

TECHNICAL INDEX

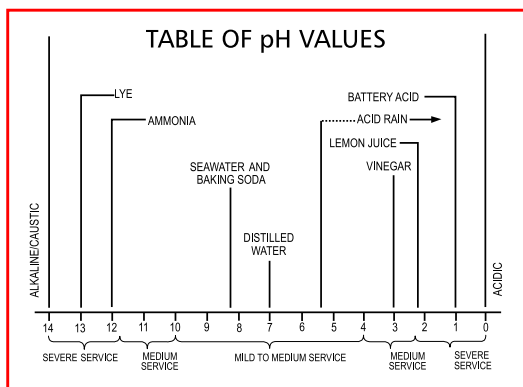
| | |
|---|-----|
| Knife Gate Packing | 1.0 |
| Packing Chemical Compatibility | 1.0 |
| Braided Packing Specifications | 2.0 |
| Low Pressure Operation | 3.0 |
| Pressure/Temperature Ratings | 3.0 |
| Reverse Pressure Rating | 3.0 |
| Material Standards | 3.0 |
| Pump Isolation | 4.0 |
| Seat Orientation Markings | 4.0 |
| Gaskets | 5.0 |
| Standard Orientation | 5.0 |
| Exterior Coatings | 5.0 |
| Bolting | 6.0 |
| Codes, Standards and Specifications | 7.0 |
| Packaging and Crating | 8.0 |
| Recommended Long Term Storage | 8.0 |
| Elastomer Chemical Resistance Table | 9.0 |

Knife Gate Valve Packing

The purpose of packing in knife gate valves is to provide a seal around the gate where it passes through the valve body. The ability to maintain a seal is dependent upon many factors including:

- 1. Smoothness of the gate and consistency of gate section.** A rough gate surface carries away particles of the packing with each valve cycle. This reduction in packing volume results in a loss of packing pressure against the gate, reducing sealing ability. Variation in gate section can also produce a reduction in packing pressure, resulting in reduced sealing ability.
- 2. Range of chemical compatibility.** Packing consists of two components. A fiber which is woven to give the packing form, and a filler/lubricant which fills the voids between the fibers and provides lubricity. Cored packing also contain a third component, an elastomer core, which provides resiliency and improved sealing ability. All components must be resistant to the materials being handled.

Chemical compatibility of packing is expressed in terms of the pH of the material being handled. pH is a measure of the presence of hydrogen ions. It is a scientific shorthand for measuring the level of acidity or alkalinity of a substance. The scale is logarithmic, making Lye at 13, ten times as alkaline as Ammonia at 12.



Strong Oxidizing Agents

Oxidizers act as a catalyst and cause the carbon to combine with oxygen and cause a breakdown of the fiber.

- Fluorine, which is used as an oxidizer or rocket fuel.
 - Sulfur Trioxide, which is used to make sulfuric acid.
 - Aqua Regia (nitric and hydrochloric acid), which is used to dissolve metals.
 - Sodium Peroxide, which is used in dyeing, paper bleaching, and oxygen generation.
 - Oleum (fuming sulfuric), which is used in detergent and explosive manufacturing.
 - Perchloric Acid, which is used in the manufacturing of explosives, esters, and medicine.
- Sulfuric Acid greater than 75% and over 250°F (121°C), which is the most widely used industrial chemical.
 - Chloric Acid greater than 10% and over 200°F (93°C), which ignites organic materials on contact.
 - Ferric Chloride greater than 50% and over 200°F (93°C), which is used for sewage treatment, photography, medicine, etching, feed additives, and oxidizing disinfectant.
 - Nitric Acid greater than 20% and over 250°F (121°C), which is used in fertilizer, etching, medicine, dyeing, drugs, and explosives.
 - Chlorous Acid greater than 10% and over 200°F.
 - Iodine greater than 5% and over 200°F (93°C), which is used in soaps, medicine, some lubricants, dyes and salt.
 - Hydrofluoric Acid greater than 40% and over 200°F (93°C), which is used for pickling, purification, dissolving ores, cleaning castings, etching, cleaning stone and brick, and fermentation.
 - Sodium Hypochlorite greater than 5%, which is used in textiles, water purification, and bleaching pulp and paper.
 - Sodium Chlorate greater than 5%, which is used as a bleach for paper pulp, medicine, and leather tanning textiles.
 - Calcium Chlorate greater than 5%, which is used in pyrotechnics and photography.
- 3. Abrasion caused by service conditions.** Since materials that are soft and move around under load make good sealing materials, most good sealing materials are not very abrasion resistant, particularly when materials are pulled through the packing as in the case of a knife gate valve. Synthetic packing such as Kevlar® fiber does an excellent job in abrasive service, and can be used in combination with a softer packing to take advantage of the best features of each. For example, PTFE packing, when used in conjunction with a bottom row of Kevlar® provides a good seal with the PTFE while allowing the Kevlar® to clean the gate and retain the PTFE.
Kevlar® is a registered trademark of DuPont
 - 4. Thermal Cycling.** The function of the packing is dependent upon maintaining a load against a sealing surface. Thermal cycling causes expansion and contraction of the valve body, gate, and packing components, which alters the sealing load. Live loading the packing hardware will improve packing performance in thermal cycling applications.
 - 5. Cycling Requirements.** Packing wear occurs each time the gate passes through the packing. Packing adjustments are made to compensate for wear. Live loading the packing hardware reduces adjustment requirements to an absolute minimum.

