00 | 241.30 | 5/16-18 11.2 DP | 38.10 | 3/4-16 | 11.43 | 20.57 | 34.04 | 9.65 |
| 50 RP | B106 | 260.35 | 38.10 | 90.42 | 44.45 | 90.42 | 127.00 | 241.30 | 5/16-18 11.2 DP | 38.10 | 3/4-16 | 11.43 | 20.57 | 34.04 | 9.65 |

* American National Thread in inches.

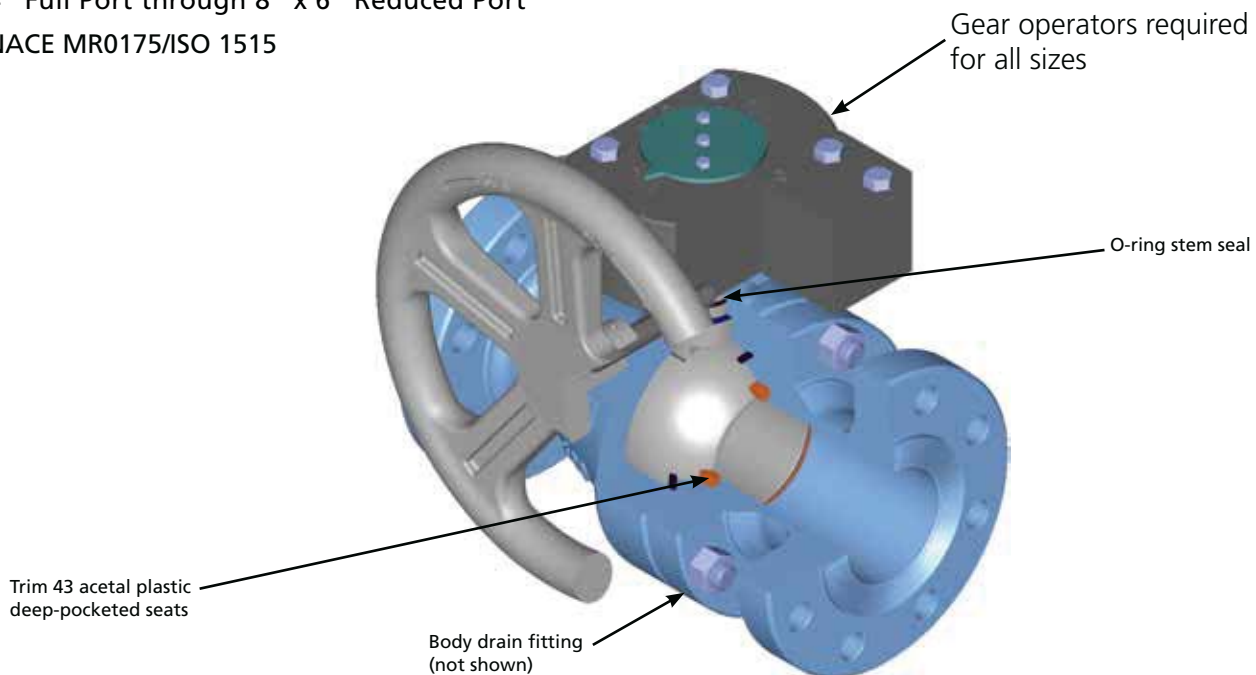
FEATURES AND BENEFITS

Handle can be installed in correct position only in alignment with the ball port. Handle aligned with piping shows valve is open. Handle perpendicular to piping shows valve is closed. 4" (100 mm) and 6" (150 mm) bore only.

310C ASME Classes 150 and 300
 4" Full Port through 8" Reduced Port
 NACE MR0175/ISO 15156



310F2 ASME Class 600
 4" Full Port through 8" x 6" Reduced Port
 NACE MR0175/ISO 1515



WKM DynaSeal 310 ball valves satisfy a wide range of applications. Available in a variety of standard and optional materials, they may be specified in sizes from 4" (100 mm) to 8" x 6" (200 mm x 150 mm) and ASME Class 150 and 300. ASME Class 600 is available in sizes 4" (100 mm) through 8" x 6" (200 mm x 150 mm). Engineered for heavy-duty, maintenance-free performance, the WKM DynaSeal 310 ball valve is commonly selected for a variety of applications in virtually any industry.

Chemical and Petrochemical Plants

There is a wide range of chemical and petrochemical applications for WKM DynaSeal 310 ball valves. They are serving in many plastic plants, handling such slurries as 40% vinyl chloride in high-pressure catalyst lines; and in processes, handling dry lading such as polyethylene and polystyrene powders.

There are hundreds of applications in such plants where WKM DynaSeal 310 ball valves are providing efficient service.

Refining

The WKM DynaSeal 310 ball valve is ideal for the refining industry. The many metal seats, seals and available trims offer the versatility needed to handle the wide variety of products used in the refining process.

High-temperature Service

Special high-temperature trims are available for WKM DynaSeal 310 ball valves, which provide for service to 600° F (316° C). This trim is designed for steam service, hot oil, heat transfer fluids, boiler feed water and similar applications.

Low-temperature Service

Standard trims accommodate temperatures to -20° F (-29° C). For temperatures to -50° F (-46° C), please consult factory.

Maintenance-free Performance

Under most conditions, the WKM DynaSeal 310 ball valve will provide years of trouble-free service with no maintenance required.

In some severe applications, such as handling extremely abrasive slurries at high temperature, it may be necessary to replace the seats occasionally.

Seat and seal kits are available, and replacement can be done easily with ordinary tools.

Sour Oil and Gas Service

WKM DynaSeal 310 ball valves have served for years in gathering lines, manifolds and field processing units in sour oil and gas fields. They can be trimmed to conform with NACE MR0175/ISO 15156.

Actuation-friendly

A variety of actuator types can be installed easily, including pneumatic, hydraulic, diaphragm, vane, electromechanical and electrohydraulic.

Fire-tested for Safety

All WKM DynaSeal 310 ball valves are qualified under API Standard 607. The pocketed seat and locked-in stem design contributes to its fire-tested characteristics. Should the soft seats be destroyed by fire, the ball floats down stream, providing a tight metal-to-metal seal against the lip of the seat pocket. If the tailpiece seals are destroyed, the metal-to-metal tailpiece-to-body connection retards external leakage.



WKM DynaSeal 310 ball valve with pneumatic actuator

FEATURES AND BENEFITS (CONTINUED)

Deep-recessed Seats

The seat is recessed into a deep machined pocket that surrounds and protects the seat on all sides. This design eliminates cold flow into the valve conduit, where it can be damaged by the action of the ball or the flow medium. The result is long and extended service life.

Teflon Body Seal

A Teflon body seal is used between the valve body and tailpiece.

Adjustable, Replaceable Packing

The in-line valve stem packing through ASME class 300 consists of PTFE impregnated graphite with a metal barrier. The packing is field-adjustable and virtually never requires lubrication. The packing and the stainless steel cap can be replaced without removing the valve from line.

Fugitive Emissions

WKM DynaSeal 310 ball valves through ASME Class 300 can be supplied and certified to meet the requirements of fugitive emissions as regulated by The 1990 Amendment to The Clean Air Act to 100 ppm.

Positively Retained Stem

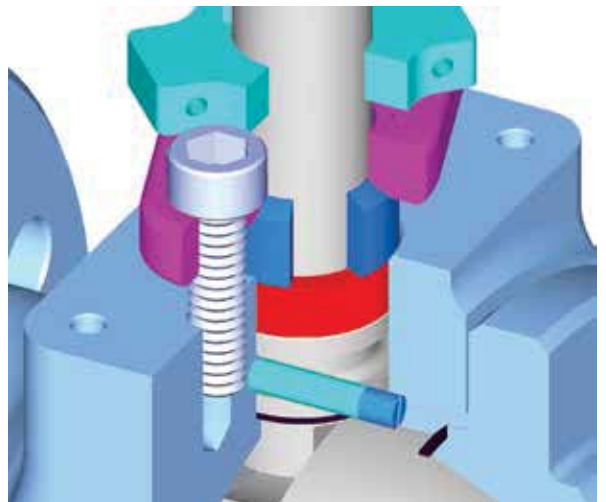
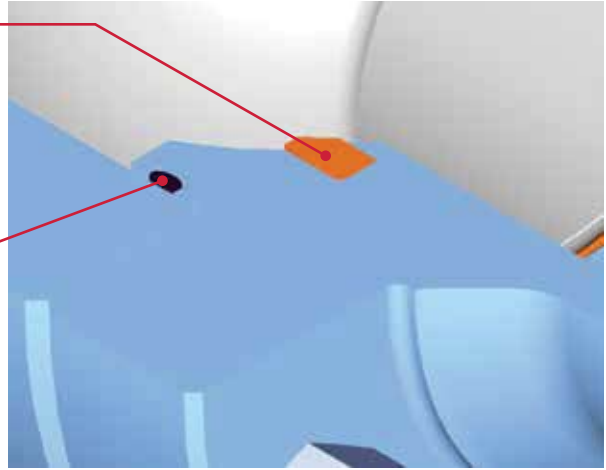
The stem is positively retained and cannot be removed with the valve in service.

Indicator Handle

The design of the handle ASME class 300 permits installation on the stem in the correct position only, in alignment with the ball port. When the handle is aligned with the pipe, the valve is open. When the handle is perpendicular to the pipe, the valve is closed.

Floating Ball Design Delivers Tight Seal

The ground and polished ball is free to float and mates perfectly with the conical seats for a positive, leakproof seal. Self-cleaning and self-adjusting, the ball also is pressure activated – the higher the line pressure, the tighter the seal.



Gear Mounting Brackets For:

4" FP to 8" RP
 (100 mm FP to 200 mm RP)
 ASME Classes 150/300



SPECIFICATIONS

ASME Classes 150 and 300

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

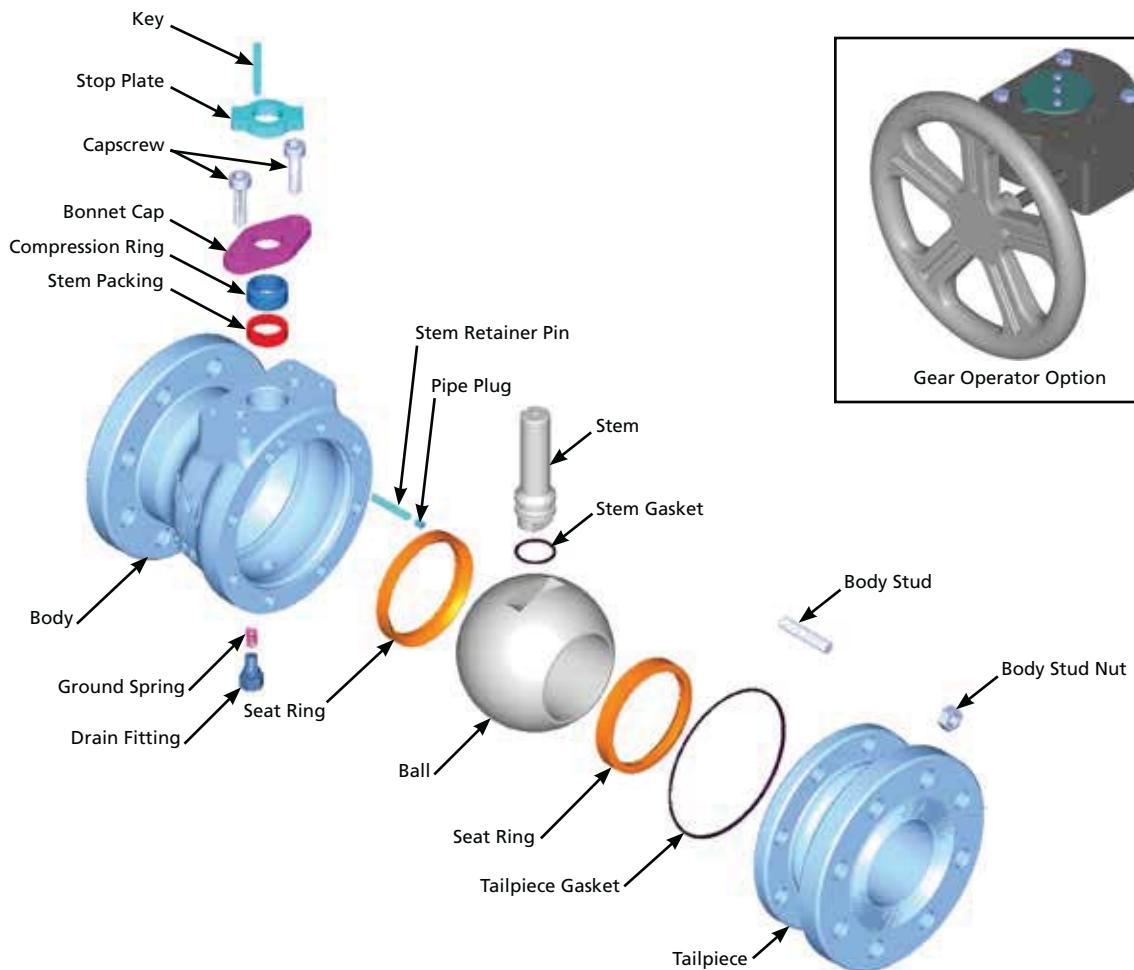
- Carbon steel and stainless steel

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification
- GOST-R

ASME Pressure Class

| Size | | | Class | |
|-------|-------------|----|-------|-----|
| in. | (mm) | | 150 | 300 |
| 4 | (100) | FP | • | • |
| 6 x 4 | (150 x 100) | RP | • | • |
| 6 | (150) | FP | • | • |
| 8 x 6 | (200 x 150) | RP | • | • |



SPECIFICATIONS

ASME Class 600

Operating Temperatures

- From -20° F to 220° F (-29° C to 104° C)

Standard Material

Body

- Carbon steel

Ball/Stem

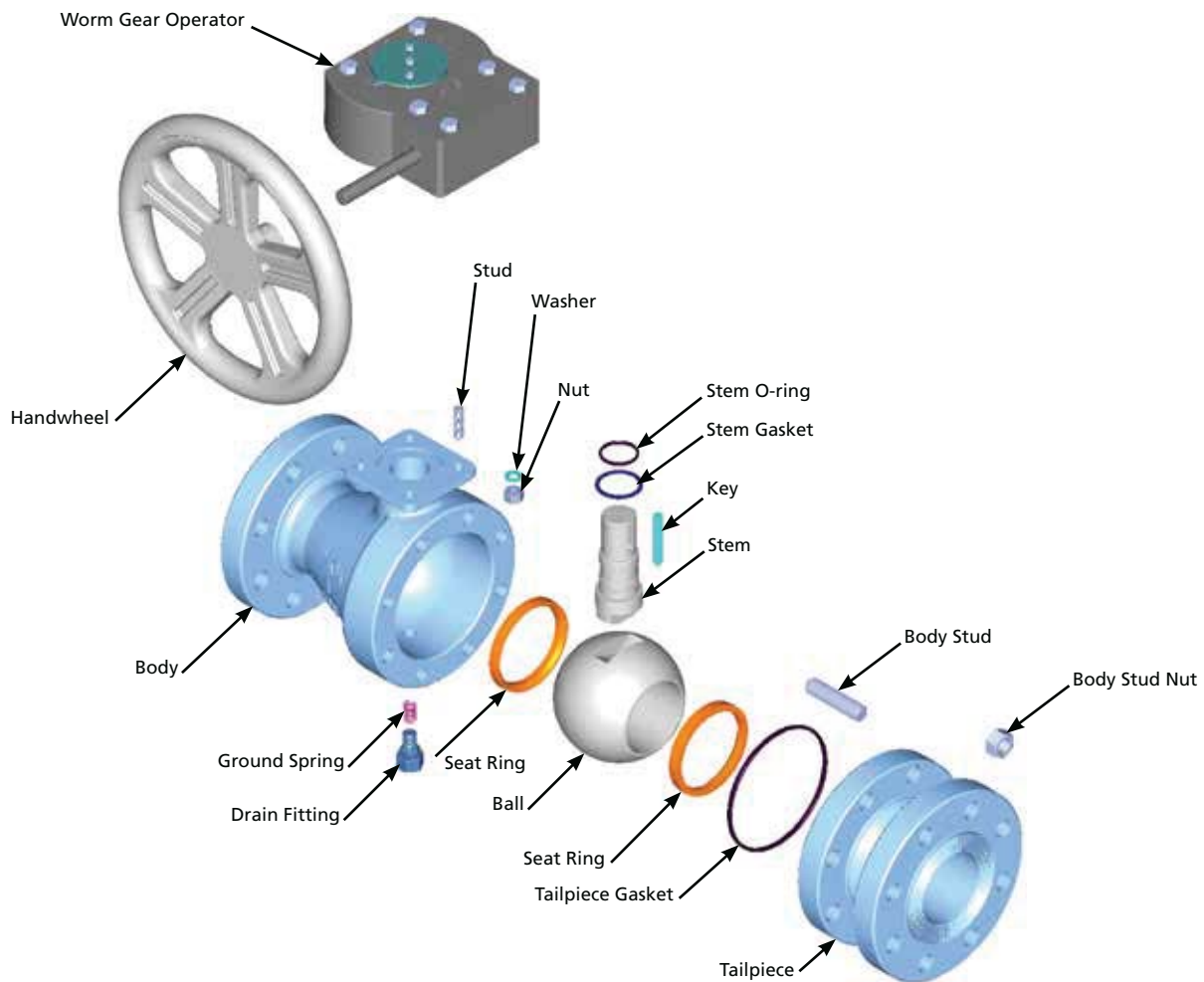
- Carbon steel and stainless steel

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification
- GOST-R

ASME Pressure Class

| Size | | Class |
|-------|-------------|-------|
| in. | (mm) | |
| 4 | (100) | FP • |
| 6 x 4 | (150 x 100) | RP • |
| 6 | (150) | FP • |
| 8 x 6 | (200 x 150) | RP • |



MATERIALS LIST

4" Full Port through 8" Reduced Port

ASME Classes 150, 300 and 600

Body / Tailpiece Material Code

| Part | CS | CS1*‡ | CS2* | S1 | S8* |
|----------------------------|------------------------|-------------------|------------------------|---------------------|-----------------|
| Body | A216 Gr. WCC | A216 Gr. WCC | A216 Gr. WCC | A351 Gr. CF8M | A351 Gr. CF8M |
| Studs | A193 Gr. B7 | A192 Gr. B7 | A193 Gr. B7 † | A193 Gr. B7 Plated | A193 Gr. B8 |
| Nuts | A194 Gr. 2H | A194 Gr. 2H | A194 Gr. 2H † | A194 Gr. 2H Plated | A194 Gr. B8 |
| Body Drain Fitting | Carbon Steel | Carbon NACE | Stainless Steel | Stainless Steel | Stainless Steel |
| Tailpiece | ASTM A105/A216 Gr. WCC | ASTM A216 Gr. WCC | ASTM A105/A216 Gr. WCC | A351 Gr. CF8M | A351 CF8M |
| Packing Adjust Studs | A193 Gr. B7 | N/A | A193 Gr. B7 | A193 Gr. B7 Plated | A193 Gr. B8 |
| Packing Adjust Nuts | A194 Gr. 2H | N/A | A194 Gr. 2H | A194 Gr. 2H Plated | A194 Gr. B8 |
| Packing Adjusting Screws** | Alloy Steel | N/A | Alloy Steel | Alloy Steel Plated | Stainless Steel |
| Bonnet Cap | A216 Gr. WCC Plated | N/A | A216 Gr. WCC Plated | A216 Gr. WCC Plated | A351 Gr. CF8M |

* CS1, CS2 and S8 to be used for H₂S service. Meets NACE MR0175/ISO 15156.

** Use only for 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Classes 150 and 300.

† 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 600 uses A193 Gr. B7M studs and A194 Gr. 2HM nuts.

‡ Available in 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 600 only.

Seat / Seal Material Code

| Part | 01 | 42 | 43* | 18 | 28 | 60S |
|------------------|--------------------------|------------|--------------|--------------------------|------------|-------------------|
| Seat | TFE | Filled TFE | — | Special Filled TFE | Filled TFE | Nickel Alloy HVOF |
| Tailpiece Gasket | TFE | TFE | FKM O-ring | Filled TFE | Filled TFE | Graphite |
| Stem Gasket | TFE | Filled TFE | Nylon Washer | Filled TFE | Filled TFE | Graphite |
| Packing | Graphite/TFE with SS Cap | | FKM O-ring** | Graphite/TFE with SS Cap | | |

* Specify code 43 as standard trim for ASME class 600. Seal set consists of: acetal plastic seats, high-fluorine FKM O-ring for tailpiece and stem.

** ASME Class 600 valves have FKM O-ring stem seal.

Ball / Stem Material Code

| Part | CS | S1 | S2* | 60S |
|-------------------------|-----------------------------|--------|----------|----------------------|
| Ball | ASTM A105 Hard Chrome Plate | 316 SS | 316 SS | 316 SS w/QPQ Nitride |
| Grounding Spring | 304 SS | 304 SS | 304 SS | 304 SS |
| Stem | Carbon Steel ENP | 316 SS | Type 630 | Type 630 |
| Compression Ring | 304 SS | 304 SS | 304 SS | 304 SS |
| Stem Retainer Pin | Carbon Steel | 316 SS | 316 SS | 304 SS |
| Stem Retainer Pipe Plug | Carbon Steel | 316 SS | 316 SS | 304 SS |

Actuator Codes*

| Part (Body) | Worm Gear – For All Body Material Codes |
|------------------|---|
| Mounting Bracket | Carbon Steel |
| Bolting | Carbon Steel |
| Set Screw | Carbon Steel |
| Stem Adapter | Carbon Steel |
| Actuator | As Selected |
| Handwheel | Carbon Steel |

* 4" (100 mm) through 8" (200 mm) ASME Class 600 sold with worm gear option only.

Actuator Codes (Wrenches)**

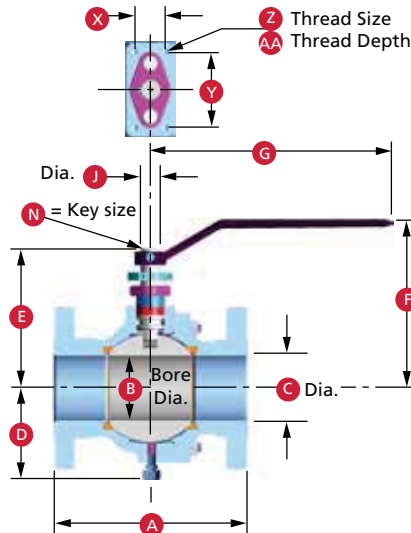
| Part (Body) | Wrench – For All Body Material Codes |
|-------------------|--------------------------------------|
| Wrench Head | Steel |
| Wrench Handle | Carbon Steel |
| Wrench Handle Pin | Carbon Steel |
| Capscrew | Alloy Steel |
| Stop Plate | Carbon Steel |

** 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 150 and 300.

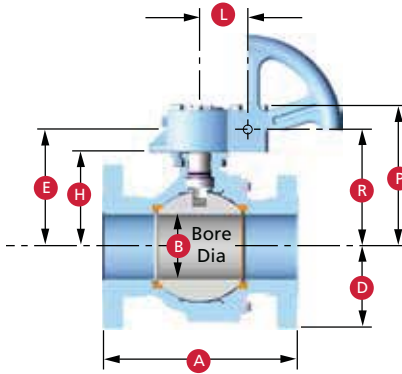
DIMENSIONAL DATA – 4" FULL PORT AND LARGER

4" Full Port through 8" Reduced Port

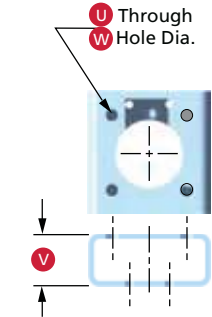
ASME Classes 150, 300 and 600



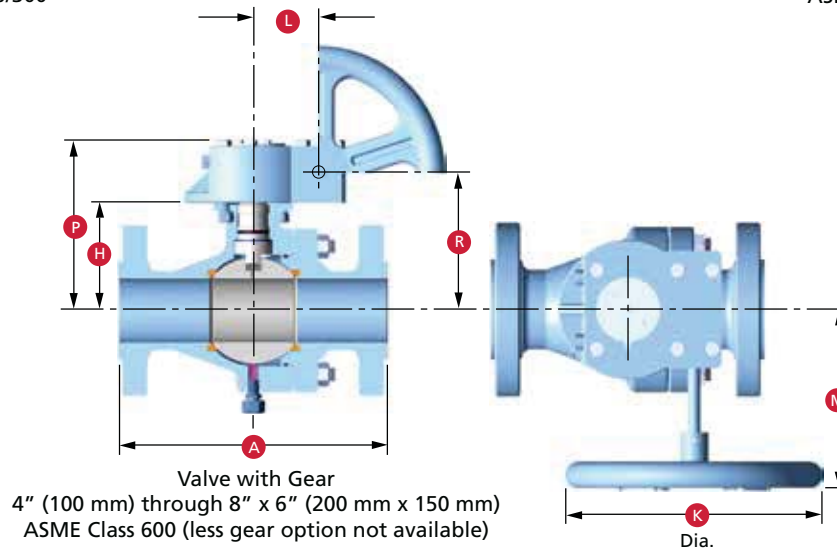
Valve with Wrench (Lever)
4" (100 mm) through
8" x 6" (200 mm x 150 mm)
ASME Classes 150/300