BRAIDED PACKING SPECIFICATIONS

| Braided Packing Name | pH Range | Maximum Temp. | Description | Characteristics |
|---|----------|--|---|--|
| Acrylic/PTFE | 3-11 | 500°F (260°C) | Acrylic yarns impregnated with PTFE and a break-in lubricant | Excellent resistance to chemicals due to PTFE dispersion |
| Acrylic/PTFE/ Silicone core | 3-11 | 500°F (260°C) | Acrylic yarns impregnated with PTFE and a break-in lubricant, with a Silicone rubber core | Excellent resistance to chemicals due to PTFE dispersion, with improved sealing over Acrylic/PTFE |
| PTFE/Graphite | 0-14 | 550°F (288°C) | Gore GFO® yarn impregnated with PTFE | Excellent chemical resistance and good sealing |
| PTFE/Graphite/ Viton® core | 0-14 | 550°F (288°C) | Gore GFO® yarn impregnated with PTFE, with a Viton® rubber core | Excellent chemical resistance, with improved sealing over PTFE/Graphite |
| PTFE | 0-14 | 500°F (260°C) | PTFE yarn impregnated with a break-in lubricant | Excellent chemical resistance and good sealing |
| FDA PTFE | 0-14 | 500°F (260°C) | Virgin PTFE yarn impregnated with an FDA approved break-in lubricant | FDA approved |
| FDA PTFE/ Silicone core | 0-14 | 500°F (260°C) | Virgin PTFE yarn impregnated with an FDA approved break-in lubricant, with a Silicone rubber core | FDA approved, with improved sealing capability over FDA PTFE |
| Carbon Yarn | 0-14 | 650°F ⁽¹⁾ 1200°F ⁽²⁾ | High temperature core with outer jacket of carbon yarn and Inconel® wire | Excellent for high temperature and pressure steam service |
| Graphite Filament (not for use with fuming nitric acid, oleum or fluorine) | 0-14 | 800°F (427°C) in oxidizing atmosphere 1200°F (649°C) in steam 1600°F (871°C) non-oxidizing | Purest of graphite filament yarns impregnated with graphite particles | Excellent for high temperature, with a very low coefficient of friction |
| PTFE/Graphite/ Kevlar® | 3-11 | 500°F (260°C) | Gore GFO® yarn (PTFE/Graphite) with Kevlar® corners and a break-in lubricant | Characteristics of PTFE/Graphite packing, plus resistant to extrusion |
| Kevlar® | 3-11 | 500°F (260°C) | Kevlar® yarns impregnated with PTFE and a break-in lubricant | Excellent abrasion resistance due to great tensile strength of yarn |
| Kevlar®/ Viton® core | 3-11 | 500°F (260°C) | Kevlar® yarns impregnated with PTFE and a break-in lubricant, with a Viton® rubber core | Excellent abrasion resistance due to great tensile strength of yarn, with improved sealing capability over Kevlar® |
| Copper | N/A | 1200°F (649°C) | Square braided copper filaments | Used as a scraper |

Gore GFO® is a registered trademark of W. L. Gore & Assoc. Inc.
Viton® is a registered trademark of DuPont Dow Corporation
Inconel® is a registered trademark of Inco Alloys International

(1) Oxidizing
(2) Non-Oxidizing

Low Pressure Operation

Knife gate valves standards, MSS SP-81 specifically, require a seat test at 40 psi (2.8 bar). In addition Fabri-Valve tests the seat at the maximum rated CWP. Due to the relatively large surface area of the gate, when pressure in metal seated valves falls below 40 psi (2.8 bar) seat sealing may degrade somewhat. Conversely, when pressure exceeds the 40 psi (2.8 bar) standard test pressure, sealing generally shows improvement. Low-pressure seat sealing can be improved by employing chest buttons and/or centerline buttons, which serve the same purpose as higher pressure by keeping the gate in close alignment with the seat.

Pressure/Temperature Ratings

Most knife gate valve applications are limited by the temperature limit or the chemical compatibility of the seat and/or packing material. When checking pressure/temperature ratings, be sure to check the temperature rating and chemical compatibility of the packing material, and the seat material if it is other than the integral metal seat.