Valve with Gear
4" (100 mm) through 8" x 6" (200 mm x 150 mm)
ASME Classes 150/300



Mounting Bracket
4" FP to 8" RP
(100 mm FP to 200 mm RP)
ASME Classes 150/300



Valve with Gear
4" (100 mm) through 8" x 6" (200 mm x 150 mm)
ASME Class 600 (less gear option not available)

ASME Class 600

Full Port Dimensions

| Size | in. | A | B | C | D | H | K | L | M | P | R |
|------|-----|-------|------|------|------|------|-------|------|-------|-------|-------|
| 4 | | 17.00 | 4.00 | 4.00 | 6.52 | 6.81 | 16.00 | 2.50 | 9.72 | 9.79 | 8.18 |
| 6 | | 22.00 | 6.00 | 6.00 | 8.17 | 9.28 | 20.00 | 4.84 | 14.26 | 13.43 | 11.25 |
| Size | mm | | | | | | | | | | |
| 100 | | 432 | 102 | 102 | 166 | 173 | 508 | 64 | 247 | 249 | 208 |
| 150 | | 559 | 152 | 152 | 208 | 236 | 610 | 123 | 362 | 341 | 286 |

Reduced Port Dimensions

| Size | in. | A | B | C | D | H | K | L | M | P | R |
|-----------|-----|-------|------|------|------|------|-------|------|-------|-------|-------|
| 6 x 4 | | 22.00 | 4.00 | 6.00 | 6.52 | 6.81 | 16.00 | 2.50 | 9.72 | 9.79 | 8.18 |
| 8 x 6 | | 26.00 | 6.00 | 8.00 | 8.17 | 9.28 | 20.00 | 4.84 | 14.26 | 13.43 | 11.25 |
| Size | mm | | | | | | | | | | |
| 150 x 100 | | 559 | 102 | 152 | 166 | 173 | 508 | 64 | 247 | 249 | 208 |
| 200 x 150 | | 660 | 152 | 203 | 208 | 236 | 610 | 123 | 362 | 341 | 286 |

Full Port Dimensions

| Size in. | A* Class | | | | | B | C | D | E | F | G | H | J | K | L | M | N | P | R | U | V | W | X | Y | Z | AA |
|-------------|----------|-------|--------|-------|-------|-------|-----|------|-------|-------|------|------|-------|-------|------|-------|-------|-------|-------|------|------|-------|-------|------|----------|----------|
| | 150 RF | | 300 RF | | 300 | | | | | | | | | | | | | | | | | | | | | |
| | Long | Short | Long | Short | BW | | | | | | | | | | | | | | | | | | | | | |
| B110 | B113 | B128 | B134 | B150 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 9.00 | N/A | – | N/A | – | 4.0 | 4.0 | 6.47 | 8.63 | 9.88 | 36.0 | 7.56 | 1.250 | 6.0 | 2.80 | 7.88 | 0.250 | 10.84 | 9.15 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |
| | – | | 12.00 | | – | 12.00 | 4.0 | 4.0 | 6.47 | 8.63 | 9.88 | 36.0 | 7.56 | 1.250 | 6.0 | 2.80 | 8.12 | 0.250 | 10.84 | 9.15 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC |
| 6 | 15.50 | 10.50 | – | N/A | – | 6.0 | 6.0 | 8.20 | 11.38 | 12.63 | 48.0 | 9.44 | 1.500 | 12.0 | 2.80 | 10.95 | 0.375 | 12.72 | 11.03 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |
| | – | – | 15.88 | | 15.88 | 6.0 | 6.0 | 8.20 | 11.38 | 12.63 | 48.0 | 9.44 | 1.500 | 14.0 | 4.11 | 13.24 | 0.375 | 13.28 | 11.33 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |

mm

| Size | A* Class | | | | | B | C | D | E | F | G | H | J | K | L | M | N | P | R | U | V | W | X | Y | Z | AA |
|------|----------|-------|--------|-------|-----|-----|-----|-----|-----|-----|------|-----|-------|-------|-----|-----|------|------|-----|-----|----|--------|--------|-----|----------|----------|
| | 150 RF | | 300 RF | | 300 | | | | | | | | | | | | | | | | | | | | | |
| | Long | Short | Long | Short | BW | | | | | | | | | | | | | | | | | | | | | |
| B110 | B113 | B128 | B134 | B150 | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 229 | N/A | – | N/A | – | 102 | 102 | 164 | 219 | 251 | 914 | 192 | 31.75 | 150 | 71 | 200 | 6.35 | 275 | 232 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |
| | – | | 305 | | – | 305 | 102 | 102 | 164 | 219 | 251 | 914 | 192 | 31.75 | 150 | 71 | 206 | 6.35 | 275 | 232 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC |
| 150 | 394 | 267 | – | N/A | – | 152 | 152 | 208 | 289 | 321 | 1219 | 240 | 38.1 | 356 | 71 | 278 | 9.53 | 323 | 280 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |
| | – | – | 403 | | 403 | 152 | 152 | 208 | 289 | 321 | 1219 | 240 | 38.1 | 300 | 104 | 336 | 9.53 | 337 | 280 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |

Reduced Port Dimensions

| Size in. | A* Class | | | | B | C | D | E | F | G | H | J | K | L | M | N | P | R | U | V | W | X | Y | Z | AA | |
|-------------|----------|-------|--------|-------|-----|-----|------|------|-------|-------|------|------|------|------|------|-------|-------|-------|-------|------|-------|-------|------|----------|----------|------|
| | 150 RF | | 300 RF | | | | | | | | | | | | | | | | | | | | | | | |
| | Long | Short | Long | Short | | | | | | | | | | | | | | | | | | | | | | |
| B100 | B102 | B120 | B122 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 x 4 | N/A | 10.5 | – | N/A | 4.0 | 6.0 | 6.45 | 8.63 | 9.88 | 36.0 | 7.56 | 1.25 | 6.0 | 2.8 | 7.88 | 0.25 | 10.84 | 9.15 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 | |
| | | – | 15.88 | | – | 4.0 | 6.0 | 6.45 | 8.63 | 9.88 | 36.0 | 7.56 | 1.25 | 6.0 | 2.8 | 8.12 | 0.25 | 10.84 | 9.15 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |
| 8 x 6 | 18.0 | 11.5 | – | N/A | – | 6.0 | 8.0 | 8.2 | 11.38 | 12.63 | 48.0 | 9.44 | 1.5 | 14.0 | 2.8 | 10.95 | 0.375 | 12.72 | 11.03 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |
| | – | – | 16.50 | | – | 6.0 | 8.0 | 8.2 | 11.38 | 12.63 | 48.0 | 9.44 | 1.5 | 16.0 | 4.11 | 11.11 | 0.375 | 13.28 | 11.33 | 0.56 | 2.44 | 4.921 | 1.88 | 4.63 | 3/8-16NC | 0.63 |

mm

| Size | A* Class | | | | B | C | D | E | F | G | H | J | K | L | M | N | P | R | U | V | W | X | Y | Z | AA | |
|-----------|----------|-------|--------|-------|-----|-----|-----|-----|-----|-----|------|-------|-------|-----|-----|------|------|-----|-----|----|--------|--------|-----|----------|----------|----|
| | 150 RF | | 300 RF | | | | | | | | | | | | | | | | | | | | | | | |
| | Long | Short | Long | Short | | | | | | | | | | | | | | | | | | | | | | |
| B100 | B102 | B120 | B122 | | | | | | | | | | | | | | | | | | | | | | | |
| 150 x 100 | N/A | 267 | – | N/A | 102 | 152 | 164 | 219 | 251 | 914 | 192 | 31.75 | 150 | 71 | 200 | 6.35 | 275 | 232 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 | |
| | | – | 403 | | – | 102 | 152 | 164 | 219 | 251 | 914 | 192 | 31.75 | 150 | 71 | 206 | 6.35 | 275 | 232 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |
| 200 x 150 | 457 | 292 | – | N/A | – | 152 | 203 | 208 | 289 | 321 | 1219 | 240 | 38.1 | 356 | 71 | 278 | 9.53 | 323 | 280 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |
| | – | – | 419 | | – | 152 | 203 | 208 | 289 | 321 | 1219 | 240 | 38.1 | 406 | 104 | 282 | 9.53 | 337 | 288 | 14 | 62 | 124.99 | 48 | 118 | 3/8-16NC | 16 |

* Center line-to-face dimension is half of dimension A, except:
 4" (100 mm) ASME class 150 Full Port – stem is offset 1/2" (12.7 mm) towards body end and 6" (150 mm).
 ASME class 150 Full Port Long Pattern – stem is offset 2-1/2" (63.5 mm) towards body end.

PRESSURE/TEMPERATURE FOR ALL DYNASEAL 310 FLOATING BALL VALVES

WKM DynaSeal 310 ball valves are rated for high performance and long life. The ratings shown here are based on tests that indicate good seat performance and acceptable wear. This rating is determined by the lower of the valve's pressure or seat rating. The seat rating is the maximum differential pressure to which the valve should be subjected on a continuous basis. Seal codes 01, 42 and 07 are suitable for vacuum service to 20 microns, absolute (minimum temperature 0° F (-18° C)).

Seal Code 01

| Temp | | Valve Port Size in. (mm) | | | | |
|------------|-----------|--------------------------|--------------------------|-----------|-----------------------|-------------------------|
| ° F | ° C | 1/4 to 3/4 (80 to 20) | 1 to 1-1/2 (25 to 40) | 2 (50) | 3 to 4 (80 to 100) | 6 to 12 (150 to 300) |
| -50 to 100 | -46 to 38 | 1500 | 1000 | 750 | 600 | 285 |
| 200 | 93 | 1500 | 1000 | 750 | 600 | 285 |
| 250 | 121 | 1400 | 900 | 700 | 550 | 150 |
| 300 | 149 | 1100 | 650 | 500 | 425 | 50 |
| 350 | 177 | 600 | 375 | 300 | 250 | - |
| 400 | 204 | 100 | 100 | 100 | 100 | - |

Seal Codes 42 and 28

| Temp | | Valve Port Size in. (mm) | |
|------------|-----------|--------------------------|------------|
| ° F | ° C | 4 (100) | 6 (150) |
| -50 to 100 | -46 to 38 | 740 | 740 |
| 250 | 121 | 740 | 675 |
| 300 | 149 | 740 | 550 |
| 350 | 177 | 590 | 410 |
| 400 | 204 | 400 | 300 |
| 450 | 232 | 325 | 175 |
| 500 | 260 | 200 | 65 |

Seal Code 42

| Temp | | Valve Port Size in. (mm) | | |
|------------|-----------|---------------------------|-----------|-----------|
| ° F | ° C | 1/4 to 1-1/2 (8 to 40) | 2 (50) | 3 (80) |
| -50 to 100 | -46 to 38 | 1500 | 1500 | 740 |
| 200 | 93 | 1400 | 1325 | 740 |
| 250 | 121 | 1250 | 1150 | 740 |
| 300 | 149 | 1090 | 975 | 740 |
| 350 | 177 | 930 | 800 | 590 |
| 400 | 204 | 770 | 640 | 450 |
| 450 | 232 | 610 | 475 | 325 |
| 500 | 260 | 450 | 300 | 200 |

Seal Code 18

| Temp | | Valve Port Size in. (mm) | | | |
|------------|-----------|---------------------------|-----------|-----------|------------------------|
| ° F | ° C | 1/4 to 1-1/2 (8 to 40) | 2 (50) | 3 (80) | 4 to 6 (100 to 150) |
| -50 to 100 | -46 to 38 | * | * | * | * |
| 200 | 93 | * | * | * | * |
| 250 | 121 | 1775 | 1250 | * | * |
| 300 | 149 | 1650 | 1175 | 740 | 600 |
| 350 | 177 | 1575 | 1075 | 700 | 500 |
| 400 | 204 | 1500 | 1000 | 650 | 400 |
| 450 | 232 | 1300 | 875 | 600 | 300 |
| 500 | 260 | 1075 | 725 | 550 | 200 |
| 550 | 288 | 850 | 600 | 500 | 100 |
| 600 | 316 | 350 | 100 | 75 | 0 |
| 625 | 329 | 100 | 0 | 0 | 0 |

* On application.

Seal Codes 43 and 48

| Temp | | Valve Port Size in. (mm) | | | | |
|------------|-----------|---------------------------|-----------|-----------|------------|------------|
| ° F | ° C | 1/4 to 1-1/2 (8 to 40) | 2 (50) | 3 (80) | 4 (100) | 6 (150) |
| -50 to 100 | -46 to 38 | 3000 | 3000 | 1500 | 1500 | 1500 |
| 200 | 93 | 3000 | 3000 | 1500 | 1500 | 1500 |
| 220 | 104 | 3000 | 3000 | 1375 | 1375 | 1375 |

Seal Code 07*

| Temp | | Valve Port Size in. (mm) | | |
|------------|-----------|---------------------------|-----------|-----------|
| ° F | ° C | 1/4 to 1-1/2 (8 to 40) | 2 (50) | 3 (80) |
| -20 to 100 | -29 to 38 | 740* | 500* | 285* |
| 350 | 177 | 500 | 350 | 200 |
| 400 | 204 | 250 | 190 | 100 |

* Block-and-bleed range.

Seal Code 23

| Temp | | Valve Port Size in. (mm) | |
|------------|-----------|--------------------------|--------------------------|
| ° F | ° C | 1/4 to 3/8 (8 to 10) | 1/2 to 3/4 (15 to 20) |
| -50 to 100 | -46 to 38 | 5000 | 3750 |
| 200 | 93 | 3250 | 2000 |
| 225 | 107 | 2500 | 1500 |

Seal Code 60S and 92H

Follows B16.34 rating for body material shown on pages 27 and 28.

BODY ASSEMBLIES

Flanged Valves

Data are maximum working pressure ratings for the valve body assembly at various temperatures. Practical pressure limitations according to actual service conditions are determined by the seal and tailpiece gasket materials. These pressure/temperature ratings are in conformance with ASME B16.5 and B16.34.

Maximum Working Pressures – psig

| Temp ° F Valve Class | Body Material Codes | | | | | |
|-------------------------|---------------------|-----|------|-----------|-----|------|
| | CS, CS2 and CS3 | | | S1 and S8 | | |
| | 150 | 300 | 600 | 150 | 300 | 600 |
| -20 to 100 | 285 | 740 | 1480 | 275 | 720 | 1440 |
| 150 | 272 | 707 | 1415 | 255 | 670 | 1340 |
| 200 | 260 | 675 | 1350 | 235 | 620 | 1240 |
| 250 | 245 | 665 | 1332 | 225 | 590 | 1180 |
| 300 | 230 | 655 | 1315 | 215 | 560 | 1120 |
| 350 | 215 | 645 | 1292 | 205 | 537 | 1073 |
| 400 | 200 | 635 | 1270 | 195 | 515 | 1025 |
| 450 | 185 | 617 | 1235 | 182 | 497 | 990 |
| 500 | 170 | 600 | 1200 | 170 | 480 | 955 |
| 550 | 155 | 575 | 1147 | 155 | 465 | 928 |
| 600 | 140 | 550 | 1095 | 140 | 450 | 900 |

Maximum Working Pressures – bars (1 bar = 14.5 psi)

| Temp ° C Valve Class | Body Material Codes | | | | | |
|-------------------------|---------------------|------|-------|-----------|------|-------|
| | CS, CS2 and CS3 | | | S1 and S8 | | |
| | 20PN | 50PN | 100PN | 20PN | 50PN | 100PN |
| -29 to 38 | 20 | 51 | 102 | 19 | 50 | 100 |
| 66 | 19 | 49 | 98 | 18 | 46 | 92 |
| 93 | 18 | 47 | 93 | 16 | 43 | 85 |
| 121 | 17 | 46 | 92 | 16 | 41 | 81 |
| 149 | 16 | 45 | 91 | 15 | 39 | 77 |
| 177 | 15 | 44 | 89 | 14 | 37 | 74 |
| 204 | 14 | 44 | 88 | 13 | 36 | 71 |
| 232 | 13 | 43 | 85 | 13 | 34 | 68 |
| 260 | 12 | 41 | 83 | 12 | 33 | 66 |
| 288 | 11 | 40 | 79 | 11 | 32 | 64 |
| 316 | 10 | 38 | 75 | 10 | 31 | 62 |

BODY ASSEMBLIES (CONTINUED)

Threaded Valves

Body Trim Code S8 and CS3 are suitable for service to -50° F (-46° C). All other trims are limited to operating temperatures no lower than -20° F (-29° C). These pressure/temperature ratings are in conformance with ASME B16.5, B16.34.

Maximum Working Pressures – psig

| Temp ° F | Body Material Codes | | | | | | | | | | |
|------------|------------------------|-----------------|------------|------------|------|------|------------|------------|------------|------|---|
| | Valve Bore Size in. | CS, CS2 and CS3 | | | | | S1 and S8 | | | | |
| | | 1/4 to 3/8 | 1/2 to 3/4 | 1 to 1-1/2 | 2 | 3 | 1/4 to 3/8 | 1/2 to 3/4 | 1 to 1-1/2 | 2 | 3 |
| -20 to 100 | 5000 | 3750 | 3000 | 2000 | 1500 | 5000 | 3750 | 3000 | 2000 | 1500 | |
| 150 | 4779 | 3583 | 2867 | 1912 | 1434 | 4650 | 3487 | 2790 | 1861 | 1396 | |
| 200 | 4557 | 3416 | 2734 | 1824 | 1368 | 4301 | 3224 | 2580 | 1722 | 1292 | |
| 250 | 4494 | 3368 | 2696 | 1800 | 1350 | 4092 | 3068 | 2455 | 1639 | 1229 | |
| 300 | 4431 | 3320 | 2658 | 1775 | 1333 | 3884 | 2912 | 2330 | 1556 | 1167 | |
| 350 | 4355 | 3264 | 2613 | 1744 | 1310 | 3725 | 2794 | 2236 | 1491 | 1117 | |
| 400 | 4278 | 3209 | 2567 | 1713 | 1287 | 3566 | 2677 | 2141 | 1426 | 1068 | |
| 450 | 4161 | 3120 | 2496 | 1665 | 1252 | 3442 | 2583 | 2066 | 1377 | 1031 | |
| 500 | 4043 | 3031 | 2425 | 1618 | 1216 | 3317 | 2489 | 1992 | 1328 | 995 | |
| 550 | 3868 | 2900 | 2320 | 1548 | 1163 | 3225 | 2419 | 1936 | 1291 | 966 | |
| 600 | 3694 | 2768 | 2215 | 1478 | 1110 | 3134 | 2349 | 1880 | 1254 | 938 | |

Maximum Working Pressures – bars (1 bar = 14.5 psi)

| Temp ° C | Body Material Codes | | | | | | | | | | |
|-----------|-----------------------|-----------------|----------|----------|-----|-----|-----------|----------|----------|-----|----|
| | Valve Bore Size mm | CS, CS2 and CS3 | | | | | S1 and S8 | | | | |
| | | 8 to 10 | 15 to 20 | 25 to 40 | 50 | 80 | 8 to 10 | 15 to 20 | 25 to 40 | 50 | 80 |
| -29 to 38 | 345 | 259 | 207 | 138 | 103 | 345 | 259 | 207 | 138 | 103 | |
| 66 | 330 | 247 | 198 | 132 | 99 | 321 | 240 | 192 | 128 | 96 | |
| 93 | 314 | 236 | 189 | 126 | 94 | 297 | 222 | 178 | 119 | 89 | |
| 121 | 310 | 232 | 186 | 124 | 93 | 282 | 212 | 169 | 113 | 85 | |
| 149 | 306 | 229 | 183 | 122 | 92 | 268 | 201 | 161 | 107 | 80 | |
| 177 | 300 | 225 | 180 | 120 | 90 | 257 | 193 | 154 | 103 | 77 | |
| 204 | 295 | 221 | 177 | 118 | 89 | 246 | 185 | 148 | 98 | 74 | |
| 232 | 287 | 215 | 172 | 115 | 86 | 237 | 178 | 143 | 95 | 71 | |
| 260 | 279 | 209 | 167 | 112 | 84 | 229 | 172 | 137 | 92 | 69 | |
| 288 | 267 | 200 | 160 | 107 | 80 | 222 | 167 | 134 | 89 | 67 | |
| 316 | 255 | 191 | 153 | 102 | 77 | 216 | 162 | 130 | 86 | 65 | |

WEIGHTS

| Valve Size | | End Connection | Full Port Weight | | Reduced Port Weight | |
|------------|-------|----------------------|------------------|-------|---------------------|-------|
| in. | (mm) | | lb | kg | lb | kg |
| 1/4 | (6) | Threaded | 1.50 | 0.68 | – | – |
| 3/8 | (10) | Threaded | 1.50 | 0.68 | – | – |
| 1/2 | (15) | Threaded | 1.50 | 0.68 | 1.50 | 0.68 |
| 3/4 | (20) | Threaded | 3.25 | 1.47 | – | – |
| | | Threaded | 5.00 | 2.30 | 3.00 | 1.36 |
| | | 150 (20 PN) Flanged | 8.50 | 3.86 | 6.3 | 2.86 |
| | | 300 (50 PN) Flanged | 12.00 | 5.44 | – | – |
| 1 | (25) | 600 (100 PN) Flanged | 32.00 | 14.50 | – | – |
| | | Threaded | 12.00 | 5.44 | – | – |
| | | 150 (20 PN) Flanged | 17.00 | 7.71 | – | – |
| | | 300 (50 PN) Flanged | 24.00 | 10.90 | – | – |
| 1-1/2 | (40) | 600 (100 PN) Flanged | 32.00 | 14.50 | – | – |
| | | Threaded | 23.00 | 10.40 | 12.50 | 5.67 |
| | | 150 (20 PN) Flanged | 33.00 | 15.00 | 23.00 | 10.40 |
| | | 300 (50 PN) Flanged | 38.00 | 17.20 | 25.00 | 11.30 |
| 2 | (50) | 600 (100 PN) Flanged | 47.00 | 21.30 | 33.00 | 15.00 |
| | | Threaded | 56.00 | 25.40 | 36.00 | 16.30 |
| | | 150 (20 PN) Flanged | 64.00 | 29.00 | 51.00 | 23.10 |
| | | 300 (50 PN) Flanged | 81.00 | 36.70 | 76.00 | 35.00 |
| 3 | (80) | 600 (100 PN) Flanged | 87.00 | 39.50 | 81.00 | 36.70 |
| | | Threaded | – | – | 67.00 | 30.40 |
| | | 150 (20 PN) Flanged | – | – | 80.00 | 36.30 |
| | | 300 (50 PN) Flanged | – | – | 127.00 | 57.60 |
| 4 | (100) | 600 (100 PN) Flanged | – | – | 130.00 | 59.00 |

| Valve Size | | End Connection | Full Port Weight | | Reduced Port Weight | | |
|------------|-------|-----------------|------------------|-----|---------------------|-----|----|
| in. | (mm) | | lb | kg | lb | kg | |
| 4 | (100) | 150 (L) Flanged | 113 | 51 | – | – | |
| | | WGA | 300 (L) Flanged | 144 | 65 | – | – |
| | | 600 Flanged | 257 | 117 | – | – | |
| 6 | (150) | 150 (L) Flanged | 162 | 73 | – | – | |
| | | WGA | 150 (S) Flanged | 144 | 65 | 125 | 57 |
| | | 300 (L) Flanged | 273 | 124 | 193 | 88 | |
| 6 | (150) | WGA | 150 (L) Flanged | 176 | 80 | – | – |
| | | 150 (S) Flanged | 158 | 72 | 133 | 60 | |
| | | 300 (L) Flanged | 313 | 142 | 223 | 101 | |
| | | 600 Flanged | 545 | 247 | 363 | 165 | |
| 8 | (200) | 150 (L) Flanged | – | – | 217 | 98 | |
| | | 150 (S) Flanged | – | – | 197 | 89 | |
| | | 300 (S) Flanged | – | – | 293 | 133 | |

(S) Short pattern.
(L) Long pattern.