Reverse Pressure Rating

Single seated knife gate valves are considered unidirectional with regard to sealing. That is, they are designed to have the line pressure assist sealing by pushing the gate against the seat. All single seated Fabri-Valve knife gate valves except the Figure 100 are rated for full reverse pressure in the fully closed position. Though leakage in reverse pressure may exceed standard leakage rates, damage to the valve or gross leakage will not occur. Installation where line pressure pushes the gate away from the seat during cycling could result in damage to the valve resulting in gross leakage in either direction. For reverse pressure during cycling, knife gate valves should be equipped with backing rings.

The 1.5" - 24" Figure C67 knife gate valves are bi-directional and are rated for 150 psi (10.3 bar) in both directions, in cycling and non-cycling service. The 30" C67 is rated for 100 psi (6.9 bar) in both directions, in cycling and non-cycling service, and the 36" C67 is rated for 80 psi (5.5 bar) in both directions, in cycling and non-cycling service.

The Figures C100 and F100 knife gate valves are not reverse pressure rated.

Material Standards

Cast valves are supplied in Ductile Iron, Carbon Steel 304 SS, 316 SS, 316L SS and 317L SS. Other alloys such as the cast equivalents of 254SMO[®], AL6XN[®], Alloy 20[®], 304L SS, 904L SS, 309 SS, Hastelloy[®], Inconel[®], and Monel[®] are also available. In addition, valves can be fabricated from a wide range of special alloys, economically and on a small run basis. Valves may be fabricated entirely of the special alloy or may be built with just the wetted parts of the special alloy and the remainder of the valve of either a lesser alloy or carbon steel. Fabricated valve materials available include those listed above, plus Titanium. Fabri-Valve has experience with a wide range of alloys, in both cast and fabricated configurations.

NOTE: ITT Engineered Process Solutions reserves the right to substitute comparable materials to achieve equivalent performance.

| Maximum temperatures for materials commonly used in the construction of Fabri-Valve valves | | | | |
|--|--------------------|----------|---------------|---------------|
| Material | ASTM Specification | | Max. Temp. °F | Min. Temp. °F |
| | Cast | Plate | | |
| Cast Iron | A126 B | - | 450 | -20 |
| Ductile Iron | A536 65-45-12 | - | 650 | -30 |
| Carbon Steel | A216 WCB | A36 | 650 | -30 |
| Carbon Steel | - | A285 | 850 | -30 |
| Carbon Steel | - | A516Gr70 | 1000 | |
| 410 / 13 Cr | A743 CA15 | A240 | 1200 | |
| 304 / 18 Cr, 8 Ni | A351 CF8 | A240 | 1700 | -100 |
| 309 / 22 Cr, 12 Ni | A351 CH20 | A240 | 1800 | |
| 310 / 24 Cr, 19 Ni | A351 HK40 | A240 | 1900 | |
| 316 / 16 Cr, 10 Ni | A351 CF8M | A240 | 1700 | -100 |
| 316L / 16 Cr, 10 Ni | A351 CF3M | A240 | 850 | -100 |
| 317L / 18 Cr, 11 Ni | A351 CG3M | A240 | 850 | |
| Inconel 800HT [®] | A351 CT15C | B407 | 2000 | |
| 254SMO [®] | A351 CK3MCUN | A240 | 1000 | |
| Alloy 20 [®] | A351 CN7M | B463 | * | |
| Hastelloy C276 [®] | A494 CW12MW | B575 | * | |
| Titanium | - | B265 Gr2 | * | |

* Consult Factory

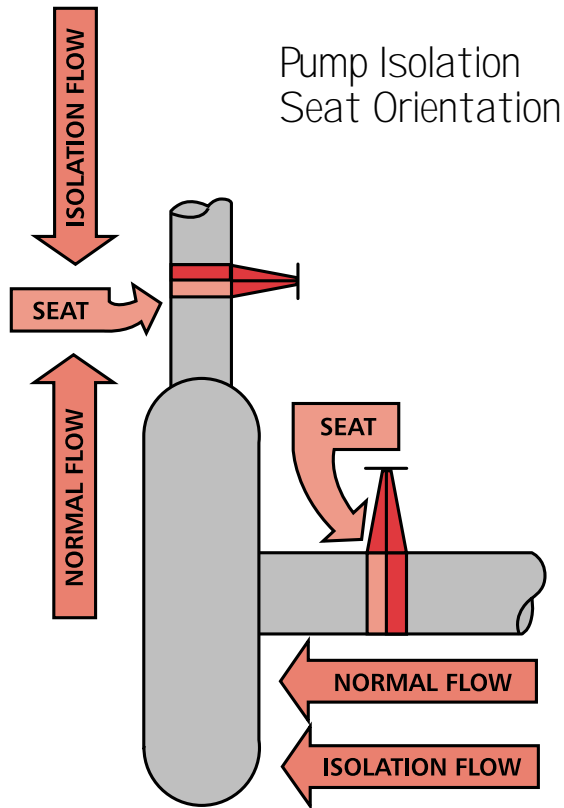
CAUTION:

Ratings are based on the temperature of the valve. Care must be taken to consider service and/or environmental conditions that will adversely affect the valve.

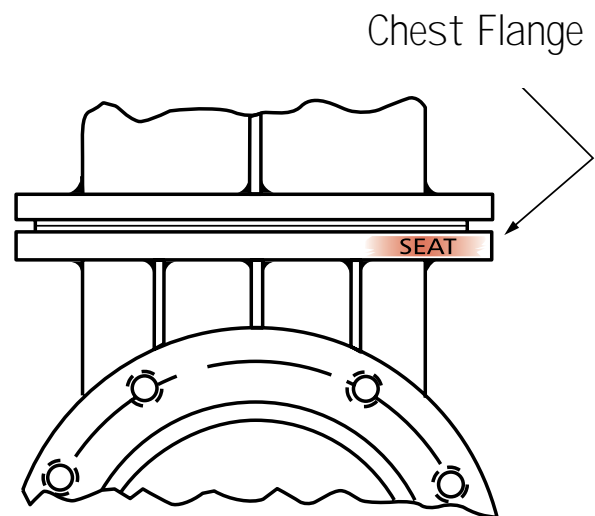
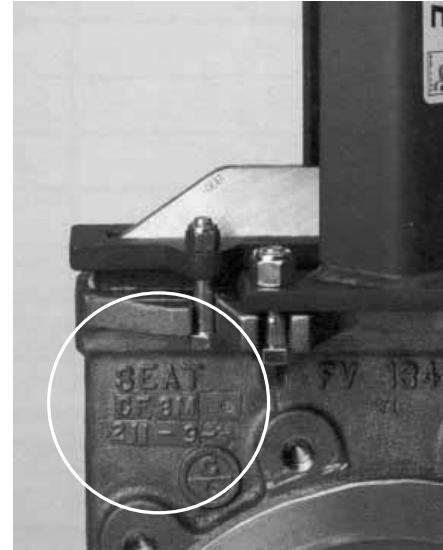
254SMO[®] is a registered trademark of Avesta Sheffield AB
 AL6XN[®] is a registered trademark of Allegheny Ludlum Corp.
 Hastelloy[®] is a registered trademark of Haynes International
 Inconel[®] is a registered trademark of Inco Alloys International
 Monel[®] is a registered trademark of Inco Alloys International

Pump Isolation

When using a knife gate valve to isolate the suction side of a pump, use the standard knife gate installation (valve's seat on the down stream side). When using knife gate valves to isolate the discharge side of a pump, install the valve **backwards** (seat upstream). Valves used to isolate the discharge side of a pump should be equipped with backing rings.



Seat Orientation Markings



Bonneted Valves

Gaskets

Gaskets are required in some Fabri-Valve valves such as bonneted valves, check valves, and valves equipped with replaceable metal seats. Gasket materials available and their specifications/performance ratings are as follows:

Standard Gasket

Aramid Fibers with NBR Synthetic Rubber;
 Temperatures to 750°F (399°C), pressures to 900 psi (62 bar).

Corrosive Service

TFE; Temperatures to 500°F (260°C).

High Temperature

Compressed carbon fiber; Temperatures to 900°F (482°C)
 Reinforced Graphite; Temperatures to 1600°F (871°C).

Standard Orientation

NOTE: Where position is indicated as upstream or downstream it applies only to single directional shutoff valves.

- I. **Butterfly Valves:**
 Looking at the actuator end of shaft, the disc rotates clockwise to close. Clockwise rotation of the handwheel closes the valve.
- II. **Gate Valves**
 The handwheel rotates clockwise to close the valve.
- III. **Bevel Gear and Worm Gear Operators:**
 - a. **Gate Valves**
 The handwheel is perpendicular to the pipeline, to the right side when looking downstream.
 - b. **Butterfly Valves**
 With the valve shaft vertical, actuator on top, the handwheel is perpendicular to the pipeline, to the left side when looking downstream.
NOTE: On Figure 60 valves, downstream is looking into the side of the disc opposite the seat.
- IV. **Cylinders**
 Cylinders are mounted with the ports on the seat side.
- V. **Electric Motor Operator**
 Limit switch compartment is on the upstream side.
- VI. **Limit Switches**
 Limit switches are mounted on the seat side of the valve, same as cylinder ports.
- VII. **Directional Control Valves (solenoids, etc...)**
 Control valves are mounted on the seat side of the valve, same as cylinder ports.

VIII. Positioners

Positioners are mounted on the right side of the valve when looking downstream, and are piped to open valve with increasing signal.

IX. Filter-Regulator-Lubricator

Shipped loose. Can be furnished mounted and piped to the supply port of the directional control valve (valve orientation must be supplied).