WEIGHTS (CONTINUED)

| Valve Size | | MOP | Male x Female Threaded Ends | | | |
|------------------|------|------|-----------------------------|------|----------------------|------|
| in. | (mm) | | Full Port Weights | | Reduced Port Weights | |
| | | | lb | kg | lb | kg |
| 1/2 | (15) | 3000 | – | – | 3 | 1.36 |
| 1/2 | (15) | 5000 | – | – | 3 | 1.36 |
| 3/4 | (20) | 3000 | 6 | 2.72 | – | – |
| 3/4 | (20) | 3750 | 6 | 2.72 | – | – |
| 1 | (25) | 3000 | – | – | 7 | 3.18 |
| 1 | (25) | 3750 | – | – | 7 | 3.18 |
| Socket Weld Ends | | | | | | |
| 1/4 | (8) | 3000 | 2 | 0.91 | – | – |
| 3/4 | (20) | 3000 | 6 | 2.72 | – | – |
| 1 | (25) | 3000 | – | – | 6 | 2.72 |
| 1-1/2 | (40) | 3000 | 19 | 8.62 | – | – |
| 2 | (50) | 3000 | – | – | 21 | 9.53 |

FLOW CHARACTERISTICS (C_V)*

| Valve Size and Port Size | | Threaded End Valves | Valve Pressure Class | | |
|--------------------------|-------------|---------------------|----------------------|---------------------|-----|
| in. | (mm) | | 150 | 300 | 600 |
| 1/4 x 1/4 | (8 x 8) | 9 | – | – | – |
| 3/8 x 3/8 | (10 x 10) | 9 | – | – | – |
| 1/2 x 3/8 | (15 x 10) | 5 | – | – | – |
| 1/2 x 1/2 | (15 x 15) | 16 | 16 | 14 | – |
| 3/4 x 1/2 | (20 x 15) | – | 10 | 10 | – |
| 3/4 x 3/4 | (20 x 20) | 45 | – | – | – |
| 1 x 3/4 | (25 x 20) | 20 | 35 | 34 | – |
| 1 x 1 | (25 x 25) | 93 | 88 | 77 | 68 |
| 1-1/2 x 1-1/2 | (40 x 40) | 248 | 223 | 208 | 184 |
| 2 x 1-1/2 | (50 x 40) | 80 | 102 | 101 | 99 |
| 2 x 2 | (50 x 50) | 491 | 464 | 421 | 362 |
| 3 x 2 | (80 x 50) | 107 | 117 | 133 | 133 |
| 3 x 3 | (80 x 80) | 1099 | 1228 | 1042 | 928 |
| 4 x 3 | (100 x 80) | 322 | 359 | 410 | 406 |
| 4 x 4 | (100 x 100) | – | 2118 | 2446 | – |
| 6 x 4 | (150 x 100) | – | 390 | 391 (S) | – |
| 6 x 6 | (150 x 150) | – | 5403 | 6644 (S) / 5468 (L) | – |
| 8 x 6 | (200 x 150) | – | 1215 | 1219 (S) / 1215 (L) | – |

* Flow of water in US gallons per minute per 1 psi pressure drop across a fully open valve.
(S) Short pattern.
(L) Long pattern.

STEM TORQUES (in-lb)

Seat Seal Code 01

| Valve Bore Size | | Differential Pressure | | | | |
|-----------------|-----------|-----------------------|------|------|------|------|
| in. | (mm) | 0 to 285 | 500 | 740 | 1000 | 1500 |
| 1/4 to 3/8 | (8 to 10) | 36 | 36 | 36 | 36 | 42 |
| 1/2 | (15) | 60 | 60 | 60 | 72 | 72 |
| 3/4 | (20) | 90 | 90 | 90 | 120 | 180 |
| 1 | (25) | 120 | 150 | 180 | 225 | - |
| 1-1/2 | (40) | 240 | 330 | 420 | 520 | - |
| 2 | (50) | 500 | 640 | 810 | - | - |
| 3 | (80) | 1200 | 1800 | 2400 | - | - |

Seat Seal Code 42**

| Valve Bore Size | | Differential Pressure | | | | |
|-----------------|-----------|-----------------------|------|------|------|------|
| in. | (mm) | 0 to 285 | 500 | 740 | 1000 | 1500 |
| 1/4 to 3/8 | (8 to 10) | 36 | 36 | 36 | 36 | 42 |
| 1/2 | (15) | 60 | 60 | 60 | 72 | 72 |
| 3/4 | (20) | 90 | 90 | 90 | 120 | 180 |
| 1 | (25) | 120 | 150 | 180 | 225 | 300 |
| 1-1/2 | (40) | 240 | 330 | 420 | 520 | 720 |
| 2 | (50) | 500 | 640 | 810 | 1090 | 1440 |
| 3 | (80) | 1200 | 1800 | 2400 | - | - |

** Multiply trim 42 torque by two for seat seal code 60S and 92H.

Seat Seal Codes 43 and 48

| Valve Bore Size | | Differential Pressure | | | | | | | | | |
|-----------------|-----------|-----------------------|------|------|------|------|------|------|------|------|--|
| in. | (mm) | 0 to 285 | 500 | 740 | 1000 | 1500 | 2000 | 2250 | 2500 | 3000 | |
| 1/4 to 3/8 | (8 to 10) | 48 | 48 | 48 | 50 | 55 | 60 | 70 | 85 | 100 | |
| 1/2 | (15) | 58 | 60 | 64 | 70 | 90 | 120 | 140 | 165 | 215 | |
| 3/4 | (20) | 90 | 95 | 105 | 125 | 175 | 230 | 260 | 295 | 370 | |
| 1 | (25) | 225 | 245 | 260 | 280 | 320 | 400 | 455 | 520 | 700 | |
| 1-1/2 | (40) | 390 | 410 | 450 | 510 | 700 | 920 | 1050 | 1200 | 1550 | |
| 2 | (50) | 860 | 960 | 1075 | 1210 | 1500 | 1830 | 2000 | 2200 | 2600 | |
| 3 | (80) | 1450 | 1635 | 1885 | 2220 | 3050 | - | - | - | - | |

Seat Seal Code 18

| Valve Bore Size | | Differential Pressure | | | | | |
|-----------------|-----------|-----------------------|------|------|------|------|------|
| in. | (mm) | 0 to 285 | 500 | 740 | 1000 | 1500 | 2250 |
| 1/4 to 3/8 | (8 to 10) | 60 | 60 | 60 | 60 | 72 | 84 |
| 1/2 | (15) | 60 | 60 | 60 | 70 | 84 | 108 |
| 3/4 | (20) | 128 | 128 | 145 | 160 | 215 | 360 |
| 1 | (25) | 274 | 284 | 312 | 360 | 405 | 580 |
| 1-1/2 | (40) | 520 | 580 | 680 | 810 | 980 | 1390 |
| 2 | (50) | 910 | 1042 | 1240 | 1500 | 1765 | 2300 |
| 3 | (80) | 1200 | 1800 | 2400 | 2900 | 3420 | - |

Seat Seal Code 07

| Valve Bore Size | | Liquid | Dry Gas | |
|-----------------|-----------|----------|----------|------|
| in. | (mm) | 0 to 285 | 0 to 285 | 740 |
| 1/4 to 3/8 | (8 to 10) | 36 | 42 | 113 |
| 1/2 | (15) | 60 | 82 | 220 |
| 3/4 | (20) | 90 | 150 | 404 |
| 1 | (25) | 180 | 336 | 606 |
| 1-1/2 | (40) | 420 | 840 | 2260 |
| 2 | (50) | 900 | 1200 | 3230 |
| 3 | (80) | 2400 | 3600 | 9690 |

STEM TORQUES (in-lb) (CONTINUED)

Seat Seal Code 23

| Valve Bore Size | | Differential Pressure | | | | | | | | | | | | | |
|-----------------|-----------|-----------------------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| in. | (mm) | 0 to 285 | 500 | 740 | 1000 | 1500 | 2000 | 2250 | 2500 | 3000 | 3500 | 3750 | 4000 | 4500 | 5000 |
| 1/4 to 3/8 | (8 to 10) | 60 | 60 | 60 | 60 | 60 | 65 | 70 | 85 | 100 | 115 | 125 | 130 | 150 | 165 |
| 1/2 | (15) | 70 | 70 | 70 | 82 | 110 | 125 | 140 | 180 | 220 | 276 | 310 | - | - | - |
| 3/4 | (20) | 108 | 108 | 125 | 140 | 190 | 260 | 340 | 420 | 560 | 695 | 800 | - | - | - |

Seat Seal Code 01

| Valve Bore Size | | Differential Pressure | | |
|-----------------|-------|-----------------------|------|--------|
| in. | (mm) | 0 to 285 | 500 | 740 |
| 4 | (100) | 2090 | 3300 | 4200 |
| 6 | (150) | 4400 | 8200 | 11,200 |

Seat Seal Codes 28 and 42

| Valve Bore Size | | Differential Pressure | | |
|-----------------|-------|-----------------------|------|--------|
| in. | (mm) | 0 to 285 | 500 | 740 |
| 4 | (100) | 2400 | 3300 | 4200 |
| 6 | (150) | 5400 | 8200 | 11,200 |

NOTE: The torque values listed for 285 psi and greater are based on valves controlling the flow of clean lubricating liquid at ambient temperature.

For valves at pressures less than 285 psi, use the value for 285 psi.

Interpolation may be used for any pressure above 285 psi, but less than maximum pressure listed.

Running torque values will average two-thirds of these values.

For running torque values less than breakaway torque values at 285 psi, use breakaway torque values.

Re-seating torque is equal to breakaway torque.

For operating temperatures between -20° F and -50° F (-29° C and -46° C), multiply these values by 1.20.

These torque values do not contain service or safety factors.

Actuator selection should be made based on experience and appropriate service and safety factors.

WKM DynaSeal 210 and 310 Floating Ball Valves

MATERIAL SELECTION GUIDE

A selection of body, stem and seat/seal materials for WKM DynaSeal valves are available. The following list is intended as a guide in the selection of materials for corrosive service. No material can be expected to resist the corrosive action of all the many ladings found in modern industry. Experience has shown, however, that certain materials can perform satisfactorily within certain limits. The physical properties of a material are affected differently by each corrosive medium. Therefore, it sometimes becomes necessary to sacrifice value in another property. As a result, the user must decide which property is of prime importance for his application. Internal moving parts, in contact with the lading, should always carry an "A" rating. Body materials with exposure to corrosive ladings can sometimes carry a "B" rating because metal loss due to corrosive is not as critical.

The following information is designed for use by technically qualified individuals at their own discretion and risk. We strongly recommend that tests be run under actual operating conditions to obtain a material's performance ability in any one corrosive medium.