X. Fail Safe System

Shipped loose

XI. Levers

Lever is perpendicular to pipeline, to the right side when looking downstream.

XII. Position Indicators

Position indicators are mounted to the upstream side of valve, to the right side when looking downstream.

Exterior Coatings

Standard Coating

Type: Low Sheen Alkyd Primer

Color: Dark Blue

Thickness: 2-3 mils

Maximum Temperature: 200° F (93°C)

Optional Coatings

• *Corrosion Resistant*

Type: Coal Tar Epoxy

Color: Black

Thickness: 8-20 mils

Maximum Temperature: 350° F (177°C)

• *Corrosion Resistant*

Type: Two-part Epoxy

Color: Dark Blue

Thickness: 2-3 mils

Maximum Temperature: 230° F (110°C)

• *High Temperature*

Type: Polysiloxane Inorganic

Color: Deep Gray

Thickness: 4-6 mils

Maximum Temperature: 2000° F (1093°C)

Knife Gate and Wedge Gate Valve Flange Bolting

Assumptions:

- 1/16" allowed for compressed gasket thickness.
- Mating flange thickness is based on ANSI B16.5, 150# Flanges. Tolerances of + 1/8" on valve sizes 2" to 18" and + 3/16" on sizes 20" and 24" are not taken into consideration.
- Due to machining tolerances, etc., flange thickness and tapped bolt hole depth may vary slightly. Therefore, it is recommended that studs be used in the tapped holes in the chest area. If bolts are used, flat washers should be used to prevent the bolts from bottoming in the tapped hole and either harming the chest or preventing proper tightening.

| Valve Size | Figures C33, C133, C37, C45, C67 and C134 | | | | | Figures F 10, F11, F36 & F71** | |
|------------|---|-----------------|--------------------------------|------------------|------------------------------|--------------------------------|------------------------------|
| | Bolt Size | Total No. Bolts | No. Tapped Holes in Chest Area | | Minimum Stud Length (Inches) | Bolt Length (Inches) | Minimum Bolt Length (Inches) |
| | | | Series C37, C45, C134 & C67 | Series C33, C133 | | | |
| 2 | .625-11NC | 4 | 2 | 4 | 2.00 | 1.25 | 2.25 |
| 3 | .625-11NC | 4 | 2 | 4 | 2.25 | 1.50 | 2.50 |
| 4 | .625-11NC | 8 | 2 | 8 | 2.25 | 1.50 | 2.50 |
| 5 * | .75-10NC | 8 | 2 | 8 | 2.50 | 1.50 | 2.50 |
| 6 | .75-10NC | 8 | 2 | 8 | 2.50 | 1.50 | 2.50 |
| 8 | .75-10NC | 8 | 2 | 8 | 2.75 | 1.88 | 2.75 |
| 10 | .875-9NC | 12 | 4 | 12 | 2.75 | 1.88 | 3.00 |
| 12 | .875-9NC | 12 | 4 | 12 | 3.00 | 2.00 | 3.00 |
| 14 | 1.00-8NC | 12 | 4 | 12 | 3.25 | 2.13 | 3.25 |
| 16 | 1.00-8NC | 16 | 6 | 12 | 3.25 | 2.25 | 3.50 |
| 18 | 1.125-7NC | 16 | 6 | 16 | 3.50 | 2.38 | 3.75 |
| 20 | 1.125-7NC | 20 | 8 | 20 | 4.00 | 2.88 | 4.00 |
| 24 | 1.25-7NC | 20 | 8 | 20 | 4.50 | 3.25 | 4.25 |

* 5" Valve is fabricated, not cast.

** Flange holes are not tapped. Drilling is 1/8" larger than recommended bolt size. Nuts are required.

Packing Gland Bolting

The standard nuts for the packing gland bolting feature a nylon insert type anti-vibration lock.

NOTE: Applications above 400°F (204°C) must be identified so nuts with an alternative locking device can be used in lieu of the nylon insert.

Installation Caution

Mating piping must be properly supported, and care should be exercised in mating up the flanges, to prevent distortion of the valve body and/or flanges caused by piping stresses and/or installation procedures.

Mechanical Properties of Stem Nut Materials

| | Acid Resistant Bronze | 316 SS | Ni-Resist |
|----------------------------------|-----------------------|--------|-----------|
| Tensile (PSI x 10 ³) | 65 | 75 | 25 |
| Yield (PSI x 10 ³) | 20 | 30 | 25 |

Bearing Properties in Order of Preference

1. Manganese Bronze
2. Ni-Resist
3. 316 SS*

*Care must be taken to reduce surface loads and provide lubrication and differential hardness between components to avoid galling.

NOTE: ITT Engineered Process Solutions reserves the right to substitute comparable materials to achieve equivalent performance.