Rating Interpretation:

- "A" – Excellent
- "B" – Good (slightly attacked)
- "C" – Fair (moderately attacked)
- "D" – Not recommended

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|----------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| ACETALDEHYDE | C | A | C | A | C | A | A | A | D | B | C | A | C | A |
| ACETATE SOLVENTS | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| ACETIC ACID (30%) | C | A | C | A | C | A | A | A | B | D | C | A | C | A |
| ACETIC ACID (AERATED) | D | A | D | A | D | A | A | A | D | D | D | A | D | A |
| ACETIC ACID (AIR-FREE) | D | A | D | A | D | A | A | A | D | D | D | B | D | A |
| ACETIC ACID (CRUDE) | C | A | C | A | C | A | A | A | D | D | C | A | C | A |
| ACETIC ANHYDRIDE | D | B | D | B | D | A | A | A | D | D | D | B | D | A |
| ACETONE | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| ACETYLENE (DRY ONLY) | A | A | A | A | A | A | A | A | A | D | A | A | A | A |
| ACRYLONITRILE | A | A | A | A | A | A | A | A | C | C | A | A | A | A |
| ALCOHOL-AMYL | B | A | B | A | B | A | A | A | B | B | B | A | B | A |
| ALCOHOL-BUTYL | B | A | B | A | B | A | A | A | A | C | B | A | B | A |
| ALCOHOL-ETHYL | B | A | B | A | B | A | A | A | C | B | B | A | B | A |
| ALCOHOL-METHYL (METHANOL) | B | A | B | A | B | A | A | A | D | C | B | A | B | A |
| ALUMINUM CHLORIDE (DRY) | B | A | B | A | B | A | A | A | A | D | B | A | B | A |
| ALUMINUM SULFATE (ALUMS) | C | A | C | A | C | A | A | A | A | B | C | A | C | A |
| ALUMS | C | A | C | A | C | A | A | A | A | C | C | A | C | A |
| AMINES | A | A | A | A | A | A | A | A | B | C | A | A | A | A |
| AMINES-BASED CORROSION INHIBITOR | A | A | A | A | A | A | A | A | - | B | A | A | A | A |
| AMINES RICH | D | A | A | A | A | A | A | A | - | C | D | A | A | A |
| AMMONIA (AQUEOUS) | A | A | A | A | A | A | A | A | D | D | A | A | A | B |
| AMMONIA ANHYDROUS | A | A | A | A | A | A | A | A | D | D | A | A | A | B |
| AMMONIA SOLUTIONS | B | A | B | A | B | A | A | A | D | D | B | A | B | B |
| AMMONIUM BICARBONATE | C | B | C | B | C | A | A | A | B | D | C | B | C | B |
| AMMONIUM CARBONATE | B | B | B | B | B | A | A | A | B | D | B | B | B | B |
| AMMONIUM CHLORIDE | D | C | D | A | D | A | A | A | A | B | D | C | D | B |
| AMMONIUM HYDROXIDE (28%) | C | B | C | B | C | A | C | C | B | C | C | B | C | D |
| AMMONIUM HYDROXIDE CONCENTRATED | C | B | C | B | C | A | C | C | D | D | C | B | C | D |
| AMMONIUM MONOPHOSPHATE | D | B | D | B | D | A | A | A | B | B | D | B | D | C |
| AMMONIUM NITRATE | D | A | D | A | D | A | A | A | C | C | D | A | D | D |
| AMMONIUM PHOSPHATE (DIBASIC) | D | B | D | B | D | A | A | A | A | C | D | B | D | C |
| AMMONIUM PHOSPHATE (TRIBASIC) | D | B | D | B | D | A | A | A | A | C | D | B | D | C |
| AMMONIUM SULFATE | C | B | C | B | C | A | A | A | A | A | C | B | C | C |
| AMYL ACETATE | C | B | C | B | C | A | A | A | D | B | C | B | C | B |
| ANILINE | A | B | A | B | A | A | A | A | C | C | A | B | A | B |
| ANILINE DYES | C | A | C | A | C | A | A | A | B | C | C | A | C | A |
| ANTIMONY TRICHLORIDE | D | D | D | D | D | A | A | A | A | D | D | D | D | B |
| APPLE JUICE | D | B | D | B | D | A | A | A | A | A | D | B | D | A |
| ARSENIC ACID | D | B | D | B | D | A | A | A | A | A | D | B | D | D |
| ASPHALT EMULSION | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| ASPHALT LIQUID | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| BARIUM CARBONATE | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| BARIUM CHLORIDE | C | C | C | C | C | A | A | A | A | A | C | C | C | B |
| BARIUM HYDROXIDE | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| BARIUM SULFATE | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| BARIUM SULFIDE | B | B | B | B | - | A | A | A | A | A | C | B | - | B |

(-) – Not tested. VTFEP – Virgin TFE packing.

NOTE: All ladings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|-----------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| BEER (ALCOHOL INDUSTRY) | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| BEER (BEVERAGE INDUSTRY) | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| BEEF SUGAR LIQUIDS | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| BENZALDEHYDE | A | A | A | A | A | A | A | A | D | A | A | A | A | A |
| BENZENE (BENZOL) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| BENZOIC ACID | D | B | D | B | D | A | A | A | A | C | D | B | D | B |
| BORAX LIQUORS | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| BORIC ACID | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| BRINES | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| BROMINE (DRY) | D | D | D | D | D | A | A | A | A | C | D | D | D | A |
| BROMINE (WET) | D | D | D | D | D | A | A | A | B | D | D | D | D | B |
| BUNKER OILS (FUEL OILS) | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| BUTADIENE | B | A | B | A | B | A | C | D | A | B | B | A | B | C |
| BUTANE | A | A | A | A | A | A | A | A | A | A | B | A | B | A |
| BUTTERMILK | D | A | D | A | D | A | A | A | A | A | D | A | D | D |
| BUTYLENE | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| BUTYRIC ACID | D | B | D | B | D | A | A | A | B | C | D | B | D | B |
| CALCIUM BISULFITE | D | B | D | B | D | A | A | A | B | D | D | B | D | B |
| CALCIUM CARBONATE | D | B | D | B | D | A | A | A | A | A | D | B | D | B |
| CALCIUM CHLORIDE | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| CALCIUM HYDROXIDE (20%) | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| CALCIUM HYPOCHLORITE | D | C | D | C | D | A | A | A | A | D | D | A | D | C |
| CALCIUM SULFATE | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| CARBON BISULFIDE | B | B | B | B | B | A | A | A | A | D | B | B | B | A |
| CARBON DIOXIDE (DRY) | A | A | A | A | A | A | A | A | D | A | A | A | A | A |
| CARBON DIOXIDE (WET) | D | B | D | B | - | A | A | A | D | A | D | A | A | A |
| CARBON TETRACHLORIDE (DRY) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| CARBON TETRACHLORIDE (WET) | D | B | D | B | D | A | A | A | A | C | D | B | D | B |
| CARBONATED WATER | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| CARBONIC ACID | D | B | D | B | D | A | A | A | A | B | D | B | D | A |
| CASTOR OIL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| CHINA WOOD OIL (TUNG) | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| CHLORINATED SOLVENTS (DRY) | C | B | C | B | C | A | A | A | A | B | C | B | C | B |
| CHLORINE (WET) | D | D | D | D | D | A | A | A | A | D | D | D | D | C |
| CHLORINE GAS (DRY) | B | B | B | B | B | A | A | A | A | D | B | B | B | B |
| CHLOROACETIC ACID | D | C | D | C | D | A | A | A | D | D | D | D | D | B |
| CHLORO BENZENE (DRY) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| CHLOROFORM (DRY) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| CHLOROSULPHONIC ACID (DRY) | B | B | B | B | B | A | A | A | D | D | B | B | B | A |
| CHLOROSULPHONIC ACID (WET) | D | D | D | D | D | A | A | A | D | D | D | D | D | C |
| CHROME ALUM | B | A | B | A | B | A | A | A | A | C | B | A | B | B |
| CHROMIC ACID | D | C | D | C | D | A | A | A | A | D | D | C | D | B |
| CITRUS JUICES | D | B | D | B | D | A | A | A | A | A | D | B | D | A |
| COCONUT OIL | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| COFFEE EXTRACTS (HOT) | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| COKE OVEN GAS | B | A | B | A | B | A | A | A | A | D | B | A | B | B |
| COOKING OIL | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| COPPER ACETATE (10%) | C | B | C | B | C | A | A | A | D | A | C | B | C | B |
| COPPER CHLORIDE | D | D | D | D | D | A | A | A | A | A | D | D | D | C |
| COPPER NITRATE | D | B | D | B | D | A | A | A | A | A | D | B | D | C |
| COPPER SULFATE | D | C | D | C | D | A | A | A | A | B | D | C | D | B |
| CORN OIL | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| CORROSION INHIBITOR – AMINE BASED | A | A | A | A | A | A | A | A | - | B | A | A | A | A |
| COTTONSEED OIL | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| CREOSOTE OIL | B | B | B | B | B | A | A | A | A | C | B | B | B | A |
| CRYSYLIC ACID | B | B | B | B | B | A | A | A | A | C | B | B | B | B |
| CRUDE OIL SOUR | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| CRUDE OIL SWEET | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| CUTTING OILS, WATER EMULSIONS | B | A | B | A | B | A | A | A | A | B | B | A | B | - |
| CYCLOHEXANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| DIACETONE ALCOHOL | A | A | A | A | A | A | A | A | D | C | A | A | A | A |
| DIESEL FUEL | A | A | A | A | A | A | A | A | A | A | A | A | A | A |

(-) – Not tested. VTFEP – Virgin TFE packing.
 NOTE: All ladings at ambient temperatures except as noted.

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|--------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| DIETHYLAMINE | A | A | A | A | A | A | A | A | HF | C | A | A | A | A |
| DIPHTALIC ANHYDROUS | - | - | - | - | - | - | A | - | - | - | - | - | - | - |
| DOWTHERMS (A-E) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| DRILLING MUD | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| DRIP COCKS, GAS | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| DRY CLEANING FLUIDS | B | A | B | A | B | A | A | A | A | B | B | A | B | B |
| EPSOM SALT | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| ETHANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| ETHANOLAMINE | A | A | A | A | A | A | A | A | D | C | A | A | A | A |
| ETHERS | B | A | B | A | B | - | A | A | D | A | B | A | B | B |
| ETHYL ACETATE | B | B | B | B | B | A | A | A | D | C | B | B | B | B |
| ETHYL ACRYLATE | A | A | A | A | A | A | A | A | B | C | A | A | A | A |
| ETHYL CHLORIDE (DRY) | B | A | B | A | B | A | A | A | A | B | B | A | B | B |
| ETHYL CHLORIDE (WET) | B | B | B | B | B | A | A | A | A | B | B | B | B | B |
| ETHYLENE (LIQUID OR GAS) | A | A | A | A | A | A | - | - | A | B | A | A | A | A |
| ETHYLENE GLYCOL | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| ETHYLENE OXIDE | B | B | B | B | B | A | A | A | D | B | B | B | B | B |
| FATTY ACIDS | D | B | D | B | D | A | A | A | A | B | D | B | D | B |
| FERRIC CHLORIDE | D | D | D | D | D | A | A | A | A | A | D | D | D | C |
| FERRIC NITRATE | D | C | D | C | D | A | A | A | A | A | D | C | D | C |
| FERRIC SULFATE | D | B | D | B | D | A | A | A | A | A | D | B | D | B |
| FERROUS CHLORIDE | D | D | D | D | D | A | A | A | A | A | D | D | D | C |
| FERROUS SULFATE | D | B | D | B | D | A | A | A | A | A | D | B | D | B |
| FERROUS SULFATE (SAT) | C | A | C | A | C | A | A | A | - | C | C | A | C | A |
| FERTILIZER SOLUTIONS | B | B | B | B | B | A | A | A | D | D | B | B | B | B |
| FISH OILS | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| FLUORINE (DRY) | B | A | B | A | B | C | C | C | C | C | B | A | B | A |
| FLUOROSILICIC ACID | D | C | D | C | D | A | - | - | A | C | D | C | D | C |
| FOOD FLUIDS - PASTES | C | A | C | A | C | A | A | A | A | C | A | C | A | A |
| FORMALDEHYDE (COLD) | A | A | A | A | A | A | A | A | D | A | A | A | A | A |
| FORMALDEHYDE (HOT) | D | B | D | B | D | A | A | A | D | B | D | B | D | B |
| FORMIC ACID (COLD) | D | B | D | B | D | A | A | A | C | D | D | B | D | B |
| FORMIC ACID (HOT) | D | D | D | D | D | A | A | A | C | D | D | D | D | B |
| FREON 12 (DRY) | B | A | B | A | B | A | A | A | B | B | B | A | B | A |
| FRUIT JUICES | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| FUEL JET JP-4 | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| FUEL JET JP-5 100F | A | A | A | A | A | A | A | A | B | A | A | A | A | A |
| FUEL JET JP-6 100F | A | A | A | A | A | A | A | A | B | A | A | A | - | A |
| FUEL OIL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| FUEL RP-1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| FURFURAL | A | B | A | B | A | A | A | A | D | B | A | B | A | A |
| GALLIC ACID | D | B | D | B | D | A | A | A | A | C | D | B | D | B |
| GAS (MANUFACTURED) | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| GAS ODORIZERS (VTFEP) | B | A | B | A | B | A | A | A | A | - | B | A | B | B |
| GAS, NATURAL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| GASOLINE, AVIATION | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| GASOLINE, SOUR | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| GASOLINE, LEADED, LOW OCTANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| GASOLINE, UNLEADED, LOW OCTANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| GELATIN | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| GLUCOSE | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| GLUE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| GLYCERINE - GLYCEROL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| GLYCOLS | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| GREASE | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| HEPTANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HEXANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HEXANOL, TERTIARY | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| HYDRAULIC OIL PHOSPHATE ESTER | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| HYDRAULIC OIL PETROLEUM BASE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| HYDROBROMIC ACID | D | D | D | D | D | A | A | A | A | D | D | D | D | C |
| HYDROCHLORIC ACID 37% AIR FREE | D | D | D | D | D | A | A | A | B | D | D | D | D | B |
| HYDROCYANIC ACID | D | B | D | B | D | A | - | - | B | D | D | B | D | A |