Codes, Standards and Specifications

Fabri-Valve continually keeps abreast of new standards and/or revised standards through participation in MSS, ASME, ASTM, ANSI, NACE and AWS. Listed below are some of the more commonly used codes and standards, along with a brief summary of each.

| | |
|-------|--|
| ANSI | American National Standards Institute (formerly ASA and USAS) |
| ASME | American Society of Mechanical Engineers |
| ISO | International Organization for Standardization |
| MSS | Manufacturers Standardization Society for the Valves & Fittings Industry |
| ASTM | American Society for Testing and Materials |
| API | American Petroleum Institute |
| AWWA | American Water Works Association |
| AISC | American Institute of Steel Construction |
| NACE | National Association of Corrosion Engineers |
| AWS | American Welding Society |
| DIN | Deutsche Industrie Norm (Germany Industry Standard or Norm) |
| SSPC | Steel Structures Painting Council |
| TAPPI | Technical Association of the Pulp and Paper Industry |
| BS | British Standards |

ANSI

- a. B16.1 Cast Iron Pipe Flanges and Flanged Fittings** (CL. 25, 125, 250, and 800.) CL. 25 and 125 lb. to 96" size, CL. 250 lb. to 48" size. CL. 25 and CL. 125 flange drilling matches B16.5, CL. 150 steel flanges, except CL. 25 bolts are smaller. CL. 250 flange drilling matches B16.5, CL. 300 steel flanges.

When using valves between cast iron flanges, flat-faced valve flanges or spacers should be used to prevent breaking the cast iron flanges.

- b. B16.5 Pipe Flanges and Flanged Fittings** (CL. 150, 300, etc.) to 24" size.

This standard is used by Fabri-Valve for flange bolting pattern dimensions through 24" size unless specified otherwise. Fabri-Valve standard flange thicknesses do not match this standard, due to pressure ratings.

This standard also contains pressure/temperature rating charts, which basically are as follows:

1. A CL. 150 mild steel flange or fitting manufactured from A515 Gr. 70, is good for 150 PSI at approximately 550°F. At ambient temperature, it is good for 285 PSI. **NOTE:** Ambient is -20 to 100°F. Charts then give pressure ratings at other temperatures up to 1000°F for various materials of construction.

2. A CL. 300 mild steel flange, valve or fitting manufactured from A515 Gr. 70, is good for 300 PSI at approximately 840°F. At ambient temperature, it is good for 740 PSI. **NOTE:** It is very important that it is understood whether an ANSI class valve is required or if a CWP valve may be utilized.
Example: CL. 150 or 150 PSI CWP.

- c. **B16.10 Face-to-Face and End-to-End Dimensions of Valves** This standard is used by Fabri-Valve for face-to-face and end-to-end dimensions on 2"-24" wedge gate valves (Figure 71, 72 and 78) and check valves (Figure 10 & 11).
- d. **B16.34-Valves Flanged, Threaded, And Welding End** This standard covers fabricated valves, but: proscribes a minimum wall thickness that requires very thick pressure walls – making valves more costly, requires flanged valves be class rated, restricts the materials that can be used, and specifies a minimum weld efficiency factor which dictates spot x-ray of pressure vessel welds.
- e. **B16.47 Large Diameter Steel Flanges: NPS 26 Through NPS 60** This standard is used by Fabri-Valve for flange bolting pattern dimensions for valves over 24" unless specified otherwise. Fabri-Valve standard flange thicknesses do not match this standard, due to pressure ratings.
- f. **B31.1 Power Piping** Short section on valves, basically referring that B16.34 valves may be designed to B31.1 and may include proof-testing.
- g. **B31.3 Petroleum Refinery Piping** Same as "F" (B31.1) above.

ASME

- a. **Section II-Material Specifications** Usually closely parallels ASTM specifications.
- b. **Section VIII, Division 1-Pressure Vessels** For unfired pressure vessels.
Used as a guide in design of Fabri-Valves. Has charts showing allowable stresses for various materials at various temperatures (some to 1500°F). Establishes casting and joint welding efficiency factors depending on degree of non-destructive testing. Also has section on proof testing and design of flanges.
- c. **Section IX-Welding Qualifications** Procedures for weld and welder qualifications for use in pressure vessels. Used as a guide for Fabri-Valve welders and welding procedures.

ISO

International organization to establish international standards for items including valves.

MSS

- SP-6 **Finishes for Contact Faces of Connecting End Flanges of Ferrous Valves and Fittings.**
- SP-9 **MSS Spot-Facing Standard.**
- SP-25 **Standard Marking System for Valves, Fittings, Flanges and Unions**
- SP-42 **MSS 150 lb. Corrosion Resistant Cast Flanged Valves (to 12" size)**
- SP-44 **MSS Steel Pipeline Flanges** Formerly an addition to ANSI B16.5 with additional flange sizes. Now information included in ANSI B16.47
- SP-61 **Hydrostatic Testing of Steel Valves** Covers wedge gate and check valves.
- SP-67 **Butterfly Valves**
- SP-81 **Stainless Steel, Bonnetless, Flanged, Wafer Knife Gate Valves** Fabri-Valve Figure C37 meets this standard.