(-) - Not tested. VTFEP - Virgin TFE packing.
NOTE: All loadings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|--------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| HYDROFLUORIC ACID | D | D | D | D | D | A | C | C | D | D | D | D | D | B |
| HYDROFLUOSILICIC ACID | D | C | D | C | D | A | A | A | A | D | D | C | D | B |
| HYDROGEN GAS (COLD) | B | A | B | A | B | A | A | A | B | A | B | A | B | A |
| HYDROGEN PEROXIDE 30% (DILUTE) | D | B | D | B | D | A | A | A | B | D | D | B | D | B |
| HYDROGEN PEROXIDE 90% | D | B | D | B | D | A | A | A | B | D | D | D | B | D |
| HYDROGEN SULFIDE (DRY) | D | D | A | A | A | A | A | A | A | A | D | D | A | A |
| HYDROGEN SULFIDE (WET) | D | D | B | A | B | A | B | A | A | A | D | D | A | A |
| HYPO (SODIUM THIOSULFATE) | D | A | D | A | D | A | A | A | A | B | D | A | D | B |
| HYPOCHLORITES, SODIUM | D | C | D | C | D | A | A | A | A | D | D | C | D | B |
| ILLUMINATING GAS | A | A | A | A | A | A | A | A | - | A | A | A | A | A |
| INK | D | A | D | A | D | A | A | A | - | A | D | A | D | B |
| IODINE (WET) | D | D | D | D | D | A | A | A | B | B | D | D | D | D |
| ISO-OCTANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| ISODOFORM (DRY) | B | B | B | B | B | A | A | A | - | - | B | B | B | B |
| SOPROPYL ALCOHOL | B | B | B | B | B | A | A | A | B | B | B | B | - | B |
| ISOPROPYL ETHER | A | A | A | A | A | A | A | A | D | C | A | A | A | A |
| KEROSENE | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| KETCHUP | D | A | D | A | D | A | A | A | A | A | D | A | D | B |
| KETONES | A | A | A | A | A | A | A | A | D | A | A | A | A | A |
| LACQUERS (SOLVENTS) | C | A | C | A | C | A | A | A | D | C | C | A | C | A |
| LACTIC ACID (CONC. COLD) | D | A | D | A | D | A | A | A | A | B | D | B | D | D |
| LACTIC ACID (CONC. HOT) | D | B | D | B | D | A | A | A | A | D | D | B | D | D |
| LACTIC ACID (DILUTE COLD) | D | A | D | A | D | A | A | A | A | A | D | A | D | C |
| LACTIC ACID (DILUTE HOT) | D | A | D | A | D | A | A | A | A | D | D | B | D | D |
| LARD OIL | C | A | C | A | C | A | A | A | A | A | C | A | C | B |
| LEAD ACETATE | D | B | C | B | C | A | A | A | D | C | D | B | D | B |
| LINOLEIC ACID | B | A | B | A | B | A | A | A | C | C | B | A | B | B |
| LINSEED OIL | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| LIQUEFIED PET GAS (LPG) | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| LITHIUM BROMIDE | D | A | D | A | D | D | A | A | - | - | D | A | - | A |
| LUBRICATING OIL | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| MAGNESIUM BISULFATE (10%) | C | A | C | A | C | A | A | A | A | A | C | A | C | B |
| MAGNESIUM CHLORIDE | C | D | C | D | C | A | A | A | A | C | C | D | C | B |
| MAGNESIUM HYDROXIDE | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| MAGNESIUM HYDROXIDE (HOT) | B | A | B | A | B | A | A | A | B | A | B | A | B | A |
| MAGNESIUM SULFATE | B | B | B | B | B | A | A | A | A | C | B | B | B | B |
| MALEIC ACID | B | C | B | C | B | A | A | A | A | C | B | C | B | B |
| MALEIC ANHYDRIDE | D | A | D | A | D | - | A | A | - | - | D | A | B | A |
| MALIC ACID | D | A | D | A | D | A | A | A | A | C | D | A | D | B |
| MAYONNAISE | D | A | D | A | D | A | A | A | A | A | D | A | D | B |
| MERCAPTANS | A | A | A | A | A | A | A | A | A | - | A | A | A | D |
| MERCURIC CHLORIDE | D | D | D | D | D | A | A | A | A | A | D | D | D | D |
| MERCURIC CYANIDE (10%) | D | B | D | B | D | A | A | A | - | B | D | B | D | D |
| MERCURY | A | A | A | A | A | A | A | A | A | A | A | A | A | C |
| METHANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| METHYL ACETATE | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| METHYL ACETONE | A | A | A | A | A | A | A | A | D | C | A | A | A | A |
| METHYL CELLOSOLVE | B | B | B | B | B | A | A | A | D | B | B | B | B | B |
| METHYL CHLORIDE (DRY) | B | A | B | A | B | A | A | A | A | - | B | A | B | A |
| METHYL ETHYL KETONE | A | A | A | A | A | A | A | A | D | A | A | A | A | A |
| METHYL FORMATE | B | B | B | B | B | A | A | A | - | B | B | B | B | B |
| METHYLAMINE | B | B | B | B | B | A | A | A | - | C | B | B | B | B |
| METHYLENE CHLORIDE (DRY) | B | B | B | B | B | A | A | A | B | B | B | B | B | B |
| MILK | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| MINE WATERS (ACID) | D | B | D | B | D | A | A | A | B | C | D | B | D | B |
| MINERAL SPRITS | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| MINERAL OIL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| MIXED ACIDS (COLD) | C | A | C | A | C | A | A | A | - | D | C | A | C | B |
| MOLASSES, CRUDE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| MOLASSES, EDIBLE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| MTBE 100% MAX | B | A | B | A | B | A | B | A | D | B | B | A | A | A |
| MTBE 40% MAX | A | A | A | A | A | D | A | A | D | B | - | A | A | A |
| MURIATIC ACID | D | D | D | D | D | A | A | A | A | D | D | D | D | B |

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All loadings at ambient temperatures except as noted.

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|--|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| MUSTARD | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| NAPHTHA | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| NAPHTHALENE | A | A | A | A | A | A | A | A | A | B | A | A | A | B |
| NICKEL AMMONIUM SULFATE (20%) | D | A | D | A | D | A | A | A | A | A | D | A | D | D |
| NICKEL CHLORIDE | D | B | D | B | D | A | A | A | A | D | D | B | D | B |
| NICKEL NITRATE (30%) | D | B | D | B | D | A | A | A | A | C | D | B | D | B |
| NICKEL SULFATE | D | C | D | C | D | A | A | A | A | C | D | C | D | B |
| NICOTINIC ACID | B | A | B | A | B | A | A | A | - | C | B | A | B | A |
| NITRIC ACID (10%) (VTFEP) | D | A | D | A | D | A | B | B | A | D | D | A | D | D |
| NITRIC ACID (100%) (VTFEP) | A | A | A | A | A | A | B | B | D | D | A | A | A | D |
| NITRIC ACID (30%) (VTFEP) | D | A | D | A | D | A | B | B | A | D | D | A | D | D |
| NITRIC ACID (80%) (VTFEP) | D | A | D | A | D | A | B | B | C | D | D | A | D | D |
| NITRIC ACID ANHYDROUS/AQUEOUS (VTFEP) | A | A | A | A | A | A | B | B | D | D | A | A | A | D |
| NITROBENZENE | B | B | B | B | B | A | A | A | B | C | B | B | B | B |
| NITROGEN | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| NITROUS ACID (10%) | D | B | D | B | D | A | A | A | A | D | D | B | D | D |
| NITROUS GASES | B | A | B | A | B | A | A | A | A | B | B | A | B | D |
| NITROUS OXIDE | A | B | A | B | A | A | A | A | A | A | A | B | A | D |
| OIL, COTTONSEED | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| OIL, PETROLEUM (REFINED) | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| OIL, PETROLEUM (SOUR) H ₂ S AND CO ₂ | D | D | A | A | A | A | A | A | B | A | A | A | A | A |
| OIL, WATER MIXTURES | B | A | B | A | B | A | A | A | B | A | B | A | B | A |
| OIL, ANIMAL | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| OIL, FISH | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| OIL, FUEL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| OIL, LUBE | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| OIL, MINERAL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| OLEIC ACID | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| OLEUM | B | B | B | B | B | A | A | A | A | D | B | B | B | D |
| OLIVE OIL | B | A | B | A | B | A | A | A | D | B | B | A | B | A |
| OXALIC ACID | D | D | D | D | D | A | A | A | B | C | D | D | D | B |
| OXYGEN | B | A | B | A | B | A | A | A | A | C | B | A | B | A |
| OZONE (DRY) | A | A | A | A | A | A | A | A | A | C | A | A | A | A |
| OZONE (WET) | C | A | C | A | C | A | A | A | A | C | C | A | C | A |
| PAINTS AND THINNERS | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| PALM OIL | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| PALMITIC ACID | C | A | C | A | C | A | A | A | A | B | C | A | C | B |
| PARAFFIN | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| PARAFORMALDEHYDE | B | B | B | B | B | A | A | A | C | A | B | A | B | B |
| PENTANE | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| PERCHLOROETHYLENE | B | B | B | B | B | A | A | A | A | B | B | B | B | A |
| PETROLATUM | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| PHENOL (CARBOLIC ACID) | B | A | B | A | B | A | A | A | A | B | B | A | B | A |
| PHENOL RESIN | C | A | C | A | C | A | D | A | A | D | C | A | A | A |
| PHOSGENE (DRY) (VTFEP) | A | A | A | A | A | - | A | A | B | - | A | A | A | A |
| PHOSGENE (WET) (VTFEP) | D | A | D | A | D | B | A | A | A | - | D | A | A | A |
| PHOSPHORIC ACID (10%) COLD | D | B | D | B | D | A | A | A | A | D | D | B | D | B |
| PHOSPHORIC ACID (10%) HOT | D | D | D | D | D | A | A | A | A | D | D | D | D | C |
| PHOSPHORIC ACID (50%) COLD | D | B | D | B | D | A | A | A | A | D | D | B | D | C |
| PHOSPHORIC ACID (50%) HOT | D | D | D | D | D | A | A | A | A | D | D | D | D | C |
| PHOSPHORIC ACID (85%) COLD | B | A | B | A | B | A | A | A | A | D | B | A | B | A |
| PHOSPHORIC ACID (85%) HOT | C | A | C | A | C | A | A | A | A | D | C | A | C | A |
| PHTHALIC ACID | C | B | C | B | C | A | A | A | A | C | C | A | C | A |
| PHTHALIC ANHYDRIDE | C | B | C | B | C | A | A | A | A | B | C | B | C | C |
| PICRIC ACID | C | B | C | B | C | A | A | A | A | D | C | B | C | A |
| PINE OIL | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| PINEAPPLE JUICE | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| POLY ESTER RESIN (VTFEP) | - | A | - | A | - | - | - | - | - | - | - | A | A | A |
| POLYETHYLENE FLUFF | B | A | B | A | B | - | - | - | - | - | - | A | A | A |
| POLYETHYLENE LIQUID | B | A | - | A | - | - | - | - | A | - | B | A | A | A |
| POLYURETHANE | A | A | A | A | A | - | A | A | D | D | A | A | A | A |
| POTASSIUM BISULFITE (10%) | D | B | D | B | D | A | A | A | A | A | D | D | B | A |