ASTM

Specifications for materials, including chemistry and physical properties.

API

- a. API 595 **Cast Iron Gate Valves**
- b. API 598 **Valve Inspection and Test**
- c. API 600 **Steel Gate Valves**

AWWA

- a. C207 **Standard for Steel Pipe Flanges** This standard is used by Fabri-Valve for flange bolting pattern dimensions greater than 60" size unless specified otherwise. Fabri-Valve standard flange thicknesses do not match this standard, due to pressure ratings.
- b. C504-**Rubber Sealed Butterfly Valves**

AISC

Steel Construction Manual. Used primarily for building and bridge design, but can be and is used as a guide in designing large, low-pressure valves and structural components of all valves such as yokes.

NACE

The Technical Society concerned exclusively with the protection and performance of materials in corrosive environments.

Std. MR-01-75-material requirements-materials for valves for resistance to sulfide stress cracking in production and pipeline service.

AWS

The AWS structural welding code specify the nature and size of acceptable discontinuities which may remain in a particular type of welded structure for a specific service. The code usually requires the removal and repair of cracks, but permit limited amounts of some other discontinuities, particularly porosity.

DIN

Standards for flanges used in Germany and other parts of Europe.

DIN 2501-ND10 **Flange Dimensions** – superceded by DIN EN 1092-1 **Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges**

SSPC

- a. SP-6 **Commercial Blast Cleaning**
- b. SP-10 **Near-White Blast Cleaning**

TAPPI

TIS 405-8 and 405-20 **Valve Standards for Pulp and Paper Mills** (Standard for Stainless Steel, Bonnetless, Flanged Wafer Knife Gate Valves). Revoked by TAPPI, were same as MSS SP-81.

British Standards

BS10 **British Standard Flange**

BS EN 1092-1 **Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges**

Standard Domestic Packaging

(Protection for shipment by Common Carrier) Plywood covers are secured to flange faces on all valves prior to shipment. Handwheels are installed on the valve when shipped, except handwheels larger than 24" in diameter and handwheels for bevel gears, which are removed and strapped to one flange. Cylinders are provided with a cardboard cover to protect against strap abrasion. Cylinder actuated valves having instrumentation/controls subject to damage are provided with an additional wooden box cover for protection. All 24" valves and larger will be skidded for shipping unless otherwise directed by customer. Skids will be utility grade timbers with cross-members adequate for support, unit bolted and/or strapped to skid, and handwheel secured to flange cover or yoke. Stem nut assembly will be secured with tape or other means to prevent loss of parts in shipment. Specialty items requiring skidding or pallets are prepared as required to insure damage-free delivery at destination.

Export Crating

"Optional Export Crating" includes a fully enclosed non-coniferous and/or OSB (Oriented Strand Board) wooden box with reinforced ends and sides from utility grade 3/4" net lumber with skids. Goods are stowed inside in a manner to insure minimum movement and no damage from top stowage. Polyethylene sheet is draped over the valves. Boxes are steel strapped at each end and stenciled or painted with shipping information supplied by customer. Items are stowed in the box to take full advantage of all available space. Fabri-Valve will supply the customer with critical information on Net and Gross weights, cubic dimensions, and other pertinent data, as it becomes available. Other box liner materials and/or protective coatings are available on request. See Pricebook for export crating charge.

Export or Domestic Crating Other than Standard

Special crating or other preparation will be furnished at customers' expense. Specify requirements on your purchase order.

Recommended Long Term Storage Procedure for Fabri-Valve® Products

- I. Handwheel, Lever, or manual gear operated gate valve.
 - a. Objective
The following are Fabri-Valve's recommendations for storage procedures to retain maximum product integrity during long-term storage of 1 to 5 years.
 - b. Location
 1. The preferred storage location is a clean, dry, protected warehouse.
 2. If valves are to be stored outside, precautions should be taken to keep valves clean and dry.
 - c. Equipment Orientation
Valves may be stored in the vertical or horizontal position. In horizontal position, seat side of valve should be on bottom.
 - d. Storage Preparation
 1. Valves may be stored as shipped, provided the above storage location and equipment orientation instructions are followed.
 2. If the as shipped condition must be altered for receiving inspection, reattach flange covers and repackage valve.
 3. Then follow the above Instructions for location and equipment orientation.
- NOTE:** O-ring valves should be stored with the gate slightly open (Gate off of seating wedges)
- e. Storage Inspection
 1. Visual inspection shall be performed on a semi-annual basis and results recorded.
 2. Visual inspection as a minimum shall include checking the following: Packaging, Covers, Dryness, and Cleanliness.
 - f. Maintenance
Maintenance shall consist of correcting deficiencies noted during inspection. All maintenance activity shall be recorded.
- II. Cylinder Operated Gate Valve
 - a. Objective
The following are Fabri-Valve's recommendations for storage procedures to retain maximum product integrity during long-term storage of 1 to 5 years.
 - b. Location
 1. The preferred location is a clean, dry protected warehouse.
 2. If valves are to be stored outside, precautions should be taken to keep valves clean and dry.
 - c. Equipment Orientation
 1. The preferred orientation for optimum protection of cylinder is with the valve fully opened and with the cylinder in the vertical position.
 2. An acceptable alternate for valves with cylinder diameters of 6" or less is with the cylinder in the horizontal position. In horizontal position, seat side of valve should be on bottom.
 3. If valves with cylinders larger than 6" in diameter must be stored with the cylinder in the horizontal position then the cylinder must be operated 6-12 times every 3-4 months.

d. Storage Preparation

- 1a.** For storage of up to 3 years - Squirt a good grade of hydraulic oil into cylinder ports and operate cylinder 6-12 times on a yearly basis.
- 1b.** For storage of 3-5 years - Squirt a good grade of hydraulic oil into cylinder ports and operate cylinder 6-12 times. Extend cylinder rod, until valve is fully closed. Then coat cylinder gland and rod with heavy grease. Retract cylinder rod until valve is fully open, drawing good grade of hydraulic oil into rod end of cylinder.
- 2.** Securely plug cylinder ports with pipe plugs, if cylinder is not piped.
- 3.** Cover flange faces with flange covers. Plywood flange covers installed at factory are acceptable.
- 4.** Then follow the above instructions on location and equipment orientation.

NOTE: O-ring valves should be stored with the gate slightly open. (Gate off of seating wedges)

e. Storage Inspection

- 1.** Visual inspection shall be performed on a semi-annual basis and results recorded.
- 2.** Visual inspection as a minimum, shall include checking the following: Packaging, Covers, Dryness and Cleanliness.

f. Maintenance

Maintenance shall consist of correcting deficiencies noted during inspection. All maintenance activity shall be recorded.

III. Electric Motor Operated Gate Valve – Normal Storage

a. Objective

The following are Fabri-Valve's recommendations for storage procedures to retain maximum product integrity during long-term storage of 1 to 5 years.

b. Location

Valves to be stored in a clean, dry protected warehouse, free from excessive vibration and rapid temperature changes.

NOTE: The maximum source of equipment deterioration anticipated during long-term storage is from possible condensation within the actuator enclosure that may be produced by rapid temperature changes. The user should consider the connection of built-in heaters or addition of heat sources in the electrical enclosures during storage.

c. Equipment Orientation

- 1.** The preferred storage position is with the valve stem and motor shaft in the horizontal position and the actuator limit switch compartment cover vertically up.

- 2.** An acceptable alternate position is with the valve stem vertical, the motor shaft horizontal and the limit switch compartment cover either facing to the side or vertically up.
- 3.** The assembly shall be stored off the floor on suitable skids and shall be covered with an unsealed dust cover with the bottom open and air holes in the side.

d. Storage Preparation, Inspection and Maintenance

- 1.** For storage situations of 1 to 2 years maximum, spray electric contacts with CRC #2-26®. (This preservative does not have to be removed prior to usage of the actuator.)
- 2.** For storage situations between 2 and 5 years, spray electric contacts with CRC Lectra Shield® spray coating. (This coating must be removed with a suitable cleaner, such as any standard petroleum solvent, prior to making electrical connections.)
- 3.** Cover flange faces with flange covers. Plywood flange covers installed at factory are acceptable.

e. Storage Inspection

- 1.** Visual inspection shall be performed on a semi-annual basis and results recorded.
- 2.** Visual inspection as a minimum, shall include checking the following: Packaging, Plugs, Covers, Dryness, Cleanliness, and Function of heat sources (when used).

NOTE: O-ring valves should be stored with the gate slightly open (Gate off of seating wedges)

f. Maintenance

Maintenance shall consist of correcting deficiencies noted during inspection. All maintenance activity shall be recorded.

IV. Storage of Rubber Products

While the various rubbers possess differing degrees of resistance to the deteriorating influences which may be present during storage, the same general recommendations apply to all. Vulcanized rubber products should be stored in a cool, dry, dark place away from steam pipes, sunlight, etc. The product should be supported so that no portion of it is under undue stress from loading or bending. For example, replacement seals should not be hung over a hook or allowed to kink, but should be stored in a flat position. Seals in assembled valves and actuators should be positioned to minimize compression on the seals. For example, storage of valves in the vertical position with the gate or disc open will minimize the occurrence of compression on the seals.