(-) - Not tested. VTFEP - Virgin TFE packing.
NOTE: All loadings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|-----------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| POTASSIUM BROMIDE | D | B | D | B | D | A | A | A | - | A | D | B | D | B |
| POTASSIUM CARBONATE | C | A | C | A | C | A | A | A | A | A | C | A | C | B |
| POTASSIUM CHLORATE | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| POTASSIUM CHLORIDE | C | A | C | A | C | A | A | A | A | A | C | A | C | B |
| POTASSIUM CYANIDE | B | B | B | B | B | A | A | A | A | C | B | B | B | B |
| POTASSIUM DICHROMATE | B | A | B | A | B | A | A | A | A | C | B | A | B | B |
| POTASSIUM DIPHOSPHATE | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| POTASSIUM FERRICYANIDE | B | A | B | A | B | A | A | A | A | A | B | B | B | B |
| POTASSIUM FERROCYANIDE | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| POTASSIUM HYDROXIDE 70% (COLD) | B | B | B | B | B | A | B | B | D | C | B | B | B | A |
| POTASSIUM HYDROXIDE 70% (HOT) | A | A | A | A | A | A | B | B | D | C | A | A | A | A |
| POTASSIUM HYDROXIDE-DILUTE (COLD) | B | B | B | B | B | A | A | A | C | A | B | B | B | A |
| POTASSIUM HYDROXIDE-DILUTE (HOT) | B | A | B | A | B | A | B | B | D | B | B | B | B | A |
| POTASSIUM IODIDE | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| POTASSIUM NITRATE | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| POTASSIUM PERMANGANATE | A | A | A | A | A | A | A | A | A | C | A | A | A | B |
| POTASSIUM SULFATE | B | A | B | A | B | A | A | A | A | C | B | A | B | B |
| POTASSIUM SULFIDE (10%) | C | B | C | B | C | A | A | A | A | A | C | B | C | D |
| POTASSIUM SULFITE (10%) | D | A | D | A | D | A | A | A | A | A | D | A | D | D |
| PRODUCER GAS | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| PROPANE | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| PROPLENE | - | A | - | A | - | - | - | - | - | - | - | - | A | A |
| PROPYL ALCOHOL | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| PROPYLENE GLYCOL | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| PYROGALLIC ACID | B | B | B | B | B | A | A | A | | D | B | B | B | B |
| QUENCH OIL (WATER SOLUBLE) | A | A | A | A | A | A | A | A | B | B | A | A | A | - |
| RESINS-ROSINS | C | A | C | A | C | A | A | A | | B | C | A | C | A |
| ROAD TAR | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| ROOF PITCH | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| RUBBER LATEX EMULSIONS | B | A | B | A | B | A | A | A | A | A | B | A | B | - |
| RUBBER SOLVENT | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| SALAD OIL | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| SALICYLIC ACID | D | A | D | A | D | A | A | A | A | B | D | A | D | A |
| SALT | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| SEAWATER | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| SHELLAC (BLEACHED) | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| SHELLAC (ORANGE) | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| SILICONE OILS | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| SILVER NITRATE | D | B | D | B | D | A | A | A | A | B | D | B | D | D |
| SOAP SOLUTIONS (STEARATES) | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| SODIUM ACETATE | B | B | B | B | B | A | A | A | D | B | B | B | B | B |
| SODIUM ALUMINATE | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| SODIUM BICARBONATE | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| SODIUM BISULFATE (10%) | D | A | D | A | D | A | A | A | A | A | D | A | D | B |
| SODIUM BISULFITE (10%) | D | D | D | D | D | A | A | A | A | A | D | D | D | B |
| SODIUM BORATE | C | D | C | D | C | A | A | A | A | A | C | D | C | B |
| SODIUM BROMIDE (10%) | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| SODIUM CARBONATE | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| SODIUM CHLORATE | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| SODIUM CHLORIDE | C | B | C | B | C | A | A | A | A | A | C | B | C | A |
| SODIUM CHROMATE | B | B | B | B | B | A | A | A | A | D | B | B | B | B |
| SODIUM CYANIDE (10%) | A | A | A | A | A | A | A | A | A | B | A | A | A | B |
| SODIUM FLUORIDE | D | B | D | B | D | A | A | A | A | A | D | B | D | A |
| SODIUM HYDROXIDE 20% (COLD) | A | A | A | A | A | A | A | A | B | A | A | A | A | A |
| SODIUM HYDROXIDE 20% (HOT) | C | B | C | B | C | A | B | B | C | B | C | B | C | A |
| SODIUM HYDROXIDE 50% (COLD) | B | B | B | B | B | A | C | C | C | A | B | B | B | A |
| SODIUM HYDROXIDE 50% (HOT) | B | B | B | B | B | A | C | C | C | C | B | B | B | A |
| SODIUM HYDROXIDE 70% (COLD) | C | B | C | B | C | A | C | C | C | C | C | B | C | B |
| SODIUM HYDROXIDE 70% (HOT) | B | B | B | B | B | A | D | D | C | C | B | B | B | B |
| SODIUM HYPOCHLORIDE | D | D | D | D | D | A | A | A | A | D | D | D | D | D |
| SODIUM METAPHOSPHATE | A | B | A | B | A | A | A | A | A | A | A | B | A | B |
| SODIUM METASILICATE (HOT) | D | A | D | A | D | A | A | A | - | A | D | A | D | A |

(-) – Not tested. VTFEP – Virgin TFE packing.
 NOTE: All ladings at ambient temperatures except as noted.

| Lading | STD BDY CS | STD BDY S1 | STD BDY CS2 | STD BDY S8 | SPL BDY CS3 | SPL 01 | STD 42 | SPL 18 | SPL 07 | STD 43 | STD INT CS | STD INT S1 | SPL INT S2 | SPL INT ML |
|---|------------------|------------------|-------------------|------------------|-------------------|-----------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|------------------|
| SODIUM METASILICATE (COLD) | C | A | C | A | C | A | A | A | - | A | C | A | C | A |
| SODIUM NITRATE | B | B | B | B | B | A | A | A | - | C | B | B | B | B |
| SODIUM PERBORATE | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| SODIUM PEROXIDE | C | B | C | B | C | A | A | A | A | B | C | B | C | B |
| SODIUM PHOSPHATE (DIBASIC) | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| SODIUM PHOSPHATE (TRIBASIC) | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| SODIUM SILICATE | A | A | A | A | A | A | A | A | A | A | A | A | A | B |
| SODIUM SILICATE (HOT) | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| SODIUM SULFATE NA ₂ SO ₄ | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| SODIUM SULFIDE (HOT) | C | B | C | B | C | A | A | A | A | A | C | B | C | B |
| SODIUM SULFIDE NA ₂ SO ₂ | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| SODIUM THIOSULFATE | D | B | D | B | D | A | A | A | A | A | D | B | D | B |
| SOUR GAS AND OIL | D | D | A | A | A | A | A | A | A | A | D | D | A | A |
| SOYBEAN OIL | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| STANNIC CHLORIDE | D | D | D | D | D | A | A | A | A | B | D | D | D | C |
| STANNOUS CHLORIDE | D | C | D | C | D | A | A | A | A | D | D | C | D | C |
| STARCH | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| STEAM (212° F) | B | A | B | A | B | B | C | A | D | D | B | A | A | A |
| STEARIC ACID | C | A | C | A | C | A | A | A | | B | C | A | C | B |
| STODDARD SOLVENT | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| STYRENE | A | A | A | A | A | B | D | D | D | B | A | A | A | A |
| SUGAR LIQUIDS | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| SULFATE, BLACK LIQUORS | C | B | C | B | C | A | A | A | B | B | C | B | C | B |
| SULFATE, GREEN LIQUORS | C | B | C | B | C | A | A | A | A | B | C | B | C | B |
| SULFATE, WHITE LIQUORS | D | B | D | B | D | A | A | A | A | B | D | B | D | B |
| SULFURIC ACID (0 to 7%) (VTFEP) | D | B | D | B | D | A | A | A | A | D | D | B | D | B |
| SULFURIC ACID (100%) H ₂ SO ₄ (VTFEP) | B | B | B | B | B | A | A | A | B | D | B | B | B | D |
| SULFURIC ACID (20%) (VTFEP) | D | D | D | D | D | A | A | A | A | D | D | D | D | B |
| SULFURIC ACID (50%) (VTFEP) | D | D | D | D | D | A | A | A | A | D | D | D | D | B |
| SULFUROUS ACID | D | D | D | D | D | A | A | A | A | D | D | D | D | D |
| SULPHUR | B | A | B | A | B | A | A | A | A | C | B | A | B | A |
| SULPHUR DIOXIDE (DRY) | B | A | B | A | B | A | A | A | A | A | B | A | B | A |
| SULPHUR TRIOXIDE (DRY) | B | B | B | B | B | A | A | A | A | B | B | B | B | B |
| SYNTHESIS GAS | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| TALL OIL | B | B | B | B | B | A | A | A | A | A | B | B | B | A |
| TANNIC ACID | B | B | B | B | B | A | A | A | A | A | B | B | B | B |
| TAR – TAR OIL | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| TARTARIC ACID | D | B | D | B | D | A | A | A | A | B | D | B | D | B |
| TETRAETHYL LEAD | C | B | C | B | C | A | A | A | A | B | C | B | C | A |
| TITANIUM TETRACHLORIDE T1-CL4 | - | - | - | - | - | - | - | A | - | - | - | - | - | - |
| TITANIUM TRICHLORIDE T1-CL3 | - | - | - | - | - | - | - | A | - | - | - | - | - | - |
| TOLUENE – TOLUOL | A | A | A | A | A | A | A | A | A | B | A | A | A | A |
| TOMATO JUICE | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| TRANSFORMER OIL | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| TRIBUTYL PHOSPHATE | A | A | A | A | A | A | A | A | D | B | A | A | A | A |
| TRICHLOROETHYLENE | B | B | B | B | B | A | A | A | B | B | B | B | B | A |
| TUNG OIL | B | A | B | A | B | A | A | A | A | A | B | A | B | C |
| TURPENTINE | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| UREA | C | B | C | B | C | A | A | A | - | - | C | B | C | A |
| VARNISH | C | A | C | A | C | A | A | A | B | B | C | A | C | A |
| VEGETABLE OIL, EDIBLE | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| VEGETABLE OIL, NON-EDIBLE | B | A | B | A | B | A | A | A | A | A | B | A | B | B |
| VINEGAR | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| WATER, DISTILLED (AREATED) | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| WATER, FRESH | C | A | C | A | C | A | A | A | A | A | C | A | C | A |
| WATER, SEA | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| WAX, EMULSIONS | A | A | A | A | A | A | A | A | A | A | A | A | A | - |
| WAXES | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| WHISKEY AND WINE | D | A | D | A | D | A | A | A | A | A | D | A | D | A |
| XYLENE (DRY) | A | A | A | A | A | A | A | A | A | A | A | A | A | A |
| ZINC CHLORIDE | D | D | D | D | D | A | A | A | A | C | D | D | D | B |
| ZINC HYDROSULFITE | A | A | A | A | A | A | A | A | A | D | A | A | A | B |
| ZINC SULFATE | D | B | D | B | D | A | A | A | A | D | D | B | D | B |

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All loadings at ambient temperatures except as noted.

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- OEM spare valves, actuators, and parts (including non-Cameron brands)
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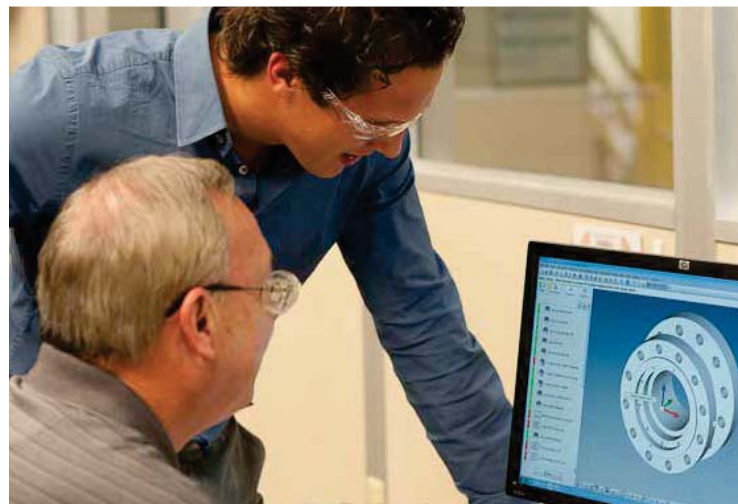
Comprehensive Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
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Customized Total Valve CareSM (TVC) Programs

Customized asset management plans that optimize uptime, availability and dedicated services.

- Engineering consultancy
- Site management
- Flange management
- Startup and commissioning
- Spare parts and asset management
- Operational support



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| Trademark | Owner | Common Name | Comparable Cameron Abbreviated Name (in trim charts) |
|-----------|----------------------------------|--|--|
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| Teflon | E.I. DuPont De Nemours & Company | Poly Tetra Fluoro Ethylene | PTFE |
| Viton | DuPont Dow Elastomers L.L.C. | Fluoroelastomer | FKM |
| 17-4PH | Armco Advanced Materials Corp. | 17-4PH Stainless Steel Electroless Nickel Plating | Type 630 ENP |



FLOCONX LLC
USA FLOW CONTROL COMPANY

SALES | INFORMATION
SALES@FLOCONX.COM
VENTAS@FLOCONX.COM

FLOW CONTROL, OUR PASSION.™

WWW.FLOCONX.COM